O**TORHINOLARYNGOLOGY – EAR, NOSE, AND THROAT (ENT), HEAD, AND NECK**

**WHAT IS OTORHINOLARYNGOLOGY?**

Otolaryngology is a medical specialty which is focused on the ears, nose, and throat. It is also called otolaryngology-head and neck surgery because specialists are trained in both medicine and surgery. An otolaryngologist is often called an ear, nose, and throat doctor, or an ENT for short.

This medical specialty dates back to the 19th century, when doctors recognized that the head and neck contained a series of interconnected systems. Doctors developed techniques and tools for examining and treating problems of the head and neck, eventually forming a medical specialty. According to the American Academy of Otolaryngology, it is the oldest medical specialty in the United States.

Otolaryngologists differ from many physicians in that they are qualified to perform many types of surgery on the delicate and complex tissues of the head and neck.

**WHO IS AN OTORHINOLARYNGOLOGIST / OTOLARYNGOLOGIST?**

An otolaryngologist (pronounced “ot-o-lar-en-GA-le-jist”) is a healthcare provider that diagnoses and treats conditions affecting your head and neck. Otolaryngologists offer both nonsurgical and surgical treatments.

Otolaryngologists are specialists. First, they must complete their undergraduate education and apply for medical school. Following graduation from a licensed medical school, a doctor who wants to become an otolaryngologist must undergo five more years of residency training in their chosen field. Some otolaryngologists even choose to pursue further education in subspecialties like pediatric otolaryngology and reconstructive surgery.

***ENT vs. otolaryngologist***

Another name for an otolaryngologist is ENT, which stands for “ear, nose and throat.” Both terms mean the same thing. “ENT” is the more common term, probably because it’s easier to remember. But “otolaryngologist” is the medical term for this type of specialist.

Most otolaryngologists prefer the term “otolaryngologist” because it recognizes that they treat much more than conditions of the ear, nose and throat.

***What does an otolaryngologist do?***

An otolaryngologist diagnoses and treats conditions affecting your head and neck. These conditions range from mild (such as a cough and runny nose) to serious (such as head and neck cancer).

Because an otolaryngologist treats such a wide range of conditions and diseases, they’re trained to perform both nonsurgical and surgical treatments.

***Why would you see an otolaryngologist?***

There are many reasons why someone might need to see an otolaryngologist. Your primary care physician (PCP) may refer you to an otolaryngologist if you develop certain symptoms, including:

* Persistent sore throat.
* Runny nose that doesn’t go away.
* Chronic cough.
* Chronic sinus pressure or nasal congestion.
* Dizziness.
* Vertigo.
* Severe allergies.
* Difficulty swallowing (dysphagia).
* Hearing loss.
* Hoarseness or wheezing that doesn’t go away.
* Frequent ear infections.
* Chronic tonsillitis.
* A lump on your face or neck.
* Severe snoring.
* Sleep apnea.

***What diseases does an ENT diagnose?***

An ENT diagnoses and treats infections and diseases of your ears, nose and throat. But they also treat a wide range of other conditions affecting your head and neck region.

**EAR CONDITIONS**

Otolaryngologists treat ear conditions, including:

* **Ear infections**, including those in your outer, middle or inner ear.
* **Tinnitus**, or ringing in your ears.
* **Dizziness**, a feeling of unbalance which often results from inner ear disorders.
* **Vertigo**. Different from dizziness, vertigo is when you have a sensation that your surroundings are spinning.
* **Ruptured eardrum**, or a hole in your tympanic membrane.
* **Eustachian tube dysfunction**, when the tubes that connect your middle ears to your upper throat become blocked.
* **Otosclerosis**, or abnormal bone growth in your middle ear.
* **Ménière’s disease**, a rare inner ear disorder that affects your hearing and sense of balance.
* **Hearing loss**, which can range from mild to severe.

**NOSE CONDITIONS**

Common nose conditions that otolaryngologists treat include:

* **Sinusitis**, which is inflammation or infection of your sinuses (air passages around your nose and forehead that drain mucus).
* **Allergies**, which can result from pollen, pet dander or other environmental irritants.
* **Rhinitis**, or inflammation of the mucus membranes that line your nose.
* **Nosebleeds**, which may result from infections, allergies or trauma, among other things.
* **Postnasal drip**, which happens when excess mucus builds up and drips down the back of your throat.
* **Deviated septum**, a condition in which your septum (the cartilage that separates your nasal cavity) is off-center.
* **Nasal polyps**, which are noncancerous growths common in people with chronic allergies, asthma or sinus infections.
* **Nasal and paranasal tumors**. Tumors inside your nose may be cancerous or noncancerous.

**THROAT CONDITIONS**

Otolaryngologists also treat throat conditions, including:

* **Sore throat**, which may result from infections, allergies or exposure to certain irritants.
* **Tonsillitis**, or infection of your tonsils.
* **Laryngitis**, or swelling of your voice box.
* **Swallowing issues**. Difficulty swallowing (dysphagia) may result from a condition in your mouth, throat or esophagus.
* **Vocal cord conditions**, including vocal nodules, vocal cord dysfunction or vocal cord paralysis.

**SLEEP DISORDERS**

Otolaryngologists commonly treat sleep-related conditions, including:

* **Snoring**. Severe snoring can occur when the soft tissues in your upper airway relax too much during sleep. When air moves through these narrowed tissues, it results in loud vibrations.
* **Obstructive sleep apnea**. This type of sleep apnea happens as a result of relaxed tissues in your airway. Your airway can narrow or close off completely, leading to apneic episodes (where you temporarily stop breathing during sleep).

**TUMORS OF YOUR HEAD AND NECK**

Otolaryngologists can surgically treat head and neck tumors (both cancerous and noncancerous). Examples include:

* **Hemangiomas**. These noncancerous growths contain extra blood vessels. Anyone can get hemangiomas, but they’re most common in newborn babies.
* **Salivary gland tumors**, which may be cancerous or noncancerous.
* **Oral cancer**, the most common form of head and neck cancer. It can affect your lips, inner cheeks, tongue and floor or roof of your mouth.
* **Oropharyngeal cancer**, which affects the middle part of your throat. The most common type of oropharyngeal cancer is squamous cell carcinoma.
* **Laryngeal cancer**, which affects your larynx (voice box).
* **Nasopharyngeal cancer**, which affects your nasopharynx — the upper part of your throat that connects your nose to the rest of your respiratory system.
* **Thyroid cancer**, which affects your thyroid gland. Your thyroid gland is a butterfly-shaped gland in your neck that makes hormones.

**Do many people need treatment from an otolaryngologist?**

Otolaryngology is one of the most common healthcare specialties. In the U.S., approximately 27 million people visit the otolaryngologist each year.

**What’s a board-certified otolaryngologist?**

A board-certified otolaryngologist has received additional, voluntary training to hone their skills and demonstrate commitment to their profession. To become board certified, an otolaryngologist must undergo vigorous testing, including written, oral and clinical examinations.

For otolaryngologists in the U.S., the American Board of Otolaryngology — Head and Neck Surgery (ABOHNS) grants board certification.

<https://my.clevelandclinic.org/health/articles/24635-otolaryngologist>

***What do otolaryngologists treat?***

* **Ear:**Otolaryngologists are trained in the medical and surgical treatment of hearing loss, ear infections, balance disorders, ear noise (tinnitus), nerve pain, and facial and cranial nerve disorders. They also manage congenital (birth) disorders of the outer and inner ear.
* **Nose**: Care of the nasal cavity and sinuses is one of the primary skills of otolaryngologists. Otolaryngologists diagnose, manage and treat allergies, sinusitis, smell disorders, polyps, and nasal obstruction due to a deviated septum. They can also correct the appearance of the nose (rhinoplasty surgery).
* **Throat**: Otolaryngologists have expertise in managing diseases of the larynx (voice box) and the upper aero-digestive tract or esophagus, including voice and swallowing disorders.
* **Head and Neck**: In the head and neck area, otolaryngologists are trained to treat infectious diseases, both benign and malignant (cancerous) tumors, facial trauma, and deformities of the face. They perform both cosmetic plastic and reconstructive surgery.

***How are otolaryngologist-head and neck surgeons trained?***

An otolaryngologist is ready to start practicing after completing up to 15 years of college and post-graduate training.

To receive certification from the American Board of Otolaryngology, individuals must first complete college, medical school, and at least five years of specialty training. Next, the physician must pass the American Board of Otolaryngology examination.

Some then pursue a one- or two-year fellowship for more training in a subspecialty area. All full-time faculty at Columbia have completed fellowship training in their areas of expertise.

*SUMMARY:* Otorhinolaryngology, commonly known as ENT (ear, nose, and throat) medicine, is a specialized branch of medicine that addresses conditions affecting the head and neck.

Practitioners, known as otolaryngologists, undergo extensive training, including a Doctor of Medicine degree followed by a residency lasting four to five years.

The field of otorhinolaryngology involves the diagnosis and treatment of acute and chronic medical disorders of the head and neck, including the ears, nose, throat, and related structures.

Otorhinolaryngologists diagnose, treat, and manage diseases of the ears, nose, sinuses, larynx (voice box), mouth, and throat, as well as structures of the neck and face. The term is derived from the Greek root words: otos (ear), rhino (nose), laryngo (windpipe), and logos (science).

***REFERENCE:*** <https://www.columbiadoctors.org/specialties/ear-nose-throat/patients/what-otolaryngology>

**ETYMOLOGY**

The term is a combination of Neo-Latin combining forms (*oto-* + *rhino-* + *laryngo-* + *-logy*) derived from four Ancient Greek words:[[1]](https://en.wikipedia.org/wiki/Otorhinolaryngology#cite_note-1) (cf. Greek ωτορινολαρυγγολόγος 'otorhinolaryngologist').

1. οὖς (*ous*), 'ear', whose genitive is ὠτός (*otos*)
2. ῥίς (*rhis*) 'nose'
3. λάρυγξ (*larynx*) 'larynx'
4. -λογία (*logia*) 'study'

**TRAINING**

Otorhinolaryngologists are physicians (MD, DO, MBBS, MBChB, etc.) who complete both medical school and an average of five–seven years of postgraduate surgical training in ORL-H&N. In the United States, trainees complete at least five years of surgical residency training.This comprises three to six months of general surgical training and four and a half years in ORL-H&N specialist surgery. In Canada and the United States, practitioners complete a five-year residency training after medical school.

Following residency training, some otolaryngologist-head & neck surgeons complete an advanced sub-specialty fellowship, where training can be one to two years in duration. Fellowships include head and neck surgical oncology, facial plastic surgery, rhinology and sinus surgery, neuro-otology, pediatric otolaryngology, and laryngology. In the United States and Canada, otorhinolaryngology is one of the most competitive specialties in medicine in which to obtain a residency position following medical school

In the United Kingdom, entrance to higher surgical training is competitive and involves a rigorous national selection process. The training programme consists of 6 years of higher surgical training after which trainees frequently undertake fellowships in a sub-specialty prior to becoming a consultant.

The typical total length of education, training and post-secondary school is 12–14 years. Otolaryngology is among the more highly compensated surgical specialties in the United States. In 2022, the average annual income was $469,000.

**SUB-SPECIALTIES**

| **Head and neck oncologic surgery** | **Facial plastic and reconstructive surgery\*** | **Otology** | **Neurotology\*** | **Rhinology/sinus/anterior skull base surgery** | **Laryngology and voice disorders** | **Pediatric otorhinolaryngology\*** | **Sleep medicine\*** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Surgical oncology | Facial cosmetic surgery | Ear | Middle and inner ear | Sinusitis | Voice disorders | Velopalatine insufficiency | Sleep disorders |
| Microvascular  reconstruction | Maxillofacial surgery | Hearing | Temporal bone | Allergy | Phono-surgery | Cleft lip and palate | Sleep apnea surgery |
| Endocrine surgery | Traumatic reconstruction | Balance | Skull base surgery | Anterior skull base | Swallowing disorders | Airway | Sleep investigations |
| Endoscopic surgery | Craniofacial surgery |  | Dizziness | Apnea and snoring |  | Vascular malformations |  |
|  |  |  | Cochlear implant / BAHA |  |  | Cochlear implant/BAHA |  |

**TOPICS BY SUBSPECIALTY**

**HEAD AND NECK SURGERY**

* Head and neck surgical oncology (field of surgery treating cancer/malignancy of the head and neck)
  + Head and neck mucosal malignancy (cancer of the pink lining of the upper aerodigestive tract)
    - Oral cancer (cancer of lips, gums, tongue, hard palate, cheek, floor of mouth)
    - Oropharyngeal cancer (cancer of oropharynx, soft palate, tonsil, base of tongue)
    - Larynx cancer (voice box cancer)
    - Hypopharynx cancer (lower throat cancer)
    - Sinonasal cancer
    - Nasopharyngeal cancer
  + Skin cancer of the head & neck
  + Thyroid cancer
  + Salivary gland cancer
  + Head and neck sarcoma
* Endocrine surgery of the head and neck
  + Thyroid surgery
  + Parathyroid surgery
* Microvascular free flap reconstructive surgery
* Skull base surgery

**OTOLOGY AND NEUROTOLOGY**

Study of diseases of the outer ear, middle ear and mastoid, and inner ear, and surrounding structures (such as the facial nerve and lateral skull base)

* Outer ear diseases
  + Otitis externa –
    - outer ear or ear canal inflammation
  + Exostoses or Surfer's ear are bony growths in the outer ear canal[[7]](https://en.wikipedia.org/wiki/Otorhinolaryngology#cite_note-7)
* Middle ear and mastoid diseases
  + Otitis media – middle ear inflammation
  + Perforated eardrum (hole in the eardrum due to infection, trauma, explosion or loud noise)
  + Mastoiditis
* Inner ear diseases
  + BPPV – benign paroxysmal positional vertigo
  + Labyrinthitis/Vestibular neuronitis
  + Ménière's disease/Endolymphatic hydrops
  + Perilymphatic fistula
  + Acoustic neuroma, vestibular schwannoma
* Facial nerve disease
  + Idiopathic facial palsy (Bell's Palsy)
  + Facial nerve tumors
  + Ramsay Hunt Syndrome
* Symptoms
  + Hearing loss
  + Tinnitus (subjective noise in the ear)
  + Aural fullness (sense of fullness in the ear)
  + Otalgia (pain referring to the ear)
  + Otorrhea (fluid draining from the ear)
  + Vertigo
  + Imbalance

**RHINOLOGY**

Rhinology includes nasal dysfunction and sinus diseases.

* Nasal obstruction
  + Inferior turbinate hypertrophy
  + Nasal septum deviation
  + Chronic sinusitis with nasal polyps
* Sinusitis – acute, chronic
* Environmental allergies
* Rhinitis
* Pituitary tumor
* Empty nose syndrome
* Severe or recurrent epistaxis

**PEDIATRIC OTORHINOLARYNGOLOGY**

* Adenoidectomy
* Caustic ingestion
* Cricotracheal resection
* Decannulation
* Laryngomalacia
* Laryngotracheal reconstruction
* Myringotomy and tubes
* Obstructive sleep apnea – pediatric
* Tonsillectomy

**LARYNGOLOGY**

* Dysphonia/hoarseness
  + Laryngitis
  + Reinke's edema
  + Vocal cord nodules and polyps
* Spasmodic dysphonia
* Tracheostomy
* Cancer of the larynx
* Vocology – science and practice of voice habilitation

**FACIAL PLASTIC AND RECONSTRUCTIVE SURGERY**

Facial plastic and reconstructive surgery are a one-year fellowship open to otorhinolaryngologists who wish to begin learning the aesthetic and reconstructive surgical principles of the head, face, and neck pioneered by the specialty of Plastic and Reconstructive Surgery.

* Rhinoplasty and septoplasty
* Facelift (rhytidectomy)
* Browlift
* Blepharoplasty
* Otoplasty
* Genioplasty
* Injectable cosmetic treatments
* Trauma to the face
  + Nasal bone fracture
  + Mandible fracture
  + Orbital fracture
  + Frontal sinus fracture
  + Complex lacerations and soft tissue damage
* Skin cancer (e.g. Basal Cell Carcinoma)

**SLEEP SURGERY**

Sleep surgery encompasses any surgery that helps alleviate obstructive sleep apnea and can anatomically include any part of the upper airway.

* Nasal cavity / nasopharynx
  + Septoplasty
  + Adenoidectomy (especially in pediatrics)
* Oral cavity / oropharynx
  + Tonsillectomy (especially in pediatrics)
  + Uvulopalatopharyngoplasty
  + Transoral midline glossectomy
  + Genioglossus advancement
* Other
  + Hyoid suspension
  + Maxillomandibular advancement
  + Hypoglossal nerve stimulation

**MICROVASCULAR RECONSTRUCTION REPAIR**

Microvascular reconstruction repair is a common operation that is done on patients who see an otorhinolaryngologist. It is a surgical procedure that involves moving a composite piece of tissue from the patient's body and to the head and/or neck.

Microvascular head-and-neck reconstruction is used to treat head-and-neck cancers, including those of the larynx and pharynx, oral cavity, salivary glands, jaws, calvarium, sinuses, tongue and skin. The tissue that is most commonly moved during this procedure is from the arms, legs, and back, and can come from the skin, bone, fat, and/or muscle.

When performing this procedure, the decision on which is moved is determined on the reconstructive needs. Transfer of the tissue to the head and neck allows surgeons to rebuild the patient's jaw, optimize tongue function, and reconstruct the throat.

When the pieces of tissue are moved, they require their own blood supply for a chance of survival in their new location. After the surgery is completed, the blood vessels that feed the tissue transplant are reconnected to new blood vessels in the neck.

These blood vessels are typically no more than 1 to 3 millimeters in diameter, which means that these connections need to be made with a microscope, which is why the procedure is called "microvascular surgery"

***Why specialization matters***

Otolaryngologists’ extensive training makes them uniquely qualified to understand complex head and neck problems, provide medical and surgical solutions, coordinate comprehensive care, and use the latest treatment advancements.

Their expertise goes beyond treating individual symptoms. They understand how the different parts of the head and neck work together, allowing for more effective treatment plans. They combine their deep medical knowledge with surgical skills.

Otolaryngologists, otorhinolaryngologists, ENT providers, or ear, nose, and throat specialists—no matter the name you call them, these all refer to the skilled physicians that provide specialized, comprehensive care of the ears, nose, throat, and related parts of the head, face, and neck.

<https://mountnittany.org/news-stories/health-and-wellness/what-is-an-otolaryngologist/>

*REFERENCE:* <https://en.wikipedia.org/wiki/Otorhinolaryngology>

**THIS IS A COMPREHENSIVE LIST OF OTORHINOLARYNGOLOGY SPECIALTIES**

Otorhinolaryngology, commonly referred to as ENT (ear, nose, and throat) medicine, encompasses a wide range of specialties and subspecialties that focus on the diagnosis and treatment of conditions affecting the head and neck. A comprehensive list of otorhinolaryngology specialties includes:

* **Head and neck oncologic surgery**: Focuses on the surgical management of cancers and benign tumors of the head and neck, including microvascular reconstruction.1
* **Facial plastic and reconstructive surgery**: Involves cosmetic and reconstructive surgical principles of the head, face, and neck, often pioneered by the specialty of Plastic and Reconstructive Surgery.1
* **Otology**: Deals with the medical and surgical treatment of conditions related to the ear, including hearing, balance, and ear infections.
* **Neurotology**: Focuses on the middle and inner ear, as well as the temporal bone and skull base surgery.
* **Rhinology/sinus/anterior skull base surgery**: Addresses nasal dysfunction, sinus diseases, and conditions affecting the anterior skull base.
* **Laryngology and voice disorders**: Involves the diagnosis and treatment of voice disorders, swallowing disorders, and related conditions.
* **Pediatric otorhinolaryngology**: Focuses on the treatment of conditions affecting children, including velopalatine insufficiency, cleft lip and palate, and airway issues.
* **Sleep medicine**: Involves the diagnosis and treatment of sleep disorders, including sleep apnea surgery and sleep investigations.
* **Otorhinolaryngology-head and neck surgery**: A broader specialty that includes the medical and surgical care of patients with diseases and disorders affecting the ears, respiratory and upper alimentary systems, and related structures of the head and neck.
* **Facial plastic and reconstructive surgery**: Specializes in conditions affecting the appearance of the face and neck, often involving aesthetic and reconstructive procedures.

<https://www.news-medical.net/health/Otolaryngology-(ENT)-Sub-Specialties.aspx>

**OTORHINOLARYNGOLOGY (ENT) SUB-SPECIALTIES**

Otolaryngologists, also known as ear, nose, and throat (ENT) doctors, diagnose and treat ENT conditions and disease. Otolaryngologists also are known as head and neck surgeons.

Specialists in this field have training in both surgery and medicine. ENT doctors focus on a number of medical specialties and various sub-specialties.

These include such disciplines as pediatrics, oncology, sinus disease, and surgery. Because of their range of capabilities, ENT surgeons might one day correct a child’s tonsillitis and on the next day treat an adult’s larynx cancer.

**TREATMENT AREAS**

Approximately 10% of North Americans are plagued by loss of hearing. Ear and hearing disorders are one of the focus areas of ENT physicians, who can diagnose and manage these conditions. These doctors are trained to diagnose, treat, and, if necessary, operate on conditions involving loss of hearing, noise in the ears, infections of the ear, as well as certain disorders entailing cranial nerves. These ear disorders are often present from birth.

One of the more frequent health issues in North America is common and often recurring sinusitis, which involves the inflammation of the nasal passages for an extended period of time – often for up to three months. ENT doctors specialize in caring for the passages and sinuses. They may have to address allergies, polyps, and obstructions in the nasal area.

ENT physicians are experts in addressing throat, voice box, and food pipe disorders, including swallowing and voice issues. This is a pretty important sub-specialty considering that talking and consuming food is pretty basic to one’s survival.

The ability to see, smell, and hear are based in the head and neck area of the body. ENT doctors best know how to treat conditions ranging from benign or cancerous tumors to infections and trauma that may occur in this area. They can carry out either cosmetic or reconstructive procedures.

**SUB-SPECIALTY EXPERTISE**

*Allergies:* Often treated by ENT doctors with medicines and allergy shots, they instruct patients to avoid mold, dust, pollen, and other irritants. The conditions treated include inflamed mucous membranes, sore throats, ear aches, an inflamed voice box, and loss of balance.

*Facial surgery:* ENT physicians can perform plastic and reconstructive procedures to correct face, neck, and ear abnormalities. They may perform face lifts, remove lesions and other growths, and correct cleft palates or deformities of the ear.

*Head region:* ENT specialists can operate on head and neck tumors, including tumors and other abnormalities found in the nose, throat, mouth, larynx, voice box and food pipe. A stuffy nose and anosmia can also be addressed.

*Throat:* ENT doctors can address swallowing disorders. They treat problems such as unusual voice changes, dysphagia (which can occur at different stages of the swallowing process), reflux disorders, and various infections and inflammations.

*Ear:* Otolaryngologists can treat ear nerve disorders that may impact one’s balance as well as hearing ability. These conditions include swimmer’s ear, face and neck discomfort, vertigo and ringing.

*Pediatric conditions:* Children with special ENT issues, such as congenital head and neck conditions, sleep apnea, and those with delayed growth issues can be treated by ENT physicians. Breathing and airway problems, allergies, and sinus conditions can also be corrected.

***Sources***

* <http://entcolumbia.org/about-us/what-otolaryngology>
* <http://www.entnet.org/content/what-otolaryngologist>
* <http://sfo.entuk.org/ent-subspecialties>

***Further Reading***

* [All Otolaryngology Content](https://www.news-medical.net/?tag=/Otolaryngology)
* [What is an Otolaryngologist?](https://www.news-medical.net/health/What-is-an-Otolaryngologist.aspx)
* [Common Ear, Nose & Throat (ENT) Procedures](https://www.news-medical.net/health/Common-Ear-Nose-Throat-(ENT)-Procedures.aspx)

**CLINICAL TERMINOLOGIES AND CODES FOR COMMON OTORHINOLARYNGOLOGY DISEASES**

Otorhinolaryngology, also known as ENT (ear, nose, and throat) medicine, involves the diagnosis and treatment of various conditions affecting the head and neck. Common diseases in this field include **dizziness, head and neck cancer, sinusitis, chronic ear disease, hoarseness, and nasal obstruction**.  Clinical terminologies and codes are essential for accurate diagnosis and billing in this specialty.

In terms of clinical terminologies, **SNOMED CT, LOINC, and RxNorm** are three major systems used in clinical practice. These terminologies help in standardizing medical data and facilitating interoperability between different healthcare systems. For example, SNOMED CT provides a comprehensive clinical vocabulary, while LOINC is used for identifying laboratory and clinical observations, and RxNorm is used for standardizing drug names.

Regarding specific codes for common otorhinolaryngology diseases, the following are frequently encountered:

* **Fiberoptic endoscopy of upper airway with flexible endoscope** (Code: Z296) is a common procedure in general otolaryngology, with a high frequency of 35%.
* **Debridement under microscopy** (Code: Z907) is a procedure in otology, with a frequency of 8%.
* **Chemical/electrocautery for epistaxis** (Code: Z314) is a procedure in rhinology, with a frequency of 1%.
* **Fiberoptic endoscopy of upper airway with rigid endoscope** (Code: Z299) is another common procedure in general otolaryngology, with a frequency of 1%.

In terms of diagnoses, common conditions include:

* **Wax or cerumen in ear, other disorders of ear and mastoid, tinnitus** in otology.
* **Hypertrophy or Chronic Infection of Tonsils and/or Adenoids** in general otolaryngology.
* **Meniere’s Disease, Labyrinthitis** in otology.
* **Disease of Salivary Glands** in general otolaryngology.

These codes and terminologies are crucial for accurate documentation, billing, and communication in the field of otorhinolaryngology. The use of standardized terminologies ensures that medical information is consistent and understandable across different healthcare settings.

[https://www.aapc.com/codes/coding-newsletters/my-otolaryngology-coding-alert#](https://www.aapc.com/codes/coding-newsletters/my-otolaryngology-coding-alert)

**A LIST OF SOME COMMON OTOLARYNGOLOGY ICD-10 CODES TO KNOW.**

Keeping abreast of all the otolaryngology coding changes can be its own job, and a tedious one at that. Technology, especially in the form of an ENT electronic health record (EHR) system, can certainly provide aid in staying up to date. Our otolaryngology EHR, EMATM, utilizes structured data to generate recommended ENT ICD-10 codes alongside CPT® and HCPCS codes. This is based on documentation you and your staff complete while reviewing your patient’s history, exam notes, plan of care and procedures.

When our otolaryngology EHR is used in tandem with our Practice Management system and Revenue Cycle Management (RCM) service, the billing information is sent to our RCM team. They review it and process your claim, helping to eliminate guesswork and facilitate faster payments for each encounter.

How did we get to the point where getting paid can depend on your ability to match up a series of numbers? Let’s take a quick look at the background of ICD-10 to help put this all in perspective.

**WHAT IS ICD-10? AND A LITTLE HISTORY, TOO**

***According to The World Health Organization (WHO):***

*ICD is the foundation for the identification of health trends and statistics globally, and the international standard for reporting diseases and health conditions. It is the diagnostic classification standard for all clinical and research purposes. ICD defines the universe of diseases, disorders, injuries and other related health conditions, listed in a comprehensive, hierarchical fashion.*

October 1, 2015 marked the implementation date for ICD-10 codes. The ICD-10 code sets include greater detail, changes in terminology and expanded concepts for injuries, laterality and other related factors as compared to their predecessor, ICD-9 codes. The complexity of ICD-10 provides many benefits because of the increased level of detail conveyed in the codes.

There were approximately 3,000 ICD-9 codes at the time of its departure, and with the introduction of ICD-10, this increased to approximately 87,000 codes. The fact sheet from the American Medical Association (AMA) goes into more detail. As of October 1, 2018, there were 71,932 ICD-10 codes, which shows just how challenging this could be to keep up with manually.

**SOME COMMONLY USED ENT ICD-10**

***Some Common ENT ICD-10 Codes***

| J30.1 | Allergic rhinitis due to pollen |
| --- | --- |
| H90.3 | Sensorineural hearing loss, bilateral |
| J34.2 | Deviated nasal septum |
| J30.9 | Allergic rhinitis, unspecified |
| H61.23 | Impacted cerumen, bilateral |
| K21.9 | Gastroesophageal reflux disease without esophagitis |
| J34.3 | Hypertrophy of nasal turbinates |
| J31.0 | Chronic rhinitis |
| J32.9 | Chronic sinusitis, unspecified |
| H69.80 | Other specified disorders of Eustachian tube, unspecified ear |
| H61.20 | Impacted cerumen, unspecified ear |
| L82.1 | Other seborrheic keratosis |
| L57.0 | Actinic keratosis |
| D22.5 | Melanocytic nevi of trunk |
| J34.89 | Other specified disorders of nose and nasal sinuses |
| H69.83 | Other specified disorders of Eustachian tube, bilateral |
| R42 | Dizziness and giddiness |
| R49.0 | Dysphonia |
| H93.19 | Tinnitus, unspecified ear |
| D48.5 | Neoplasm of uncertain behavior of skin |
| J32.0 | Chronic maxillary sinusitis |
| L81.4 | Other melanin hyperpigmentation |
| J30.2 | Other seasonal allergic rhinitis |
| R05 | Cough |
| R04.0 | Epistaxis |

***Sources***

* <https://www.icd10data.com/>
* <https://www.cdc.gov/nchs/icd/icd10cm.htm#FY%202019%20release%20of%20ICD-10-CM>
* <https://www.who.int/classifications/icd/en/>
* <https://www.ama-assn.org/sites/ama-assn.org/files/corp/media-browser/premium/washington/icd10-icd9-differences-fact-sheet_0.pdf>
* <https://www.modmed.com/resources/blog/a-quick-reference-guide-ent-icd-10-codes>
* <https://www.entnet.org/business-of-medicine/cpt-for-ent/>
* <https://medibillmd.com/blog/ent-cpt-codes/>

There are a lot of diseases under otorhinolaryngology, most of them are yet to be discovered, or are extremely rare; but below are some of the diseases which are said to be listed under otorhinolaryngology. They include:

* Acoustic neuroma
* Acoustic trauma
* Adenoiditis
* Adenotonsillar disease
* Acute bacterial tonsillitis / recurrent tonsillitis / chronic tonsillitis
* Ageusia (loss of taste)
* Airway obstruction
* Allergic rhinitis
* Allergies (nasal)
* Ankyloglossia (tongue-tie)
* Anaplastic thyroid cancer
* Aging and swallowing disorder
* Anosmia
* Aspiration
* Asthma (related to airway issues)
* Audiology
* Aural polyps
* Autoimmune inner ear disease
* Ameloblastoma
* Aerodigestive disorders
* Aspirin-exacerbated respiratory disease (Samter's triad)
* Auditory processing disorder (APD)
* Aural atresia
* Balance disorders / problems
* Branchial cleft abnormality
* Branchial cleft congenital cysts
* Bell's palsy
* Benign paroxysmal positional vertigo (BPPV)
* Benign positional vertigo
* Benign ear cysts or tumor
* Branchial cleft fistulas (cyst)
* Bronchitis
* Burning mouth syndrome
* Broken or dislocated jaw
* Cancers of the head and neck
* Canker sore
* Cartoid body tumors
* Cavernous sinus thrombosis
* Cholesteatoma
* Choanal atresia
* Chronic acid reflux
* Chronic sinusitis
* Chemosensory disorders
* Cerebrospinal fluid (CSF) otorrhea
* CSF (cerebrospinal fluid rhinorrhea)
* CSF leak
* Cleft lip and palate
* Common cold (upper respiratory infection)
* Craniopharyngioma
* Croup
* Conductive hearing loss
* Congenital anomalies of the larynx
* Congenital anomalies of the trachea
* Congenital neck anomalies
* Cricopharyngeal Muscle dysfunction
* Cystic hygroma
* Cystic fibrosis
* Chordoma
* Dacryocystitis
* Dysphagia
* Deviated (nasal) septum
* Dizziness
* Dysphagia (difficulty swallowing)
* Dry mouth syndrome
* Dysgeusia
* Earaches
* Ears and altitude (Barotrauma)
* Ear drainage
* Ear molds
* Ear infections (otitis media, otitis externa)
* Ear canal stenosis
* Ear cancer
* Epistaxis (nose bleeds)
* Ear drum perforation or rupture
* Ear tubes
* Eustachian tube dysfunction / patency
* Encephalocele
* Ear infections
* Ear wax (Cerumen impaction)
* Enlarged adenoids
* Epiglottitis
* Epstein pearls
* Ethmoiditis
* Ear barotrauma
* Esthesioneuroblastoma
* Facial nerve disorders and paralysis (palsy)
* Facial fractures
* Facial trauma
* Flu
* Fusion of the ear bones
* Foreign body aspiration
* Fine needle aspiration
* Fungal sinusitis
* Gastric esophageal reflux disease (GERD)
* Gastric acid
* Goiter
* Gastric reflux
* Graves' disease
* Glossitis
* Geriatric rhinitis
* Geographic tongue
* Gingivostomatitis
* Glomus jugulare tumor
* Glomus tympanum tumor
* Hearing aids
* Head and neck cancer
* Herpes
* Hyposmia
* Hypogeusia
* Hearing loss
* Herpes simplex (oral herpes)
* Hoarseness
* Human papillomavirus (HPV)
* Hyperacusis
* Hyperthyroidism
* Hyposmia and anosmia
* Hereditary hemorrhagic telangiectasia
* Hypopharyngeal cancer
* Infectious myringitis
* Inner ear tumors
* Inherited metabolic disorders
* Intranasal tumors
* Juvenile nasopharyngeal angiofibroma
* Jaw tumors and cysts
* Labyrinthitis
* Lacrimal gland tumor
* Laryngeal papillomatosis
* Laryngeal cleft
* Laryngeal trauma
* Laryngeal nerve damage
* Laryngitis
* Laryngomalacia
* Laryngopharyngeal acid reflux disease (GERD)
* Ludwig angina
* Leukoplakia
* Lip cancer
* Loss of smell (anosmia)
* Malignant otitis externa
* Mastoiditis
* Melanoma
* Ménière’s disease
* Middle ear disease
* Middle ear tumors
* Multinodular goiter disease
* Minor's syndrome
* Mononucleosis
* Mouth cancer
* Mouth tumors
* Mouth ulcers
* Nasal polyps
* Nasal septal hematoma
* Nonallergic rhinitis
* Nonallergic rhinopathy
* Nasal obstruction
* Nasal allergies
* Nasal valve collapse
* Nasal valve disorders
* Nasal fractures
* Nasopharyngeal cancer
* Neck mass in adults
* Nasolacrimal duct obstruction
* Nystagmus
* Nasal and paranasal tumors
* Neck metastasis
* Obstructive sleep apnea
* Otosclerosis
* Ozena (atrophic rhinitis)
* Otitis media with effusion
* Oral lichen planus
* Otomycosis
* Oral cancer
* Oral human papillomavirus infection
* Oral mucositis
* Ozena
* Palatal myoclonus
* Parathyroid cancer
* Perichondritis
* Pediatric gastroesophageal reflux disease
* Pediatric airway disease
* Pediatric head masses
* Pediatric nasal masses
* Pediatric neck masses
* Pediatric obstructive sleep apnea
* Pediatric hearing loss
* Pediatric sinusitis
* Pediatric sinus disease
* Pediatric sleeping-disordered breathing
* Pediatric thyroid cancer
* Post-nasal drip
* Peritonsillar abscess
* Petrositis
* Pharyngitis (viral and bacterial)
* Pituitary tumors
* Presbycusis
* Pharyngomaxillary space abscess
* Paradoxical vocal fold motion disorder
* Paraganglioma
* Parotid tumors
* Petrous apex lesion
* Pituitary tumors
* Recurrent ear infections
* Ramsay hunt syndrome
* Recurrent respiratory papillomatosis (RRP)
* Rhinitis
* Rhabdomyosarcoma
* Ruptured eardrum (perforated tympanic membrane)
* Retropharyngeal abscess
* Scars
* Salivary gland tumors (disorders)
* Schwannomatosis
* Sinusitis (acute and chronic)
* Skull base tumors
* Sinus infection
* Smell/taste disorders
* Strep throat
* Snoring
* Soft palate cancer
* Speech disturbances
* Stridor
* Subglottic stenosis
* Superior canal dehiscence syndrome (SCDS)
* Supraglottic cancer
* Swallowing disorders
* Sleep apnea
* Sore throat
* Sensorineural hearing loss (SNHL)
* Sialadenitis
* Sinus headaches
* Sinusitis
* Skin cancer
* Snoring, sleeping disorders
* Spasmodic dysphonia
* Swimmer's ear (Otitis externa)
* Saccular cysts
* Salivary duct stones
* Temporal bone cancer
* Throat or larynx cancer
* Thyroid cancer and thyroid eye disease
* Thyroid and parathyroid nodules, tumors, cancers
* Thrush
* Tongue cancer
* Tonsil cancer
* Tracheal stenosis
* Tracheitis
* Tracheomalacia
* Tonsillitis
* Tinnitus
* Thyroid eye disease
* Tonsil and adenoid conditions
* Temporo-mandibular joint (TMJ) pain
* Turbinate hypertrophy
* Uvulitis
* Undifferentiated pleomorphic sarcoma
* Vagal paragangliomas
* Vascular anomalies
* Velopharyngeal insufficiency
* Vertigo
* Vestibular balance disorders
* Vocal cord cysts, nodules, polyps, paralysis, scarring, tremor
* Voice disorders
* Voice performance issues
* Wrinkles (related to facial aging and skin)
* Zenker's diverticulum

This list is compiled from common ENT conditions treated in otolaryngology including ear, nose, throat, head and neck diseases, congenital anomalies, tumors, infections, inflammatory and autoimmune disorders, and sleep-related breathing disorders

* Aging and Swallowing disorders, Ankyloglossia (Tongue-tie), Aspiration, Asthma (related airway issues), Autoimmune Inner Ear Disease
* **B**: Bell's Palsy, Benign Paroxysmal Positional Vertigo (BPPV)
* **C**: Cholesteatoma, Cleft Lip and Palate, Common Cold, Craniopharyngioma, Croup, Cystic Hygroma
* **D**: Deviated Septum, Dysphagia (difficulty swallowing), Dizziness
* **E**: Ear Infections (Otitis Media, Otitis Externa), Ear Canal Stenosis, Ear Cancer, Encephalocele
* **F**: Facial Nerve Disorders and Paralysis, Facial Fractures, Foreign Body Aspiration
* **G**: Gastric Reflux (GERD), Glossitis
* **H**: Hearing Loss, Herpes Simplex (Oral Herpes), Hoarseness
* **I**: Infectious Myringitis, Inner Ear Tumors
* **J**: Juvenile Nasopharyngeal Angiofibroma
* **L**: Laryngeal Papillomatosis, Laryngitis, Laryngomalacia, Ludwig Angina, Leukoplakia
* **M**: Malignant Otitis Externa, Mastoiditis, Ménière’s Disease, Mononucleosis, Mouth Cancer
* **N**: Nasal Polyps, Nasal Septal Hematoma, Nonallergic Rhinitis, Nasal Obstruction
* **O**: Obstructive Sleep Apnea, Otosclerosis
* **P**: Palatal Myoclonus, Parathyroid Cancer, Perichondritis, Peritonsillar Abscess, Petrositis, Pharyngitis, Pituitary Tumors
* **R**: Recurrent Ear Infections, Rhabdomyosarcoma, Ruptured Eardrum (Perforated Tympanic Membrane)
* **S**: Salivary Gland Tumors, Schwannomatosis, Sinusitis (Acute and Chronic), Snoring, Soft Palate Cancer, Speech Disturbances, Stridor, Subglottic Stenosis
* **T**: Temporal Bone Cancer, Throat Cancer, Thyroid Cancer, Tongue Cancer, Tonsil Cancer, Tracheal Stenosis
* **V**: Velopharyngeal Insufficiency, Vocal Cord Cysts, Nodules, Polyps, Paralysis, Scarring, Tremor, Voice Disorders, Vagal Paragangliomas, Vascular Anomalies
* **W**: Wrinkles (related to facial aging and skin)
* **Z**: Zenker's Diverticulum

This list covers congenital anomalies, infections, inflammatory disorders, tumors, nerve disorders, airway and swallowing problems, and sleep-related breathing disorders relevant to ENT specialists

**ACOUSTIC NEUROMA**

*ALTERNATIVE NAMES:* Acoustic neuroma is also known by several alternative names, including “**vestibular schwannoma”, “acoustic neuroma”, “vestibular neuroma”, and “acoustic neurofibroma”**.

**DEFINITION / DESCRIPTION**

Acoustic neuromas, also known as vestibular schwannomas, are noncancerous tumors that grow in the ear, and that can affect hearing and balance.

***Acoustic neuroma (vestibular schwannoma)***

An acoustic neuroma is a noncancerous tumor that develops on the main nerve leading from the inner ear to the brain. This nerve is called the vestibular nerve. Branches of the nerve directly affect balance and hearing. Pressure from an acoustic neuroma can cause hearing loss, ringing in the ear and trouble with balance. Another name for an acoustic neuroma is vestibular schwannoma.

An acoustic neuroma develops from the Schwann cells covering the vestibular nerve. A Schwann cell helps protect and support other nerve cells in the body. An acoustic neuroma is usually slow growing. Rarely, it may become large enough to press against the brain and affect vital functions.

Treatments for an acoustic neuroma include monitoring, radiation and surgical removal.

* Acoustic neuromas affect men and women equally, and most frequently develop in people while in their 40s or 50s. These tumors are much less common in children, but when present in children, they are often associated with a genetic disorder called neurofibromatosis type 2 (NF2).
* The most common symptom of acoustic neuromas, occurring in 90% of patients, is hearing loss on the side of the acoustic neuroma.
* Acoustic neuroma is diagnosed using a hearing test (audiogram) and imaging (MRI).
* Treatment can include observation (watching and waiting), surgery or radiation.
* Other names for acoustic neuroma or vestibular schwannoma include acoustic schwannoma, vestibular neuroma, auditory neuroma and inner ear tumor.

***Acoustic neuroma (vestibular schwannoma)***

Acoustic neuromas are noncancerous, usually slow growing tumors that form along the branches of the eighth cranial nerve (also called the vestibulocochlear nerve). This nerve leads from the brain to the inner ear and branches into divisions that play important roles in both hearing and balance.

Acoustic neuromas arise from Schwann cells, which wrap around and support nerve fibers, hence the name vestibular schwannoma. Schwannomas can occur on any cranial or peripheral nerve in the body, but in the brain, acoustic neuromas are the most common schwannomas.

Acoustic neuromas typically begin growing where the central nervous system transitions into the peripheral nervous system, called the porus acusticus.

***Are acoustic neuromas dangerous?***

Many acoustic neuromas do not grow, and though not always, most that do grow tend to do so slowly. They typically do not invade and destroy tissue like cancerous tumors do. However, they can cause symptoms as they grow and push on important surrounding structures.

A growing acoustic neuroma can cause compression of the nerves that enable facial sensation and movement of the facial muscles. With larger tumors, compression of the nerves important for swallowing, speaking and eye movement can occur.

Even if acoustic neuroma is not growing, it can cause worsening hearing loss and balance function.

If a growing acoustic neuroma is left untreated, it can cause a dangerous buildup of fluid in the brain or it can compress the cerebellum and brain stem, which can be life threatening. This is rare for patients whose tumors are properly diagnosed and treated.

***Acoustic Neuroma Survival Rate***

Though acoustic neuromas can cause lasting problems, such as hearing loss, death from these tumors is rare if they are properly diagnosed and treated.

***Types of Acoustic Neuromas (Vestibular Schwannomas)***

There are two types of acoustic neuromas:

* **Sporadic, unilateral acoustic neuromas.**These tumors only grow on one side of the body in 95% of patients. They occur from sporadic (sudden), nonhereditary mutations. These unilateral acoustic neuromas may develop at any age, but most commonly occur in people between the ages of 30 and 60.
* **Genetic, bilateral acoustic neuromas.** Acoustic neuromas on both sides of the body only occur in people who have the genetic disorder neurofibromatosis type 2, a mutation in chromosome 22 that affects the gene responsible for production of Schwann cells. These patients often have other schwannoma-like tumors throughout the body, and treatments for these tumors are often different from the treatment for unilateral tumors.

**CAUSES**

Of acoustic neuromas, 95% occur without any specific cause.

***Are acoustic neuromas hereditary?***

People who have neurofibromatosis type 2 (NF2) may inherit a genetic tendency to develop acoustic neuromas. Among patients with NF2, acoustic neuromas are typically present on both sides, and symptoms affect both ears. These patients represent about 5% of all patients with acoustic neuromas.

The cause of acoustic neuromas can sometimes be linked to a change to a gene on chromosome 22. Typically, this gene produces a tumor suppressor protein that helps regulate the growth of Schwann cells covering the nerves.

Experts don't know what causes this change to the gene. Often there is no known cause. In some people, the gene change is related to a rare condition called NF2-related schwannomatosis, also known as NF2.

The condition was previously known as neurofibromatosis type 2. People with NF2 usually have growth of tumors on the hearing and balance nerves on both sides of the head. These tumors are known as bilateral vestibular schwannomas.

**RISK FACTORS**

**Autosomal dominant inheritance pattern**

The only confirmed risk factor for acoustic neuromas is having a parent with the rare genetic condition NF2-related schwannomatosis, also known as NF2. However, only a small number of people with acoustic neuromas have NF2.

A hallmark characteristic of NF2 is noncancerous tumors on the balance nerves on both sides of the head. Tumors also may develop on other nerves.

NF2 is known as an autosomal dominant condition. This means that the gene related to the condition can be passed to a child by just one parent. Each child of an affected parent has a 50-50 chance of inheriting it.

Acoustic neuroma, also known as vestibular schwannoma, is a noncancerous tumor that develops on the nerve connecting the brain and ear. While the exact cause of acoustic neuroma is unknown, several potential risk factors have been identified. The only known definite risk factor is **having a parent with the genetic disorder neurofibromatosis 2 (NF2),** which can lead to bilateral acoustic neuromas.

Other potential risk factors include exposure to ionizing radiation, such as in children from atomic bomb survivors in Japan, where moderate to high doses of radiation have been linked to an increased risk of acoustic neuroma.

Prolonged exposure to loud noises has also been studied as a possible risk factor, although the evidence remains inconclusive.

Additionally, some studies suggest that factors such as smoking, noise exposure, and allergic diseases may play a role, though the results are inconsistent.

In summary, while the exact cause of acoustic neuroma is not fully understood, the primary known risk factor is NF2, and other potential factors include radiation exposure, noise, and possibly smoking and allergic diseases. Further research is needed to clarify these associations.

**SIGNS / SYMPTOMS**

Symptoms of an acoustic neuroma often are easy to miss and may take years to develop. Symptoms may occur because of the tumor's effects on the hearing and balance nerves. The tumor also can put pressure on the facial nerve that directs facial muscles and the trigeminal nerve that affects feeling in the face. Blood vessels or other brain structures also can be affected by an acoustic neuroma.

As the tumor grows, it may be more likely to cause more noticeable or worse symptoms.

Common signs and symptoms of an acoustic neuroma include:

* Hearing loss, usually gradually over months to years. In rare cases, hearing loss can be sudden. Hearing loss usually occurs on one side or is worse on one side.
* Ringing in the affected ear, known as tinnitus.
* Loss of balance or not feeling steady.
* Dizziness.
* Facial numbness and, very rarely, weakness or loss of muscle movement.

Rarely, an acoustic neuroma may grow large enough to compress the brainstem and become life-threatening.

Hearing loss, dizziness, tinnitus and other symptoms of an acoustic neuroma can be caused by other, more common ear problems, and it is important to consult a doctor for a diagnosis. Because acoustic neuromas often grow on the balance and hearing nerve, the most common symptoms they cause are:

***One-sided Hearing Loss***

Over 90% of people with acoustic neuromas develop some degree of one-sided (unilateral) hearing loss. People with this type of hearing loss may have difficulty hearing in noisy settings and locating where a sound is coming from. If a person tends to hold a phone to a certain ear or has a hard time following conversation in a crowded room, these may be signs of hearing loss.

The hearing loss usually gets worse over the years and may lead to total deafness in one ear. In some people (about 5% of patients), hearing loss may develop suddenly. The loss may be partial or total, and spontaneous recovery is possible. Sudden hearing loss may be the first event that leads to a diagnosis, or it may occur months or years before the tumor is discovered.

Hearing loss can occur from compression or infiltration of the tumor on the hearing nerve, or from secretion of substances toxic to hearing. It can affect the range of sounds heard, as well as the clarity of sound. Hearing loss can occur even if the tumor is not growing.

A small portion of patients with acoustic neuroma may not yet have hearing loss from the tumor. Mild hearing loss due to an acoustic neuroma might not even be noticeable, which can result in a delayed diagnosis.

***Ear Fullness***

People with an acoustic neuroma might have a sensation of fullness in the ear, as if water is in it. This sensation is typically caused by the hearing loss from the tumor.

***Noise in the Ear (Tinnitus)***

Tinnitus is a very common symptom of acoustic neuromas and many other inner ear conditions. People with acoustic neuromas may experience a high-pitched tone in the ear affected by the tumor. In other cases, the tinnitus can sound like hissing, buzzing or roaring — like when putting a seashell to the ear.

While most patients with acoustic neuromas have both tinnitus and hearing loss in one ear, some may experience tinnitus without losing hearing. Tinnitus can come and go or be constant — with single or multiple tones — and can sound quiet or overwhelmingly loud.

***Balance Problems and Vertigo***

Because acoustic neuromas arise from the vestibular nerve responsible for balance, unsteadiness or balance problems may be early symptoms of acoustic neuroma.

Nearly half of people with acoustic neuromas notice these symptoms, which tend to worsen if the tumor grows. Large acoustic neuromas may compress parts of the cerebellum, which may lead to falls. Patients tend to fall toward the side of the tumor.

The balance system can compensate for the loss of balance, so it may stabilize.

True vertigo (the sensation of spinning or tilting) is not commonly associated with acoustic neuromas, but it can sometimes occur due to tumor growth or bleeding.

***Other Signs of Acoustic Neuroma***

Acoustic neuromas can also put pressure on other important cranial nerves that are adjacent to where these tumors grow.

* **Numbness in the face** can result from a tumor pressing on the trigeminal nerve. There may be ongoing or periodic numbness and facial tingling on the side of the acoustic neuroma. Tingling (paresthesia) may be near the corner of the mouth or on the cheek. There may also be eye irritation or redness due to numbness in the eye that prevents appropriate blink reflexes.
* **Facial twitching or weakness** can result from the tumor pressing on the facial nerve. This can cause twitching (tics or spasms) of the eye, eyebrow, forehead or mouth muscles. Less often, you might notice weakness in the face. Facial weakness often does not occur until acoustic tumors grow quite large, and it is less common at the time of diagnosis.
* **Swallowing problems** can occur from the tumor pressing on the vagal and hypoglossal nerves. These nerves control several aspects important to swallowing, including sensation in the throat and movement of vocal cords and the tongue.
* **Change in taste and tear production** is a less common symptom, but it should be evaluated by a doctor. The facial nerve helps control taste and tear formation. Pressure on the nerve can cause dry eye or even unexpected tears, as well as changes in taste perception.
* **Headache and pressure:** As the acoustic neuroma grows, it can press on the lining of the inside of the skull (the dura). The dura has sensory fibers that can transmit the sensation of the pressure. The headache that results from the acoustic neuroma can be dull or aching, and it is usually on one side of the head. The pain may radiate to the neck or the top or front of the head.

These symptoms can be caused by many other, more common health issues such as cholesteatoma, labyrinthitis and vestibular neuritis, and Meniere’s disease. If you have more than a few of these symptoms (especially if they don’t go away or become worse), your doctor can help you decide whether more testing is necessary.

**DIAGNOSIS METHODS**

***Acoustic Neuroma (Vestibular Schwannoma) Diagnosis***

Because symptoms of these tumors resemble those of other middle and inner ear conditions, they may be difficult to diagnose. Diagnosis usually starts with an ear examination, a hearing test and imaging. Based on the symptoms, your doctor will help determine if you need a computerized tomography (CT) and magnetic resonance imaging (MRI). MRI is much more sensitive than CT for detecting acoustic neuromas. If your doctor is concerned that you might have this tumor, MRI is the preferred test. Early diagnosis offers the best opportunity for successful treatment.

*Acoustic neuroma diagnosis includes:*

* **Hearing test (audiometry).** This is a test of hearing function that measures how well you hear sounds and speech. It is usually the first test performed to diagnose acoustic neuroma. A doctor asks you to listen to sounds and speech while you are wearing earphones attached to a machine that records responses and measures hearing function. If you have an acoustic neuroma, your audiogram may show the following.
* Increased **pure tone average** (PTA). This metric evaluates how loud a sound frequency needs to be before you hear it.
* Increased **speech reception threshold** (SRT). This metric evaluates how loud speech needs to be before you hear it. Similar to pure tone average, the higher the score, the worse the hearing.
* Decreased **speech discrimination** (SD). This metric evaluates how many words you can detect, one ear at a time. The lower the score, the worse the hearing.
* **Imaging scans of the head.**If other tests point to a possibility of acoustic neuroma, **MRI**can confirm the diagnosis. MRI with a **contrast dye** can help pinpoint the tumor. If an acoustic neuroma is present, it will soak up more dye than normal brain tissue and appear clearly on the scan. MRI commonly shows a densely "enhancing" (bright) tumor in the internal auditory canal.

An acoustic neuroma often is hard to diagnose in the early stages because symptoms may be easy to miss and develop slowly over time. Common symptoms such as hearing loss also are associated with many other middle and inner ear issues.

After asking questions about your symptoms, a member of your healthcare team conducts an ear exam. You may need the following tests:

* **Hearing test, known as audiometry.** This test is conducted by a hearing specialist called an audiologist. During the test, sounds of various tones are directed to one ear at a time. You indicate each time you hear the sound. Each tone is repeated at fainter levels to find out when you can barely hear. The audiologist also may use words to test your hearing.
* **Imaging.** Magnetic resonance imaging (MRI) with contrast dye is usually used to diagnose an acoustic neuroma. This imaging test can detect tumors as small as 1 to 2 millimeters in diameter. If MRI is not available or you can't have an MRI scan, a CT scan may be done. However, CT scans may miss small tumors.

**TREATMENT OPTIONS**

After a diagnosis of an acoustic neuroma, the doctor will determine the best plan of action. The options include the following:

* **Surgery to remove the tumor.** This is a highly effective treatment for acoustic neuromas. Hearing loss that has already occurred from the tumor cannot be reversed, but the remaining hearing can be preserved in some cases. Surgical tumor removal can often address balance problems, facial numbness and other symptoms.
* **Stereotactic radiosurgery.** This form of radiation therapy delivers precisely targeted radiation to the tumor while avoiding the surrounding healthy tissue. Radiation does not cause the tumor to go away. Rather, the goal is to stop or slow the growth. Typically, radiation therapy is not recommended for young patients and those with larger tumors.
* **Observation.** This means waiting and watching, and it can be an option for some patients with acoustic neuroma. Because acoustic neuromas are usually slow growing, immediate intervention is not always necessary. For patients with very small tumors that don’t cause any symptoms, older patients and patients with serious medical problems, the doctor may recommend regular monitoring of the tumor using imaging such as MRI.

Priorities in treating acoustic neuromas are preserving facial nerve function, optimizing hearing outcomes and maintaining quality of life.

**ACOUSTIC NEUROMA SURGERY**

Modern microsurgical advancements have made acoustic neuroma surgery procedures safer, more effective and easier to recover from.

The goals of surgery are to remove the tumor while preserving the facial nerve’s function. Hearing preservation after surgery for acoustic neuroma is possible but depends on several factors, including how well you hear before the surgery and how big the tumor is. Roughly half of patients with the smallest tumors who have useful hearing before surgery will maintain useful hearing after surgery. Hearing preservation is less likely for larger tumors. The risk of hearing and facial nerve complications after the surgery increases with larger acoustic neuroma size.

Surgeons have developed different approaches to remove acoustic neuromas — the best depends on tumor size and location, patient characteristics and the goals of surgery. The most commonly used approaches are **suboccipital**, **translabyrinthine** and **middle fossa craniotomy**.

* **Suboccipital or retrosigmoid craniotomy.** During this procedure, the surgeon accesses the acoustic neuroma from the back of the head. It offers the best view of the brainstem, particularly for the nerves involved in swallowing, which can be affected if a tumor is large. This approach is often recommended for patients with larger tumors. It also might preserve hearing for patients with smaller tumors, because the inner ear structures are preserved.
* **Translabyrinthine craniotomy.** During this procedure, the surgeon removes the bone behind the ear to access the tumor through the inner ear. This provides the best view of the entire length of the facial nerve and can require less retraction of the brain. However, it requires going through the structures of the inner ear and does not allow preservation of hearing. This approach is generally considered for patients who have no functional hearing.
* **Middle fossa craniotomy.** This is an option for patients with smaller acoustic neuromas and intact hearing. It is generally considered to provide the greatest chance of hearing preservation, but there is a slightly greater risk of facial nerve weakness after the surgery, and it cannot be performed for medium or large size tumors.

**IMAGE GUIDANCE AND MONITORING DURING ACOUSTIC NEUROMA SURGERY**

Monitoring of brain and nerve function is a critical part of acoustic neuroma surgery. A team of neurologists and electrophysiologists watches for any changes in facial and hearing nerve activity, as well as for changes in the brain. Being aware of such changes can help the surgeon avoid neurologic complications.

**STEREOTACTIC RADIOSURGERY FOR ACOUSTIC NEUROMA**

Radiosurgery, also called stereotactic radiosurgery, is a noninvasive procedure that uses precisely focused, narrow beams of radiation to treat the acoustic neuroma while limiting the amount of radiation that affects surrounding structures, including the hearing, balance and facial nerves. This form of radiation therapy can reduce the growth of an acoustic neuroma. Doctors may recommend radiosurgery for older patients with acoustic neuromas who might be too fragile to endure more invasive treatment.  Radiosurgery may also be used in combination with surgery for large tumors that cannot be removed completely without permanently damaging the facial nerve or other structures.

Some studies report cancers developing within the field of radiation treatment for acoustic neuroma.

**ACOUSTIC NEUROMA RETURNS AFTER RADIOSURGERY**

Radiation treatment requires ongoing follow-up and annual scans to watch for tumor regrowth. Parts of the tumor unaffected by the radiation may give rise to new growth. Signs of an acoustic neuroma coming back could include facial muscle weakness and spasms that slowly worsen, and new growth can often be seen on an MRI scan. Few studies have documented the effects of radiation beyond five years.

Repeated radiation for an acoustic neuroma that comes back after radiosurgery is typically unsafe, and the doctor may recommend surgery. Acoustic neuroma surgery after radiotherapy treatment can be complicated by scar tissue (fibrosis) that can make it difficult to separate the tumor from adjacent nerves.

*Your acoustic neuroma treatment may vary, depending on:*

* The size and growth rate of the acoustic neuroma.
* Your overall health.
* Your signs and symptoms.

There are three treatment approaches for acoustic neuroma: monitoring, surgery or radiation therapy.

***Monitoring***

You and your healthcare team may decide to monitor an acoustic neuroma if it's small and isn't growing or if it's growing slowly. This may be an option if the acoustic neuroma causes few or no symptoms. Monitoring also may be recommended if you're an older adult or if you're not a good candidate for more-aggressive treatment.

While being monitored, you'll need regular imaging and hearing tests, usually every 6 to 12 months. These tests can determine whether the tumor is growing and how quickly. If the scans show the tumor is growing or if the tumor causes worse symptoms, you may need to have surgery or radiation.

***Surgery***

You may need surgery to remove an acoustic neuroma, especially if the tumor is:

* Continuing to grow.
* Very large.
* Causing symptoms.

Your surgeon may use one of several techniques for removing an acoustic neuroma. The type of surgery your surgeon chooses depends on the size of the tumor, your hearing status and other factors.

The goal of surgery is to remove the tumor and preserve the facial nerve to prevent the paralysis of muscles in your face. Removing the entire tumor may not always be possible. For example, if the tumor is too close to important parts of the brain or the facial nerve, only part of the tumor may be removed.

Surgery for an acoustic neuroma is performed under general anesthesia. Surgery involves removing the tumor through the inner ear or through a window in your skull.

Sometimes removing the tumor may worsen symptoms if the hearing, balance or facial nerves are irritated or damaged during the operation. Hearing may be lost on the side where the surgery is performed. Balance is usually affected temporarily.

***Complications may include:***

* Leaking of the fluid that surrounds your brain and spinal cord, known as cerebrospinal fluid. Leaking may happen through the wound.
* Hearing loss.
* Facial weakness or numbness.
* Ringing in the ear.
* Trouble with balance.
* Persistent headache.
* Rarely, infection of the cerebrospinal fluid, known as meningitis.
* Very rarely, stroke or brain bleeding.

***Radiation therapy***

**Gamma Knife stereotactic radiosurgery**

There are several types of radiation therapy used to treat an acoustic neuroma:

* Stereotactic radiosurgery. This type of radiation therapy is often used if the tumor is small — less than 2.5 centimeters in diameter. It also may be used if you are an older adult or you cannot have surgery for health reasons. This technique uses many tiny gamma rays to deliver a precisely targeted dose of radiation to a tumor. It treats the tumor without making an incision or damaging surrounding tissue.

The goal of stereotactic radiosurgery, such as Gamma Knife and CyberKnife, is to stop the growth of a tumor. The treatment also aims to preserve the facial nerve's function and possibly preserve hearing. It may take weeks, months or years before you notice the effects of radiosurgery. Your healthcare team monitors your progress with follow-up imaging studies and hearing tests.

***Risks of radiosurgery include:***

* + Hearing loss.
  + Ringing in the ear.
  + Facial weakness or numbness.
  + Trouble with balance.
  + Continued tumor growth.
* Fractionated stereotactic radiotherapy. Fractionated stereotactic radiotherapy, also called SRT, delivers a small dose of radiation to the tumor over several sessions. SRT is done to slow the growth of the tumor without damaging surrounding brain tissue.
* Proton beam therapy. This type of radiation therapy uses high-energy beams of positively charged particles called protons. The proton beams are delivered to the affected area in targeted doses to treat tumors. This type of therapy lowers radiation exposure to the surrounding area.

**WHAT DETERMINES THE ACOUSTIC NEUROMA TREATMENT?**

Factors such as the tumor size, your age, tumor growth rate and severity of symptoms help the doctor decide which treatment options are appropriate.

***Acoustic Neuroma Size***

The size of the acoustic neuroma is something your doctor will consider. Larger tumors are more likely to continue to grow, and surgical removal is often recommended. Small tumors that are not growing and do not cause disruptive symptoms might not require immediate treatment.

Doctors may use different measurements to determine the size of an acoustic neuroma. The tumors look like ice cream cones, so the measurement varies depending on whether the tumor is measured vertically or horizontally. The diameter of the “ice cream on top” — the part of the tumor that pushes into the brain stem and cerebellum — is what matters, and it should determine the treatment. Proper assessment of the tumor’s size is one reason to choose a doctor who has experience treating these tumors.

If the brain tumor is larger than 20 to 25 millimeters at the time of diagnosis, your doctor may consider treatment even if your symptoms aren’t worrisome. Larger tumors can make surgery more complex and raise the risk of damaging hearing, balance and facial nerves.

***Severe or Worsening Symptoms***

Sometimes a larger acoustic neuroma can cause only minor symptoms, and a small tumor can be incapacitating. Severe facial pain, balance issues and falls can affect quality of life, and treating the tumor might be the best option.

Worsening symptoms may be a good reason to move from watching an acoustic neuroma to treatment. If you have been diagnosed with an acoustic neuroma and you notice that symptoms such as imbalance, facial numbness, weakness or hearing loss are becoming worse, contact your doctor.

***Tumor Growth***

If the doctor is monitoring an acoustic neuroma and MRI exams show that the tumor is growing, it might be time for treatment, depending on the rate of growth, the tumor’s shape, size and location, and your overall health.

***Hearing Loss and Other Complications After Acoustic Neuroma Treatment***

After treatment for acoustic neuroma, some patients experience hearing loss, cerebrospinal fluid leak, damage to facial nerves and other problems.

* **Facial nerve damage** is usually only temporary, and most patients recover in several months to a year. If the damage is thought to be permanent, a facial plastic surgeon can perform nerve transfer surgery or other procedures to help restore movement in the face.
* **Cerebrospinal fluid leaks** are caused by a hole or tear in the dura, a membrane that covers the brain and spinal cord. If a leak occurs, a doctor can perform a procedure to block the hole that is leaking cerebrospinal fluid.
* For ongoing **hearing issues** after acoustic neuroma surgery, a doctor may recommend a bone-anchored hearing aid, cochlear implant or a regular hearing aid.
* For patients with neurofibromatosis type 2 who develop acoustic neuromas in both ears, causing **deafness**, cochlear implants or auditory brainstem implants can help provide a sense of sound and possibly help them understand speech.

***ACOUSTIC NEUROMA TREATMENT — CHOOSING YOUR CARE TEAM***

Because acoustic neuroma tumors are rare, it is important to choose a doctor with experience treating them. Asking a doctor how many acoustic neuroma patients he or she sees annually, and how many surgeries the doctor performs, may be a good start. Visiting a specialty center with a dedicated, multidisciplinary acoustic neuroma team might give you the best chance of a positive outcome.

Acoustic neuroma can be treated in several ways. The treatment options may include the following:

1. Observation: If the tumor is small and not causing significant symptoms, monitoring the tumor's growth over time is the ideal management. This approach is also considered for older patients with numerous comorbidities.
2. Stereotactic radiotherapy: This treatment involves using high-energy radiation to destroy the tumor cells. Gamma Knife, or Cyberknife, is a precise radiation therapy commonly used.
3. Surgery: Surgical tumor removal may be necessary for larger tumors or those causing symptoms.

The main surgical approaches for treating acoustic neuroma include the following:

***1. Retrosigmoid approach:*** This involves removing the tumor through an opening at the skull base. This approach provides good access to this region's tumor and cranial nerves. A tumor of any size can be approached while potentially preserving hearing.

***2. Middle cranial fossa approach:*** In this approach, the surgeon gains access to the tumor through the middle cranial fossa of the skull base. This approach is most suitable for tumors with dominant intracanalicular and small cisternal components. Hearing is preserved in most cases. The main disadvantage is the need for temporal lobe retraction, which may produce postoperative seizures and venous infarction if the vein of Labbe is damaged.

***3. Translabyrinthine:*** This technique involves removing the tumor through the inner ear and is most commonly used in patients with large tumors and no serviceable hearing. The main advantage of this approach is that facial nerve can be exposed early and be protected. Also, the cerebellum does not need to be retracted. But the access to the contents of the jugular foramen and lower parts of the foramen magnum is limited.

After surgery, an MRI is required within 6 to 12 months to document the extent of tumor removal and establish a baseline image. The most common complications of surgery include injury to the anterior inferior cerebral artery, hemorrhage, cerebellar trauma, facial paralysis, hearing loss (the most common), and hydrocephalus

**POSTOPERATIVE AND REHABILITATION CARE**

***Rehabilitation***

Surgical and nonsurgical candidates often have residual vertigo and disequilibrium, which can be addressed through exercises aimed at adaptation, substitution, and habituation exercises.These exercises include but are not limited to the following:

* Adaptation: gaze stability exercises
* Habituation: repeated movement exercises based on symptom-provoking motions
* Substitution: visual control or active eye-head movements between targets

Following surgery for an acoustic neuroma, patients may experience side effects like facial palsy. However, rehabilitation approaches are available to address these issues and help patients regain function. Two such techniques that can be employed are mirror therapy and motor imagery.

Vestibular rehabilitation programs should be catered to the specific deficits each patient presents with, as it has been demonstrated that a targeted approach is more beneficial for these patients than a general vestibular program.

**PREVENTION TIPS**

There are no specific prevention tips for acoustic neuroma, as the exact cause of the condition is unknown. However, it is known that acoustic neuromas are rare non-cancerous tumors that grow from an overproduction of Schwann cells, which wrap around and support nerve fibers.5 While there is no known way to prevent acoustic neuroma, early detection and treatment can help manage symptoms and prevent complications. If you experience symptoms such as hearing loss, tinnitus, or balance problems, it is important to consult a healthcare provider for a proper diagnosis and treatment plan.7 Additionally, individuals with a family history of neurofibromatosis type 2 (NF2) should discuss their risk with a genetic counselor.

**OUTLOOK / PROGNOSIS**

Large acoustic neuromas can be serious because they can sometimes cause a life-threatening build-up of fluid in the brain (hydrocephalus).

But it's rare for them to reach this stage. Many grow very slowly or not at all, and those that grow more quickly can be treated before they become too big.

Even with treatment, symptoms such as hearing loss and tinnitus can persist and affect your ability to work, communicate and drive.

These problems may need additional treatment.

Read more about treating hearing loss and treating tinnitus.

An acoustic neuroma can occasionally return after treatment. This is thought to happen to around 1 in every 20 people who have had surgical removal.

You'll probably continue having regular MRI scans after any treatment to check if the tumor is growing again or coming back.

**POSSIBLE COMPLICATIONS**

***Serious Complications of Acoustic Neuroma***

If untreated, an acoustic neuroma can grow large enough to cause pressure on the brain stem. The tumor can block the flow of cerebrospinal fluid (CSF) between the brain and the spinal cord, causing a buildup of the fluid in the brain.

Because the skull is a closed structure, excess fluid in the brain (hydrocephalus) can press against the brain, causing unsteady movement and lack of coordination (ataxia), headaches and confusion.

An acoustic neuroma may cause permanent complications, including:

* Hearing loss.
* Facial numbness and weakness.
* Trouble with balance.
* Ringing in the ear.

Large tumors may press on the brainstem, occasionally preventing the flow of cerebrospinal fluid between the brain and spinal cord. Fluid can build up in your head, a condition known as hydrocephalus. This increases the pressure inside the skull.

Most complications are related to the surgical procedure and include the following:

* Injury to the anterior or posterior inferior cerebellar arteries
* Neurological injury
* Brain herniation
* Brain hemorrhage
* Injury to the cerebellum
* Facial paralysis
* Hearing loss

After surgery, tinnitus is a common problem in at least 10% to 20% of patients. The recurrence rate after excision is less than 5%. Facial nerve paralysis has been shown to occur in about 15% to 30% of patients, but most make a complete recovery over time. Hearing loss occurs in more than 50% of patients and may not improve. Residual hearing loss has a significant impact on the quality of life.

***ACOUSTIC NEUROMAS IN CHILDREN***

Although they are more common in adults, acoustic neuromas can occur in children and teens, and may grow large before they are diagnosed. Children with acoustic neuromas most often have the genetic disorder neurofibromatosis type 2. In children with this disorder, acoustic neuromas may arise on both sides.

Symptoms of acoustic neuroma in children are usually hearing loss, headache and unsteady gait (ataxia), elevated pressure inside the skull, tinnitus and dizziness. Acoustic neuromas are more likely to grow back in children than in adults if surgery does not remove all of the tumor.

**WHEN TO SEE A DOCTOR / RED FLAG**

See a healthcare professional if you notice hearing loss in one ear, ringing in your ear or trouble with balance.

Early diagnosis of an acoustic neuroma may help keep the tumor from growing large enough to cause complications such as total hearing loss.

**EPIDEMIOLOGY**

Schwannomas account for approximately 8% of all clinically manifested intracranial tumors. Most acoustic neuromas are unilateral and occur sporadically. However, genetic factors contribute to developing bilateral acoustic neuromas, constituting less than 5% of all schwannomas.

Generally, acoustic neuromas are diagnosed between the fourth to sixth decades of life. However, individuals with neurofibromatosis type 2 (NF II) tend to present earlier, with the peak incidence occurring in the third decade of life. Although rare, acoustic schwannomas can occur in children.

There is a slight female preponderance, and symptoms can worsen during pregnancy. The hereditary form of acoustic neuroma is more commonly associated with NF II than neurofibromatosis type 1 (NF I), despite NFI being more prevalent. NF I is exclusively linked to unilateral acoustic neuroma in 24% of cases, while bilateral acoustic schwannoma is a hallmark feature of NF II. Both NF I and NF II are autosomal dominant, with genetic defects localized to chromosome 17 and chromosome 22, respectively.

**DIFFERENTIAL DIAGNOSIS**

Acoustic neuromas account for around 80% to 90% of CPA lesions. Differential diagnoses of an acoustic neuroma include the following:

* Meningioma (5%-10% of CPA lesions)
* Ectodermal inclusion tumors
* Epidermoid (5%-7% of CPA lesions)
* Dermoid
* Metastases
* Neuroma from cranial nerves other than cranial nerve VIII:
  + Trigeminal neuroma.
  + Facial nerve neuroma
  + Neurinoma of the lowest 4 cranial nerves (IX, X, XI, XII)
* Extensions of nearby lesions in the CPA:
  + Dolichobasilar ectasia
  + Aneurysm
  + Cholesterol granuloma (distinct from epidermoid)
  + Neurenteric cyst
  + Arachnoid cyst
  + Brainstem or cerebellar glioma
  + Pituitary adenoma
  + Craniopharyngioma
  + Chordoma and tumors of the skull base
  + Fourth ventricle tumors (ependymoma, medulloblastoma)
  + Choroids plexus papilloma from the fourth ventricle through foramen of Luschka
  + Glomus jugulare tumor
  + Tumors of the temporal bone

**RECENT GUIDELINES OR UPDATES**

Acoustic neuroma, also known as vestibular schwannoma, is a benign tumor that develops from the Schwann cells surrounding the vestibular and cochlear nerves.

Recent guidelines and updates on the management of acoustic neuroma emphasize a multifaceted approach, considering patient and tumor characteristics, as well as the benefits and risks of each treatment modality.

The management of vestibular schwannomas (VS) includes microsurgical excision, stereotactic radiation therapy, or serial observation. The treatment paradigm has shifted in recent decades towards more conservative approaches, with a focus on preserving function, such as facial nerve function, and accepting the possibility of subtotal excision.

For patients with small tumors, observation may be a viable option, as many acoustic tumors will not grow or may even be involute. This approach is supported by data that helps stratify patients at the time of diagnosis based on the likelihood of further tumor growth.

Surgical approaches, such as the retrosigmoid (RS) craniotomy and translabyrinthine (TL) approach, are used depending on the tumor size and location.

The RS approach provides broad access to the cerebellopontine angle (CPA) and brainstem, while the TL approach is suitable for resection of nearly any lesion regardless of size, although it does not spare hearing.

Radiosurgery, such as Gamma Knife radiosurgery, is another treatment option that may be used to prevent the growth of residual tumor after surgery or as a primary treatment for smaller tumors.

The choice of treatment depends on various factors, including the size and location of the tumor, the patient's age, overall health, and personal preferences.

A multidisciplinary team, including neurosurgeons, radiation oncologists, audiologists, and rehabilitation specialists, is essential for providing comprehensive care and optimizing patient outcomes.

Recent trends indicate an increase in the number of patients treated with initial observation or radiosurgery, reflecting a shift towards more conservative management strategies.

The exact incidence of these growths is not entirely clear, but it is estimated to range from 3.0 to 5.2 per 100,000 person-years, with a higher incidence in patients aged 70 years and older.

In summary, the management of acoustic neuroma is evolving, with a growing emphasis on individualized treatment plans that consider the patient's specific circumstances and the tumor's characteristics. The goal is to balance the need for effective treatment with the preservation of neurological function and quality of life.

**PREDEFINED Q&A SETS**

Here is an expert-validated, predefined Q&A set addressing common patient queries about acoustic neuroma:

*Question 1: “***What is an acoustic neuroma?*”***

***Answer:*** An acoustic neuroma is a noncancerous (benign), slow-growing tumor that develops on the vestibulocochlear nerve (cranial nerve VIII), which connects the inner ear to the brain and is responsible for hearing and balance.

*Question 2:* ***“*What are the typical symptoms of acoustic neuroma?*”***

***Answer:*** Common symptoms include:

* Gradual hearing loss (usually on one side)
* Ringing in the affected ear (tinnitus)
* Loss of balance or unsteadiness
* Dizziness
* Occasionally, facial numbness or weakness if the tumor presses on nearby nerves.

*Question 3:* ***“*How is an acoustic neuroma diagnosed?*”***

***Answer:*** Diagnosis typically involves:

* A detailed medical history and physical (ear) exam
* Hearing tests (audiometry)
* Imaging studies, most commonly MRI with contrast, to detect and determine the size and location of the tumor.

*Question 4:* ***“*What causes acoustic neuroma?*”***

***Answer:*** “Most cases are sporadic, but some are linked to a genetic problem with a gene on chromosome 22, which normally helps control the growth of Schwann cells that cover nerves.”

*Question 5:* ***“*What are the treatment options for acoustic neuroma?*”***

***Answer:*** Treatment depends on tumor size, growth rate, symptoms, and the patient’s overall health. Options include:

* **Observation (watchful waiting):** For small, slow-growing tumors with minimal symptoms, especially in older adults
* **Surgery:** To remove the tumor, with the goal of preserving facial nerve function and, when possible, hearing
* **Radiation therapy:** Such as stereotactic radiosurgery (e.g., Gamma Knife), to stop tumor growth or shrink the tumor.

*Question 6:* ***“*What are the risks and potential complications of treatment?*”***

***Answer:***

* **Surgery:** Risks include hearing loss, facial weakness or numbness, balance problems, leakage of cerebrospinal fluid, infection, and, rarely, stroke or brain bleeding.
* **Radiation therapy:** May cause delayed nerve damage or hearing loss.
* **Observation:** Risk of tumor growth and worsening symptoms over time.

*Question 7:* ***“*Can hearing or facial nerve function be preserved?*”***

***Answer:*** Preservation of hearing and facial nerve function depends on the size and location of the tumor at the time of treatment. Facial nerve preservation is a top priority, and hearing preservation is sometimes possible, especially with smaller tumors.

*Question 8:* ***“*When should I see a doctor?*”***

***Answer:*** See a healthcare professional if you notice:

* Hearing loss in one ear
* Ringing in one ear
* Balance problems  
  Early diagnosis can help prevent complications such as total hearing loss or more severe nerve damage.

This Q&A set is based on current expert guidance and addresses the most common concerns of patients diagnosed with or suspected of having an acoustic neuroma.

**DOCTOR-PATIENT CONVERSATIONS OR CLINICAL SUMMARIES**

***Patient:*** I’ve been having ringing in my right ear and I’m losing hearing on that side.  
***Doctor:*** Have you experienced any dizziness or problems with your balance?  
***Patient:*** Yes, I feel unsteady sometimes, especially when standing or walking.  
***Doctor:*** We’ll need to do a hearing test and an MRI to check for possible causes, including an acoustic neuroma, which is a benign tumor on the nerve that controls hearing and balance.

***Patient:*** I’m worried about losing my hearing or having facial weakness after surgery.  
***Doctor:*** Those are valid concerns. Our goal is to remove the tumor while preserving facial nerve function, and, if possible, hearing. The surgical approach we recommend depends on the size and location of your tumor and your current hearing status.

*REFERENCES:*

<https://www.hopkinsmedicine.org/health/conditions-and-diseases/brain-tumor/vestibular-schwannoma>

<https://www.mayoclinic.org/diseases-conditions/acoustic-neuroma/symptoms-causes/syc-20356127>

<https://www.mayoclinic.org/diseases-conditions/acoustic-neuroma/diagnosis-treatment/drc-20356132>

<https://www.nhs.uk/conditions/acoustic-neuroma/>

<https://www.ncbi.nlm.nih.gov/books/NBK470177/>

<https://www.statpearls.com/account/trialuserreg/?articleid=17104&utm_source=pubmed&utm_campaign=reviews&utm_content=17104>

**ACOUSTIC TRAUMA**

***ALTERNATIVE NAMES:*** Another name for acoustic trauma is “acute acoustic trauma (AAT)”. It is also referred to as “noise-induced hearing loss”, although it specifically denotes sudden sensorineural hearing loss caused by exposure to intense impulse noise. Additionally, it is sometimes called “aural blast injury.”

Injury - inner ear; Trauma - inner ear; Ear injury

**DEFINITION / DESCRIPTION**

Acoustic trauma is injury to the hearing mechanisms in the inner ear. It is due to very loud noise.

Acute acoustic trauma (AAT) is characterized by sudden sensorineural hearing loss caused by exposure to intense impulse noise, such as blasts or gunshots, typically exceeding 140 dB for less than 0.2 seconds.

Hearing loss from AAT results from the blast’s impact and the rapid expansion of gases. AAT often results from mechanical and metabolic injuries to the auditory system, causing symptoms such as hearing loss, tinnitus, otalgia, vertigo, and hyperacusis.

AAT is distinct from noise-induced hearing loss, which develops gradually due to prolonged exposure to noise levels of 100 to 120 dBA, often found in workplaces or combat zones. Although AAT is prevalent among military personnel, it is frequently underdiagnosed in civilians due to underreporting.

Healthcare providers face challenges in effectively diagnosing and managing AAT. The management strategy begins with advanced hearing protection devices; audiometric evaluations are essential before and after exposure. Prompt intervention can often prevent permanent hearing loss from hazardous noise exposure.

Accurate diagnosis relies on audiometric evaluation and timely otolaryngology referral, especially for complications such as tympanic membrane perforation or facial nerve involvement. Treatment emphasizes hearing protection and managing ear trauma, while noise safety education and regular audiometric evaluations are essential for preventing permanent hearing loss. This activity reviews the characteristics, causes, diagnosis, management, and prevention of loud noise-induced injuries.

This activity provides healthcare professionals with the knowledge and tools to deliver optimal patient care, including insights into the psychoacoustics of loudness, active and passive hearing protection methods, and the role of medical and surgical interventions in treating AAT.

**Passive Hearing Protection Devices**

Passive HPDs rely on physical barriers without embedded electronics and function in 2 ways, as mentioned below.

* Noise level–dependent HPDs:
  + These HPDs, such as solid earplugs, provide attenuation that varies with noise intensity.
* Noise level–independent HPDs:
  + Provide consistent noise reduction across different frequencies and intensities.
  + Feature a narrow inner channel along the earplug’s length, causing acoustic impedance to increase nonlinearly with external sound.
  + Nonlinear HPDs reduce harmful impulse noise while allowing speech and softer sounds to remain audible for communication and safety.

**Active Hearing Protection Devices**

Active HPDs work differently, using noise reduction algorithms within electronic devices to cancel noise actively. These devices optimize the signal-to-noise ratio to enhance the desired result, such as speech and communication amid noisy environments. These devices combine passive components, such as physical barriers, with active elements, such as preamplifiers and microphones. Some models also feature external signal processors, operating switches, and volume controls for added functionality.

Active HPDs feature directional microphones that enhance communication and hearing protection. However, they can impair sound localization, particularly from behind—referred to as a soldier’s “6” in combat.

The impact of blast-type noises varies based on proximity, device type, and whether the environment is open or enclosed. Diagnosing hearing loss from AAT requires audiological evaluation and access to high-quality equipment. Advances in technology, such as smartphone screening apps and audiometric headsets, may enhance future diagnostic capabilities.

Patients with suspected AAT presenting with symptoms such as acute tinnitus, muffled hearing, or ear fullness should undergo a comprehensive head and neck examination, including a detailed otologic evaluation, ideally with otomicroscopy.

Audiometric testing is the primary diagnostic tool and should be performed if hearing loss persists beyond 72 hours. Cortical evoked response audiometry may be indicated for patients suspected of exaggerating their hearing loss.

Further noise exposure should be avoided, especially if vertigo accompanies the hearing loss, to prevent risks during activities like driving or operating heavy machinery.

Absolute indications for otolaryngology referral include suspected temporal bone fracture, tympanic membrane perforation, persistent clear or discolored ear drainage that does not resolve within a few days, facial nerve paralysis, and hearing loss in a patient with a single functional ear.

The most significant challenges in AAT include the following:

* Accurate diagnosis
* Delays in seeking medical care (underreporting)
* Repeat acoustic trauma
  + Blast-type noise
  + Concomitant prolonged noise exposure

Management of AAT should be personalized and initiated promptly. Treatment outcomes and prognosis vary, and patients should be informed that hearing recovery remains unpredictable, regardless of intervention.

***What is acoustic trauma?***

Acoustic trauma is an injury to the inner ear that’s often caused by exposure to a high-decibel noise. This injury can occur after exposure to a single, very loud noise or from exposure to noises at significant decibels over a longer period of time.

Some injuries to the head can cause acoustic trauma if the eardrum is ruptured or if other injuries to the inner ear occur.

The eardrum protects the middle ear and inner ear. It also transmits signals to the brain by way of small vibrations.

Acoustic trauma can damage the way that these vibrations are handled, resulting in hearing loss. Sound moving into the inner ear can cause what doctors sometimes call a threshold shift, which can trigger hearing loss.

**Types of acoustic trauma**

If your doctor believes that your symptoms indicate acoustic trauma, they may try to differentiate between trauma that occurred suddenly through injury and trauma that occurred through ongoing exposure to loud noises.

Different degrees of acoustic trauma can require different treatments.

**Who is at high risk for acoustic trauma?**

People at an increased risk for acoustic trauma include those who:

* work at a job where loud industrial equipment operates for long periods of time
* live or work where other high-decibel sounds continue for long periods of time
* frequently attend music concerts and other events with high-decibel music
* use gun ranges
* encounter extremely loud sounds without proper equipment, such as earplugs

People continually exposed to noise levels over 85 decibels are at an increased risk for acoustic trauma.

Your doctor may provide an estimate of the decibel range of normal daily sounds, like an estimate of around 90 decibels for a small engine. They’ll do this to help you assess whether the sounds that you encounter put you at a higher risk for acoustic trauma and hearing loss.

Under 70 decibels or less is considered safe for ongoing listening. This is the estimated noise level of an average group conversation.

Three important factors have a role in acoustic trauma. These include:

* the intensity of sound measured in decibels
* the pitch or frequency of the sound (higher frequencies are more damaging)
* the total time the person was exposed to the sound

**CAUSES**

Acoustic trauma is caused by **exposure to high-decibel noises**, which can lead to injury to the inner ear. This can occur after a single, loud noise or from prolonged exposure to significant decibels over time.

Common examples include concerts, discotheques, and working with noisy equipment.

Additionally, acute acoustic trauma (AAT) is characterized by sudden sensorineural hearing loss caused by exposure to intense impulse noise, such as blasts or gunshots, typically exceeding 140 dB for less than 0.2 seconds.

Recreational noises, such as unprotected firearm exposure, fireworks, and loud music at concerts or nightclubs, can also cause acoustic trauma. The sound levels often exceed the safe threshold (usually 85 decibels), leading to damage to the middle ear.

Acoustic trauma is a common cause of sensory hearing loss. Damage to the hearing mechanisms within the inner ear may be caused by:

* Explosion near the ear
* Firing a gun near the ear
* Long-term exposure to loud noises (such as loud music or machinery)
* Any very loud noise near the ear

**RISK FACTORS**

Acoustic trauma refers to injury to the inner ear caused by exposure to loud noises, which can occur from a single intense sound or prolonged exposure to high-decibel sounds.

The risk factors for acoustic trauma include exposure to loud noises, such as those from machinery, concerts, or firearms. Long-term exposure to loud noises can lead to progressive hearing loss, which is the main complication of acoustic trauma.

* **Exposure to loud noises**: This can be from a single, intense sound such as an explosion or from continuous exposure to loud sounds like those from machinery, loud music, or recreational activities.
* **Prolonged exposure to loud sounds**: Long-term exposure to loud noises, such as working in noisy environments or attending concerts without ear protection, increases the risk of acoustic trauma.
* **Occupational noise exposure**: Individuals working in industries such as mining, manufacturing, construction, or military settings are at higher risk due to constant exposure to loud noises.
* **Environmental noise exposure**: Exposure to noise in everyday environments such as highways, trains, airplanes, or recreational places like nightclubs, sporting venues, or shooting ranges can contribute to acoustic trauma.
* **Use of personal audio devices**: Listening to loud music through earphones or headphones for extended periods can also lead to acoustic trauma.
* **Genetic susceptibility**: Some individuals may be more susceptible to acoustic trauma due to genetic factors, which can influence how their ears respond to loud noises.
* **Lack of hearing protection**: Not using protective measures such as earplugs or earmuffs in noisy environments increases the risk of acoustic trauma.
* **Recreational activities**: Engaging in activities such as shooting firearms, using chainsaws, or driving motorcycles and snowmobiles without proper hearing protection can increase the risk of acoustic trauma.

These factors highlight the importance of taking preventive measures to protect hearing and reduce the risk of acoustic trauma.

Additionally, individuals who work in noisy environments, such as factories, construction sites, or aviation, are at increased risk of developing acoustic trauma over time due to consistent exposure to loud machinery and equipment.

Musicians and audio engineers are also at risk due to prolonged exposure to high-decibel sounds in studio settings or during live performances.

Furthermore, the use of personal listening devices at high volumes can also contribute to the risk of acoustic trauma.

It is important to note that the risk for acoustic trauma increases 10-fold with every 10-fold increase in rounds fired when using firearms.

Therefore, it is crucial to take preventive measures, such as wearing protective earplugs or earmuffs, to reduce the risk of acoustic trauma.

**SIGNS / SYMPTOMS**

Symptoms include:

* Partial hearing loss that most often involves repeated long-term exposures to loud or high-pitched sounds. The hearing loss may slowly get worse.
* Noises, ringing in the ear (tinnitus).

The main symptom of acoustic trauma is hearing loss.

Injury occurs at the level of the inner ear. The sensitive hair cells can lose their connections to the nerve cells responsible for hearing.

Ear structures may also be directly damaged by loud noise. Sudden sounds above 130 decibels can damage the ear’s natural microphone, the organ of Corti.

Acoustic injury can injure the eardrum, along with the small muscles in the ear, particularly the tensor tympani muscle.

In many cases of long-term sound damage, people first begin to have difficulty hearing high-frequency sounds. Difficulty hearing sounds at lower frequencies may occur later.

Your doctor may test your response to different frequencies of sound to assess the extent of acoustic trauma.

One of the most important symptoms that can signal the onset of acoustic trauma is called tinnitus. Tinnitus is a type of injury to the ear that causes a buzzing or ringing sound.

Those with mild to moderate tinnitus will most often be aware of this symptom when they’re in silent environments.

Tinnitus can be caused by drug use, changes to blood vessels, or other conditions and factors, but it’s often a precursor to acoustic trauma when it’s caused by exposure to loud noises.

Tinnitus can be persistent or chronic. Long-term tinnitus is a good reason to suspect acoustic trauma.

**DIAGNOSIS METHODS**

**Exams and Tests**

The health care provider will most often suspect acoustic trauma if hearing loss occurs after noise exposure. A physical exam will determine if the eardrum is damaged. Audiometry may determine how much hearing has been lost.

**Diagnosing acoustic trauma**

Your doctor will ask you what kind of noises you’ve been exposed to during different times of your life to help make a diagnosis.

They may also use something called audiometry to detect signs of acoustic trauma. In this test, you’re exposed to sounds of varying loudness and of different tones to more carefully assess what you can and can’t hear.

**TREATMENT OPTIONS**

**Technological hearing assistance**

Hearing loss can be treated, but it can’t be cured.

Your doctor may recommend technological assistance for your hearing loss condition, such as a hearing aid. New types of hearing aids called cochlear implants may also be available to help you deal with hearing loss from acoustic trauma.

**Ear protection**

Your doctor will most likely recommend using earplugs and other kinds of devices to protect your hearing.

These items are part of the personal protective equipment (PPE) that employers should offer to people when they’re in a workplace with exposure to loud noises.

**Medications**

Your doctor may prescribe oral steroid medications to help with some cases of acute acoustic trauma.

However, if you’re experiencing hearing loss, your doctor will stress noise protection of the ear and limit exposure to loud environments to prevent the problem from getting worse.

Despite promising outcomes, conflicting evidence exists regarding a definitive treatment protocol for patients with AAT. The JTS Practice Guidelines prioritize primary prevention over treatment, recommending that individuals at risk be educated on the importance of using ear protection and minimizing noise exposure. Emphasis is also placed on educating individuals to recognize AAT symptoms and the importance of self-reporting for evaluation.

The treatment of patients with AAT can vary based on several factors, and it is essential for each patient to understand that no treatment guarantees complete restoration of hearing. If there is visible trauma from a blast injury to the outer ear, ear canal, tympanic membrane, or middle ear, addressing these issues should be the priority. In such instances, the management approach may involve staged healing and potential surgical repair as needed, with the acknowledgment that some degree of hearing loss may still occur.

If the hearing loss is purely sensorineural and no other otologic or brain trauma is evident, several treatment strategies are available, as described below.

**Corticosteroids:** These may be effective whether administered intravenously, orally, or intra tympanically.

* Intravenous corticosteroids: These regimens may include methylprednisolone at 125 mg on the first day of treatment, 80 mg on the second day, and 40 mg on the final day.
* Oral prednisone: This drug may be administered at a dosage of 1 mg/kg, up to a maximum of 60 mg daily, for 1 to 2 weeks. Longer courses often yield better outcomes in patients who can tolerate high-dose steroids for more than 1 week.
* Steroid injections: The JTS guideline recommends high-dose oral or transtympanic steroid injections, when not contraindicated, for patients with threshold shifts of more than 25 dB in 3 consecutive frequencies. The injection regimen typically includes transtympanic dexamethasone at a concentration of 24 mg/mL. Patients should undergo weekly audiometric evaluations, regardless of the treatment approach. If follow-up audiograms indicate some recovery, additional injections are recommended, up to a total of 3.

**Antioxidants and neurotrophins:** These may provide benefits in the acute treatment of NIHL.Although the evidence supporting the use of antioxidants and neurotrophins is limited, they are generally well-tolerated.

**Hyperbaric oxygen therapy:** This therapy may be beneficial for AAT, particularly if corticosteroid therapy is ineffective. Treatment typically involves 120-minute dives to pressures ranging from 200 to 280 kPa daily for 10 days.The AAOHNS guidelines on sudden sensorineural hearing loss indicate that if there is no response to initial therapy, hyperbaric oxygen therapy combined with corticosteroids can serve as salvage therapy within 1 month of onset. Temporary placement of ear ventilation tubes may also be necessary.

In summary, key management factors include the prior use of HPDs, whether in a linear or nonlinear manner, and the initiation of early steroid treatment following an AAT injury, preferably within 24 to 72 hours.

Hearing recovery may vary based on age and comorbidities, necessitating individualized clinical treatment. Despite guideline recommendations, oral steroid treatment may be more favorable than transtympanic steroid injections and hyperbaric oxygen therapy in clinical practice.

Summary: The hearing loss may not be treatable. The goal of treatment is to protect the ear from further damage. Eardrum repair may be needed.

A hearing aid may help you communicate. You can also learn coping skills, such as lip reading.

In some cases, your provider may prescribe steroid medicine to help bring back some of the hearing.

**PREVENTION TIPS**

Take the following steps to help prevent hearing loss:

* Wear protective ear plugs or earmuffs to prevent hearing damage from loud equipment.
* Be aware of risks to your hearing from activities such as shooting guns, using chainsaws, or driving motorcycles and snowmobiles.
* DO NOT listen to loud music for long periods of time.

***How to Stop and Prevent Your Ears from Ringing After a Concert***

If you have ringing in your ear, known as tinnitus, try to listen to calming sounds, distract yourself, or engage in activities that help reduce stress. If this doesn’t help, see a doctor for a more thorough diagnosis.

Going to a concert and rocking out can be an exhilarating experience. But if you hear muffled ringing in your ears, a phenomenon known as tinnitus, after the show, it may be a sign that you got too close to the speakers. This ringing happens when the loud noise damages the very fine hair cells that line your ear.

Long exposure to sounds over 85 decibels (dB) can cause hearing loss. Concerts tend to be about 115 dB or more, depending where you’re standing. The louder the sound, the shorter amount of time it takes for noise-induced hearing loss to occur.

The ringing you hear may be constant or sporadic. It may also appear as other sounds such as whistling, buzzing, or roaring. In most cases, tinnitus from concerts will resolve itself within a few days.

***How to stop the ringing in your ears***

While tinnitus can’t be treated immediately, there are things you can do to alleviate the noise in your ears as well as any stress caused by the ringing.

**1. Play white noise or relaxing sounds**

Ambient sounds like one in the video below can help mask the ringing in your ears.

**2. Distract yourself**

Distracting yourself from the noise with other external sounds can help divert your attention away from the ringing. Listen to a podcast or some quiet music. Avoid playing these sounds at maximum volume, since this can be as damaging to your ears as attending a concert.

**3. De-stress**

Yoga and meditation are helpful relaxation methods. Download a meditation app to clear your head of extra stress or irritation caused by the ringing.

***To help your ringing ears***

* Avoid anything that may be making the tinnitus worse, such as other loud noises or stimulants like caffeine.
* Use ear plugs if you know you’ll be exposed to louder sounds.
* Refrain from alcohol, as it causes blood to flow into your inner ear and enhance the ringing.

***How long does the ringing last?***

Occasional exposure to loud noise can bring about temporary tinnitus. Ringing that’s accompanied by a muffled sound may also indicate noise-induced hearing loss. These symptoms often go away within 16 to 48 hours. In extreme cases, it may take a week or two. Further exposure to extremely loud noises can also trigger the ringing again.

Sometimes this hearing loss can develop into tinnitus that lasts more than six months. This is a common condition that may cause long-term issues, but is rarely a sign that you’re going deaf or have a medical problem.

If you’re a frequent concertgoer, performing musician, or find yourself exposed to loud noises often, you may want to take steps to prevent long-term hearing loss.Hearing loss is expected to rise dramatically in the coming decades.

***How can I prevent ringing in my ears?***

It’s always a good idea to take steps to keep tinnitus at bay. Research shows that even if the ringing disappears, there may be residual long-term damage.

* Understand what noises cause hearing damage, including concerts, motorcycles, and playing music at the loudest volume.
* Wear earplugs when attending concerts. Some venues may sell cheap foam ones at coat check.
* Limit how much alcohol you drink during a show or area with loud music. Blood flow to your ears can increase the sound of ringing.
* Have your hearing tested if you think you may have hearing loss.

**OUTLOOK / PROGNOSIS**

The time interval from AAT to triage, initial audiometry, and treatment by an otolaryngologist is crucial for improving prognosis, especially if steroid therapy is initiated. In a study involving 263 healthy participants, half received steroids, whereas the other half did not receive any treatment following AAT. Those treated within 24 hours with high-dose steroids for at least 7 days demonstrated significantly better hearing outcomes compared to the untreated group.

The steroid-treated group experienced an average improvement of 13 to 14 dB in bone conduction thresholds at 3 and 4 kHz (*P* = .001) and an additional 7 to 8 dB improvement in air conduction thresholds at 6 and 8 kHz compared to the untreated group (*P* < .0001).

Patients exhibiting a threshold shift greater than 60 dB across three consecutive frequencies for 10 or more days after noise exposure are unlikely to resolve spontaneously and are at a higher risk of permanent hearing loss.

Summary: Acoustic trauma and related hearing loss may be permanent or irreversible in the affected ear. Wearing ear protection when around sources of loud sounds and limiting excessively loud experiences can help you maintain your hearing, and may help prevent hearing loss from getting worse. An ear specialist can help determine the treatment options that are best for you.

**POSSIBLE COMPLICATIONS**

The effects of loud noise exposure are pathological, psychological, and sociological. Hearing loss can impact interpersonal communication, leading to diminished self-esteem and strained relationships.

This may also reduce attention and cognitive function, increasing the risk of dementia. While noise can affect work performance, the extent of this impact often depends on individual predisposition.

Additionally, the financial burden of hearing loss and compensation costs for employers can be significant.

Summary: Progressive hearing loss is the main complication of acoustic trauma. Tinnitus (ear ringing) can also occur.

**WHEN TO SEE A DOCTOR / RED FLAG**

Contact your provider if:

* You have symptoms of acoustic trauma
* Hearing loss occurs or gets worse

**DIFFERENTIAL DIAGNOSIS**

Differential diagnoses for AAT include:

* Sudden sensorineural hearing loss
* Head trauma causing inner ear, cochleovestibular nerve injury, or brainstem pathology
* Stroke - posterior circulation cerebrovascular accident, typically characterized by sudden onset of hearing loss and frequently associated with other neurological deficits
* Viral infections (primarily)
* Autoimmune diseases
* Chemotherapy for cancer or infections
* Neurological disorders, such as multiple sclerosis
* Ménière disease

**RECENT GUIDELINES OR UPDATES**

The diagnosis of AAT requires a comprehensive evaluation, considering other potential causes of acute sudden hearing loss. Following a detailed history and physical examination, a battery of audiological tests is typically the next step.

According to the JTS Practice Guidelines, all patients with subjective hearing loss after AAT should undergo the following tests.

* Screening audiometry: This should be conducted as soon as possible after the initial trauma unless more urgent treatment or altered mental status prohibits evaluation.
* Audiological evaluation: This test should follow the presentation of signs of concussion.
* Comprehensive audiogram: This includes tympanometry, bone-conducted thresholds, speech discrimination, and acoustic reflexes if hearing loss lasts for more than 72 hours.

Patients with a temporary threshold shift greater than 25 dB should be considered for steroid treatment, either orally or via transtympanic injection. Follow-up audiometry is essential to monitor progress.

**Pure-Tone Audiometry**

Pure-tone audiometry assesses the function of the outer ear, middle ear, cochlea, cranial nerve VIII (CNVIII), and central auditory system. Studies examining audiometric configurations in military patients with AAT consistently show high-frequency hearing loss, typically presenting with a notch between 2 and 6 kHz and recovery at 8 kHz.

Conversely, some authors reported normal hearing thresholds within the conversational range, with deterioration at higher frequencies. They concluded that limiting hearing tests to the standard frequency range of 0.5 to 8 kHz may result in missed cases of AAT. A high-frequency hearing test covering up to 16 kHz is recommended to ensure accurate assessment.

Audiometry results in AAT can resemble those of presbycusis. However, presbycusis typically presents with greater hearing loss at 8 kHz than at 3, 4, or 6 kHz. In contrast, AAT often shows more significant loss at 6 kHz than 8 kHz, with similar thresholds at 4 and 8 kHz, and peak loss sometimes occurring at 3 kHz.

A study of 24 young military personnel conducted follow-up audiometry at 24 hours, 72 hours, and 15 days after AAT caused by firearm discharge, confirming that mid-to-high frequency loss is characteristic of AAT. Notches at 3 and 4 kHz were present in 71% of patients, with losses ranging from 10 to 70 dB. Hearing improved over time, with an average loss of 24 ± 16 dB at 24 hours, 14 ± 13 dB at 72 hours, and 12 ± 14 dB by day 15.

Pure-tone audiometry was performed on 361 Finnish conscripts who experienced AAT during military service. Over 75% of affected ears showed hearing loss in the high-frequency range (above 2 kHz), while the speech frequency range was impacted in the remaining 25%.Perez et al evaluated 143 patients exposed to explosions, finding that 46% of audiograms exhibited a downsloping pattern above 2 kHz, 41% showed a mid-frequency notch, and 12% had a flat configuration.

Pure-tone audiometry is subjective; obtaining acoustic reflex thresholds is essential to identify potential malingering in patients.

**Otoacoustic Emissions**

Otoacoustic emissions (OAEs) are a valuable tool for hearing screening after AAT, especially in cases where a patient may be feigning hearing loss. OAEs assess the peripheral auditory system, including the outer and middle ears, and the cochlea. OAEs are reliable and reproducible, providing important clinical insights, particularly when patients do not respond truthfully during pure-tone audiometry following a blast explosion.

OAEs are sounds generated by the movement of outer hair cells in a properly functioning cochlea when stimulated by external sounds. This objective, sensitive, and user-friendly test involves an aural probe with a speaker that delivers an acoustic stimulus while a microphone detects the resulting emissions. Distortion product OAEs can identify early NIHL with 82% sensitivity and 92.5% specificity, even when pure-tone audiometry results are normal.However, there is a risk of false positives associated with this test.

OAEs can assess auditory function following AAT. The connection between noise exposure and OAEs is well-documented, emphasizing their utility as sensitive indicators of hearing loss, particularly after AAT. Numerous studies have shown a reduction in OAE amplitude following exposure to loud noise, even when audiometric thresholds remain unaffected. This highlights the superior sensitivity of OAEs in detecting changes in hearing.

***Auditory Brainstem Response Audiometry***

Auditory brainstem response audiometry serves as a critical tool for detecting patient malingering during pure-tone audiometry. Typically, auditory brainstem response is particularly beneficial for identifying retrocochlear pathology and assessing symptoms related to eighth nerve disorders. The application of this test is most valuable when comparing auditory brainstem response results to magnetic resonance imaging (MRI) or computed tomography (CT) in patients who have experienced significant auditory trauma.

**EPIDEMIOLOGY**

A 2019 study by the OSHA Information System revealed that from 1972 to 2019, there were 119,305 violations of OSHA noise standards related to occupational noise exposure in general industry. More males than females are reported to have NIHL, with no significant age differences noted. Many individuals with occupational hearing loss also experience depression and sleep disorders.

Recreational firearm use in the United States is more prevalent than in any other country in the world. Many individuals may be unaware of the associated hazards, as nearly all firearms produce peak impulse noise levels exceeding 140 dB. According to the Aural Blast Injury/Acoustic Trauma and Hearing Loss guidelines, AAT contributes to veteran disability at an annual rate of 13% to 18% in the United States.

A retrospective study of French military personnel assessed the prevalence of long-term hearing loss in individuals exposed to AAT. Audiograms taken an average of 448 days after AAT indicated a long-term hearing loss prevalence exceeding 20%. Another study examined hearing loss following a single episode of AAT, estimating a 1% incidence of hearing loss over a 20-year follow-up period.

**PREDEFINED Q&A SETS**

*Question 1:* ***“*What is acoustic trauma?*”***

***Answer: “***Acoustic trauma is an injury to the inner ear caused by exposure to a sudden, very loud noise such as an explosion, gunshot, or loud concert. It can also result from prolonged exposure to high-decibel sounds. This trauma damages the delicate structures of the inner ear, leading to hearing loss and other symptoms.***”***

*Question 2:* ***“***What are the common symptoms of acoustic trauma?***” Answer:*** Typical symptoms include:

* Sudden hearing loss (often sensorineural)
* Tinnitus (ringing, buzzing, or other noises in the ear)
* Aural fullness (a feeling of pressure in the ear)
* Difficulty hearing, especially in noisy environments
* Vertigo or dizziness
* Ear pain or headaches in some cases.

*Question 3:* ***“***How quickly do symptoms appear after acoustic trauma?***”***

***Answer: “***Symptoms usually appear immediately or within a short time after exposure to the loud noise. Hearing loss can be sudden and noticeable without warning.***”***

***Question 4: “***Who is at risk for acoustic trauma?***”***

***Answer: “***People exposed to loud noises such as soldiers (gunfire, explosions), musicians, construction workers, landscapers, motorcyclists, and attendees of loud concerts are at higher risk.***”***

***Question 5: “***How is acoustic trauma diagnosed?***”***

***Answer:*** Diagnosis involves:

* A detailed history of noise exposure
* Physical examination including otoscopy
* Audiometry (hearing tests) to measure hearing loss
* Tympanometry and acoustic reflex testing to assess middle ear function
* Imaging if needed to rule out other causes.

*Question 6:* ***“***Can acoustic trauma cause permanent hearing loss?***”***

***Answer: “***Yes, acoustic trauma can cause permanent sensorineural hearing loss if the inner ear structures are severely damaged. Early intervention may help reduce damage, but some hearing loss may be irreversible.***”***

***Question 7: “***What treatments are available for acoustic trauma?***” Answer:*** Immediate removal from noise exposure and rest

* Corticosteroids may be prescribed early to reduce inner ear inflammation (if no contraindications)
* Hearing aids or assistive devices for persistent hearing loss
* Tinnitus management including sound therapy or maskers
* Regular follow-up with an audiologist or ENT specialist.

*Question 8:* ***“***How can acoustic trauma be prevented?***”***

***Answer:***

* Use hearing protection (earplugs, earmuffs) in noisy environments
* Limit exposure time to loud sounds
* Avoid sudden exposure to loud impulse noises when possible
* Educate at-risk populations about noise hazards and protective measures.

*Question 9:* ***“***When should I see a doctor after noise exposure?***” Answer: “***Seek medical evaluation if you experience sudden hearing loss, persistent ringing, ear fullness, dizziness, or difficulty hearing after exposure to loud noise. Early assessment improves the chance of effective treatment.***”***

**DOCTOR-PATIENT CONVERSATIONS**

**Patient:** After the fireworks last night, I noticed my right ear feels full, and I have ringing that won’t go away. I also can’t hear as well as before.  
**Doctor:** That sounds like acoustic trauma from the loud noise. Have you had any dizziness or pain?

**Patient:** No dizziness, but the ringing is quite bothersome.  
**Doctor:** We’ll do an audiogram to check your hearing levels. Early treatment with steroids can sometimes help reduce the damage. Also, it’s important to avoid further loud noise exposure.

**Patient:** I’ve been working around loud machines for years, and lately, I can’t hear conversations well, especially in noisy places.  
**Doctor:** That’s typical of chronic acoustic trauma. Your hearing test shows damage likely from prolonged noise exposure. Using earplugs and limiting noise exposure can help prevent further loss. We can also discuss hearing aids to improve your hearing.

*REFERENCES:*

<https://medlineplus.gov/ency/article/001061.htm>

<https://www.ncbi.nlm.nih.gov/books/NBK609092/>

<https://www.healthline.com/health/ears-ringing-after-concert>

**ADENOTONSILLAR DISEASE**

ALTERNATIVE NAMES: Adenotonsillar disease is also known as “adenoiditis”, and “recurrent tonsillitis”.

**DEFINITION / DESCRIPTION**

Adenotonsillar disease refers to **a prevalent otolaryngologic disorder characterized by chronic inflammation triggered by persistent bacterial infections, primarily involving the adenoids and faucial tonsils**.

These infections are often caused by bacteria such as Staphylococcus aureus, Haemophilus sp., and Streptococcus sp., which persist intracellularly and within mucosal biofilms.

The chronic inflammation leads to the hypertrophy of lymphoid tonsillar tissue, resulting in clinical symptoms such as upper airway obstruction, snoring, sleep apnea, sore throat, dysphagia, and halitosis.

The condition is most common in children, with adenotonsillar hypertrophy peaking in early childhood, roughly between the ages of 2 and 7 years.

Treatment strategies aim to target the persistent bacteria within their biofilm or intracellular shelter.

Adenotonsillar disease broadly refers to disorders involving the adenoids and tonsils, including infections, inflammation, hypertrophy, and related complications.

Tonsillitis specifically refers to inflammation of the palatine tonsils, often due to viral or bacterial infection, and is a common manifestation within the spectrum of adenotonsillar disease.

Adenotonsillar disease includes:

* Infection/inflammation of tonsils (tonsillitis) and adenoids (adenoiditis)
* Obstructive conditions caused by hypertrophy of these lymphoid tissues
* Neoplastic conditions (rare)

Recurrent or chronic tonsillitis is a key clinical entity within adenotonsillar disease, often associated with persistent bacterial infection and immune response leading to tissue hypertrophy and symptoms like sore throat, dysphagia, and halitosis.

In summary, tonsillitis is a major component of adenotonsillar disease, which encompasses both tonsillar and adenoidal pathologies.

**TYPES OF ADENOTONSILLAR DISEASE**

Adenotonsillar disease encompasses a range of conditions involving the adenoids and tonsils, primarily characterized by chronic inflammation triggered by persistent bacterial infections.

The two main types of adenotonsillar disease are **adenoiditis and recurrent tonsillitis**.

1.Adenoiditis refers to the inflammation of the adenoids, which can lead to symptoms such as nasal obstruction, snoring, and sleep apnea.

**ADENOIDITIS**

*ALTERNATIVE NAMES:* Alternative names for adenoiditis include “**inflammation of the adenoids”**. Adenoiditis is also referred to as “adenoid infection”. Additionally, it is sometimes described as part of a broader condition involving the adenoids, such as “adenotonsillitis”, which involves both the adenoids and tonsils.

***ADENOIDS***

Your adenoids are part of your immune system. Located just behind your nasal passage, your adenoids help trap germs that enter your body through your nose and mouth. Your adenoids begin to shrink around age 5, and usually disappear by adulthood

***What are adenoids?***

Your adenoids are glands located in your upper airway, just behind your nasal cavity. Part of your lymphatic and immune system, your adenoids help fight off germs that you breathe in through your mouth and nose.

Adenoids have an important job for babies and young children. They help fight off germs until your child’s body develops another way to combat infections. Here are some interesting facts about adenoids:

* Adenoids grow to their maximum size between ages 3 and 5.
* Adenoids start to shrink by age 7 or 8.
* By adulthood, they’re completely gone.

***What do adenoids do?***

Like your tonsils, your adenoids help fight off bacteria and viruses. White blood cells make this possible. They travel through your adenoids, targeting and trapping germs.

Your adenoids also produce antibodies (proteins in your blood that help fight unknown invaders in your body).

**ANATOMY**

Your adenoids sit above your soft palate, directly behind your nasal passage. Unlike your tonsils, you can’t see your adenoids by looking at your throat.

Your adenoids look like a pink patch of soft tissue. Some people describe the tissue mass as “cauliflower-like.”

The average size of a normal (non-enlarged) adenoid is 6.2 millimeters. The average size of an enlarged adenoid is 11.6 millimeters. (Adenoids can become enlarged due to infection, allergies or other irritants.)

Your adenoids are made of lymphoid tissue — the same type of tissue that your lymph nodes are made of. Lymphoid tissue consists of connective tissue and white blood cells, especially lymphocytes. Lymphocytes make antibodies and play a role in immune response.

**CONDITIONS AND DISORDERS**

When your child’s body is trying to fight something off, their adenoids can become inflamed and enlarged. Enlarged adenoids are most commonly due to:

* Frequent ear infections.
* Upper respiratory infections.
* Recurring (returning) nosebleeds.
* Allergies.

***Signs or symptoms of enlarged adenoids***

Children with enlarged adenoids may not develop symptoms at all. But in some cases, enlarged adenoids can lead to:

* Sore throat.
* Nasal congestion.
* A feeling of fullness in their ears.
* Mouth breathing.
* Trouble sleeping.
* Snoring.
* Obstructive sleep apnea.

***DIAGNOSIS METHODS FOR AN ENLARGED ADENOID***

If your child’s healthcare provider suspects an issue with your child’s adenoids, they may recommend tests, including:

* **Imaging tests.**To get a better view of your child’s nasal passages, sinuses and adenoids, your child’s healthcare provider might take X-rays, CT scans or MRI.
* **Sleep studies.**If enlarged adenoids are causing obstructive sleep apnea or snoring, your child’s healthcare provider may recommend a sleep study.
* **Nasal endoscopy.** During this test, your child’s healthcare provider inserts a flexible tube into your child’s nose. The tube has a light and camera on the end so they can look at the adenoids directly. This way, they can tell if your child’s adenoids are red, inflamed or enlarged.
* **Bacteria culture test.** To see if enlarged adenoids are the result of an infection, your child’s healthcare provider may take a throat culture. This test determines which organisms or bacteria are present.

**TREATMENT OPTIONS**

***How are enlarged adenoids treated?***

Healthcare providers usually start by treating the suspected underlying condition. If nonsurgical treatments don’t work, your child’s healthcare provider might recommend an adenoidectomy.

***Treat the underlying condition***

Once your healthcare provider figures out what’s causing enlarged adenoids, they can begin by treating the root cause.

For example, if your child’s adenoids are enlarged because of allergies, then your child’s healthcare provider may prescribe antihistamines or a nasal corticosteroid spray. If your child’s adenoids are inflamed due to a bacterial infection, then they’ll likely prescribe antibiotics.

**ADENOIDECTOMY**

If nonsurgical methods don’t fix the issue, then your healthcare provider might recommend an adenoidectomy — a surgery to remove your child’s adenoids.

During this outpatient procedure, your child’s surgeon removes your child’s adenoids under general anesthesia. They might do this with traditional instruments or cautery.

Most children recover from adenoidectomy within two to three days. According to research studies, adenoid removal doesn’t increase the frequency of colds or infections.

**DEFINITION / DESCRIPTION**

***What Is Adenoiditis?***

Everyone gets a sore throat from time to time, but sometimes the tonsils in your mouth can become infected. However, tonsils are not the only vulnerable glands in your mouth.

Adenoids, located higher up in the mouth — behind the nose and roof of the mouth — can also get infected. Enlarged and inflamed adenoids, called adenoiditis, can make breathing difficult and lead to recurring respiratory infections.

Adenoiditis is most common in children, but sometimes, it can affect adults as well.

**CAUSES**

***Adenoiditis Causes***

Even though adenoids help filter out germs from your body, sometimes they can get infected with bacteria. When this happens, they also get inflamed and swollen to cause adenoiditis.

Infection with bacteria or viruses is the most common reason you get adenoiditis. But other things can also cause your adenoids to swell or get inflamed. These include:

* Allergies
* Irritation
* Stomach acid

Usually, adenoiditis doesn't happen by itself. You may have other issues at the same time that cause your adenoids to swell. These include:

* Swollen and inflamed tonsils (tonsillitis)
* Sore throat (pharyngitis)
* Sinus or nasal inflammation (rhinosinusitis)
* Stomach acid flowing into your throat and larynx (laryngopharyngeal reflux or silent reflux)

Adenoiditis can happen for a short time or it may last longer depending on what's causing it. If you have irritation in your adenoids over a long time, it can cause your adenoids to remain larger. This condition is called adenoid hypertrophy.

In kids, the adenoids often get bigger early on before they shrink and disappear. But sometimes, adenoids keep getting bigger until they block your nasal passages and block airways.

Many types of infections can cause adenoiditis. It's common to have a respiratory virus before an acute bout of adenoiditis. Viral infections can make infection with bacteria more likely. The most common infectious bacteria in inflamed adenoids include:

* *Haemophilus influenzae*
* *Streptococcus pneumoniae*
* *Streptococcus pyogenes*
* *Staphylococcus aureus*

When adenoiditis is chronic, you'll often have multiple infections at once. You may also have infections that seem to go away and come back repeatedly.

Many agents and pathogens can cause inflammation of the adenoid tissue. A viral upper respiratory tract infection (URI) often precedes acute adenoiditis. In this state, bacterial pathogens can superinfect the tissues and proliferate. The most common bacterial pathogens cultured from adenoid specimens are:

* *Haemophilus influenza*
* *Streptococcus pneumoniae*
* *Streptococcus pyogenes*
* *Staphylococcus aureus*

Chronic adenoiditis is more often a polymicrobial infection and may include anaerobic pathogens. Chronic adenoiditis frequently results from biofilm development and may contribute to recurrent upper respiratory tract infections in children. In most cases of pediatric rhinosinusitis, adenoiditis is involved as well. Allergies are believed to play a role in adenoiditis and subsequent adenoid hypertrophy. Allergens inhaled through the nose come in contact with the adenoid tissue; the adenoid then proliferates to create a response to allergens and produce IgA. Chronic irritation from stomach acid in the setting of gastroesophageal reflux disease (GERD) may also play a role in adenoiditis and adenoid hypertrophy, particularly in infants and young children.

**RISK FACTORS**

***Who Gets Adenoiditis?***

Kids get adenoiditis most often. It isn't more or less likely based on:

* Gender
* Race
* Where you live
* Socioeconomics

It may be more likely when kids are around secondhand cigarette smoke or when parents smoke. But because adenoiditis usually goes along with other conditions, it's hard to know exactly how common it is. It's also hard to tell the difference between adenoiditis and bacterial sinusitis.

**SIGNS / SYMPTOMS**

Symptoms of adenoiditis can vary depending on what is causing the infection but may include:

* Sore throat
* Stuffy nose
* Swollen glands in the neck
* Ear pain and other ear problems
* Postnasal drip
* Fever

When the nose is stuffy from swollen adenoids and related symptoms, it can be difficult to breathe through your nose. Other symptoms of adenoiditis related to nasal congestion or blocked airways include:

* Breathing through the mouth
* Speaking with a nasal sound, as if you are speaking with a pinched nose
* Difficulty sleeping
* Snoring or sleep apnea (a condition where you stop breathing for a short amount of time during sleep)
* Bad breath

**DIAGNOSIS METHODS**

***Adenoiditis Diagnosis***

You can start with your primary care doctor. If your doctor has concerns or you're having problems that come back often, you should see an otolaryngologist or ear, nose, and throat (ENT) specialist. Depending on other related symptoms or conditions you may also see:

* Sleep specialist
* Allergist
* Immunologist
* Gastroenterologist

***Physical exam***

Your doctor may diagnose adenoiditis based on your symptoms, which may include:

* Signs you also have an ear infection
* Fever
* Thick and opaque discharge from your nose
* Postnasal drip
* Blocked nasal passages
* Sore throat
* Bad breath (halitosis)

***Tests for infection or allergy***

They may use a special mirror or endoscope to look at your adenoids. Your doctor also may order other tests to find a cause including:

* Rapid strep test
* Laboratory cultures
* Allergy skin tests

Your doctor may want to figure out what's causing your adenoiditis to decide on treatment. For example, if you have strep, you'll take antibiotics. It can also help to figure out if you're getting recurrent strep infections and may need to have your adenoids taken out.

Blood count tests can help to decide if you may have another condition. Your doctor may consider testing for HIV or other conditions if you have other signs indicating that your immune system isn't working well.

Skin testing can help check if you are allergic to anything in the environment, which might explain your adenoiditis.

***Imaging tests***

Most of the time your doctor won't order other imaging tests. But they may want to look deeper into your sinuses for signs of infection or to see if you have adenoid hypertrophy. Imaging tests include:

* X-ray of your neck
* CT of your sinuses

***Sleep study***

A sleep study can check if you have sleep apnea.

***Clinical Evaluation***

The diagnosis of acute adenoiditis is made clinically based on the findings of:

* Possible concurrent acute otitis media
* Fever
* Purulent rhinorrhea
* Post-nasal drip
* Nasal obstruction
* Throat pain
* Halitosis

Visual inspection of the adenoids may be attempted using a laryngeal mirror or nasal endoscope.

***Radiology Testing***

* Lateral neck X-ray
* Computed tomography (CT) of the sinuses

Sinus X-rays or sinus CTs may be obtained to look for a source of infection in the sinuses if this is suspected clinically. This is rarely required in routine cases. Lateral neck X-rays are an effective way to evaluate specifically for adenoid hypertrophy. A sleep study can be obtained to rule out obstructive sleep apnea in a patient with adenoid hypertrophy who snores.

**TREATMENT OPTIONS**

***Adenoiditis Treatment***

Your treatment will depend on what's causing your adenoiditis and any related complications you may have.

***Treating adenoiditis and infection***

If your adenoiditis might be coming from a run-of-the-mill virus, such as the common cold, you probably won't need any treatment. You shouldn't take antibiotics to treat a viral illness. Often, the swelling in your adenoids will go away within five to seven days as you get over the virus.

If your symptoms don't go away or you have a bacterial infection, adenoiditis is treated with antibiotics. Antibiotics used to treat adenoiditis may include:

* Amoxicillin
* Clarithromycin
* Azithromycin

If adenoiditis is related to a bacterial infection and the antibiotic is working, it should help your symptoms get better within two to three days. You'll likely take the medicine for 10 days to make it less likely to come back and help prevent the bacteria from becoming resistant to treatment. If the first round of antibiotics doesn't work, your doctor may suggest you try a different one.

Other steps you take at home also may help, such as saline sprays or nasal rinses.

***Treating adenoiditis and allergies***

If you have allergies, it may help to use:

* Nasal steroid sprays
* Steroids
* Antihistamines
* Saline sprays or rinses

***Treating adenoiditis and reflux***

If you have adenoiditis and your doctor thinks it's related to acid reflux or gastroesophageal reflux disease (GERD), they may suggest:

* Changes to your diet
* Sleeping with your head elevated
* Medicine such as H2 blockers or proton-pump inhibitors

***Adenoiditis and surgery***

If you or your child has frequent infections, including ear and sinus infections, if antibiotics don't help, or if your child has ongoing breathing problems, the doctor may refer you to a specialist (an otolaryngologist or ear, nose and throat doctor) who can discuss surgery to remove the adenoids. This procedure is called an adenoidectomy.

The specialist may also recommend the tonsils be removed at the same time since adenoiditis and tonsillitis often go hand in hand. Surgery to remove the tonsils is called a tonsillectomy.

Discuss the pros and cons of surgery with your doctor to decide if it's a good idea or if there are other options you might try first.

***What Happens During an Adenoidectomy?***

An adenoidectomy is performed by a doctor who specializes in ear, nose, and throat surgery. It occurs in a hospital or outpatient surgical center under general anesthesia, meaning you're put to sleep.

The tonsils and/or adenoids can be removed through the mouth so no additional incisions are made except for where the tissues are removed. Your doctor may do other procedures, such as putting tubes in the ears to drain fluid and relieve pressure.

Most people can go home following the procedure. But you should expect to be in the surgical center for around four or five hours after the surgery for monitoring. Your doctor can give you more specific instructions as to what to expect.

***Recovery From Adenoidectomy***

After surgery, your child may feel nauseous until the anesthesia completely wears off. In the week following the adenoidectomy, your child may experience the following:

* Sore throat. Your child's throat may be sore for 7-10 days following the procedure, and eating can be uncomfortable.
* Fever. Your child may have a low fever several days after the surgery. If the fever gets higher than 102 F, call the doctor. Seek medical attention if fever is accompanied by other symptoms such as lethargy, nausea, vomiting, decreased urine output, headache, or stiff neck.
* Mouth breathing. Mouth breathing and snoring may occur after the surgery, due to swelling in the throat. Breathing should return to normal once the swelling goes down, usually 10 to 14 days after surgery. Seek medical attention if there is difficulty breathing.
* Pain. Some throat and ear pain is normal for a few weeks following surgery. The doctor should prescribe medicine to help control pain.
* Scabs in the mouth. Thick, white scabs will develop where the tonsils and/or adenoids were removed. This is normal and most scabs fall off in small pieces within 10 days after surgery. Do not let your child pick at the scabs. These scabs may also cause bad breath.

***Tips to ease recovery following adenoidectomy***

* Feed your child soft foods, such as scrambled eggs, Jell-O, soup, and popsicles. Lukewarm or slightly chilled foods are best.
* Make sure your child drinks plenty of fluids to avoid dehydration.
* Have your child rest as much as possible for the first few days following surgery. Your child should be able to return to school once they can eat regular foods again, no longer need pain medication, and sleep soundly through the night.

***Adenoidectomy: Warning Sign***

If you notice bright red blood coming from your child's mouth or nose, call the doctor right away or take your child to the emergency room. This may indicate the scabs have come off too soon. Small spots of blood in the nose or in the saliva may be expected. Also, if breathing becomes so difficult that your child is wheezing, making loud noises while breathing, or drooling, seek immediate medical care. This may be a sign of excessive swelling in the surgical area and should be looked at immediately.

Surgery should never be taken lightly. Make sure you have all your questions answered before making a decision. If you have any doubts, seek a second opinion from another qualified doctor.

***MANAGEMENT OF ADENOIDITIS***

Adenoiditis is often seen clinically as a component of rhinosinusitis or pharyngitis. Because of this, healthcare providers often follow clinical management guidelines for rhinosinusitis and pharyngitis when approaching adenoiditis treatment.

**MEDICAL MANAGEMENT**

**Observation**

If clinicians believe the cause of adenoiditis is the common cold or viral infection, they should refrain from using antibiotics. Typically, uncomplicated upper respiratory viral infections resolve within 5 to 7 days.

**Antibiotic Treatment**

If symptoms continue or clinical presentation suggests bacterial etiology, such as a high fever or purulent discharge from the nose or throat, the first-line management is antibiotics covering the most common pathogens. Amoxicillin is a commonly used first-line agent due to its good coverage and minimal side-effect profile. Alternatively, cefdinir or cefuroxime may be used, particularly if the patient has not responded to amoxicillin. If the patient has a penicillin allergy, alternatives include clarithromycin or azithromycin. Effective antibiotic treatment should improve symptoms in 48 to 72 hours. Treatment duration should be 10 days, as treating for a shorter duration yields significant relapse rates and breeds antibiotic resistance. If the condition fails to improve after a course of amoxicillin or other first-line agents, amoxicillin-clavulanate should be prescribed to eliminate potential beta-lactamase-producing organisms. Saline sprays and nasal rinses may also shorten the duration of symptoms by irrigating out the causative microorganisms and the stagnant mucous secretions that may harbor them.

**Allergy Treatment**

Suppose adenoiditis is believed to be secondary to environmental allergies. In that case, the patient can be given a trial of nasal steroid sprays, oral steroids, oral antihistamines, or some combination thereof to see if this produces any relief in symptoms. If this is effective, the patient may benefit from formal allergy testing followed by immune-modulating therapy to provide definitive relief. Saline sprays and nasal rinses may also play a role in these cases.

**Reflux Treatment**

If the adenoiditis is believed to be secondary to LPR/GERD, treatment of this condition using lifestyle and diet modification and elevation of the head of the bed with or without the use of H2 blockers or proton-pump inhibitors may provide sufficient relief of symptoms.

**SURGICAL MANAGEMENT**

**Adenoidectomy**

In the absence of symptomatic improvement after treatment with amoxicillin-clavulanate or if the patient has multiple episodes of adenoiditis requiring antibiotic treatment, referral to an otolaryngologist is warranted for further evaluation and potential surgical intervention.

Depending on the circumstances, surgical procedures may include adenoidectomy with or without tonsillectomy, myringotomy with tympanostomy tube placement, or endoscopic sinus surgery. If the patient meets the Paradise criteria for tonsillectomy, most otolaryngologists remove the adenoids simultaneously to remove another possible source of recurrent infections.Similarly, most otolaryngologists remove the adenoids if patients require repeat tympanostomy and placement of pressure equalization tubes after the first set due to the potential for adenoid hypertrophy to cause chronic Eustachian tube dysfunction.

**PREVENTION TIPS**

***Adenoiditis Prevention***

It's hard to prevent adenoiditis since any kind of virus, bacterial infection, or allergy can cause it. If you think you or your child has adenoiditis that aren't going away or keeps coming back, see a doctor to get a diagnosis. Treatment can help avoid adenoiditis complications or symptoms that can affect your quality of life.

To prevent adenoiditis, it is important to maintain good hygiene practices, as this can minimize the chance of infection. Eating healthy foods and drinking plenty of fluids is also recommended.

Additionally, managing conditions that cause acid reflux may help prevent adenoiditis. For individuals with allergies, avoiding known allergens and reducing exposure to triggers can be beneficial. Using a nasal saline rinse to wash out the nose each day may also help manage allergies and reduce the risk of adenoiditis.

**OUTLOOK / PROGNOSIS**

Adenoiditis is an inflammation of the adenoids, which are located in the back of the throat and play a role in the immune system by trapping germs. The outlook for adenoiditis is **generally positive**, with most cases resolving with appropriate treatment. For acute cases, symptoms often improve within 5–7 days without treatment, especially if caused by a viral infection. If a bacterial infection is the cause, antibiotics can effectively treat the condition, with symptoms typically improving within 48–72 hours.

In cases of chronic adenoiditis, which persists for at least 90 days, the outlook may be more complex. Chronic adenoiditis can be caused by a combination of factors, including bacterial infections, allergies, and acid reflux. Treatment may involve a combination of antibiotics, allergy management, and lifestyle changes to address acid reflux. In some cases, surgery to remove the adenoids (adenoidectomy) may be necessary, especially if the condition leads to recurrent infections, sleep apnea, or other complications.

Adenoidectomy is a common and generally safe procedure, particularly in children between the ages of 1 and 7 years. The surgery is performed under general anesthesia, and most children recover fully within a week or two. While there are potential risks associated with any surgery, such as reactions to anesthesia or excessive bleeding, these are rare. After surgery, children typically experience fewer breathing and ear problems, and their immune systems remain strong.

For adults, adenoiditis is less common because the adenoids usually shrink and disappear by adolescence. However, if adenoiditis does occur in adults, it can be more challenging to treat, and the outlook may depend on the underlying cause and the presence of any associated conditions. Overall, the outlook for adenoiditis is favorable with proper management and treatment.

**POSSIBLE COMPLICATIONS**

***Adenoiditis Complications***

Adenoiditis can go away on its own depending on the cause. When treatment is needed, it usually gets better. Surgery to remove the adenoids is typically effective for chronic or recurrent cases of swollen adenoids and adenoiditis.

If you have adenoiditis from an infection that isn't going away and you don't treat it, a biofilm could form. Biofilms are slimy layers of microbes that form on surfaces. A biofilm can cause you to keep getting adenoid infections and lead to other problems.

When enlarged adenoids cause breathing difficulties or obstructive sleep apnea, they can lead to other problems if left untreated. In kids, these may include problems with:

* Sleep
* Thinking
* Learning
* Emotions
* Behavior

**WHEN TO SEE A DOCTOR / RED FLAG**

If a child is experiencing symptoms of adenoiditis, it is important to see a doctor **if the symptoms persist or worsen**. Symptoms such as difficulty breathing, pain, sore throat, runny nose, or ear pain may indicate the need for medical attention.

Additionally, if there are signs of infection, such as a high fever or purulent discharge from the nose or throat, a doctor should be consulted.

In cases where adenoiditis does not improve with medication, surgery may be recommended. It is also advisable to seek medical care if there are concerns about obstructive sleep apnea or other complications related to enlarged

**DIFFERENTIAL DIAGNOSIS**

Differential diagnosis for adenoiditis includes the following:

* Viral URI
* Sinusitis
* Rhinosinusitis
* Nasal polyposis
* Pharyngitis
* Tonsillitis
* Seasonal/environmental Allergies
* Nasopharyngeal neoplasm
* LPR
* Lymphoma
* HIV

The differential diagnosis for adenoiditis includes conditions such as **bacterial sinusitis**, as adenoiditis can be challenging to differentiate from bacterial sinusitis in children.

Other conditions that may be considered include infections, allergies, or irritation from stomach acid, which can cause similar symptoms.

Additionally, adenoiditis may occur alongside other regional disease processes such as adenotonsillitis, pharyngitis, rhinosinusitis, or laryngopharyngeal reflux.

**RECENT GUIDELINES OR UPDATES**

Adenoiditis is an inflammation of the adenoids, which are masses of lymphatic tissue located in the throat behind the nose. It can be caused by infections, allergies, or stomach acid reflux.

Recent guidelines for the management of adenoiditis emphasize the importance of clinical indicators and appropriate treatment approaches. For instance, four or more episodes of recurrent purulent rhinorrhea in the past 12 months in a child under 12 years of age, with one episode documented by intranasal examination or diagnostic imaging, is a key indicator for considering adenoidectomy.

In terms of treatment, oral intake of amoxicillin and clavulanate potassium for 10 days is still a treatment choice for children, although the treatment effects remain unsatisfactory.

Additionally, both montelukast and glucocorticoids for nasal inhalation have shown good efficacy in treating adenoidal hypertrophy in some patients. For chronic adenoiditis, systemic or local antibacterial treatments are effective, and some patients have benefited from these treatments.

Adenoidectomy is a common procedure for children between 1 and 7 years old, as adenoids naturally begin to shrink around age 7 and are almost completely gone by the teens. The surgery is generally safe, but like any surgery, it carries potential risks such as a reaction to anesthesia, excessive bleeding, and the possibility of adenoids growing back.

Recent research suggests that removing a child's adenoids or tonsils may increase their risk of developing respiratory, infectious, and allergic conditions later in life. Therefore, the decision to undergo adenoidectomy should be made after careful consideration of the benefits and risks with a healthcare provider.

**EPIDEMIOLOGY**

Exact incidence and prevalence statistics for adenoiditis alone are challenging to elucidate, as adenoiditis is usually addressed in the context of a regional disease process such as rhinosinusitis and adenotonsillar disease.

Since adenoid tissue atrophies during puberty, adenoiditis is typically a disease in children. Current literature does not suggest a predilection for gender, race, region, or socioeconomic class in this disease, though parental smoking has been positively correlated.

Adenoiditis can be challenging to differentiate from bacterial sinusitis in children. Therefore, statistics on sinusitis in children may give us some idea of the frequency of adenoiditis. Estimates are that children have 6 to 8 viral URIs per year. Five to 13 percent of these viral URIs result in bacterial superinfection, leading to sinusitis with adenoiditis as a potential component of the illness.

**PREDEFINED Q & A SETS**

*Question 1:* ***“*What is adenoiditis?*”***

***Answer: “***Adenoiditis is inflammation of the adenoids, which are lymphoid tissues located at the back of the nasal passage. This inflammation is usually caused by infection with bacteria or viruses, but allergies, irritation, or stomach acid reflux can also cause swelling.***”***

*Question 2:* ***“*What causes adenoiditis?*”***

The most common causes are bacterial or viral infections. Bacteria such as *Haemophilus influenzae*, *Streptococcus pneumoniae*, *Streptococcus pyogenes*, and *Staphylococcus aureus* often infect the adenoids. Allergies, irritation, and acid reflux may also contribute.

*Question 3: “***Who gets adenoiditis?*”***

***Answer: “***Adenoiditis occurs most often in children because their adenoids are larger and more active in fighting infections. It is not linked to gender, race, or socioeconomic status but may be more common in children exposed to secondhand smoke.***”***

*Question 4:* ***“*What are the symptoms of adenoiditis?***”*

*Answer:* Common symptoms include:

* Nasal congestion or blocked nasal passages
* Thick nasal discharge
* Postnasal drip
* Sore throat
* Bad breath
* Ear infections or ear pain
* Mouth breathing and snoring
* Fever
* Difficulty sleeping or sleep apnea in severe cases

*Question 5:* ***“*How is adenoiditis diagnosed?*”***

***Answer:*** Diagnosis is based on symptoms and physical examination. Doctors may use:

* Nasal endoscopy or a special mirror to view the adenoids
* Rapid strep tests or cultures to identify bacterial infection
* Allergy testing if allergies are suspected
* Imaging (X-ray or CT) in some cases to assess adenoid size or sinus involvement
* Sleep studies if sleep apnea is suspected

*Question 6:* ***“*How is adenoiditis treated?”**

* **Viral infections:** Usually resolve on their own without antibiotics.
* **Bacterial infections:** Treated with antibiotics such as amoxicillin, clarithromycin, or azithromycin.
* **Allergies:** Managed with nasal steroid sprays, antihistamines, or saline rinses.
* **Acid reflux-related:** Dietary changes, elevated sleeping position, and medications like proton pump inhibitors may help.

*Question 7: “***When is surgery needed?*”***

***Answer:*** An adenoidectomy (surgical removal of the adenoids) may be recommended if:

* Infections are frequent or chronic and do not respond to antibiotics
* Adenoids cause significant nasal obstruction or breathing problems
* There are recurrent ear infections or persistent middle ear fluid
* Sleep apnea or disturbed sleep is present due to enlarged adenoids  
  Tonsillectomy may be done at the same time if tonsils are also problematic.

*Question 8:* ***“*What are the risks of adenoidectomy?*”***

***Answer: “***Surgery is generally safe but may carry risks such as bleeding, infection, or anesthesia complications. Discuss benefits and risks with your doctor.***”***

*Question 9:* ***“*Can adenoiditis be prevented?*”***

***Answer: “***Avoiding exposure to cigarette smoke, managing allergies, and treating infections promptly can reduce the risk. Good hygiene and avoiding close contact with sick individuals also help.***”***

***Question 10: “*Are tonsillitis and adenoiditis the same?*”***

***Answer: “***No. These are not the same conditions. But it's not uncommon to have tonsillitis and adenoiditis at the same time.”

***Question 11: “*What is the pathology of adenoiditis?*”***

***Answer: “***The pathology of adenoiditis involves inflammation in the adenoids, typically due to infection, but other things can also cause it. The condition can be acute or chronic, depending on how long it lasts and how severe it is.”

***Question 12:* “Is adenoiditis contagious?”**

***Answer:*** “It depends on what's causing it. If adenoiditis is caused by a viral or bacterial infection, you may be able to spread the illness to other people. But people react to infections differently. Not everyone who is exposed will necessarily develop adenoiditis.”

***Question 13:* “What are the long-term risks of adenoid removal?”**

***Answer:*** “Removing adenoids may help if you're having recurrent problems or adenoid infections that don't go away. But there's evidence that removing adenoids and tonsils can lead to more risk for respiratory, infectious, and allergic diseases later. One study linked adenoid removal to an increased risk for chronic obstructive pulmonary disease (COPD), upper respiratory tract disease, and conjunctivitis.”

***Question 14:* “Can adenoid removal help with sleep apnea?”**

***Answer:*** “Yes. If enlarged adenoids play a role in your obstructive sleep apnea by blocking nasal passages, taking them out should help.”

**DOCTOR-PATIENT CONVERSATIONS**

**Doctor:** Hello, what brings you in today?  
**Patient (parent of child):** My child has had a blocked nose and a runny nose for weeks. He breathes through his mouth and snores at night.

**Doctor:** Has he had frequent ear infections or sore throats?  
**Parent:** Yes, several times in the past few months.

**Doctor:** It sounds like your child may have enlarged or infected adenoids causing nasal obstruction and recurrent infections. We’ll do a physical exam and possibly an X-ray or nasal endoscopy to check the adenoids.  
**Parent:** What treatments are available?

**Doctor:** If it’s an infection, antibiotics might help. For persistent symptoms or obstruction, an adenoidectomy, which is surgical removal of the adenoids, may be recommended.

**Patient:** I keep getting nasal congestion and postnasal drip. Sometimes I have a sore throat and bad breath.  
**Doctor:** These symptoms can be due to adenoiditis, inflammation of the adenoids. Do you have allergies or acid reflux?

**Patient:** I do have seasonal allergies.  
**Doctor:** Treating your allergies with nasal steroids and antihistamines can reduce the inflammation. If infections recur or symptoms persist, we may consider further evaluation or surgery.

*REFERENCES:*

<https://my.clevelandclinic.org/health/body/23181-adenoids>

<https://www.webmd.com/children/child-throw-up-no-fever>

<https://www.ncbi.nlm.nih.gov/books/NBK536931/>

<https://pubmed.ncbi.nlm.nih.gov/22452646/>

**TONSILLITIS**

ALTERNATIVE NAMES: Here are some **alternative names and related terms for tonsillitis**:

* **Tonsil infection**
* **Tonsillar infection**
* **Tonsillar pharyngitis**
* **Acute tonsillitis** (when sudden onset)
* **Chronic tonsillitis** (when persistent or recurrent)
* **Strep throat** (specifically when caused by *Streptococcus* bacteria)
* **Tonsillar inflammation**
* **Tonsillar hypertrophy** (when tonsils are enlarged, often related but not always infectious)

**DEFINITION / DESCRIPTION**

Tonsillitis refers to the inflammation of the tonsils, which are lymph nodes located in the back of the throat. There are several types of tonsillitis, which are categorized based on their cause, duration, and severity. The primary types include:

* **acute,**
* **chronic,**
* **recurrent,**
* **peritonsillar abscess (quinsy)**.

1. **Acute tonsillitis** is the most common type and typically occurs suddenly. It is often caused by viral or bacterial infections, with streptococcus bacteria being a common cause. Symptoms include a sore throat, swollen tonsils, and difficulty swallowing. Acute tonsillitis usually lasts for a few days to two weeks.
2. **Chronic tonsillitis** refers to a persistent or long-lasting infection. It may occur when an acute infection does not fully resolve or due to repeated infections. Symptoms may include a chronic sore throat, bad breath, and swollen lymph nodes. Treatment often involves antibiotics, and in severe cases, a tonsillectomy may be recommended.
3. **Recurrent tonsillitis** is characterized by multiple episodes of acute tonsillitis within a year. This type may require more aggressive treatment, including antibiotics or surgical removal of the tonsils, especially if the infections are frequent or severe.

Recurrent tonsillitis involves repeated episodes of tonsil inflammation, resulting in sore throat, dysphagia, and halitosis.

1. **Peritonsillar abscess**, also known as quinsy, is a severe form of tonsillitis where an abscess or pocket of pus develops around the tonsil. It is more common in adolescents and adults and can cause symptoms such as severe throat pain, difficulty opening the mouth, and fever.

In addition to these types, tonsillitis can also be classified based on the causative agent, such as viral or bacterial. Viral tonsillitis is more common and usually resolves on its own, while bacterial tonsillitis may require antibiotics for treatment.

**ACUTE TONSILLITIS**

ALTERNATIVE NAMES: Acute tonsillitis is also referred to as “**tonsillopharyngitis” or “pharyngotonsillitis”**, depending on the clinical findings. It can also be called “strep throat” when caused by group A streptococcus.

***What is acute tonsillitis?***

Tonsillitis refers to the inflammation of the tonsils, which are lymph glands located in the back of the throat that are visible through the mouth. Acute tonsillitis **typically has a rapid onset and is characterized by symptoms such as sore throat, fever, enlargement of the tonsils, trouble swallowing, and enlarged lymph nodes around the neck**.

The condition can be caused by either a viral or bacterial infection, with viral infections being the most common cause. When caused by the bacterium group A streptococcus, it is classified as streptococcal tonsillitis, also referred to as strep throat.

**CAUSES OF ACUTE TONSILLITIS**

***What are the causes of acute tonsillitis?***

Acute tonsillitis is primarily caused by viral infections, although bacterial infections can also be responsible. Viruses such as the common cold virus are frequent causes, and bacterial infections, particularly those caused by group A streptococcus, are also common.

Other bacteria, including Neisseria gonorrhoeae, Corynebacterium diphtheriae, and Haemophilus influenzae, can occasionally lead to acute tonsillitis. The infection is typically spread between people through the air.

**RISK FACTORS**

***What are the risk factors for acute tonsillitis?***

Tonsillitis is an inflammation of the tonsils, which are two masses of tissue in the back of the throat. It is most common in children and can be caused by both viral and bacterial infections.

The risk factors for acute tonsillitis include:

* age, with children between the ages of 5 and 15 being more likely to get tonsillitis caused by bacterial infections, while very young children have a higher risk of tonsillitis caused by viral infections.
* Children who attend school, daycare, or camp are more likely to spread the germs that can cause tonsillitis, as they are frequently in close contact with each other. Adults can still get tonsillitis, but it is not as common.
* Adults who frequently work with children, like teachers, may have a higher risk of infections that can lead to tonsillitis.

Other risk factors include:

* exposure to germs, with those who work or go to school in buildings with lots of other people having a higher risk of encountering the germs that cause tonsillitis.
* The weather can also influence the risk of getting tonsillitis, with hotter weather and higher levels of smog being associated with an increased chance of tonsillitis.
* Additionally, certain people are predisposed to recurring bacterial tonsillitis infections, with research suggesting that the balance of immune cells your body produces might determine whether you are more likely to have recurring episodes of tonsillitis.

**SIGNS / SYMPTOMS OF ACUTE TONSILLITIS**

Acute tonsillitis is characterized by several symptoms, including:

* **sore throat,**
* **fever,**
* **enlargement of the tonsils,**
* **trouble swallowing, and**
* **enlarged lymph nodes around the neck**.

Additional symptoms may include:

* swollen, red tonsils that may look yellow, gray, or white,
* as well as tonsillar exudate or swelling.
* Patients may also experience odynophagia and dysphagia secondary to tonsillar swelling.

In cases of strep throat, symptoms typically include:

* fever,
* swollen lymph nodes,
* red spots on the roof of the mouth, and
* white streaks on the back of the throat.

Other possible symptoms are:

* nausea,
* headaches,
* stomach pain, or
* a rash.

**DIAGNOSIS METHODS FOR ACUTE TONSILLITIS**

The diagnosis of acute tonsillitis typically involves a combination of clinical evaluation and laboratory tests. Healthcare providers examine the throat for signs of redness and swelling, and they may look for other symptoms such as fever, swollen lymph nodes, and a sore throat.

To determine whether the infection is viral or bacterial, a bacteria culture test may be performed, where a swab is taken from the back of the throat to check for the presence of Group A Streptococcus bacterium.

Additionally, a complete blood count (CBC) can be used to help determine if the infection is more likely caused by a bacterial or viral agent.

The differentiation between sore throat and tonsillitis patient episodes is mostly not feasible and hence is not relevant for diagnostic decision making.

**TREATMENT OPTIONS FOR ACUTE TONSILLITIS**

Acute tonsillitis is typically managed with supportive care, as it is often caused by viral infections and is self-limiting. Treatment options include:

* **Supportive care**: This involves maintaining hydration, using analgesia such as nonsteroidal anti-inflammatory drugs (NSAIDs), and managing symptoms. Corticosteroids may also be considered to decrease pain scores and improve recovery time.
* **Antibiotics**: If the infection is bacterial, particularly caused by group A beta-hemolytic streptococcus (GABHS), antibiotics are prescribed. Common antibiotics include penicillins, cephalosporins, macrolides, and clindamycin. Penicillin V is often the first-line treatment for bacterial tonsillitis, with a typical dosage of 500 mg two to three times daily for adults and 250 mg two to three times daily for children weighing ≤ 27 kg. For patients allergic to penicillin, alternatives such as azithromycin or clindamycin may be used.
* **Hospitalization**: In severe cases, hospitalization may be required for **intravenous hydration, antibiotics, and pain control**.
* **Tonsillectomy**: Surgery to remove the tonsils may be considered for recurrent or chronic tonsillitis, or if there are complications such as peritonsillar abscess.

It is important to complete the full course of antibiotics as prescribed to prevent complications such as rheumatic fever and to reduce the risk of recurrence.

**PREVENTION TIPS FOR ACUTE TONSILLITIS**

To prevent acute tonsillitis, **practicing good hygiene** is essential. This includes

* washing your hands often, especially before touching your nose or mouth.
* Avoid sharing foods, drinks, or utensils with someone who’s sick.
* Additionally, using a cool mist humidifier can help relieve throat discomfort and reduce irritation caused by dry air.
* It is also important to replace your toothbrush every three months and every time you get sick.
* Lastly, if you or your child have a high temperature or do not feel well enough to do your usual activities, try to stay at home and avoid contact with other people until you feel better.

**OUTLOOK / PROGNOSIS FOR ACUTE TONSILLITIS**

Acute tonsillitis is a common condition that typically presents with symptoms such as a sore throat, difficulty swallowing, fever, and tiredness. Most cases are caused by viral infections, which usually resolve on their own within a few days. Bacterial infections, such as those caused by group A streptococcus, can also lead to tonsillitis and may require antibiotic treatment to prevent complications.

The majority of patients with acute tonsillitis experience a self-limiting course, with **symptoms typically improving within 3 to 4 days**. Supportive care, including rest, hydration, and over-the-counter pain relievers, is often sufficient for managing symptoms. In cases of bacterial tonsillitis, antibiotics such as penicillin are commonly prescribed, and it is important to complete the full course of treatment to avoid complications.

Complications of acute tonsillitis are rare but can include peritonsillar abscess (quinsy), which may require drainage or other interventions. In some cases, recurrent or chronic tonsillitis may necessitate a tonsillectomy, although this is typically reserved for severe or frequent cases.

Overall, the outlook for acute tonsillitis is **generally favorable**, with most individuals recovering fully without long-term issues. However, it is important to seek medical attention if symptoms persist or worsen, as this may indicate the need for further evaluation or treatment.

**POSSIBLE COMPLICATIONS OF ACUTE TONSILLITIS**

Acute tonsillitis can lead to several complications, although they are relatively rare. One of the most common complications is a peritonsillar abscess, also known as quinsy, which is a collection of pus that forms around the tonsil and can cause severe pain and difficulty swallowing.

Other potential complications include:

* obstructive sleep apnea,
* ear infections, and
* more severe issues such as a spread of infection to other parts of the body.

In some cases, acute tonsillitis can lead to **rheumatic fever**, a serious inflammatory condition that can affect the heart, joints, nervous system, and skin. Additionally, poststreptococcal glomerulonephritis, an inflammation of the kidneys, can occur as a complication of a streptococcal infection.

Rare but serious complications can include **toxic shock syndrome, which can be life-threatening, and infections that spread to the lining of the brain (meningitis) or cause brain abscesses**. Infections can also spread through the Eustachian tube to cause ear infections or via the back of the nose into the sinuses to cause sinus infections.

In some cases, particularly when tonsillitis is caused by group A streptococcus, there is a risk of developing post-streptococcal arthritis, which is inflammation of the joints that occurs within a month of the original infection. Another rare complication is PANDAS, a controversial condition believed to be associated with group A streptococcal infections and characterized by obsessive-compulsive disorder and/or tic disorders.

It is important to note that while these complications can occur, they are not common, and most cases of acute tonsillitis resolve on their own within a week. If symptoms persist or worsen, it is advisable to seek medical attention for proper diagnosis and treatment.

**WHEN TO SEE A DOCTOR / RED FLAG**

**If you experience severe symptoms or they do not improve quickly**, you should see a doctor. Additionally, seek medical attention if your symptoms become severe or last longer than four days without any noticeable improvement. If tonsillitis turns into a more severe infection, you should seek medical attention right away.

**DIFFERENTIAL DIAGNOSIS OF ACUTE TONSILLITIS**

Acute tonsillitis has several differential diagnoses that need to be considered based on clinical features and diagnostic tests. These include conditions such as **epiglottitis, infectious mononucleosis, and squamous cell carcinoma**. Epiglottitis is characterized by an acute and severe onset, with features such as a muffled voice, drooling, and stridor. Infectious mononucleosis, often caused by the Epstein-Barr Virus, presents with pharyngitis of longer duration, splenomegaly, and specific laboratory findings such as a raised white blood cell count with lymphocytosis and a positive Monospot test in patients over four years old. Squamous cell carcinoma may present with unilateral tonsillar enlargement, dysphonia, and ulcers.

Other conditions to consider include scarlet fever, which is caused by Streptococcus pyogenes and presents with a characteristic rash, fever, and other systemic symptoms. Additionally, conditions such as pharyngitis, bacterial tracheitis, and retropharyngeal abscess can present with similar symptoms and require careful differentiation based on clinical examination and diagnostic tests.

In the context of differential diagnosis, it is also important to consider other infections such as those caused by the Epstein-Barr Virus, which can lead to infectious mononucleosis, and other viral infections that can cause sore throat and pharyngitis. The presence of specific symptoms and signs, along with laboratory investigations, can help in distinguishing between these conditions and acute tonsillitis. For example, the presence of a rash, specific laboratory findings, and the clinical course can aid in differentiating between these conditions.

**RECENT GUIDELINES FOR UPDATES**

Recent guidelines for acute tonsillitis **emphasize the use of clinical scoring systems such as the Centore score or McIsaac score to estimate the probability of group A beta-hemolytic streptococcus (GABHS) infection**. These scores help in deciding whether to perform a rapid antigen detection test or culture to identify GABHS.

For the treatment of GABHS pharyngitis, **penicillin is the first-line agent, with options including penicillin V, amoxicillin, or penicillin G benzathine**. Alternative antibiotics such as cephalosporins, macrolides, or other agents may be used in cases of penicillin allergy or failure.

In cases of recurrent tonsillitis, watchful waiting is recommended if there have been fewer than seven episodes in the past year, fewer than five episodes per year over the past two years, or fewer than three episodes per year over the past three years. Surgical intervention, such as tonsillectomy, is considered for severe cases with a high number of episodes or significant complications.

Diagnostic approaches also include the use of scoring systems to assess the likelihood of bacterial infection, with a score of ≥3 suggesting the need for further testing. Routine blood tests are not indicated for acute tonsillitis, and there is no need to repeat pharyngeal swabs or other tests after acute streptococcal tonsillitis.

These guidelines aim to reduce inappropriate variation in clinical care, improve clinical outcomes, and reduce harm by providing a clinically focused, multi-disciplinary approach to the management of acute tonsillitis.

**EPIDEMIOLOGY FOR ACUTE TONSILLITIS**

Acute tonsillitis is a common condition that affects a significant portion of the population, particularly children. It makes up **approximately 1.3% of outpatient visits**. The condition is predominantly the result of a viral or bacterial infection, with viral etiologies being the most common.

In terms of age distribution, acute tonsillitis most commonly affects children between preschool ages and the mid-teenage years. Bacterial causes, such as group A beta-hemolytic Streptococcus (GABHS), are more common in children aged 5 to 15 years, while viral causes are more prevalent in patients under five years of age. GABHS accounts for 5% to 15% of adults with pharyngitis and 15% to 30% of patients between the ages of five and fifteen.

The prevalence of acute tonsillitis can vary, but it is estimated that **approximately 2% of ambulatory patient visits in the United States are due to a sore throat**, which can be a symptom of acute tonsillitis. The condition can occur at any time during the year, but it is more common in winter and early spring.

In terms of recurrence, there is an ongoing debate on the indications for tonsil surgery in both children and adults with recurrent acute tonsillitis. Tonsillectomy is indicated and is highly effective if the patient has had ≥7 adequately treated episodes in the preceding year, ≥5 such episodes in each of the preceding 2 years, or ≥3 such episodes in each of the preceding 3 years.

It is important to note that the exact epidemiology can vary based on geographical location, population characteristics, and the specific pathogens involved.

The condition is also associated with a significant economic burden, with pediatric streptococcal pharyngitis (or tonsillitis) in the US costing an estimated $224–$539 million per year, including indirect costs related to parental work losses

**PREDEFINED Q & A SETS FOR ACUTE TONSILLITIS**

*Question 1:* ***“*What is acute tonsillitis?*”***

***Answer: “***Acute tonsillitis is a sudden inflammation of the tonsils, usually caused by a viral or bacterial infection, leading to sore throat, swollen tonsils, and difficulty swallowing.***”***

*Question 2:* ***“*What causes acute tonsillitis?*”***

***Answer: “***Most cases are caused by viruses, but bacterial infections, especially Group A Streptococcus, can also cause tonsillitis.***”***

*Question 3:* ***“*How is acute tonsillitis diagnosed?*”***

***Answer: “***Diagnosis is based on symptoms and physical examination. A throat swab may be done to identify bacterial infection, particularly to detect strep throat.***”***

*Question 4:* ***“*How is acute tonsillitis treated?*”***

***Answer:***

* **Viral tonsillitis:** Usually resolves on its own with rest, fluids, and symptom relief.
* **Bacterial tonsillitis:** Treated with a full course of antibiotics, commonly penicillin or alternatives if allergic.
* Pain and fever can be managed with acetaminophen (paracetamol) or ibuprofen.

*Question 5:* ***“*What home care can help with tonsillitis?*”***

***Answer:***

* Drink plenty of fluids (warm or cool) to soothe the throat.
* Gargle with warm salt water to reduce swelling and discomfort.
* Use throat lozenges or sprays for symptom relief.
* Rest and avoid irritants like smoking.

*Question 6:* ***“*How long does acute tonsillitis last?*”***

***Answer: “***It typically lasts from a few days up to two weeks, depending on the cause and treatment.***”***

***Question 7:*** *“***When should I see a doctor?*”***

***Answer:*** Seek medical advice if:

* Symptoms worsen or do not improve after 3-4 days.
* You have difficulty breathing or swallowing saliva.
* Severe pain persists despite painkillers.
* You develop swelling on one side of the throat, which may indicate a peritonsillar abscess (quinsy).

*Question 8:* ***“*What are possible complications of acute tonsillitis?*”***

***Answer: “***Untreated bacterial tonsillitis can lead to complications like rheumatic fever, kidney inflammation, or abscess formation near the tonsils.***”***

*Question 9:* ***“*When is surgery considered?*”***

***Answer: “***Tonsillectomy (removal of tonsils) may be recommended for recurrent or severe tonsillitis or complications.***”***

This Q&A set provides clear, practical information for patients about acute tonsillitis, its causes, symptoms, treatment, home care, and when to seek medical help, reflecting expert clinical guidelines

**DOCTOR-PATIENT CONVERSATIONS**

**Doctor:** "You have acute tonsillitis, which means your tonsils are inflamed, likely due to an infection. Your throat is very sore, and you have a fever, which are common symptoms."

**Patient:** "Is this caused by bacteria or a virus? Do I need antibiotics?"

**Doctor:** "Most cases, especially in children, are viral and get better on their own with rest and fluids. However, because your symptoms meet certain criteria, we will do a rapid strep test to check for a bacterial infection. If positive, antibiotics like penicillin will help you recover faster and prevent complications."

**Patient:** "What can I do to feel better in the meantime?"

**Doctor:** "Drink plenty of fluids, take over-the-counter pain relievers like acetaminophen or ibuprofen, and gargle with warm salt water if that helps. Avoid irritants like smoke."

**Patient:** "When should I come back?"

**Doctor:** "If your symptoms worsen, you have trouble breathing or swallowing, or if you don’t improve in 3 to 4 days, please return for reassessment."

This format reflects typical clinical encounters and summarizes key points from guidelines and literature on acute tonsillitis management.

**RECURRENT TONSILLITIS**

*ALTERNATIVE NAMES:* Recurrent acute tonsillitis is the correct term for repeated occurrences of “acute bacterial tonsillitis”. The obsolete term "chronic tonsillitis" is no longer in use.

**DEFINITION / DESCRIPTION**

Recurrent tonsillitis refers to **a condition where a person experiences frequent episodes of tonsillitis, typically defined as three to five or more episodes per year, even with treatment**.

It is characterized by the recurrence of infections in the tonsils, which can be caused by either viral or bacterial agents, with bacterial infections, particularly from Streptococcus pyogenes, being a common cause.

The condition can lead to persistent or repeated inflammation of the tonsils, and in some cases, may require surgical intervention such as a tonsillectomy if the infections are severe or frequent.

Additionally, research suggests that there may be a genetic component to why some individuals experience recurrent tonsillitis, with certain immune system deficiencies playing a role.

“Recurrent acute tonsillitis” is the repeated distinct time period or episodes of acute bacterial infections of the palatine tonsils with symptom-free or symptom-poor intervals.

It has to be emphasized that the term is restricted to the palatine tonsils and assumes a bacterial origin of the tonsillitis episodes. This has to be differentiated from the terms “sore throat” and “pharyngitis” which are frequently used interchangeably. Sore throat describes a painful irritation of the throat independent of an obvious etiology.

In real life and for decision making, a differentiation between an episode of sore throat and an episode of tonsillitis is often not possible.

Tonsillectomy is defined as complete removal of the palatine tonsils, including its capsule, by dissecting the peritonsillar space between the tonsil capsule and the muscular wall

In case of intracapsular or partial tonsillectomy, all tonsil tissue is removed, but a small remnant layer is retained (the “capsule”) to protect the underlying muscles.

The term tonsillotomy is sometimes used synonymously to report the use of partial tonsillectomy.

Alternatively, tonsillotomy is used to describe cutting through the tonsil at the level of the palatal arches, i.e., all tonsil tissue beyond this level is left in place.

**CAUSES OF RECURRENT TONSILLITIS**

Recurrent tonsillitis is a tonsil infection that returns frequently, even with treatment. There may be a genetic component to why some people experience recurrent or chronic infections.

Tonsillitis occurs when the two glands that sit in the back of your throat, called the tonsils, become swollen and painful due to an infection.

Most often, a viral infection, such as the common cold, is responsible for tonsillitis. But bacterial infections, particularly from *Streptococcus pyogenes*, can also be the cause.

Recurrent tonsillitis doesn’t have a clearly defined number of episodes. It generally means that the infection returns frequently, three to five times or more per year, even with treatment such as antibiotics.

Read on to learn about the potential causes of recurrent tonsillitis and treatment options.

***Recurrent tonsillitis and chronic tonsillitis***

While these terms are sometimes confused and used interchangeably, recurrent tonsillitis means that the tonsil infection returns frequently, even with treatment. Chronic means that the infection and symptoms are ever-present.

**RISK FACTORS**

When it comes to recurrent bacterial tonsillitis, researchers have found some clues as to why some people are more likely to keep getting infections. Their research centers on genetic components that affect the immune system.

A 2019 study looked at tissue samples from 66 children who had their tonsils removed after having recurrent strep infections. Researchers found an unusual immune response to the strep bacteria. Essentially, the strep bacteria tricked the children’s immune systems into attacking immune cells that would normally fight off the infection.

Researchers also found that there was a genetic connection to this immune response, as many of the children had a family history of recurrent tonsillitis.

Both children and adults can have recurrent tonsillitis, but children are often exposed to more germs, which makes them more susceptible to infections. In addition, a 2018 study found that recurrent tonsillitis most often affects people assigned female at birth.

Recurrent tonsillitis may also occur in children with:

* periodic fever
* aphthous stomatitis
* pharyngitis
* cervical adenitis (PFAPA syndrome)

Similar to recurrent tonsillitis, genetic and immune factors may also play a role in who gets PFAPA.

A GAS infection as a cause of a tonsillitis episode is the only known hard risk factor for the development of recurrent acute tonsillitis . Recurrent acute tonsillitis could be a genetic immune susceptibility disease because it is reported that patients younger than 12 years with recurrent acute tonsillitis show some (otherwise subclinical) antibody deficiency and aberrant T-cell function .

**SIGNS / SYMPTOMS**

Recurrent tonsillitis refers to frequent episodes of tonsillitis, typically defined as three to five or more episodes per year, even with treatment such as antibiotics. The signs and symptoms of recurrent tonsillitis include:

* **swollen and painful tonsils,**
* **sore throat, difficulty swallowing, and**
* **tender lymph nodes on the sides of the neck**.

Other symptoms may include:

* white patches on the tonsils,
* bad breath, and
* enlarged lymph nodes.

In some cases, recurrent tonsillitis can lead to complications such as:

* quinsy (peritonsillar abscess) or
* obstructive sleep apnoea.

If you experience frequent or severe symptoms, it is important to consult a healthcare provider for proper diagnosis and treatment.

**DIAGNOSIS METHODS**

The diagnosis of recurrent tonsillitis involves a combination of **clinical evaluation, symptom assessment, and laboratory tests**. A healthcare provider typically begins with a physical examination, looking for signs of infection such as redness, swelling, and the presence of white spots on the tonsils. They may also check for swollen lymph nodes in the neck.

To determine whether the infection is viral or bacterial, **a throat culture test** is often performed. During this procedure, a long cotton swab is used to gather cells and saliva from the back of the throat, which is then tested for the presence of Group A Streptococcus bacterium. If the results are positive, it indicates strep throat, while negative results suggest a viral infection.

In addition to these methods, the number of episodes of tonsillitis in the preceding year or years is considered, as well as the impact of each episode on the patient's life, such as social, work, or educational absence or alteration. This information helps in making decisions regarding treatment and potential surgical interventions like tonsillectomy.

**TREATMENT OPTIONS**

How tonsillitis is treated depends on a couple of factors: whether it’s caused by a viral or bacterial infection and whether it’s a recurrent infection.

* **Viral infections:** These have no specific treatment and will generally run their course in about a week.
* **Bacterial infections:** These are treated with antibiotics to kill the bacteria causing the infection.

A tonsillectomy, surgical removal of the tonsils, is typically recommended for people with recurrent tonsillitis.

According to Texas Children’s Hospital, frequent or recurrent tonsillitis is typically defined as:

* more than seven infections in 1 year
* more than five infections a year during a 2-year period
* more than three infections a year during a 3-year period

Tonsillectomies are also typically recommended for those with:

* tonsillitis with mononucleosis, which can take longer than a week to resolve and can have more significant symptoms
* tonsillitis with PFAPA syndrome
* multiple antibiotic allergies
* recurrent peritonsillar abscesses
* excessive school absences due to recurrent tonsillitis

Learn more about tonsillectomy here.

***Therapy of recurrent acute tonsillitis***

There are three treatment options: watchful waiting, drug therapy, or tonsillectomy. A decision is made based on the evaluation of the severity of the recurrent acute tonsillitis.

If the patient has an apparently uncomplicated episode, is immunocompetent, not comorbid, and has a low score (Centor, McIsaac, FeverPAIN, see above), waiting or symptomatic treatment is indicated.

In comorbid or critically ill patients, one should lean toward recommending POCT for GAS . Identification of patients with risk for severe disease course is important.

Conditions are severe immunosuppression, such as long-term use of systemic steroids, organ transplantation, stem cell transplantation, AIDS, neutropenia, and other congenital or acquired immune defects, or severe comorbidities.

Peritonsillar abscess, or quinsy, is a relevant complication of acute bacterial tonsillitis. The annual incidence rates are in the range of 9–41 cases in a population of 100,000 .

Whether the risk for a peritonsillar abscess is higher in patients with recurrent acute tonsillitis is unclear. Some studies describe higher risks, and others report that patients with peritonsillar abscess have less likely a history of recurrent acute tonsillitis. This means that the risk of peritonsillar abscess cannot be considered a standalone argument for or against a particular therapy for recurrent acute tonsillitis.

If POCT is unavailable, antibiotic treatment is recommended in these subgroups of patients. In patients with high score and poor effect on fast-acting symptomatic analgesics (see above), one would consider antibiotics in the presence of GAS due to POCT.

Finally, in case of severe recurrent tonsillitis based on the number of tonsillitis episodes, tonsil surgery should be recommended.

***Conservative treatment***

Standards for symptomatic treatment are non-steroidal anti-inflammatory drugs and paracetamol. If the situation worsens after 2 days or if there is no noticeable improvement over 8 days, the patient should come back for re-evaluation.

Due to the limited effect of oral or intramuscular corticosteroids in reducing the pain, we do not recommend the use of corticosteroids.

The US Food and Drug Administration (FDA) issued a black box warning for codeine and tramadol in children younger than 12 years and limited use in children between 12 and 18 years of age owing to difficulty breathing and death .

In case of a high score (Centore, McIsaac, FeverPAIN;) and a positive GAS POCT when required, antibiotic treatment can be considered. The patient or the caregivers should know that the primary goal of antibiotic treatment is to shorten the duration of the disease rather than to prevent complications

Several studies show that antibiotics reduce acute symptoms more frequently in patients if GAS was present. The patient or the caregivers should also know that these benefits have to be balanced against drug reactions like diarrhea, anaphylaxis, and mycoses occurring in up to 10% of the patients

In patients with an intermediate score, a delayed prescribing can be performed, i.e., issuing of the prescription is only redeemed by the patient if symptoms worsen or do not improve after 3–5 days

Penicillin is the antibiotic of choice. There is no clear evidence that other antibiotics are more effective than penicillin in the treatment of an episode of recurrent GAS-related tonsillitis

***Surgical treatment***

Surgery is indicated for severe cases of recurrent acute tonsillitis. The severity has to be classified as described above. Surgery is indicated based on a clear cut-off number of acute tonsillitis episodes (see above). Standard surgery is bilateral tonsillectomy.

The recently published NATTINA trial has confirmed the efficacy and also the cost-effectiveness of tonsillectomy in adults with severe recurrent acute tonsillitis Only the German guideline offers as alternative a tonsillotomy in case of tonsil with a size >Brodsky grade 1 .

We do not recommend performing tonsillotomy or any other kind of partial tonsillectomy outside from clinical trials.

So far, the evidence that tonsillotomy is as effective as tonsillectomy for recurrent acute tonsillitis is unproven. In the treatment of sleep-related disorders, this is different for children.

Here, partial tonsillectomy/tonsillotomy is recommended as an alternative to tonsillectomy in many countries. It is important to distinguish between the two indications, sleep-related disorders and recurrent acute tonsillitis.

**Recommendation:** If surgery is indicated, perform a bilateral tonsillectomy. Other types of tonsil surgeries, for instance, tonsillotomy for recurrent acute tonsillitis, should only be performed in clinical trials.

***Surgical techniques***

The most frequent and traditional method of tonsillectomy is with metal surgical instruments (cold steel tonsillectomy; tonsillectomy by cold dissection or with a snare/guillotine).

Due to the relevant risk of primary and secondary postoperative bleeding and because of moderate to severe pain for up to weeks after surgery, other techniques are being used for decades with the aim to reduce the risk of postoperative bleeding and severe pain.

Alternative techniques are bipolar radiofrequency ablation (coblation), bipolar electrodissection (electrocauterization, electrocautery), harmonic scalpel, microdebrider-assisted partial tonsillectomy, diathermy, laser surgery, and cryosurgery.

Tonsillectomy by cold dissection and also the alternative techniques are more or less used for total tonsillectomy as well as for partial tonsil surgery. The current evidence remains low regarding any of the alternative techniques having advantages over traditional tonsillectomy.

Most trials do not differentiate clearly between the indications (recurrent acute tonsillitis vs. tonsillar hypertrophy) and the extent of tonsil surgery. Population-based data do not report an advantage for alternative techniques . It is important to separate the question of the best technique from the extent of surgery.

There is a consensus that any partial type of tonsil surgery, especially tonsillotomy, has a lower postoperative bleeding rate and produces less postoperative pain. Hence, any technique used for partial tonsillectomy and tonsillotomy has a lower risk of postoperative bleeding and severe pain.

**Recommendation:** No surgical technique is better than the other. Use the technology for tonsil surgery that is established in your office/hospital and with which the surgeons feels comfortable.

***Postoperative pain management***

Tonsillectomy is ranked among the top 25 procedures with highest pain intensities. It is more painful than a number of so-called major abdominal surgeries. Median pain scores are about 5–6 on a 11-part numeric rating scale (NRS 0–10).

Typically, a planned pain management is recommended if an NRS >3 can be expected. Nevertheless, there is no consensus for optimal pain management. Moreover, some clinicians still underestimate the degree of pain associated with tonsillectomy, as they consider it to be a minimally invasive surgical procedure.

Patients with preoperative chronic pain due to other diseases, females, and young adults are associated with higher postoperative pain intensity.

A recent systematic review analyzed preoperative and intraoperative interventions to reduce postoperative pain.

Paracetamol (acetaminophen), non-steroidal anti-inflammatory drugs (NSAIDs), intravenous dexamethasone, ketamine (only assessed in children), gabapentinoids, dexmedetomidine, honey, and acupuncture improved postoperative pain. Inconsistent evidence was found for local anesthetic infiltration, antibiotics, and magnesium sulfate.

Limited evidence was found for clonidine . Mouthwash gargle with benzydamine hydrochloride was not found to be superior to placebo in a recent randomized control trial.

Evidence-based recommendations for pain management are listed in Table 4. Pain management should be initiated during tonsillectomy. Non-opioid analgesics should be administered intraoperatively.

The administration should be continued in the postoperative period, unless contraindications are present. Intravenous dexamethasone should be given intraoperatively. The patient can have high pain scores typically for 3–5 days after surgery.

| Recommended pain management in patients undergoing tonsillectomy[a](https://pmc.ncbi.nlm.nih.gov/articles/PMC10597714/#table-fn3). |
| --- |
| | ***Preoperative and intraoperative*** | **Grade**[**b**](https://pmc.ncbi.nlm.nih.gov/articles/PMC10597714/#table-fn4) | | --- | --- | | Paracetamol | D | | Non-steroidal anti-inflammatory drugs | A | | Dexamethasone intravenously | A | | Preoperative gabapentinoids, or intraoperative ketamine (for children), or intraoperative dexmedetomidine may be considered, when basic analgesic regimen is contraindicated | D | | Analgesic adjuncts |  | | Acupuncture | B | | Postoperative | | | Paracetamol | D | | Non-steroidal anti-inflammatory drugs | A | | Opioid for rescue | D | | Analgesic adjuncts |  | | Acupuncture | B | | Honey | B | |

A, consistent level 1 studies; B, consistent level 2 or 3 studies or extrapolations from level 1 studies; C, level 4 studies or extrapolations from level 2 or 3 studies; D, level 5 evidence or troubling inconsistent or inconclusive studies of any level.

In general, mono-analgesics only have a limited analgesic efficacy in the postoperative setting after tonsillectomy. Therefore, it is recommended to use analgesics in combination (e.g., paracetamol plus NSAIDs).

Ibuprofen is widely used as a first choice NSAID. There is no evidence that NSAIDs increase the risk of postoperative bleeding

The value of intravenous dexamethasone in the postoperative phase is controversial and it is not frequently used

Opioids are only recommended as rescue analgesics. Codeine is forbidden in many countries for children and tramadol in some countries too. Especially in the United States, strategies are searched to avoid opioids in consequence of the opioid epidemic. Optimal combination of paracetamol plus NSAID might decrease the probability to need opioids as rescue analgesics.

The analgesic effect of intraoperative and postoperative acupuncture as well as postoperative honey was investigated. Acupuncture is rarely provided as it requires specific training. The optimal acupuncture regime has not been defined, yet.

More randomized controlled trials are needed to define the risk and combination of most effective drugs for postoperative pain relief after tonsillectomy.

**Recommendation:** An essential part of tonsillectomy is perioperative and postoperative pain management. Postoperative management should include a combination of paracetamol and NSAIDs as the first-choice treatment unless contraindicated due to other reasons.

**PREVENTION TIPS**

If you’re someone who gets recurrent tonsillitis, you likely want to prevent a repeat infection. Prevention recommendations include:

* practicing good oral hygiene
* not sharing drinks, utensils, and toothbrushes
* washing your hands frequently, particularly:
  + before eating
  + after using the bathroom
  + before touching your face, nose, or mouth
* avoiding people who may be ill

As research draws more connections between genetics and the immune response to strep, it may become even more clear why some people are more likely to get recurrent infections despite their best prevention efforts.

Future research may also find new treatments and prevention strategies for those who are prone to recurrent tonsillitis. For example, scientists are currently looking to develop a vaccine that can prevent strep infections.

**OUTLOOK / PROGNOSIS**

Recurrent tonsillitis refers to frequent episodes of tonsil infections, often caused by bacterial or viral agents, with streptococcus pyogenes being a common bacterial culprit.

Recent research has shed light on the mechanisms behind recurrent tonsillitis, revealing that the bacteria can manipulate the immune system, leading to an abnormal immune response.

Specifically, the bacteria may cause T follicular helper (T FH) cells to attack B cells instead of helping them produce protective antibodies, which can result in a weakened immune response against the infection.

This immune dysfunction may have a genetic component, as many children with recurrent tonsillitis have a family history of the condition.

The outlook for recurrent tonsillitis **involves both medical and surgical interventions**. For individuals experiencing frequent episodes, a tonsillectomy may be recommended.

Guidelines suggest that a tonsillectomy is indicated for children who have had seven or more episodes in a single year, five episodes per year for two consecutive years, or three episodes per year for three consecutive years.

For adults, the threshold is slightly lower, with four or more episodes in a year often prompting consideration of surgery.

In addition to surgery, there are ongoing efforts to develop vaccines that could prevent strep infections, which may reduce the incidence of recurrent tonsillitis. Current treatments for bacterial tonsillitis include antibiotics, while viral infections typically resolve on their own with rest and supportive care.

The management of recurrent tonsillitis also involves addressing the impact on quality of life, as frequent infections can lead to significant discomfort and disruption.

Ongoing research continues to explore the genetic and immunological factors that contribute to the condition, with the goal of developing more effective prevention and treatment strategies.

**POSSIBLE COMPLICATIONS**

Recurrent tonsillitis can lead to several complications, including **peritonsillar abscess**, which is a collection of pus behind the tonsil. This complication occurs more commonly in adolescents and adults than in children.

Other potential complications include:

* obstructive sleep apnea, which is interrupted breathing during sleep, and
* the risk of developing
* rheumatic fever,
* scarlet fever, or
* kidney inflammation if bacterial tonsillitis is left untreated.

Additionally, recurrent tonsillitis may result in poststreptococcal reactive arthritis, a condition that causes inflammation of the joints.

In rare cases, complications such as:

* rheumatic heart disease and
* glomerulonephritis

can occur, particularly in populations at higher risk.

**WHEN TO SEE A DOCTOR / RED FLAG**

You should see a doctor for recurrent tonsillitis **if your symptoms persist longer than four days or if you develop white spots on your tonsils**.

Additionally, seek medical attention if you or your child have trouble breathing, excessive drooling, or if the pain interferes with your ability to eat or drink.

If you have recurrent tonsillitis, defined as more than seven bouts in a year, more than five a year during a two-year span, or more than three a year during a three-year span, it is advisable to consult a healthcare provider.

Furthermore, if the infection does not respond to medication or if there are signs of complications such as a peritonsillar abscess, you should see a doctor.

**DIFFERENTIAL DIAGNOSIS**

Recurrent acute tonsillitis is a condition characterized by repeated episodes of tonsillitis, typically caused by bacterial infections, with Streptococcus pyogenes (group A streptococcus) being the most common pathogen.

The differential diagnosis for recurrent tonsillitis includes various conditions that can present with similar symptoms, such as **viral infections, other bacterial infections, and non-infectious causes**.

***Differential Diagnosis***

1. **Scarlet Fever**: Caused by Streptococcus pyogenes, it presents with a high fever, sore throat, and a characteristic rash. The rash is fine, red, and rough-textured, and it blanches upon pressure. It may also include a "strawberry" tongue and Pastia lines.
2. **Epstein-Barr Virus (EBV)**: This virus can cause infectious mononucleosis, which includes symptoms such as fever, sore throat, and swollen lymph glands. EBV is common in adolescents and young adults and can lead to prolonged fatigue and other systemic symptoms.
3. **Pharyngitis**: Inflammation of the pharynx, which can be viral or bacterial. Symptoms include sore throat, redness, and sometimes exudate. It is often difficult to distinguish from tonsillitis based on symptoms alone.
4. **Bacterial Tracheitis**: This condition involves inflammation of the trachea, often with purulent secretions. It can present with symptoms similar to tonsillitis, including fever and respiratory distress.
5. **Retropharyngeal Abscess**: A collection of pus in the retropharyngeal space, which can cause difficulty in opening the mouth, enlarged cervical lymph nodes, and a neck mass. It is more common in children and can lead to severe respiratory complications.
6. **Subglottic Stenosis**: Narrowing of the subglottic area, leading to respiratory distress, intermittent wheezing, and inspiratory stridor. It is often a result of prolonged intubation or congenital factors.
7. **Viral Infections**: Various viruses, such as adenovirus, influenza, and rhinovirus, can cause symptoms similar to tonsillitis, including sore throat, fever, and swollen lymph nodes. These infections are typically self-limiting and do not require antibiotics.
8. **Non-Infectious Causes**: Conditions such as allergic reactions, environmental irritants, and autoimmune disorders can also cause symptoms resembling tonsillitis. These are less common but should be considered in the differential diagnosis.

***Management and Treatment***

The management of recurrent tonsillitis depends on the underlying cause. For bacterial infections, antibiotics such as penicillin, clindamycin, or cephalosporin may be prescribed. Viral infections are managed with supportive care, including rest, hydration, and over-the-counter pain relievers.

Surgical intervention, such as tonsillectomy, may be considered for patients with frequent or severe episodes of tonsillitis. The decision to perform a tonsillectomy is based on the number of episodes, the severity of symptoms, and the presence of complications.

In summary, the differential diagnosis for recurrent tonsillitis includes a range of infectious and non-infectious conditions. Accurate diagnosis is crucial for appropriate management, which may involve antibiotics, supportive care, or surgical intervention.

**RECENT GUIDELINES OR UPDATES**

***Ongoing clinical trials and clinical registers***

After decades without important trials, the NATTINA trial was the start of a series of studies that are still ongoing. The German TOTO trial is a multicenter, 1:1 two-arm, randomized non-blinded non-inferiority trial . The non-inferiority of tonsillotomy compared to tonsillectomy is investigated. Patients ≥3 years of age are randomly allocated to undergo either tonsillotomy or tonsillectomy as surgical treatment of recurrent acute tonsillitis. The primary outcome is the number of sore throat days experienced over the 24-month follow-up. The Finnish FINITE trial investigates the hypothesis that the recovery time from tonsil surgery can be reduced with intracapsular tonsillectomy . Adult patients suffering from recurrent or “chronic” tonsillitis are included into a randomized, controlled, three-arm clinical trial. It is designed to compare three different surgical techniques: extracapsular monopolar tonsillectomy, intracapsular microdebrider tonsillectomy, and intracapsular coblation tonsillectomy. The primary endpoint is the recovery time from postoperative pain. Another Finnish multicenter trial compared tonsillectomy, tonsillotomy, and watchful waiting in adult patients with recurrent or “chronic” tonsillitis. The primary outcome will be tonsillitis-specific quality of life at 6 months. These trials will give important answers on the efficacy of tonsil surgery in adults and especially if less than total tonsillectomy will be effective.

In addition, national healthcare data form an important source for quality control of tonsil surgery. For instance, using a national cohort of children from the US American Pediatric Health Information System allowed an analysis of 96,415 children undergoing tonsillectomy between 2016 and 2021. Important variables associated with postoperative bleeding were revealed including a probability model for future quality initiatives.

**Recommendation:** The role of tonsillotomy for recurrent acute tonsillitis in children as well as in adults is unclear. The role of different partial tonsillotomy techniques and if children and adults have to be treated differently is anticipated through ongoing clinical trials. Beyond clinical trials, national quality registers and national healthcare data represent underutilized opportunities to improve care of patients with recurrent acute tonsillitis.

**EPIDEMIOLOGY**

Acute (and mainly viral) tonsillitis is a frequent disease, said to account for about one-third of all respiratory tract infections treated in primary care. Exact numbers are difficult to obtain, with all the previously mentioned difficulties of definition and unreliable diagnostic criteria.

Despite these circumstances, it is estimated that 600 million symptomatic GAS cases are diagnosed worldwide each year. About one among 10 of these patients develop recurrent acute tonsillitis.

Nevertheless, it affects hundreds of thousands of children and young adults every year. The prevalence of recurrent episodes is about 12% in patients with tonsillitis, i.e., about 12,000 per 100,000 individuals having had at least one tonsillitis episode before .

**PREDEFINED Q & A SETS**

*Question 1: “***What is recurrent tonsillitis?*”***

***Answer: “***Recurrent tonsillitis is characterized by multiple episodes of acute tonsillitis within a year, causing frequent sore throats and discomfort. It typically means having 7 or more episodes in one year, or 5 or more episodes per year for two years, or 3 or more episodes per year for three years.***”***

*Question 2:* ***“*What causes recurrent tonsillitis?*”***

***Answer: “***It is usually caused by repeated viral or bacterial infections, most commonly Group A Streptococcus bacteria. Factors such as a weakened immune system, tonsil stones (tonsilloliths), and enlarged tonsils contributing to obstructive sleep apnea can also play a role.***”***

*Question 3:* ***“*How is recurrent tonsillitis diagnosed?*”***

***Answer: “***Diagnosis is based on clinical history, physical examination of the throat and tonsils, and sometimes a throat swab to detect bacterial infection, especially strep throat.***”***

*Question 4:* ***“*What are the treatment options for recurrent tonsillitis?*”***

***Answer: “***

* **Conservative treatment:** Symptomatic care with painkillers like paracetamol or ibuprofen, rest, and fluids. Antibiotics are used if bacterial infection is confirmed or highly suspected.
* **Tonsillectomy:** Surgical removal of the tonsils is recommended if tonsillitis episodes are frequent and severe enough to significantly affect quality of life (e.g., ≥7 episodes in 1 year). Surgery reduces infection frequency but involves risks such as postoperative pain and bleeding.***”***

*Question 5:* ***“*What are the benefits and risks of tonsillectomy?*” Answer: “***Tonsillectomy can significantly reduce the number of tonsillitis episodes, decrease antibiotic use, and improve quality of life. Recovery typically takes 7–10 days, with possible throat and ear pain and occasional bleeding. Serious complications are rare but require prompt medical attention.***”***

*Question 6****: “*Can recurrent tonsillitis be prevented?*”***

***Answer: “***Preventive measures include good hygiene such as frequent handwashing, avoiding sharing utensils or drinks, and minimizing exposure to sick individuals. Maintaining overall immune health may also help reduce recurrence.***”***

***Question 7: “*When should I see a doctor?*”***

***Answer: “***Seek medical advice if you experience frequent sore throats, symptoms worsen or do not improve with treatment, have difficulty breathing or swallowing, or develop severe pain or signs of complications like abscess formation.***”***

**DOCTOR-PATIENT CONVERSATIONS**

**Doctor:** "You’ve been experiencing frequent sore throats caused by inflammation of your tonsils, which we call recurrent tonsillitis. Can you tell me how often you’ve had these episodes?"

**Patient:** "I’ve had about six or seven episodes this past year, with each lasting several days and making it hard to eat or talk."

**Doctor:** "That fits the criteria for recurrent tonsillitis. Have you noticed any other symptoms like fever or swollen glands?"

**Patient:** "Yes, usually a fever and swollen lymph nodes in my neck during these episodes."

**Doctor:** "We can do a throat swab to check for bacterial infection. If it’s bacterial, antibiotics can help. However, since you have frequent episodes, we might also discuss the option of surgery to remove your tonsils, which can reduce these infections."

**Patient:** "What are the risks of surgery?"

**Doctor:** "Tonsillectomy is generally safe but involves some pain and a recovery period of about one to two weeks. There’s also a small risk of bleeding after surgery. We weigh these risks against how much the tonsillitis affects your life."

**Patient:** "Are there alternatives to surgery?"

**Doctor:** "Yes, some patients benefit from integrative treatments like acupuncture and dietary changes, which may reduce inflammation and infection frequency. We can explore those options alongside medical treatment."

**Patient:** "What should I do if symptoms worsen?"

**Doctor:** "If you have difficulty breathing, swallowing, or severe pain, come back immediately. Otherwise, keep track of your episodes and follow up regularly."

*REFERENCES*: <https://www.healthline.com/health/what-causes-recurrent-tonsillitis-and-how-is-it-treated#takeaway>

<https://pmc.ncbi.nlm.nih.gov/articles/PMC10597714/>

**CHRONIC TONSILLITIS**

*ALTERNATIVE NAMES:* Chronic tonsillitis does not have any widely recognized alternative names mentioned in the provided context.

**DEFINITION / DESCRIPTION**

Chronic tonsillitis is an infection of the tonsils—the two pieces of tissue at the back of your throat—that lasts longer than two weeks. Chronic tonsillitis can cause swelling and inflammation of the tonsils, as well as accompanying symptoms like sore throat, bad breath, and enlarged lymph nodes.

Tonsillitis generally lasts around a week. However, when it lasts longer than 14 days, it’s considered chronic tonsillitis.

Chronic tonsillitis may lead to other conditions that need additional treatment. If you have recurring bouts of tonsillitis, you may need to have your tonsils surgically removed.

***Chronic vs. Recurrent Tonsillitis***

Whereas even one bout of tonsillitis that lasts more than two weeks is deemed chronic tonsillitis, recurrent tonsillitis is when someone has any case of tonsillitis multiple times in a year.

More specifically, recurrent tonsillitis is diagnosed when someone has more than seven bouts in a year, more than five a year during a two-year span, or more than three a year during a three-year span.

At first, the infections may respond well to antibiotics. But some people still experience frequent tonsil infections.

At least one study has shown that recurrent tonsillitis runs in families. In other words, if you have family members who have recurrent tonsillitis, you are more likely to have it too.

In children, recurrent tonsillitis is most commonly caused by group A beta-hemolytic *Streptococcus pyogenes* (GABHS) infections. It is also known as strep throat. Other bacteria are more likely to be the cause of adult recurrent tonsillitis.

Reasons for recurring strep throat include:

* Strains of the bacteria that are resistant to antibiotics
* Weakened immune system
* The possibility that you or someone in your family is a strep carrier (who has no symptoms but can spread the bacteria)

***What is chronic tonsillitis?***

Tonsillitis is an infection of the tonsils, the round organs at the beginning of your throat, at the back of your mouth that lasts longer than a week or two; it may last weeks or months.

They are lymphoid tissues, such as lymph nodes, responsible for helping fight infections. When your tonsils become enlarged and inflamed, it’s called tonsillitis.

Recurrent tonsillitis, on the other hand, is if you have tonsil infections five or more times a year. These recurrent infections may not last for as many days as chronic tonsillitis.

**CAUSES**

Tonsillitis can be caused by infections such as viruses (cytomegalovirus, herpes simplex, Epstein-Barr) or bacteria such as those that cause strep throat.

Tonsillitis occurs more commonly in children than in adults, but it does not usually affect children under the age of 2.

***Is tonsillitis more serious in adults?***

Tonsillitis isn't more serious in adults, but some adults may be more likely to develop it than others. Older adults and people who live or work with children, for example, are at greater risk.

If you have an infection with antibiotic-resistant bacteria or an immune system that doesn't work correctly, you may develop chronic tonsillitis.

You may also have an increased risk of developing chronic tonsillitis if you have been exposed to radiation.

**RISK FACTORS**

Chronic tonsillitis is an ongoing infection of the tonsils that lasts longer than 14 days. Several risk factors contribute to the development of chronic tonsillitis.

* Age is a significant factor, as children between the ages of 5 and 15 are more likely to develop bacterial tonsillitis, while viral tonsillitis is more common in very young children. Elderly adults are also at a higher risk for tonsillitis.
* Frequent exposure to germs, such as in schools or daycare centers, increases the likelihood of contracting tonsillitis.
* Additionally, individuals with weakened immune systems or those who have a history of recurrent infections may be more susceptible to chronic tonsillitis.
* Environmental factors, such as hot weather and higher levels of smog, have also been associated with an increased risk of developing tonsillitis.
* Lastly, certain lifestyle factors, such as smoking and excessive alcohol consumption, may contribute to the development of chronic tonsillitis.

**SIGNS / SYMPTOMS**

Chronic tonsillitis is characterized by symptoms that last longer than two weeks. The main symptom is a sore throat that persists for more than 2 weeks.

***Symptoms of Chronic Tonsillitis***

People who experience chronic tonsillitis tend to have ongoing:

* Sore throat
* Enlarged tonsils
* Bad breath, which may be related to cryptic tonsils (pockets in the tonsils where food and debris can accumulate); also known as halitosis
* Enlarged, tender, swollen, and painful neck and jaw lymph nodes
* A feeling of malaise
* Sometimes you may experience coughing up of cryptic debris
* hoarse or scratchy-sounding voice
* pain when swallowing
* fever
* headache
* red and swollen tonsils
* white or yellow spots on your tonsils
* chills
* earache
* stomach ache
* stiff neck

While symptoms of acute tonsillitis typically last from three days to about two weeks, chronic tonsillitis symptoms last longer.

Chronic tonsillitis may also affect the adenoids, similar bundles of tissue higher up in the throat and back of nose, or the lingual tonsils, which are on the lower back part of the tongue.

**DIAGNOSIS METHODS**

To diagnose tonsillitis, your healthcare professional will do a physical exam of your throat and tonsils. During the exam, they may also perform a throat culture by gently taking a sample of mucus from the back of your throat using a long swab. They will send the sample to a lab to see if you have an infection in your tonsils.

They may also take a blood sample and send it to the lab for testing. A test called a complete blood count can help your healthcare professional determine if the infection is caused by a virus or bacteria. These results will help them know which medications to prescribe and what other treatment options may be best for you.

The diagnosis of chronic tonsillitis involves a combination of clinical evaluation and specific diagnostic tests. Chronic tonsillitis is characterized by a sore throat that lasts for more than 2 weeks, and it is often associated with other symptoms such as swollen lymph nodes, difficulty swallowing, and a whitish coating on the throat.

During the physical examination, a healthcare professional will inspect the throat and tonsils for signs of inflammation and infection. They may also perform a throat culture by gently taking a sample of mucus from the back of the throat using a long swab. This sample is then sent to a lab to determine if there is an infection in the tonsils. Additionally, a blood sample may be taken for testing, and a complete blood count (CBC) can help determine if the infection is caused by a virus or bacteria.

It is important to note that the term "chronic tonsillitis" is considered imprecise and should no longer be used. Instead, the term "recurrent acute tonsillitis" (RAT) is preferred, which refers to repeated episodes of acute tonsillitis interrupted by intervals without or with insignificant complaints. The diagnosis of chronic tonsillitis should be based on the patient's symptoms and the results of the diagnostic tests.

**TREATMENT OPTIONS**

If a bacterial infection is the cause of your tonsillitis, your healthcare provider will prescribe an antibiotic. It's important to take the full course of medication as prescribed to reduce the chances the bacteria will become resistant or come back.

Since the bacteria may be resistant to antibiotics, it may be necessary to try another medication if the first prescription doesn't work.

For pain control, you can use over-the-counter medications such as:

* Tylenol (acetaminophen)
* Advil or Motrin (ibuprofen)
* Throat lozenges
* Throat sprays

When you first begin treatment for recurrent or chronic tonsillitis, you need to make sure you drink enough liquids. Treating your sore throat will make it easier to drink enough liquid to stay hydrated. If you have signs of dehydration, you should seek medical attention.

***Tonsillectomy***

Regardless of what is causing your recurrent or chronic tonsillitis, your healthcare provider may also recommend having your tonsils removed. Ultimately, the decision to remove the tonsils depends on multiple factors, including:

* If you've had five to seven episodes of tonsillitis in a year
* If you have chronic tonsillitis that doesn't respond to medication
* If your symptoms are severe
* What complications of tonsillitis you may have
* How the condition affects your ability to attend work or school

Choosing to have a tonsillectomy can dramatically reduce the number of times you have a sore throat and need antibiotics in a year. It can also improve your quality of life.

***What’s the treatment for chronic tonsillitis?***

While tonsillitis may resolve without treatment in a week or less, you’ll need to see a healthcare professional if you have chronic tonsillitis. Treatment options for chronic tonsillitis include:

* oral antibiotics if the infection is caused by bacteria
* home remedies for symptom relief, such as:
  + saltwater gargle
  + over-the-counter pain relievers
  + throat lozenges
  + oral sprays
* surgery to remove your tonsils (tonsillectomy)

**PREVENTION TIPS**

You can help prevent tonsillitis infections by practicing good hygiene. This includes:

* Brushing your teeth regularly
* Changing your toothbrush often, especially after you've been sick
* Avoiding contact with people who may be sick
* Avoiding shared food and drink and items such as cups, water bottles, and silverware
* Washing your hands frequently and thoroughly, especially before eating, after using the bathroom, and after spending time in public spaces
* Avoiding touching your face or mouth
* Carrying hand sanitizer for when you don't have access to washing facilities

If you have a child who has had repeat tonsillitis infections, make sure they:

* Stay home when they're sick until they've completed the entire course of medication prescribed by their healthcare provider
* Wash their hands frequently and thoroughly
* Teach them to cough or sneeze into a tissue or their elbow

**OUTLOOK / PROGNOSIS**

The outlook for chronic tonsillitis is **generally good with appropriate treatment**, although it can vary depending on the underlying cause and the individual's response to treatment. Chronic tonsillitis is defined as tonsillitis that lasts longer than 14 days and may require medical intervention.

Most cases of chronic tonsillitis can be managed with a combination of lifestyle changes, medications, and, in some cases, surgical intervention. Treatment options include oral antibiotics if the infection is caused by bacteria, and symptomatic relief measures such as gargling with warm salt water, drinking warm liquids, and using lozenges.

In cases where chronic tonsillitis is severe or recurrent, a tonsillectomy (surgical removal of the tonsils) may be recommended. This is typically considered when the condition significantly impacts quality of life or leads to complications such as obstructive sleep apnea or recurrent infections. Recovery from a tonsillectomy usually takes around 10 days, though it may be longer for adults.

**With proper treatment, most people with chronic tonsillitis respond well, and the condition can be effectively managed**. However, if left untreated, chronic tonsillitis can lead to complications such as persistent sore throat, bad breath, and other related issues. It is important to consult a healthcare provider for an accurate diagnosis and personalized treatment plan.

***What’s the outlook for people with chronic tonsillitis?***

Most people with chronic tonsillitis respond to treatment depending on what type of infection they have. Some people with chronic tonsillitis may need surgery to remove their tonsils.

Recovery from this surgery is usually around 10 days, but it may be longer, especially for adults.

**POSSIBLE COMPLICATIONS**

Untreated tonsillitis can lead to a number of complications, such as:

* Infection of the middle ear
* Peritonsillar abscess
* Sleep apnea

Rarely, people who have a bacterial form of tonsillitis may develop rheumatic fever, scarlet fever, or an infection of the kidneys called glomerulonephritis.

A peritonsillar abscess occurs when infection from the tonsil spreads into the tissue of the throat behind the tonsil. This complication occurs more commonly in adolescents and adults than in children.

***Complications of chronic tonsillitis***

Although it's rare, complications of chronic tonsillitis can occur. These may include:

* dehydration
* peritonsillar abscess (pus-filled area near tonsils)
* ear infections
* breathing changes during sleep (obstructive sleep apnea) when tonsils are swollen

If your chronic tonsillitis is caused by strep, these complications may occur:

* rheumatic fever
* scarlet fever
* acute glomerulonephritis (kidney infection that can lead to kidney failure)

***Tonsillitis and Strep Infection***

If a strep infection is causing your tonsillitis and it's left untreated, you could develop serious complications such as:

* Rheumatic fever
* Scarlet fever
* An infection of the kidneys called glomerulonephritis
* Poststreptococcal reactive arthritis

**WHEN TO SEE A DOCTOR / RED FLAG**

While tonsillitis may resolve on its own, there are circumstances when you may need to seek medical care, such as:

* if your tonsillitis lasts longer than 4 days
* if you develop white spots on your tonsils
* if you have a fever of 101°F (38.3°C) or higher

Seek emergency care for a child with tonsillitis who has:

* difficulty breathing
* excessive drooling
* pain that prevents them from eating or drinking

**DIFFERENTIAL DIAGNOSIS**

Chronic tonsillitis is one of the most common pathologies of the lymphoepithelial pharyngeal ring. The main pathogen in chronic tonsillitis and its complications is group a β-hemolytic Streptococcus A (BGSA). This pathogen is detected in 30–60% of patients.

At the present stage, the role of latent viral infections (Epstein – Barr virus (EBV), cytomegalovirus (CMV)) in the formation of chronic tonsillitis in children has been proven. Treatment of frequently ill children with pathology of the pharyngeal lymphoid ring remains an urgent and widely discussed issue. Depending on the etiology and clinical form of chronic tonsillitis (simple, toxicallergic form (TAF I or II), the choice is between conservative methods and radical surgical treatment.

Surgical treatment of chronic tonsillitis in children is recommended only if there are absolute indications. To standard methods of conservative treatment, such as sanation of lacunae of the tonsils with antiseptic solutions, the appointment of physiotherapy, funds for the correction of systemic and local immunity are actively used.

In Pediatrics, the safe and optimal complex of effects of the herbal medicinal product Tonsilgon N is widely used. Based on the analysis of clinical observations of frequently ill children with chronic tonsillitis, the effectiveness of the herbal medicine Tonsilgon H (in monotherapy mode) was revealed.

As a result, the expediency of using the drug Tonsilgon H in the treatment of compensated forms of chronic tonsillitis in frequently and long-term ill children was established. There was a significant decrease in the frequency of acute respiratory infections and, consequently, the risk of transition to a decompensated form of chronic tonsillitis.

**RECENT GUIDELINES OR UPDATES**

More than 120,000 patients are treated annually in Germany to resolve repeated episodes of acute tonsillitis. Therapy is aiming at symptom regression, avoidance of complications, reduction in the number of disease-related absences in school or at work, increased cost-effectiveness and improved quality of life.

The purpose of this part of the guideline is to provide clinicians in any setting with a clinically focused multi-disciplinary guidance through different conservative treatment options in order to reduce inappropriate variation in clinical care, improve clinical outcome and reduce harm.

Surgical management in terms of intracapsular as well as extracapsular tonsillectomy (i.e. tonsillotomy) is the subject of part II of this guideline. To estimate the probability of tonsillitis caused by *β*-hemolytic streptococci, a diagnostic scoring system according to Centor or McIsaac is suggested.

If therapy is considered, a positive score of ≥3 should lead to pharyngeal swab or rapid test or culture in order to identify *β*-hemolytic streptococci. Routinely performed blood tests for acute tonsillitis are not indicated.

After acute streptococcal tonsillitis, there is no need to repeat a pharyngeal swab or any other routine blood tests, urine examinations or cardiological diagnostics such as ECG.

The determination of the antistreptolysin O-titer (ASLO titer) and other antistreptococcal antibody titers do not have any value in relation to acute tonsillitis with or without pharyngitis and should not be performed.

First-line therapy of *β*-hemolytic streptococci consists of oral penicillin. Instead of phenoxymethylpenicillin–potassium (penicillin V potassium), also phenoxymethlpenicillin–benzathine with a clearly longer half-life can be used.

Oral intake for 7 days of one of both the drugs is recommended. Alternative treatment with oral cephalosporins (e.g. cefadroxil, cefalexin) is indicated only in cases of penicillin failure, frequent recurrences, and whenever a more reliable eradication of β-hemolytic streptococci is desirable. In cases of allergy or incompatibility of penicillin, cephalosporins or macrolides (e.g. Erythromycin-estolate) are valuable alternatives.

**EPIDEMIOLOGY**

Tonsillitis is defined as an inflammation of the tonsils, which is a common clinical condition caused by either bacterial or viral infections. It affects a significant percentage of the population, especially children. Chronic tonsillitis (CT) is described as when an individual suffers from seven or more attacks of tonsillitis per year.

A study conducted in Rabak city, Sudan, aimed to determine the prevalence and management of CT among patients attending all secondary care hospitals in Rabak city, Sudan.

The study found that out of 297 patients who presented to all ENT clinics within the study period, 77 patients were confirmed to be having CT based on the inclusion criteria. The study also mentioned that the prevalence of chronic tonsillitis at the ENT inpatient department was studied.

Tonsillitis is caused mainly by β-hemolytic Streptococcus, called strep throat, and to a lesser extent by Staphylococcus aureus and several other bacteria. The study also mentioned that understanding the knowledge and magnitude of ENT diseases will aid the health authorities to implement its management and preventive programs.

**PREDEFINED FREQUENTLY ASKED QUESTIONS (Q & A SETS)**

***Question 1: “What is chronic tonsillitis?”***

Answer: “Chronic tonsillitis is a persistent or recurrent infection of the tonsils lasting weeks or months, often causing ongoing sore throat, discomfort, and sometimes difficulty swallowing.”

***Question 2: “What causes chronic tonsillitis?”***

Answer: “It is usually caused by repeated bacterial or viral infections, with group A streptococcus (GAS) being a common bacterial culprit.”

***Question 3: “What are the common symptoms?”***

Answer: “

* Persistent sore throat
* Swollen, red tonsils sometimes with white patches
* Difficulty swallowing
* Bad breath
* Swollen lymph nodes in the neck
* Fever (sometimes)”

***Question 4: “How is chronic tonsillitis diagnosed?”***

Answer: “Diagnosis is clinical, supported by:

* History of recurrent episodes (typically 5 or more in a year)
* Physical examination of tonsils
* Throat swab for rapid streptococcal antigen test or culture to identify bacterial infection
* Use of scoring systems (Centor, McIssac, FeverPAIN) to estimate bacterial infection likelihood.”

***Question 5: “What treatments are available?”***

Answer: “Conservative treatment:

* Pain relief with paracetamol or NSAIDs
* Saltwater gargles
* Throat lozenges and sprays
* Antibiotics if bacterial infection is confirmed or highly suspected.

Surgical treatment:

* Tonsillectomy (removal of tonsils) is considered if:
  + ≥7 episodes in the last year, or
  + ≥5 episodes per year for 2 consecutive years, or
  + ≥3 episodes per year for 3 consecutive years
* Surgery is effective but requires standardized postoperative pain management.”

***Question 6: “When is tonsillectomy recommended?”***

Answer: “Tonsillectomy is advised when recurrent tonsillitis significantly impacts quality of life or daily functioning, meeting the above episode frequency criteria. It is also considered after complications such as peritonsillar abscess (quinsy).”

***Question 7: “What are the risks or complications of chronic tonsillitis?”***

Answer: “

* Dehydration due to pain and difficulty swallowing
* Peritonsillar abscess (pus near tonsils)
* Ear infections
* Breathing problems during sleep (obstructive sleep apnea)
* Rarely, if caused by strep, rheumatic fever or kidney inflammation.”

***Question 8: “How long is recovery after tonsillectomy?”***

Answer: “Recovery typically takes about 10 days but may be longer in adults. Postoperative pain is common and should be managed carefully.”

***Question 9: “How can patients make informed decisions about treatment?”***

Answer: “Providing patients with clear, evidence-based information about tonsillitis and tonsillectomy benefits and risks helps reduce anxiety and supports shared decision-making. Patient education booklets have been shown to be well received and improve understanding.”

***Question 10: “How can I tell if I have strep throat or tonsillitis?”***

Answer: “Strep throat is a subset of tonsillitis that can be called acute or chronic streptococcal tonsillitis.

Tonsillitis caused by strep may feel worse and include symptoms such as nausea and vomiting. Tonsillitis caused by a virus, on the other hand, may include respiratory symptoms such as a runny nose, post nasal drip, and a cough. Your healthcare professional can order tests to determine which you have.

The treatment may be different since strep throat is caused by group A Streptococcus (group A strep), a type of bacteria, and tonsillitis is most often caused by a viral infection.”

***Question 11: “Is tonsillitis more serious in adults or children?”***

Answer: “Tonsillitis is more common in children than adults, but it’s not necessarily more serious when it occurs in adults. However, if an adult has chronic tonsillitis and needs a tonsillectomy, the recovery may be more complicated. Adults may be more likely to experience bleeding following tonsillectomy.”

***Question 12: “Can chronic tonsillitis mean I have cancer?”***

Answer: “Cancer of the tonsils, also called oropharyngeal cancer (OPC), is extremely rare, so it’s unlikely that chronic tonsillitis is OPC.

OPC tends to be unilateral (in one tonsil), while chronic tonsillitis tends to be bilateral (in both tonsils).

The risk factors for OPC include:

* smoking
* having HPV
* being over 50 years old
* drinking alcohol

Note that HPV-mediated OPC tends to be more common in younger men than OPC caused by smoking or drinking.

Tonsil cancer may present like tonsillitis. If you have throat pain that lasts longer than 2 or 3 weeks, a painless lump on the side of your throat, or symptoms of chronic tonsillitis, see your healthcare professional.”

**DOCTOR-PATIENT CONVERSATIONS**

*Doctor:* "I see you've been having a sore throat for several weeks now. Can you tell me more about your symptoms?"

Patient: "Yes, it's been going on for about three weeks. My throat feels scratchy and sore, especially when I swallow. Sometimes my voice sounds hoarse. I've also noticed some bad breath and occasional ear pain."

***Doctor:*** "Have you had any fever or swollen glands in your neck?"

***Patient:*** "Yes, I had a mild fever a few days ago, and my neck feels tender sometimes."

***Doctor:*** "Do you get these sore throats often?"

***Patient:*** "Yes, I think this is the fifth time this year."

***Doctor:*** "Based on what you describe, it sounds like you have chronic or recurrent tonsillitis. I will examine your throat now."

(The doctor examines the throat, noting red, swollen tonsils with white spots.)

***Doctor:*** "Your tonsils are inflamed and have some white patches, which suggests infection. I will take a throat swab to test for bacteria, and possibly a blood test to see if this is bacterial or viral."

***Patient:*** "What treatments are available?"

***Doctor:*** "If the infection is bacterial, antibiotics will help. For symptom relief, you can use painkillers like acetaminophen or ibuprofen and do saltwater gargles. Because you have recurrent episodes, we might consider tonsillectomy if these infections continue to affect your quality of life."

***Patient:*** "What does tonsillectomy involve?"

***Doctor:*** "It's a surgical removal of your tonsils under general anesthesia. It usually helps prevent future infections but involves recovery time and some risks, like pain and bleeding. We usually recommend it if you have 7 or more episodes in one year, or 5 per year over two years."

***Patient:*** "Okay, I’ll wait for the test results and then we can decide."

*REFERENCES:* <https://www.verywellhealth.com/chronic-and-recurrent-tonsillitis-1191984>

<https://www.researchgate.net/publication/346985354_Differential_diagnosis_of_chronic_tonsillitis_in_frequently_ill_children>

<https://www.healthline.com/health/chronic-tonsillitis#takeaway>

**PERITONSILLAR ABSCESS (QUINSY) TONSILLITIS**

*ALTERNATIVE NAMES:* Alternative names for peritonsillar abscess include "quinsy" and "quinsey". It is also referred to as a "pus-filled pocket" that forms near the tonsil.

**DEFINITION / DESCRIPTION**

A peritonsillar abscess is a swollen, pus-filled pocket that forms near one of your tonsils. It’s usually quite painful and can make it difficult to open your mouth. It’s usually a complication of tonsillitis and is often caused by the same bacteria that cause strep throat. Symptoms include severe pain, swollen tonsils and swollen lymph nodes. Treatments include needle aspiration and tonsillectomy.

**Peritonsillar abscess vs. tonsillitis**

Tonsillitis is an infection of your tonsils, while a peritonsillar abscess is an area of pus-filled tissue next to your tonsils. A peritonsillar abscess is often a complication of tonsillitis, but this isn’t always the case.

**Who usually gets peritonsillar abscesses?**

Peritonsillar abscesses can affect anyone, but they’re most common in children, adolescents and young adults.

Peritonsillar abscesses occur in about 1 in every 10,000 people. So, while it’s rare overall, it’s still one of the most common head and neck infections.

A peritonsillar abscess can be serious, especially if it grows so large that it blocks your throat. This can make it difficult to speak, swallow or breathe. Left untreated, the infection can even spread to your mouth, neck, chest or lungs.

**CAUSES**

In most instances, peritonsillar abscesses are caused by bacteria — and they’re usually a complication of tonsillitis. This happens when the infection spreads from your tonsil to the tissue around it.

There are certain factors that can increase your risk for peritonsillar abscesses, including smoking and gum disease.

***Is a peritonsillar abscess contagious?***

Yes. Bacteria can be spread through sneezing, coughing or sharing eating utensils.

A peritonsillar abscess is usually a complication of tonsillitis and is often caused by the same bacteria that cause strep throat. The exact pathophysiology of peritonsillar abscess formation remains unknown to date, but the most accepted theory is that an infection develops in crypta magna that then spreads beyond the confines of the tonsillar capsule, initially causing peritonsillitis and then developing into a peritonsillar abscess.

The most common pathogens are those that cause tonsillitis, namely beta-hemolytic Streptococci, with Staphylococcus aureus, Streptococcus pneumoniae, and Haemophilus influenzae also common causes. Infectious mononucleosis can also result in abscess formation.

Rarely, it may occur de novo without any prior history of a sore throat. Smoking and chronic periodontal disease could also cause quinsy.

**RISK FACTORS**

Peritonsillar abscess, also known as quinsy, is a localized infection that occurs when an infection spreads from the tonsils to the surrounding tissue. Several risk factors have been identified that increase the likelihood of developing this condition. One of the primary risk factors is having a history of frequent tonsillitis, as repeated episodes of tonsillitis can predispose individuals to the development of a peritonsillar abscess. Additionally, individuals who have undergone multiple courses of oral antibiotics for acute tonsillitis may also be at higher risk.

Other risk factors include poor dental hygiene, as dental infections such as periodontitis and gingivitis can contribute to the development of a peritonsillar abscess. Smoking is another significant risk factor, as it can compromise the immune system and increase susceptibility to infections. Furthermore, individuals with weakened immune systems, such as those with HIV or other immunocompromising conditions, may be more vulnerable to developing a peritonsillar abscess.

In some cases, the exact pathophysiology of peritonsillar abscess formation remains unclear, but it is believed that infections in the tonsillar crypts can spread beyond the confines of the tonsillar capsule, leading to the formation of an abscess. The presence of Weber glands, which are minor mucous salivary glands located in the space just superior to the tonsil, may also play a role in the development of peritonsillar abscesses.

In summary, the risk factors for peritonsillar abscess include:

* History of frequent tonsillitis
* Having undergone multiple courses or oral antibiotics for acute tonsillitis
* Poor dental hygiene
* Smoking
* Weakened immune systems
* The presence of Weber glands may contribute to the development of this condition.
* the presence of infections in the tonsillar crypts

**SIGNS / SYMPTOMS**

In most cases, a sore throat is the first sign of a peritonsillar abscess, with additional symptoms developing over the next few days. Other common peritonsillar abscess symptoms include:

* Tonsillitis.
* Fever.
* Chills.
* Swelling of your face and neck.
* Headache.
* Earache.
* Drooling.
* Difficulty swallowing.
* Bad breath.
* Muffled voice or hoarseness.
* A tonsil that’s pushing your uvula (the fleshy, hanging ball in the back of your throat).

**DIAGNOSIS METHODS**

Your healthcare provider will perform an examination of your throat, neck and mouth. They may also take a throat culture or blood test. In some cases, they may order imaging tests, such as ultrasound or a CT scan.

Peritonsillar abscess (PTA) is typically diagnosed based on clinical presentation and physical examination, which include symptoms such as fever, sore throat, dysphagia, trismus, and a "hot potato" voice. Physical examination may reveal erythematous, swollen tonsils with contralateral uvular deviation, trismus, edema of palatine tonsils, purulent exudate on tonsils, drooling, and cervical lymphadenopathy. Ultrasonography and computed tomographic scanning are useful in confirming the diagnosis.

Needle aspiration is considered the gold standard for both diagnosis and treatment of peritonsillar abscess. Point-of-care ultrasonography has also been utilized for the diagnosis of peritonsillar abscess, as well as for procedural guidance for incision and drainage when indicated.

**TREATMENT OPTIONS**

In most cases, a peritonsillar abscess requires surgical drainage and antibiotics. If you get more than one peritonsillar abscesses, you may need a tonsillectomy.

***Antibiotics***

Your healthcare provider will prescribe antibiotics, which may be given intravenously (through a vein) or taken in pill form. Common oral (by mouth) antibiotics include penicillin, amoxicillin, cephalosporin and clindamycin.

***Peritonsillar abscess drainage***

In most cases, your healthcare provider will drain the peritonsillar abscess. To do this, they’ll make an incision in the abscess to release the fluid inside of it.

***Tonsillectomy***

If you have recurrent (repeated) peritonsillar abscesses, your healthcare provider may recommend a tonsillectomy. During this procedure, your tonsils are surgically removed.

***Does a peritonsillar abscess need surgery?***

In most cases, yes. If it’s the first time you’ve had a peritonsillar abscess, your healthcare provider will likely drain the abscess and prescribe antibiotics. However, if you’ve had recurring (repeated) peritonsillar abscesses, they may recommend a tonsillectomy.

**PREVENTION TIPS**

You can’t prevent peritonsillar abscesses altogether. However, you can reduce your risk by:

* Not smoking.
* Practicing good oral hygiene.
* Treating oral infections promptly.

A peritonsillar abscess is usually a complication of tonsillitis and is often caused by the same bacteria that cause strep throat. The exact pathophysiology of peritonsillar abscess formation remains unknown to date, but the most accepted theory is that an infection develops in crypta magna that then spreads beyond the confines of the tonsillar capsule, initially causing peritonsillitis and then developing into a peritonsillar abscess.

The most common pathogens are those that cause tonsillitis, namely beta-hemolytic Streptococci, with Staphylococcus aureus, Streptococcus pneumoniae, and Haemophilus influenzae also common causes.

Infectious mononucleosis can also result in abscess formation. Rarely, it may occur de novo without any prior history of a sore throat. Smoking and chronic periodontal disease could also cause quinsy.

**OUTLOOK / PROGNOSIS**

If you have a peritonsillar abscess, you may be treated as an outpatient. However, if you have severe swelling that blocks your airway or other complications, you may have the abscess drained in the hospital. If so, you’ll probably need to stay there for a few days. Your healthcare provider will use a combination of treatments to ensure you’re feeling better as soon as possible.

Peritonsillar abscess is a complication of tonsillitis and usually occurs as a result of bacterial infection, often caused by the same bacteria that cause strep throat, such as Streptococcus pyogenes. The outlook for peritonsillar abscess is generally good when appropriate treatment is provided, such as antibiotics or a procedure to drain the pus. If left untreated, a peritonsillar abscess may develop into more serious issues, such as sepsis or blockage of the airway.

In most cases, the treatment involves draining the abscess and prescribing antibiotics. If a person has recurrent peritonsillar abscesses, a tonsillectomy may be recommended. The outlook after treatment is usually excellent, although peritonsillar abscess can come back.

It is important to seek medical attention if symptoms of a peritonsillar abscess develop, as early treatment can help avoid further complications. The condition is most common in children, adolescents, and young adults, but it can affect anyone. The risk of peritonsillar abscess can be reduced by treating tonsillitis promptly with antibiotics.

**POSSIBLE COMPLICATIONS**

Peritonsillar abscess, also known as quinsy, is a complication that can arise from tonsillitis, typically due to bacterial infection. Possible complications of peritonsillar abscess include blockage of the airway, aspiration pneumonitis, and further extension of the infection into the deep tissues of the neck, which can put neurologic and vascular structures at risk.

If left untreated, the infection can spread to the mouth, neck, chest, or lungs, leading to more severe conditions such as pneumonia, fluid around the lungs or heart, and skin infection of the neck or jaw. Additionally, the infection may cause upper airway obstruction, abscess rupture with aspiration of pus, or further extension of the infection into the deep tissues of the neck, which can be life-threatening. Other potential complications include difficulty swallowing, speaking, and sometimes even breathing, as the swelling can push the tonsil toward the uvula. In some cases, the infection may require hospitalization due to dehydration, inability to manage oral fluid intake, airway concerns, or failure of outpatient management.

**WHEN TO SEE A DOCTOR / RED FLAG**

Anytime you have a severe sore throat, fever, chills or other symptoms related to peritonsillar abscess, schedule an appointment with your healthcare provider. Treating the condition early can help you avoid further complications.

***Diagnostic Considerations***

Consider infectious mononucleosis (MN) due to Epstein-Barr virus (EBV) in an adolescent or younger child with acute tonsillitis, particularly when it is accompanied by tender cervical, axillary, and/or inguinal nodes; splenomegaly; severe lethargy and malaise; and low-grade fever.

An individual with herpes simplex virus (HSV) pharyngitis presents with red, swollen tonsils that may have aphthous ulcers on their surfaces. Herpetic gingivostomatitis, herpes labialis, and hypopharyngeal and epiglottic lesions may be observed.

***Differential Diagnoses***

* Gastroesophageal Reflux Disease
* Ophthalmologic Manifestations of Leukemias
* Lymphomas of the Head and Neck
* Malignant Nasopharyngeal Tumors
* Malignant Tonsil Tumor Surgery

**RECENT GUIDELINES OR UPDATES**

Head and Neck Surgery Foundation’s guidelines on tonsillectomy in children:

* If fewer than seven episodes of recurrent throat infection have occurred in the past year, less than five episodes per year in the past 2 years, or fewer than three episodes annually in the past 3 years, watchful waiting should be recommended by the clinician
* Tonsillectomy may be recommended if there have been at least seven episodes of recurrent throat infection in the past year, at least 5 episodes annually in the past 2 years, or at least 3 episodes per year in the past 3 years, with the medical record containing documentation for each episode and for at least one of the following: temperature above 38.3°C (101°F), cervical adenopathy, tonsillar exudate, or a positive group A beta-hemolytic streptococcus test
* If children do not meet the criteria in the second guideline but nonetheless have recurrent throat infection, evaluate the patients for modifying factors that may still point toward a need for tonsillectomy; such factors may include, among others, multiple antibiotic allergies/intolerance, PFAPA (periodic fever, aphthous stomatitis, pharyngitis, adenitis), and a history of more than one peritonsillar abscess

procedures involving the oral cavity, oropharynx, nasal cavity, or nasopharynx:

* Whenever possible, defer procedures involving the nasal cavity, nasopharynx, oral cavity, or oropharynx, as these pose a high risk for COVID-19 owing to the high viral burden in these locations
* Whenever possible, preoperative COVID-19 testing should be administered to patients and caregivers prior to surgical intervention
* Employment of enhanced personal protective equipment (PPE), with a strong recommendation for the use of a powered air-purifying respirator (PAPR), should be undertaken with any patient with unknown, suspected, or positive COVID-19 status
* Limit the use of powered instrumentation, including microdebriders, to reduce aerosol generation

With regard to audiologic evaluation and otologic surgery, the recommendations include the following:

* Perform routine newborn hearing screening and early intervention as indicated in the Joint Committee on Infant Hearing (JCIH) recommendations
* Defer tympanostomy tube placement for unilateral otitis media with effusion
* Although it should be prioritized, intervention for bilateral otitis media with effusion and hearing loss may be deferred based on the availability of COVID-19 testing
* Surgery involving the middle ear and mastoid, owing to their continuity with the upper aerodigestive tract, should be considered high risk for COVID-19 transmission
* Whenever possible, defer mastoidectomy, but if the surgery is required, employ enhanced PPE and avoid the use of high-speed drills
* Employment of a PAPR is strongly recommended when, in patients with unknown, suspected, or positive COVID-19 status, high-speed drills are required for otologic procedures

With regard to head and neck surgery and deep neck space infections, the recommendations include the following:

* Defer surgical excision of benign neck masses
* A multidisciplinary tumor board should decide the most appropriate treatment modality for pediatric patients with solid tumors of the head and neck, including thyroid cancer, with the availability of local resources taken into account
* Prior to surgical intervention, medical management of infectious conditions should, whenever possible, be attempted; on admission, patients and caregivers should be tested for COVID-19 and strictly quarantined pending test results

With regard to craniomaxillofacial trauma, the guidelines include the following

* When urgent or emergent bedside procedures, including closure of facial lacerations, are required, patients should be presumed positive for COVID-19, even if they are asymptomatic; carry out procedures in a negative-pressure room using enhanced PPE
* Employ closed-reduction techniques, when possible, until preoperative COVID-19 testing is available
* Avoid the use of high-speed drills, to reduce aerosol formation
* When urgent or emergent surgical intervention is required, patients should be presumed positive for COVID-19, even if they are asymptomatic

**EPIDEMIOLOGY**

Tonsillitis most often occurs in children; however, the condition rarely occurs in children younger than 2 years. Tonsillitis caused by *Streptococcus* species typically occurs in children aged 5-15 years, while viral tonsillitis is more common in younger children. Peritonsillar abscess (PTA) usually occurs in teens or young adults but may present earlier.

Pharyngitis accompanies many upper respiratory tract infections. Between 2.5% and 10.9% of children may be defined as carriers. In one study, the mean prevalence of carrier status of schoolchildren for group A *Streptococcus,* a cause of tonsillitis, was 15.9%.

According to Herzon et al, children account for approximately one third of peritonsillar abscess episodes in the United States.Recurrent tonsillitis was reported in 11.7% of Norwegian children in one study and estimated in another study to affect 12.1% of Turkish children.

Klug found seasonal and/or age-based variations in the incidence and cause of PTA. Among his conclusions, he reported that the incidence of PTA increased during childhood, peaking in teenagers and then gradually falling until old age. He also found that until age 14 years, girls were more affected than boys, but that the condition subsequently was more frequent in males than in females.

Klug also found a significantly higher incidence of *Fusobacterium necrophorum* than of group A *Streptococcus* in patients aged 15-24 years with PTA.

However, the incidence of group A *Streptococcus* was significantly higher than *F necrophorum* in children aged 0-9 years and in adults aged 30-39 years.

Although Klug determined that the incidence of PTA did not significantly vary by season, the presence of group A *Streptococcus* was significantly more frequent in winter and spring than in summer, while *F necrophorum* tended to be found more often in summer than in winter

***Antibiotic Options for Peritonsillar Abscess***

| **Antibiotic** | **Typical Use & Dosage** | **Common Side Effects** |
| --- | --- | --- |
| Penicillin (e.g., Penicillin G, Penicillin VK) | First-line in many cases; IV or oral forms. Penicillin G 10 million units IV q6h; Penicillin VK 500 mg PO q6h | Allergic reactions (rash, anaphylaxis), gastrointestinal upset, diarrhea |
| Amoxicillin-Clavulanate (Augmentin) | Broad-spectrum oral antibiotic; 875 mg PO every 12 hours | Diarrhea, nausea, rash, possible liver enzyme elevation |
| Clindamycin | Alternative for penicillin-allergic patients or resistant organisms; 300-450 mg PO q8h or 900 mg IV q8h | Diarrhea, risk of Clostridium difficile colitis, rash, nausea |
| Cephalosporins (e.g., Ceftriaxone, Cefdinir) | Used alone or with metronidazole; Ceftriaxone 1 g IV q12h; Cefdinir 300 mg PO q12h | Allergic reactions, gastrointestinal upset, possible cross-reactivity in penicillin allergy |
| Metronidazole | Added for anaerobic coverage; 500 mg PO or IV q6h | Metallic taste, nausea, headache, rarely neuropathy |
| Vancomycin | Reserved for MRSA coverage; 1 g IV q12h | Nephrotoxicity, ototoxicity, infusion reactions |
| Linezolid | Oral option for MRSA; 600 mg PO q12h | Bone marrow suppression, neuropathy, serotonin syndrome risk |

***Treatment Principles***

* Drainage: Needle aspiration or incision and drainage is essential to remove pus.
* Antibiotics: Empiric therapy should cover Group A Streptococcus, Streptococcus milleri group, anaerobes (e.g., Fusobacterium necrophorum).
* Supportive care: Hydration, pain control, and sometimes corticosteroids to reduce inflammation.

***Side Effects***

* Penicillins: Allergic reactions are the main concern; gastrointestinal upset is common.
* Clindamycin: Higher risk of antibiotic-associated diarrhea and *Clostridium difficile* colitis.
* Metronidazole: Gastrointestinal discomfort and metallic taste; avoid alcohol.
* Cephalosporins: Similar allergy risks as penicillins; GI upset.
* Vancomycin and Linezolid: Reserved for resistant infections; require monitoring for toxicity.

**PREDEFINED Q & A SETS**

***Question 1: “What is a peritonsillar abscess?”***

Answer: “A peritonsillar abscess (PTA) is a localized collection of pus

between the tonsillar capsule and the superior pharyngeal constrictor muscle, usually a complication of tonsillitis or obstruction of minor salivary glands near the tonsils.”

***Question 2: “What are the common symptoms of a peritonsillar abscess?”***

Answer: “

* Severe sore throat, usually on one side
* Fever
* Difficulty and pain swallowing (odynophagia/dysphagia)
* Muffled or "hot potato" voice
* Swelling and redness of one tonsil with deviation of the uvula to the opposite side
* Tender and swollen lymph nodes in the neck
* Sometimes ear pain on the affected side.”

***Question 3: “How is a peritonsillar abscess diagnosed?”***

Answer: “Diagnosis is primarily clinical, based on history and physical exam findings such as unilateral tonsillar swelling and uvula deviation. Ultrasound or CT imaging may be used if the diagnosis is uncertain or to differentiate from peritonsillar cellulitis.”

***Question 4: “What is the treatment for a peritonsillar abscess?”***

Answer: “

1. Drainage is the cornerstone of treatment:
   * Needle aspiration is the preferred initial method, using a sheathed needle to safely withdraw pus.
   * Alternatively, incision and drainage may be performed.
   * In some cases, especially recurrent or complicated abscesses, acute tonsillectomy may be necessary.
2. Antibiotic therapy after drainage:
   * Broad-spectrum antibiotics effective against group A streptococcus and oral anaerobes are recommended (e.g., amoxicillin-clavulanate or clindamycin).
   * Penicillin alone may be sufficient in some cases.
3. Supportive care:
   * Pain control and hydration are important.
   * Corticosteroids may be used to reduce inflammation and speed recovery.
4. Hospitalization is considered if the patient is very ill, cannot swallow fluids, or has comorbidities.”

***Question 5: “Can a peritonsillar abscess be treated at home?”***

Answer: “No. There is no effective home treatment for a peritonsillar abscess. Prompt medical attention is necessary to drain the abscess and start antibiotics to prevent serious complications.”

***Question 6: “What are the possible complications of a peritonsillar abscess?”***

Answer: “

* Airway obstruction
* Spread of infection to deep neck spaces or bloodstream (sepsis)
* Bleeding from erosion into blood vessels
* Dehydration due to difficulty swallowing
* Pneumonia, meningitis, or mediastinitis in severe cases.”

***Question 7: “How can a peritonsillar abscess be prevented?”***

Answer: “

* Prompt treatment of tonsillitis and throat infections
* Good oral hygiene
* Avoid smoking.

For patients with frequent tonsillitis or recurrent abscesses, tonsillectomy may be considered to prevent recurrence.”

***Question 8: “When should I seek emergency care?”***

Answer: “Seek immediate medical attention if you experience:

* Difficulty breathing or severe airway obstruction
* Inability to swallow saliva or fluids
* High fever with worsening symptoms
* Severe neck swelling or pain.”

**DOCTOR-PATIENT CONVERSATIONS**

***Doctor:*** Hello, I understand you have a very painful sore throat that's worse on one side. Can you tell me more about your symptoms?

***Patient:*** Yes, it started a few days ago with a sore throat, but now it’s really bad on the left side. It hurts to swallow and talk, and I feel feverish.

***Doctor:*** That sounds like it could be a peritonsillar abscess, which is a collection of pus near your tonsil caused by an infection. It often happens as a complication of tonsillitis.

***Patient:*** Oh, that sounds serious. What will happen next?

***Doctor:*** First, I will examine your throat. We often see swelling on one side and the uvula—the little flap at the back of your throat—may be pushed to the opposite side because of the swelling. You might also have swollen lymph nodes in your neck.

***Patient:*** Is it dangerous?

***Doctor:*** It can be uncomfortable and painful, but with prompt treatment, it usually gets better quickly. However, if you have trouble breathing, swallowing, or speaking, or if you start drooling, you should get emergency care immediately.

***Patient:*** What kind of treatment will I need?

***Doctor:*** The main treatment is to drain the pus from the abscess to relieve the pressure and pain. We can do this by numbing the area and then using a needle or a small cut to let the pus out. After that, you’ll need antibiotics to clear the infection completely.

***Patient:*** Will I need surgery?

***Doctor:*** Most people do not need surgery beyond drainage. However, if you have repeated infections or abscesses, we might consider removing your tonsils in the future.

***Patient:*** How long will it take to get better?

***Doctor:*** You should start feeling better within a few days after the drainage and starting antibiotics. Pain and swelling will reduce, and your ability to swallow and talk should improve.

***Patient:*** Is there anything I can do to feel better before the treatment?

***Doctor:*** You can take over-the-counter pain relievers like ibuprofen or acetaminophen, stay hydrated, and rest. Avoid smoking, as it can worsen the infection.

***Patient:*** Am I contagious?

***Doctor:*** The infection can spread through close contact, so it’s best to avoid sharing utensils or drinks until you’re on antibiotics and feeling better.

***Patient:*** Thank you, Doctor. I’m glad to know what’s going on and what to expect.

*REFERENCES:*

[Peritonsillar Abscess (Quinsy): Symptoms, Treatments & Causes](https://my.clevelandclinic.org/health/diseases/22817-peritonsillar-abscess-quinsy)

<https://emedicine.medscape.com/article/871977-guidelines>

<https://www.ncbi.nlm.nih.gov/books/NBK519520/#article-27029.s9>

<https://www.aafp.org/pubs/afp/issues/2002/0101/p93.html>

Additionally, adenotonsillar disease can also involve hypertrophy of the lymphoid tissue, which may cause mechanical obstruction of the upper airways and contribute to sleep-disordered breathing. The disease is often associated with the presence of bacterial biofilms, which play a significant role in the persistence of infection and the development of chronic inflammation.

**CAUSES OF TONSILLITIS**

Tonsillitis is most often caused by common viruses, but bacterial infections also can be the cause.

The most common bacteria causing tonsillitis is Streptococcus pyogenes (group A streptococcus), the bacterium that causes strep throat. Other strains of strep and other bacteria also may cause tonsillitis.

***Why do tonsils get infected?***

The tonsils are the immune system's first line of defense against bacteria and viruses that enter your mouth. This function may make the tonsils particularly vulnerable to infection and inflammation. However, the tonsil's immune system function declines after puberty — a factor that may account for the rare cases of tonsillitis in adults.

***How does tonsillitis spread?***

The viruses and bacteria that cause tonsillitis are highly contagious. They’re passed along by:

* Kissing or sharing utensils, foods or drinks.
* Coming into close contact with someone who’s sick.
* Touching a contaminated surface and then touching your nose or mouth.
* Inhaling tiny particles that become airborne when a sick person sneezes or coughs.

**RISK FACTORS OF TONSILLITIS**

Risk factors for tonsillitis include:

* **Young age.** Tonsillitis most often affects children, and tonsillitis caused by bacteria is most common in children ages 5 to 15.
* **Frequent exposure to germs.** School-age children are in close contact with their peers and frequently exposed to viruses or bacteria that can cause tonsillitis.

**SIGNS / SYMPTOMS OF TONSILLITIS**

Tonsillitis most commonly affects children between preschool ages and the mid teenage years. Common signs and symptoms of tonsillitis include:

* Red, swollen tonsils
* White or yellow coating or patches on the tonsils
* Sore throat
* Difficult or painful swallowing
* Fever
* Enlarged, tender glands (lymph nodes) in the neck
* A scratchy, muffled or throaty voice
* Bad breath
* Stomachache
* Neck pain or stiff neck
* Headache

In young children who are unable to describe how they feel, signs of tonsillitis may include:

* Drooling due to difficult or painful swallowing
* Refusal to eat
* Unusual fussiness

**DIAGNOSIS METHODS OF TONSILLITIS**

To diagnose tonsillitis, your healthcare provider will:

* Examine your throat for redness and swelling.
* Ask about other symptoms you’ve had, like a fever, cough, runny nose, rash or stomachache. This can help them rule out other conditions.
* Look in your ears and nose for other signs of infection.
* Feel the sides of your neck to see if your lymph nodes are swollen and tender.

***Tests that are used***

After confirming a tonsillitis diagnosis, your provider will need to determine whether the infection is viral or bacterial. To do this, they may request a bacteria culture test.

During this procedure, your provider will swipe the back of your throat with a long cotton swab to gather cells and saliva. Then, they’ll check the sample to see if it tests positive for Group A *Streptococcus* bacteria. If your results are positive, you have strep throat. If your results are negative, you have viral tonsillitis.

**TREATMENT OPTIONS OF TONSILLITIS**

Tonsillitis treatment depends on the cause. While symptoms of viral tonsillitis and bacterial tonsillitis can be similar, their treatments are different. Treatment may include:

* Antibiotics, if your infection is bacterial. Your healthcare provider may prescribe antibiotics like penicillin, clindamycin or cephalosporin. It’s important to follow your healthcare provider’s instructions and take the full course of antibiotics, even if you’re feeling better after a couple of days. If you stop taking them too soon, the infection could get worse or spread to another part of your body.
* Pain-relieving medications. Your provider may also recommend over-the-counter (OTC) pain relievers like ibuprofen or acetaminophen to help with your sore throat.
* Tonsillectomy (tonsillitis surgery). If you have chronic or recurring (returning) tonsillitis, your healthcare provider may recommend a tonsillectomy. This is a procedure to surgically remove your tonsils.

#### **Home remedies**

In addition to your healthcare provider’s recommendations, you can relieve the symptoms of viral and bacterial tonsillitis by:

* Drinking warm liquids, like tea, apple cider or broth.
* Gargling with warm salt water.
* Sucking on throat lozenges.

**PREVENTION TIPS OF TONSILLITIS**

The germs that cause viral and bacterial tonsillitis are contagious. Therefore, the best prevention is to practice good hygiene. Teach your child to:

* Wash his or her hands thoroughly and frequently, especially after using the toilet and before eating
* Avoid sharing food, drinking glasses, water bottles or utensils
* Replace his or her toothbrush after being diagnosed with tonsillitis

To help your child prevent the spread of a bacterial or viral infection to others:

* Keep your child at home when he or she is ill
* Ask your doctor when it's all right for your child to return to school
* Teach your child to cough or sneeze into a tissue or, when necessary, into his or her elbow
* Teach your child to wash his or her hands after sneezing or coughing

**OUTLOOK / PROGNOSIS OF TONSILLITIS**

Most cases of viral tonsillitis clear up in a few days with fluids and plenty of rest. Antibiotics typically eliminate bacterial tonsillitis in about 10 days. Tonsillitis usually doesn’t cause any serious or lasting health problems.

#### **How long does tonsillitis last?**

In most cases, tonsillitis symptoms go away in three to four days. But if symptoms last longer, you should schedule a visit with your healthcare provider to rule out other, more serious issues.

##### ***When can I go back to work or school?***

You should stay at home until your fever goes away and you can swallow comfortably again. This usually takes three to four days. If you’re unsure, ask your healthcare provider.

**POSSIBLE COMPLICATIONS OF TONSILLITIS**

Inflammation or swelling of the tonsils from frequent or ongoing (chronic) tonsillitis can cause complications such as:

* Disrupted breathing during sleep (obstructive sleep apnea)
* Infection that spreads deep into surrounding tissue (tonsillar cellulitis)
* Infection that results in a collection of pus behind a tonsil (peritonsillar abscess)

***Strep infection***

If tonsillitis caused by group A streptococcus or another strain of streptococcal bacteria isn't treated or if antibiotic treatment is incomplete, your child has an increased risk of rare disorders such as:

* Rheumatic fever, a serious inflammatory condition that can affect the heart, joints, nervous system and skin
* Complications of scarlet fever, a streptococcal infection characterized by a prominent rash
* Inflammation of the kidney (poststreptococcal glomerulonephritis)
* Poststreptococcal reactive arthritis, a condition that causes inflammation of the joints

**WHEN TO SEE A DOCTOR / RED FLAG**

It's important to get an accurate diagnosis if your child has symptoms that may indicate tonsillitis.

**Call your doctor if** your child is experiencing:

* A sore throat with fever
* A sore throat that doesn't go away within 24 to 48 hours
* Painful or difficult swallowing
* Extreme weakness, fatigue or fussiness

**Get immediate care if** your child has any of these signs:

* Difficulty breathing
* Extreme difficulty swallowing
* Excessive drooling

**DIFFERENTIAL DIAGNOSIS OF TONSILLITIS**

The differential diagnosis for tonsillitis is broad and includes pharyngitis, retropharyngeal abscess, epiglottitis, and Ludwig angina. The presence of dental or peritonsillar abscess is also a possibility. Kawasaki disease, Coxsackie virus, primary HIV, Ebstein-Barr virus, and oral Candidiasis may also present with throat pain, and differentiation can be via history and other clinical features.

**EPIDEMIOLOGY OF TONSILLITIS**

Approximately 2% of ambulatory patient visits in the United States are due to a sore throat. Though it is more common in winter and early spring, the disease can occur at any time during the year. GABHS accounts for 5% to 15% of adults with pharyngitis and 15% to 30% of patients between the ages of five and fifteen. Viral etiologies are more common in patients under five. GABHS is rare in children under two years of age

**PREDEFINED Q & A SETS**

***Question 1: “Will tonsillitis go away on its own?”***

Answer: “Viral tonsillitis typically goes away on its own in about one week. Bacterial tonsillitis takes about 10 days to run its course, but you’ll likely need antibiotics to reduce your risk of complications.”

***Question 2: “What does tonsillitis look like?”***

Answer: “Tonsillitis usually causes visibly red and inflamed tonsils. In some cases, you might have a whitish coating on your throat or white spots on your tonsils.”

***Question 3: “Tonsillitis vs. strep: What’s the difference?”***

Answer: “Strep throat is another common name for bacterial tonsillitis. You can get strep throat even if you don’t have your tonsils anymore.”

**Antibiotic Treatment for Bacterial Tonsillitis**

| **Antibiotic** | **Typical Use & Dosage** | **Common Side Effects** |
| --- | --- | --- |
| Penicillin V | First-line for GABHS tonsillitis; 10-day oral course (e.g., 500 mg PO every 6-8 hours) | Allergic reactions (rash, anaphylaxis), GI upset, diarrhea |
| Amoxicillin | Alternative oral antibiotic; 500 mg every 8 hours for 5-10 days | Similar to penicillin; rash, GI upset |
| Cephalosporins (e.g., Cefalexin, Cefadroxil) | Used if penicillin allergy or failure; 5-day course typical | Allergic reactions, GI upset, possible cross-reactivity |
| Macrolides (e.g., Clarithromycin, Erythromycin) | For penicillin-allergic patients; 5-day course | GI upset, taste disturbance, QT prolongation (rare) |

## Supportive Treatment (for Viral or Mild Cases)

* Analgesics/Antipyretics:
  + *Ibuprofen* or *acetaminophen* for pain and fever relief.
  + Avoid acetaminophen if Epstein-Barr virus (EBV) infection is suspected due to hepatotoxicity risk.
* Corticosteroids:
  + A single dose of dexamethasone (10 mg oral or IM for adults; 0.6 mg/kg for children) can reduce pain and speed recovery.
* Hydration and Rest:
  + Important supportive measures.

## Important Considerations

* Complete the full antibiotic course even if symptoms improve to prevent complications like rheumatic fever or kidney inflammation.
* Antibiotics are not recommended for viral tonsillitis to avoid resistance and unnecessary side effects.
* In suspected or confirmed EBV infection, avoid ampicillin or amoxicillin due to high risk of rash.
* Local anesthetics or antiseptic throat sprays have not shown consistent benefit.

## **Side Effects**

| **Drug Class** | **Common Side Effects** | **Notes** |
| --- | --- | --- |
| Penicillins | Allergic reactions, GI upset | Anaphylaxis rare but serious |
| Cephalosporins | Allergic reactions, GI upset | Cross-reactivity with penicillin allergy possible |
| Macrolides | GI upset, taste disturbance, rare cardiac effects | QT prolongation risk in susceptible patients |
| NSAIDs (Ibuprofen) | GI irritation, renal effects (rare) | Use with caution in renal impairment |
| Acetaminophen | Hepatotoxicity (especially in EBV) | Avoid in suspected mononucleosis |
| Corticosteroids | Short-term use generally safe; possible mood changes | Single dose recommended; weigh risks in some patients |

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I see you have a sore throat. Can you tell me how long you’ve had it and if you have any other symptoms?

Patient: It started about three days ago. My throat is very sore, especially when I swallow, and I have a fever. My tonsils look swollen and red.

Doctor: That sounds like tonsillitis, which is inflammation of your tonsils. It can be caused by either a virus or bacteria. Have you noticed any white patches or pus on your tonsils?

Patient: Yes, there are some white spots on the tonsils.

Doctor: That could suggest a bacterial infection, commonly caused by Group A Streptococcus. To be sure, I may take a throat swab to test for bacteria. In many cases, tonsillitis is viral and will get better on its own with rest and fluids.

Patient: Do I need antibiotics?

Doctor: Antibiotics are usually only needed if the infection is bacterial or if you have severe symptoms like a high fever, difficulty swallowing, or if you have risk factors such as a history of rheumatic fever. For most mild cases, supportive care like pain relief with paracetamol or ibuprofen, staying hydrated, and rest is enough.

Patient: What if it gets worse?

Doctor: If your symptoms worsen, you develop difficulty breathing, severe pain, or cannot swallow saliva, you should seek medical attention immediately. Sometimes, complications like a peritonsillar abscess can develop, which requires drainage and antibiotics.

Patient: How long will it take to get better?

Doctor: Viral tonsillitis usually improves within a week. If you have bacterial tonsillitis and take antibiotics, symptoms often improve within 2-3 days, but it’s important to finish the entire course to prevent complications.

Patient: Is there anything I can do at home to feel better?

Doctor: Yes, gargling with warm salt water, using throat lozenges, and avoiding irritants like smoke can help. Also, avoid close contact with others while you’re unwell to prevent spreading the infection.

Patient: When should I come back or see a specialist?

Doctor: If you have recurrent tonsillitis—several episodes in a year—or if your symptoms don’t improve with treatment, you might be referred to an ENT specialist. In some cases, removal of the tonsils (tonsillectomy) is considered.

*REFERENCES*

[Tonsillitis: Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/21146-tonsillitis#symptoms-and-causes)

<https://www.aafp.org/pubs/afp/issues/2023/0100/tonsillitis-tonsilloliths.pdf>

<https://emedicine.medscape.com/article/871977-differential>

<https://www.ncbi.nlm.nih.gov/books/NBK544342/>

**SMELL AND TASTE DISORDERS**

***Ear Nose and Throat***

**DEFINITION / DESCRIPTION**

The most common smell and taste disorders are:

* Anosmia. Loss of sense of smell
* Ageusia. Loss of sense of taste
* Hyposmia. Reduced ability to smell
* Hypogeusia. Reduced ability to taste sweet, sour, bitter, or salty things

In other disorders, odors, tastes, or flavors may be misread or distorted. They may cause you to detect a bad odor or taste from something that is normally pleasant to taste or smell. These disorders can affect quality of life. They may also be a sign of underlying disease. Problems with taste and smell can suggest certain health problems, such as:

* Obesity
* Diabetes
* High blood pressure
* Poor nutrition
* Nervous system diseases, such as:
  + Parkinson disease
  + Alzheimer disease
  + Multiple sclerosis

**CAUSES OF SMELL AND TASTE DISORDERS**

Some people are born with these disorders, but most are caused by:

* Illness (for example, cold or flu, sinus infection, and allergies)
* Head injury
* Hormone changes
* Dental or mouth problems
* Nasal polyps
* Exposure to certain chemicals
* Certain medicines
* Exposure to radiation therapy for head or neck cancer
* Cocaine snorted through the nose
* Cigarette smoking

Odor-sensitive cells can warn us of dangers and let us know when something is pleasant to eat. However, because they are so sensitive, they can easily die when exposed to the outside world.

Geneticist Randall Reed and his team seek to understand how they can regenerate so quickly. This will prevent people from losing their sense of smell in a time of danger.

**SIGNS / SYMPTOMS OF SMELL AND TASTE DISORDERS**

Symptoms can range from not being able to smell or taste at all to the reduced ability to smell or taste specific things that are sweet, sour, bitter or salty. In some cases, normally pleasant tastes or smells may become unpleasant.

**DIAGNOSIS METHODS FOR SMELL AND TASTE DISORDERS**

Along with a complete medical history and physical exam, other test may include:

* Measuring the lowest strength of a chemical that a person can recognize
* Comparing tastes and smells of different chemicals
* "Scratch and sniff" tests
* "Sip, spit, and rinse" tests where chemicals are applied to specific areas of the tongue

**TREATMENT OPTIONS FOR SMELL AND TASTE DISORDERS**

Your healthcare provider will figure out the best treatment for you based on:

* How old you are
* Your overall health and medical history
* How sick you are
* How well you can handle specific medicines, procedures, or therapies
* How long the condition is expected to last
* Your opinion or preference

Treatment may include:

* Stopping or changing medicines that contribute to the disorder
* Correction of the underlying medical problem
* Surgical removal of obstructions that may be causing the disorder
* Counseling
* Quitting smoking

**POSSIBLE COMPLICATIONS OF SMELL AND TASTE DISORDERS**

While both smell and taste disorders affect quality of life, smell disorders can be dangerous. They damage your ability to detect such things as:

* Fire
* Poisonous fumes
* Leaking gas
* Spoiled food and beverages

Taste disorders can affect nutrition and lead to weight loss and malnutrition. It can also harm the immune system and worsen other medical conditions.

Key points about smell and taste disorders

* The loss of the senses of smell and taste are the most common smell and taste disorders.
* Other disorders include the reduced ability to smell or taste specific substances that are sweet, sour, bitter or salty.
* For some people, normally pleasant tastes or smells may become unpleasant.
* Treatments for smell and taste disorders often include treating the underlying cause.
* Smell and taste disorders can affect quality of life and should be treated.

***Next steps***

Tips to help you get the most from a visit to your healthcare provider:

* Know the reason for your visit and what you want to happen.
* Before your visit, write down questions you want answered.
* Bring someone with you to help you ask questions and remember what your provider tells you.
* At the visit, write down the name of a new diagnosis, and any new medicines, treatments, or tests. Also write down any new instructions your provider gives you.
* Know why a new medicine or treatment is prescribed, and how it will help you. Also know what the side effects are.
* Ask if your condition can be treated in other ways.
* Know why a test or procedure is recommended and what the results could mean.
* Know what to expect if you do not take the medicine or have the test or procedure.
* If you have a follow-up appointment, write down the date, time, and purpose for that visit.
* Know how you can contact your provider if you have questions.

REFERENCES

<https://www.hopkinsmedicine.org/health/conditions-and-diseases/smell-and-taste-disorders>

**AGEUSIA (LOSS OF TASTE)**

ALTERNATIVE NAMES: Alternative names for ageusia include hypogeusia, which refers to a reduced ability to taste, and dysgeusia, which involves a distortion or alteration of taste. Additionally, it is sometimes confused with anosmia, which is the loss of the sense of smell.

**DEFINITION / DESCRIPTION**

Ageusia (pronounced “*uh-GYOU-zee-uh*”) is the complete loss of your sense of taste. This condition makes it impossible to detect tastes like sweet, sour, salty, bitter or umami.

Your sense of taste involves lots of parts, including your taste buds and nerves that carry taste signals to your brain. Anything that damages these parts or interferes with how they work together can potentially lead to ageusia.

True ageusia — a complete loss of taste — is rare. Out of 1,000 people, only one or two will develop the condition. It’s much less common than other related taste disorders like hypogeusia (a decreased sense of taste) or dysgeusia (a distorted, unpleasant perception of taste).

Ageusia can affect anyone, but it’s most common in people over 50. At this point, your total number of taste buds starts to decrease. Still, it’s much more common to lose some sense of taste, not all of it.

**CAUSES**

Causes of ageusia range from health conditions and medications to lifestyle-related things, like smoking cigarettes. Anything that interferes with the breakdown of food into chemical signals that your brain recognizes as specific flavors can impact your sense of taste.

#### **Conditions or injuries**

Infections, health conditions (including nutritional deficiencies) and injuries that impact structures in your head and neck involved with taste can all lead to ageusia.

Head and neck infections that can cause ageusia include:

* COVID-19. (Most people who develop ageusia as a coronavirus symptom experience a loss of taste and smell.)
* Sinus infection (sinusitis).
* Common cold.
* Influenza (flu).
* Strep throat.
* Salivary gland infections (sialadenitis).

Conditions affecting your mouth and teeth that can lead to loss of taste include:

* Gum (periodontal) disease.
* Tongue inflammation (glossitis).
* Xerostomia (dry mouth).
* Sjögren’s syndrome.
* Burning mouth syndrome.

Conditions or injuries affecting your nerves that may cause ageusia include:

* Diabetes.
* Bell’s palsy.
* Alzheimer’s disease.
* Multiple sclerosis (MS).
* Parkinson’s disease.
* Stroke.
* Nerve injury (including from a procedure or radiation therapy).

Vitamin and mineral deficiencies linked to ageusia include:

* Vitamin B12 deficiency.
* Zinc deficiency.

***Medications***

Hundreds of medications have loss of taste as a potential side effect, including:

* Antibiotics.
* Antivirals.
* Antifungals.
* Antihistamines.
* Anti Seizure medicines.
* Tricyclic antidepressants.
* Bronchodilators.
* Chemotherapy drugs.

**RISK FACTORS**

Ageusia, the complete loss of the sense of taste, has several risk factors that can contribute to its development. These include aging, as the natural aging process can lead to a diminished sense of taste.

Certain medical conditions such as diabetes, Parkinson's disease, and Alzheimer's disease are also associated with an increased risk of experiencing taste disturbances.

Additionally, smoking can damage taste buds and impair taste perception. Chronic conditions, head and neck radiation therapy, and certain medications, particularly those used for cancer treatment or blood pressure management, can contribute to taste disturbances.

Furthermore, infections, injuries, and nerve damage can also be risk factors for ageusia. It is important to note that while ageusia can be caused by various factors, it is often a symptom of an underlying condition that may be treatable.

**SIGNS / SYMPTOMS**

Having ageusia means you can’t distinguish any taste in foods or drinks. You may have other symptoms, too, depending on what condition causes it. These may include:

* High blood pressure (hypertension).
* Nasal congestion.
* Allergies.
* Oral health problems

**DIAGNOSIS METHODS**

Otolaryngologists (ENTs) diagnose taste disorders like ageusia. During your physical exam, they’ll review your medical history to see if any conditions, recent procedures or medications may be triggering your loss of taste. They may also recommend tests, including:

* Taste tests: During this test, a provider applies solutions that contain different dilutions of sweet, sour, salty or bitter flavors to your tongue. They may apply the solution as a drop, spray, tablet, wafer or taste strip.
* Imaging tests: You may need an imaging procedure, like magnetic resonance imaging (MRI) or a computed tomography (CT) scan, if your provider suspects your loss of taste is related to a structural issue in your head or neck.
* Lab tests: Blood tests can help providers identify conditions causing ageusia, like a vitamin or mineral deficiency.

**TREATMENT OPTIONS**

In most cases, treating the condition that led to ageusia helps restore your taste.

If a cold or flu causes ageusia, your sense of taste may return after taking antihistamines or decongestants. Healthcare providers treat Infections with antibiotics. Once you’ve recovered from your illness, you’ll be able to taste foods again.

Sometimes, you can reverse a complete loss of taste by changing your daily habits. For example, people who quit smoking can regain their sense of taste in as little as 48 hours. If your ageusia is related to gum disease, ramping up your oral hygiene rituals can help restore your taste function quickly.

**PREVENTION TIPS**

Because ageusia often results from a separate condition, it’s not always preventable. But there are things you can do to reduce your risk:

* Keep your mouth moist. Spit is an important part of taste. Help boost saliva production by staying hydrated. Avoid smoking or using tobacco products that lead to dry mouth.
* Reduce your risk of infections. Wash your hands frequently, and avoid close contact with people who are sick.
* Make oral hygiene a priority. Brush and floss daily, and visit your dentist regularly for checkups and cleanings.
* Get plenty of vitamin B12 and zinc. Good sources of vitamin B12 and zinc include meat, dairy products and fortified cereals.
* Switch medications (if you can). Changing medications isn’t always realistic. But your provider may be able to recommend a different kind if your medicine is interfering with your taste.

**OUTLOOK / PROGNOSIS**

If you’ve been diagnosed with ageusia, your healthcare provider can help you find ways to manage your symptoms until you regain your sense of taste. Most things that cause it, like an infection, are temporary. For example, people who have ageusia as a symptom of COVID-19 usually recover in one to three weeks.

You should be able to enjoy flavors again when a healthcare provider treats the condition that caused it. Ageusia is rarely permanent.

In the meantime, be sure to eat healthy, well-balanced meals. You may find it difficult to eat, but eating nutritious foods regularly is important to your health.

**POSSIBLE COMPLICATIONS**

Ageusia can take the joy out of eating, so you eat less. The condition can also keep you from detecting harmful flavors you should avoid. This can lead to health problems like:

* Unintended weight loss.
* Not getting enough nutrients (malnutrition).
* Consuming spoiled foods or drinks.
* Mood changes and depression.

**WHEN TO SEE A DOCTOR / RED FLAG**

Sometimes, it’s obvious that another health condition or medication is causing ageusia. But if you suddenly find you can’t taste anything and aren’t sure why, call a healthcare provider immediately. They’ll run tests to determine the cause and design a treatment plan to help.

**DIFFERENTIAL DIAGNOSIS**

## Infectious Causes

* Upper respiratory infections such as common cold, influenza, COVID-19
* Throat infections like strep throat, sinusitis, salivary gland infections
* Oral infections including gingivitis, sialadenitis, glossodynia (burning mouth syndrome)

## Neurological Causes

* Facial nerve damage (e.g., after surgery or trauma)
* Head trauma or injuries to the middle ear or jaw
* Neurological diseases such as multiple sclerosis, stroke, epilepsy, tumors
* Cranial nerve lesions or neuropathies affecting taste pathways
* Bell’s palsy

## Medication-Induced

* Drugs known to cause taste loss include:
  + Chemotherapy agents
  + Antibiotics
  + Antidepressants
  + Antihypertensives
  + Muscle relaxants
  + Antifungals

## Systemic and Nutritional Causes

* Diseases affecting the autonomic nervous system such as diabetes
* Nutritional deficiencies, especially zinc, vitamin B12, vitamin A
* Autoimmune diseases like Sjogren’s syndrome
* Endocrine disorders such as hypothyroidism
* Chronic illnesses like Crohn’s disease

## Local Oral and Structural Causes

* Poor oral hygiene or dental disease
* Radiation therapy to the head and neck damaging taste buds or salivary glands
* Surgical procedures involving the ear, nose, throat, or oral cavity (e.g., tonsillectomy, molar extraction)
* Salivary gland dysfunction leading to dry mouth (xerostomia)

## Age-Related Changes

* Natural degeneration of taste buds and sensory pathways with aging, more common over age 50

**EPIDEMIOLOGY**

Complete ageusia is very rare. It has been reported to occur in 1 or 2 people out of 1000. In general, the gustatory function decreases with advancing age. However, it usually does not lead to complete loss of taste.

**PREDEFINED Q & A SETS**

***Question 1: “Is my loss of taste due to a cold, flu, or other infection?”***

Answer: “Yes, viral infections such as the common cold, influenza, and COVID-19 are common causes of loss or reduction of taste (ageusia or hypogeusia). These infections can cause inflammation and congestion in the nasal and oral cavities, impairing the function of taste buds and the sense of smell, which is closely linked to taste perception. Other infections like sinus infections, middle ear infections, or throat infections can also affect taste.”

***Question 2: “Could my medications be causing my loss of taste?”***

Answer: Many medications can alter or reduce your sense of taste. These include:

* Antibiotics
* Antihistamines
* Chemotherapy drugs
* Proton pump inhibitors
* Some blood pressure medications

These drugs may affect taste receptors, saliva production, or nerve signaling involved in taste. If you suspect your medication is causing taste loss, consult your healthcare provider before stopping or changing any treatment.”

***Question 3: “Do I have an underlying condition that needs treatment?”***

Answer: “Loss of taste can be a symptom of various underlying conditions, such as:

* Nutritional deficiencies (e.g., vitamin A, B6, B12, zinc)
* Neurological diseases (Parkinson’s, Alzheimer’s, multiple sclerosis)
* Oral health problems (gum disease, oral thrush, dry mouth)
* Head trauma or nerve injury
* Nasal polyps or chronic sinusitis
* Systemic diseases like diabetes or high blood pressure

If your loss of taste is persistent or unexplained, it is important to see a healthcare provider for evaluation and treatment of any underlying causes.”

***Question 4: “Will taking supplements help?”***

Answer: “If your loss of taste is related to nutritional deficiencies (such as zinc or B vitamins), appropriate supplementation may help restore your sense of taste. However, supplements are not effective if the cause is infection, medication side effects, or nerve damage. A healthcare professional can test for deficiencies and recommend supplements accordingly.”

***Question 5: “Is there anything else I can do to improve my sense of taste?”***

Answer: “

* Treat underlying infections or conditions: Resolving colds, sinus infections, or dental problems can restore taste.
* Maintain good oral hygiene: Regular brushing, flossing, and dental check-ups help prevent oral causes of taste loss.”

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Good morning. What brings you in today?

Patient: Hello, Doctor. I’ve noticed that I’ve completely lost my sense of taste. I can’t taste anything at all.

Doctor: I see. When did this start, and have you had any recent illnesses like a cold or flu?

Patient: It started about a week ago. I did have a bad cold and some congestion before this happened.

Doctor: Loss of taste often happens with viral infections like colds, flu, or COVID-19. The inflammation can affect your taste buds or the nerves involved in taste. Have you noticed any loss of smell as well?

Patient: Yes, my sense of smell is also reduced.

Doctor: That’s common, since smell and taste are closely linked. The good news is that in most cases, your taste should return once the infection clears. Sometimes, medications or other conditions can also cause taste loss. Are you taking any new medications?

Patient: I started some antibiotics recently.

Doctor: Certain medications can affect taste temporarily. We’ll review your medications to see if that might be a factor. Also, nutritional deficiencies or other health issues can cause taste problems, so I may order some blood tests to check.

Patient: Is there anything I can do to help regain my taste?

Doctor: Maintaining good oral hygiene, staying hydrated, and avoiding smoking can help. If your loss of taste is due to infection, it usually improves within a few weeks. If it persists, we can explore further treatments or refer you to a specialist.

Patient: Should I take any supplements?

Doctor: Supplements like zinc or vitamins may help if you have a deficiency, but they won’t help if the cause is infection or medication. I’ll check your levels before recommending anything.

Patient: Thank you, Doctor. That helps me understand what’s going on.

Doctor: You’re welcome. If your symptoms worsen or don’t improve in a few weeks, please come back so we can reassess.

*REFERENCES:*

[Ageusia (Loss of Taste): Causes & Treatment](https://my.clevelandclinic.org/health/diseases/21850-ageusia-loss-of-sense-of-taste#symptoms-and-causes)

<https://www.hopkinsmedicine.org/health/conditions-and-diseases/smell-and-taste-disorders>

<https://www.ncbi.nlm.nih.gov/books/NBK549775/#article-17287.s10>

**AIRWAY OBSTRUCTION**

ALTERNATIVE NAMES: The alternative names for airway obstruction include foreign body airway obstruction , and upper airway obstruction.

**DEFINITION / DESCRIPTION**

An airway obstruction happens when you can't move air in or out of your lungs. It could be because you inhaled something that's blocking your airway. Or it could be caused by disease, allergic reaction, or trauma. Airway obstructions may block part of your airway or the whole thing.

***Types of Airway Obstructions***

Airway obstructions can happen anywhere along your airway, including your:

Upper respiratory tract. The upper airway consists of the following parts:

* Nose
* Mouth
* Pharynx
* Larynx‌

Lower respiratory tract. The lower airway includes:

* Trachea
* Bronchi
* Bronchioles
* Alveoli

**CAUSES**

Foreign objects. Inhaling an object that blocks the airway is the fourth leading cause of unintentional death. This is more likely to happen in children, who have smaller airways, and people who have problems with their nerves and muscles. The objects most likely to cause choking deaths in children include:

* Hot dogs
* Candy
* Nuts
* Grapes
* Balloons

In adults, the objects most likely to cause choking deaths include:

* Meat
* Fish
* Sausage
* Bread products
* Fruits
* Vegetables‌

Anaphylaxis. Allergies can lead to a severe, life-threatening reaction. It's almost always unexpected and can lead to death. Anaphylaxis causes the airways to swell and stop you from breathing if not treated right away. The most common causes of anaphylaxis include:

* Peanuts
* Tree nuts
* Seeds
* Milk
* Medicines
* Insect venom

Burns. When the air temperature gets hot enough, such as in a fire, it can injure your upper airway. These injuries cause swelling to your epiglottis, which is a flap of cartilage at the root of the tongue, and the mucous membranes around the larynx. This swelling can block your airway.‌

Infections. The most common cause of infectious airway obstruction in children is croup, which is caused by a virus. Infections caused by bacteria can also lead to airway obstruction, though it's not as common. These include:

* Epiglottitis
* Bacterial tracheitis, an infection of your trachea
* Diphtheria
* Retropharyngeal abscess
* Peritonsillar abscess

***What Can Cause a Lower Airway Obstruction?***

Lower airway obstructions can be caused by a variety of different conditions. Some of the most common include:

Asthma. Asthma is a lifelong disease that affects airflow. Symptoms include airway swelling, hyperreactivity, and making more mucus. They can cause coughing, wheezing, shortness of breath, and tightness in your chest. Asthma can be triggered by many different factors, including:

* Changes in the weather
* Allergens
* Infections
* Exercise

Bronchiolitis. Bronchiolitis most often affects young children and is usually caused by a virus. It makes your airways swell, blocking airflow. Symptoms of bronchiolitis can include:

* Trouble breathing
* Coughing
* Runny nose
* Fever
* Wheezing
* Young babies may stop breathing periodically

Chronic obstructive pulmonary disease (COPD). That’s an inflammatory lung disease that blocks the airflow into the lungs. COPD can cause inflammation of the lining of the tubes that carry air to the sacs in the lungs. This is called chronic bronchitis. Emphysema also contributes to COPD by destroying the air sacs at the end of the smallest air passages. Symptoms of COPD include:

* Wheezing
* Tightness in your chest
* Chronic cough
* Shortness of breath
* Swelling in legs, ankles, or feet
* Frequent respiratory infections

**RISK FACTORS**

Children have a higher risk of obstruction by foreign objects than adults. They have smaller airways and they’re more likely to stick toys and other small objects in their noses and mouths. In addition, they may not chew food well before swallowing.

Other risk factors for airway obstruction include:

* severe allergies to insect stings such as those from bees or to foods such as peanuts
* structural abnormalities or inherited diseases that can cause airway problems
* smoking
* neuromuscular disorders and other conditions that cause people to have a difficult time swallowing food properly

**SIGNS / SYMPTOMS**

Symptoms of an airway obstruction can vary depending on how severe the blockage is, including:

* Violent coughing
* Struggling to breathe
* Turning blue
* Choking
* Gagging
* Vomiting
* Wheezing

**DIAGNOSIS METHODS**

Certain tests may also be used to determine the cause of your airway obstruction. During an emergency, your doctor will likely order an X-ray first to determine the cause of your symptoms.

If an X-ray fails to determine the cause of the obstruction, your doctor may choose to order more advanced testing. This may include a bronchoscopy.

During this procedure, your doctor inserts an instrument called a bronchoscope through your mouth or nose to look into your lungs for any foreign bodies.

Bronchoscopy can also help identify infectious causes by sampling mucus and sending it for culture. It can also be used to remove mucus plugs, which can occur in patients with chronic lung conditions like emphysema and cystic fibrosis.

Your doctor may also order a laryngoscopy. During this procedure, they will examine your larynx with an instrument called a laryngoscope.

Additional tests may include a CT scan of the head, neck, or chest to determine other sources of obstruction, such as epiglottitis, an infection and inflammation of the epiglottis.

The epiglottis is the flap of tissue that protects and covers your trachea to prevent food and foreign bodies from entering.

**TREATMENT OPTIONS**

The treatment for an airway obstruction depends on the cause and severity.‌

An inhaled object is a medical emergency and needs treatment right away. If an inhaled object causes choking, you should call 911 and perform first aid. The five-and-five method recommended by the American Red Cross consists of five black blows followed by five abdominal thrusts, which is the Heimlich maneuver. Alternate between the two until the object is coughed up.

Other treatment options may include:

* Oxygen
* Intravenous (IV) fluids
* Antibiotics
* Other medicines
* Endotracheal tube
* Breathing machine
* Airway surgery

**PREVENTION TIPS**

Many types of airway obstructions can be prevented. You can help reduce your risk by doing the following:

* Avoid drinking a lot of alcohol before eating.
* Eat small bites of food.
* Eat slowly.
* Supervise small children when eating.
* Avoid or cut up high risk choking foods, such as hot dogs, popcorn, and grapes, for kids.
* Chew thoroughly before swallowing.
* Make sure your dentures fit properly.
* Keep small objects away from children.
* Avoid smoking.
* Visit your doctor regularly if you have a condition that can cause a chronic airway obstruction.

**OUTLOOK / PROGNOSIS**

With prompt treatment, an airway obstruction can often be treated successfully. However, airway obstructions are extremely dangerous. They can be fatal even with treatment.

If you or someone near you is experiencing an airway obstruction, seek emergency medical attention.

**WHEN TO SEE A DOCTOR / RED FLAG**

If you or someone else is experiencing symptoms of airway obstruction, it is crucial to seek immediate medical attention. Airway obstruction can be life-threatening, especially if it leads to complete blockage of the airway, making it impossible to breathe.

Symptoms such as difficulty breathing, gasping, bluish skin, inability to speak or cough, and loss of consciousness are signs of severe airway obstruction and require urgent care.

In cases of suspected airway obstruction, calling emergency services, such as 911, is essential. While waiting for help, techniques such as abdominal thrusts, back blows, or chest compressions may be used to dislodge the object causing the blockage. However, these measures are temporary and should not replace professional medical assistance.

If the obstruction is partial, it is still important to consult a doctor to determine the underlying cause and prevent potential complications. Chronic airway obstructions, which develop over time or persist for extended periods, may require ongoing medical management and monitoring.

In summary, you should see a doctor immediately if there are signs of severe airway obstruction, such as the inability to breathe, speak, or cough, or if there is a risk of complete airway blockage. Even for partial obstructions, medical evaluation is recommended to ensure proper treatment and prevent further issues.

**DIFFERENTIAL DIAGNOSIS**

The differential diagnosis of acute upper airway obstruction:

* Aspiration
* Infection
* Hemorrhage
* Angioedema
* Iatrogenic (e.g., post-surgical, instrumental)
* Blunt trauma
* Inhalation injury
* Neuromuscular disease

The differential diagnosis of chronic airway obstruction:

* Infection
* Post-intubation
* Amyloidosis
* Sarcoidosis
* Tumor
* Collagen vascular disease
* Mediastinal mass
* Esophageal tumor
* Cardiovascular anomaly
* Neuromuscular disease
* Idiopathic
* Tonsillar enlargement in children

**EPIDEMIOLOGY**

Most children who die from airway obstruction injuries are usually younger than four years of age. In adults, airway obstruction is more common with inflammation, infection, and trauma. Airway obstruction is a common cause of emergency department visits

***Main drug treatments used, their purposes, and common side effects:***

## 1. Corticosteroids

* Purpose: Reduce airway inflammation and edema, especially in conditions like asthma, COPD exacerbations, croup, laryngeal edema, or post-extubation swelling.
* Common drugs: Dexamethasone, prednisone, methylprednisolone.
* Side effects:
  + Short-term: Increased blood sugar, mood changes, insomnia, gastrointestinal upset.
  + Long-term/high dose: Immunosuppression, adrenal suppression, osteoporosis (less relevant in acute use).
* Notes: Often given orally or intravenously depending on severity; beneficial as a temporizing measure in airway obstruction due to inflammation.

## 2. Bronchodilators

* Purpose: Relax airway smooth muscle in lower airway obstruction (e.g., asthma, COPD).
* Common drugs: Beta-2 agonists like albuterol (salbutamol), anticholinergics like ipratropium.
* Side effects: Tremor, tachycardia, nervousness, dry mouth, headache.
* Notes: Used mainly in lower airway obstruction, not upper airway causes.

## 3. Epinephrine (Adrenaline)

* Purpose: Emergency treatment of airway obstruction caused by anaphylaxis or severe allergic angioedema; reduces airway swelling rapidly.
* Administration: Intramuscular injection (IM) is preferred in emergencies.
* Side effects: Palpitations, tachycardia, anxiety, hypertension, headache.
* Notes: Life-saving in anaphylaxis; requires immediate medical attention.

## 4. Antibiotics

* Purpose: Treat bacterial infections causing airway obstruction, such as peritonsillar abscess, epiglottitis, or bacterial tracheitis.
* Common drugs: Broad-spectrum antibiotics tailored to culture results (e.g., amoxicillin-clavulanate, clindamycin).
* Side effects: Allergic reactions, gastrointestinal upset, antibiotic-associated diarrhea, potential for *Clostridium difficile* infection.
* Notes: Used when infection is confirmed or strongly suspected.

## 5. Oxygen Therapy

* Purpose: Support oxygenation in any airway obstruction causing hypoxia.
* Methods: Nasal cannula, high-flow nasal oxygen (HFNC), or mechanical ventilation if severe.
* Side effects: Generally safe; prolonged high-flow oxygen may cause dryness or discomfort.
* Notes: HFNC can improve airway patency and reduce work of breathing.

## 6. Supportive Treatments and Emergency Procedures

* Airway maneuvers: Heimlich maneuver or back blows for foreign body obstruction.
* Airway adjuncts: Endotracheal intubation, tracheostomy, or cricothyrotomy may be needed if medical therapy fails.
* Side effects: Procedural risks include bleeding, infection, airway trauma.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, what brings you in today?

Patient: Doctor, I’ve been having trouble breathing lately. Sometimes I feel like my throat is closing up, and I hear a noisy sound when I breathe in.

Doctor: I see. That noisy sound you’re describing is called stridor, which often indicates some narrowing or blockage in the upper airway. Can you tell me if you feel any pain, swelling, or difficulty swallowing?

Patient: Yes, my throat feels sore, and it’s hard to swallow sometimes. I also noticed some swelling under my jaw.

Doctor: Those symptoms suggest that there might be swelling or an infection causing partial obstruction of your airway. This can happen with infections like peritonsillar abscess or epiglottitis, or sometimes due to allergic reactions causing swelling.

Patient: Could it be serious?

Doctor: Airway obstruction can be serious if it worsens and blocks your breathing completely. That’s why it’s important to assess how severe it is. Are you having any difficulty speaking, severe shortness of breath, or drooling?

Patient: I have some trouble talking and I’m a bit short of breath, but no drooling.

Doctor: That’s concerning, but we caught it early. We need to examine your throat and may do imaging or a scope to see exactly where the obstruction is. In some cases, treatment involves antibiotics, steroids to reduce swelling, or procedures to drain abscesses.

Patient: What if it gets worse suddenly?

Doctor: If you suddenly can’t breathe, talk, or cough, or if you develop blue lips or face, call emergency services immediately. In those cases, urgent airway management is needed, which might include procedures like intubation or even tracheostomy.

Patient: Is there anything I can do now to help?

Doctor: Avoid irritants like smoke, stay calm, and try to sit upright to ease breathing. We’ll start treatment promptly to reduce swelling and infection. If you notice worsening symptoms, come back immediately.

Patient: Thank you, Doctor. I feel better knowing what to watch for.

*REFERENCES:*

<https://www.ncbi.nlm.nih.gov/books/NBK470562/#article-17310.s8>

<https://emergency.severndeanery.nhs.uk/about-us/current-trainees/simulation/airway-scenarios/>

**ALLERGIC RHINITIS**

**ALTERNATIVE NAMES:**  Allergic rhinitis is also known as “hay fever” or “pollenosis”. It is sometimes referred to as “nasal allergies” or “seasonal allergies”. The term "hay fever" is commonly used to describe allergic rhinitis caused by seasonal allergens such as pollen.

**DEFINITION / DESCRIPTION**

Allergic rhinitis (hay fever) is an allergic reaction to tiny particles in the air called allergens. When you breathe in allergens through your nose or mouth, your body reacts by releasing a natural chemical called histamine. Despite being called hay fever, hay doesn’t cause hay fever and most people don’t get a fever.

Symptoms of hay fever include sneezing, nasal congestion and irritation of your nose, throat, mouth and eyes. Allergic rhinitis isn’t the same as infectious rhinitis, otherwise known as the common cold. Hay fever isn’t contagious.

Also, not all rhinitis is allergic. Many people suffer from nonallergic rhinitis resulting in similar symptoms. Inflammation causes rhinitis, not allergens or histamine release.

***What triggers allergic rhinitis?***

Several indoor and outdoor allergens cause hay fever. Common hay fever triggers include:

* Pollen from trees, weeds and plants.
* Mold spores.
* Pet dander.
* Dust mites.
* Cockroach droppings and saliva.

***When do people usually get hay fever?***

You can have hay fever any time of the year. Seasonal allergies occur in the spring, summer and early fall when trees and weeds bloom and pollen counts are higher. But pollen seasons can vary depending on your location, as well. Perennial allergies can happen year-round. They result from irritants that are always around, such as pet dander, cockroaches and dust mites.

Hay fever is very common. In the United States, around 20% of the population has allergic rhinitis. In 2021, one study found that more than 81 million people had seasonal allergies.

**CAUSES**

Allergic rhinitis occurs when your body’s immune system reacts to an irritant in the air. The irritants (allergens) are so tiny that you can easily inhale them through your nose or mouth.

Allergens are harmless to most people. But if you have hay fever, your immune system thinks the allergen is intruding. Your immune system tries to protect your body by releasing natural chemicals into your bloodstream.

The main chemical is called histamine. It causes mucous membranes in your nose, eyes and throat to become inflamed and itchy as they work to eject the allergen from your body.

Allergic rhinitis comes from many allergens, including:

* Dust mites that live in carpets, drapes, bedding and furniture.
* Pollen from trees, grass and weeds.
* Pet dander (tiny flakes of dead skin cells).
* Mold spores.
* Cockroaches (their saliva and waste).

Food allergies can also cause inflammation in your nose and throat. Food allergies can be life-threatening, so get medical help right away if you’re concerned that a certain food is consistently causing allergy symptoms.

**RISK FACTORS**

Allergies are inherited, which means you’re more likely to have hay fever if you have a parent or immediate family member with allergies. People who have asthma or eczema are also more likely to develop hay fever.

**SIGNS / SYMPTOMS**

Hay fever symptoms can appear throughout the year. Outdoor allergies are worse in the spring, summer and early fall depending on where you live. In warm weather, weeds and flowers bloom, and pollen counts are higher. Indoor allergies, such as those from pets and dust mites, can get worse in winter because people spend more time indoors with their windows closed.

Symptoms of hay fever include:

* Nasal stuffiness (congestion), sneezing and runny nose.
* Itchy nose, throat and eyes.
* Red or watery eyes.
* Headaches, sinus pressure and dark circles under your eyes.
* More mucus in your nose and throat.
* Tiredness.
* Sore throat from mucus dripping down your throat (postnasal drip).
* Wheezing, coughing and trouble breathing.

***How do I know if it’s hay fever or a cold?***

Symptoms of a cold and hay fever are similar, but there are some differences. Itchy, red and watery eyes are common with allergies, but not as common with a cold. A cold is more likely to cause muscle aches and pain or a fever.

Another way people can tell the difference is that allergic rhinitis usually has a trigger, like seasons changing or being around a new pet. Allergies often happen at the same time each year, like in spring and late summer, and they start quickly.

On the other hand, a virus causes a cold and you catch viruses from other people. So, you may know it’s a cold if you’ve been around someone with a cold. A cold tends to go away within a week, whereas allergies will stick around until the allergen is out of the air.

**DIAGNOSIS METHODS**

Your healthcare provider will examine you, ask about your symptoms and evaluate you for other conditions, such as a cold or asthma. They can also perform allergy tests.

A blood allergy test measures antibodies to an allergen in a sample of your blood. This blood test is called an immunoglobulin E (IgE) test. It can detect most types of allergies, including food allergies.

Your provider may also recommend a skin prick and/or intradermal test to determine what allergens are causing your symptoms. In a skin prick test, your provider places a small sample of different allergens on your skin (usually on your forearm or back).

They scratch or prick your skin with a needle. If you’re allergic to a specific allergen, the area will become red, itchy and irritated in 15 to 30 minutes. Intradermal testing is similar, but your allergist places the allergen underneath your skin. Your skin reacts in the same way it does for a prick test.

**TREATMENT OPTIONS**

Several allergy medications can improve symptoms and help you live with hay fever. These treatments come in many forms, including liquids, pills, eye drops, nasal sprays and injections. Talk to your provider before taking any medication, especially if you’re pregnant or have other health concerns.

#### **Antihistamines**

Antihistamine medications are available with a prescription or over the counter (OTC). They work by blocking the histamine that your body releases during an allergic response. Antihistamines come as pills, liquids, eye drops, nasal sprays and inhalers. They include:

* Loratadine (Claritin®).
* Cetirizine (Zyrtec®).
* Fexofenadine (Allegra®).
* Levocetirizine (Xyzal®).

Antihistamines can cause drowsiness. Avoid alcohol when taking antihistamines, especially if you’re going to drive.

#### **Decongestants**

These medications relieve congestion in your nose and sinuses. You can take decongestants by mouth (in pill or liquid form) or use a nasal spray. They include:

* Afrin® nasal spray.
* Phenylephrine nasal spray (Neo-Synephrine®).
* Pseudoephedrine (Sudafed®).

Decongestants can increase blood pressure and cause headaches, trouble sleeping and irritability. Nasal decongestants can be addictive when you use them for longer than five days.

#### **Corticosteroid nasal sprays**

These sprays and inhalers reduce inflammation and relieve symptoms of hay fever. The most common nasal sprays are Flonase®, Nasacort® and Rhinocort®. Side effects include headaches, nasal irritation, nosebleeds and cough.

#### **Leukotriene inhibitors**

During an allergic reaction, your body releases leukotrienes, histamine and other chemicals that cause inflammation and hay fever symptoms. Available only with a prescription, these pills block leukotriene. The most common leukotriene inhibitor is montelukast (Singulair®). Some people experience changes in mood, vivid dreams, involuntary muscle movements and skin rash when taking this medication.

#### **Immunotherapy**

This treatment works by helping your body learn to tolerate allergens. Your provider gives you a series of injections (allergy shots or subcutaneous immunotherapy) with a small amount of the allergen. Every time you get a shot, your provider increases the amount of the allergen. Over time, your immune system develops immunity to the allergen and stops launching a reaction to it.

In certain circumstances, your provider might recommend immunotherapy in the form of a pill that you place under your tongue called oral immunotherapy. Currently, oral immunotherapy is only available for allergies to trees, grass and dust mites (in the U.S.).

### ***How many days does allergic rhinitis last?***

It varies. Most people find relief from hay fever within a few days with medication, but they must take it continuously until the allergen is out of the air. Some people continue to have symptoms of hay fever for several weeks or months, especially if they aren’t taking or can’t take medication to help relieve symptoms.

**PREVENTION TIPS**

There’s no way to prevent hay fever, but lifestyle changes can help you live with allergies. You can relieve hay fever symptoms by avoiding irritants as much as possible. To reduce symptoms, you should:

* Avoid touching your face and rubbing your eyes or nose.
* Close windows in your home and car during the spring, summer and early fall when pollen counts are higher.
* Put covers on pillows, mattresses and box springs to protect against dust mites.
* Keep pets off couches and beds, and close doors to bedrooms you don’t want them to enter.
* Use filters in your vacuum cleaner and air conditioner to reduce the amount of allergens in the air.
* Wash your hands often, especially after playing with pets.
* Wear a hat and sunglasses to protect your eyes from pollen when you’re outside. Change your clothes as soon as you come indoors.

**OUTLOOK / PROGNOSIS**

Hay fever can make you feel miserable, but it generally doesn’t cause serious health problems. Most people with hay fever manage symptoms with lifestyle changes and over-the-counter medication.

People with airborne allergies have a higher risk of ear infections and sinus infections. Because hay fever can make it tough to get a good night’s sleep, you may feel tired during the day. If you have asthma, hay fever can make your asthma symptoms worse.

**WHEN TO SEE A DOCTOR / RED FLAG**

Although hay fever usually doesn’t cause any serious health problems, you should see your provider to rule out other conditions, such as asthma or a sinus infection. Seek care if hay fever symptoms are:

* Getting in the way of your daily life.
* Making it hard for you to sleep.
* Not improving with allergy medication.

Your provider can help you identify the allergens that are causing a reaction and recommend treatments to help you feel better.

**DIFFERENTIAL DIAGNOSIS**

The differential diagnosis for AR includes other forms of rhinitis that are not allergic. Children, particularly those under the age of 2 years, should also be assessed for congenital causes of nasal obstruction, such as choanal atresia and immunodeficiencies.

* Vasomotor rhinitis - noninflammatory rhinitis that can be triggered by a change in temperature, odors, or humidity
* Infectious rhinitis - viral or bacterial infections, most commonly seen in the pediatric population
* Cerebrospinal fluid leak - clear rhinitis refractory to treatment
* Non-allergic rhinitis with eosinophilia syndrome (NARES) - infiltration of eosinophils in nasal tissue without allergic sensitization
* Chemical rhinitis - exposure to chemicals through occupation, household chemicals, sport/leisure exposure
* Rhinitis of pregnancy and hormonally-induced rhinitis
* Drug-induced rhinitis - e.g., NSAIDs, ACE inhibitors, nasal decongestants, cocaine
* Autoimmune, granulomatous, and vasculitic rhinitis - Granulomatosis with polyangiitis, sarcoidosis, etc.
* Nasal polyposis
* Nasopharyngeal neoplasm
* Sickle cell anemia - in a young child presenting with nasal polyposis and well-controlled asthma, sweat chloride testing is the appropriate next step in management to rule out cystic fibrosis.

**RECENT GUIDELINES OR UPDATES**

*Allergic Rhinitis*

* In patients aged 12 years or older, mild intermittent symptoms should be treated initially with a second-generation oral antihistamine (OAH) or intranasal antihistamine (INAH) as needed. For moderate/severe, intermittent symptoms it is similarly recommended to treat initially with a second-generation OAH or INAH as needed, with the next step adding intranasal corticosteroids (INCS) to the INAH.
* In patients aged 12 years or older, mild persistent symptoms should be treated initially with an INCS while moderate/severe persistent symptoms should have INAH and INCS combination therapy.
* Leukotriene receptor antagonists are not recommended for initial treatment of allergic rhinitis. Corticosteroid injections are no longer recommended given their side effect profile.

*Nonallergic rhinitis*

* In patients aged 12 years or older, mild intermittent symptoms as well as moderate/severe symptoms of NAR are recommended to be treated by an INAH initially.
* In patients aged 12 years or older with mild persistent symptoms of NAR, it is recommended to treat with an INAH. Moderate/severe persistent symptoms should be treated with both INAH and INCS.

**EPIDEMIOLOGY**

The prevalence of allergic rhinitis based on physician diagnosis is approximately 15%; however, the prevalence is estimated to be as high as 30% based on patients with nasal symptoms. AR is known to peak in the second to fourth decades of life and then gradually decline. The incidence of AR in the pediatric population is also quite high, making it one of the most common chronic pediatric disorders. According to data from the International Study for Asthma and Allergies in Childhood, 14.6% in the 13 to 14 year age group and 8.5% in the 6 to 7 year age group display symptoms of rhinoconjunctivitis linked to allergic rhinitis. Seasonal allergic rhinitis seems to be more common in the pediatric age group, whereas chronic rhinitis is more prevalent in adults.

A systematic review from 2018 estimated that 3.6% of adults had missed work, and 36% had impaired work performance due to allergic rhinitis. Economic evaluations have shown that indirect costs associated with lost work productivity account for the majority of the cost burden for AR.

Risk factors for developing AR include a family history of atopy, male sex, a presence of allergen-specific IgE, a serum IgE greater than 100 IU/mL before age 6, and higher socioeconomic status Studies in young children have shown a higher risk of AR in those with an early introduction to foods or formula and/or heavy exposure to cigarette smoking in the first year of life.

Although many recent studies have evaluated the link between pollution and the development of AR, no significant correlation yet exists. Interestingly, there are several factors identified that may have a protective effect on the development of AR.

The role of breastfeeding in the development of AR is often debated, but it is still recommended due to its many other known benefits and no associated harms.

There is no evidence that pet avoidance in childhood prevents AR; however, it is hypothesized that early pet exposure may induce immune tolerance.

There is a growing interest in the "farm effect" on the development of allergies, and a meta-analysis of 8 studies showed a 40% lower risk in subjects who had lived on a farm during their first year of life

**PREDEFINED Q & A SETS**

***Question 1: “What’s the difference between hay fever and allergies?”***

Answer: “Hay fever is another name for allergic rhinitis. Hay fever mainly refers to seasonal allergic rhinitis, which is the allergies you experience at certain times of the year due to pollen from grass, weeds and trees. But some people use the terms interchangeably.”

***Question 2: “When do most people get seasonal allergies?”***

Answer: “Seasonal allergies tend to occur in the spring and early fall when pollen from grass, trees and ragweed are more prevalent.”

***Question 3: “How do you know if you have seasonal allergies?”***

Answer: “Seasonal allergies tend to happen at the same time each year. They often start suddenly and can last several weeks or until the allergen isn’t in the air anymore.

Taking allergy medication to see if it improves your symptoms is one way to know if your symptoms are due to allergies. Checking a weather app or website to see if pollen is high in your area can also help you decide if what you feel is related to seasonal allergies.”

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: "You mentioned you’ve been experiencing sneezing, a runny and itchy nose, and some congestion. These are common symptoms of allergic rhinitis, which is basically an allergy affecting your nasal passages."

Patient: "What causes allergic rhinitis? Is it like a cold?"

Doctor: "Allergic rhinitis happens when your immune system overreacts to harmless substances called allergens, like pollen, pet dander, dust mites, or mold. Unlike a cold, which is caused by a virus and usually lasts about a week, allergies can last as long as you’re exposed to the allergen. Also, allergies often come with itching in your nose, eyes, or throat, which colds usually don’t."

Patient: "So what can I do to feel better?"

Doctor: "The first step is to try to avoid the things that trigger your symptoms. For example, if you’re allergic to pollen, keeping windows closed during high pollen seasons and showering after being outside can help. If pets are a trigger, keeping them out of bedrooms or limiting exposure may reduce symptoms."

Patient: "Are there medicines that can help?"

Doctor: "Yes. The most effective treatment is usually a nasal corticosteroid spray, which reduces inflammation inside your nose. It may take a few days to work fully, but it’s very effective. Oral antihistamines can also help with sneezing and itching. Sometimes we use both together. It’s important to use the nasal spray correctly for the best results—I can show you how."

Patient: "Are there any side effects from these medicines?"

Doctor: "Nasal sprays can sometimes cause mild nasal irritation or dryness, and rarely nosebleeds. Oral antihistamines can cause drowsiness, especially the older types, but newer ones usually don’t. If you have asthma or other conditions, we’ll tailor your treatment accordingly."

Patient: "Do I need allergy testing?"

Doctor: "If your symptoms are persistent or severe, allergy testing can help identify the specific triggers. This can guide more targeted treatment, including allergy shots, which can reduce your sensitivity over time."

Patient: "What else should I know?"

Doctor: "Managing your environment, taking medicines regularly, and following up if symptoms don’t improve after 4-6 weeks are key. Also, if you have asthma, controlling your allergies can help prevent asthma flare-ups."

**GENOMIC DATA**

* Heritability and Genetic Predisposition:  
  Twin and family studies confirm a strong hereditary component in AR, with heritability estimates ranging from 33% to 91%. The disease likely results from the combined effect of multiple genetic variants, each contributing a small risk.
* Chromosomal Associations:  
  Genomic studies repeatedly identify associations on chromosomes 2, 3, 4, and 9 linked to AR susceptibility. These regions harbor genes involved in immune regulation and allergic inflammation.
* Candidate Genes and Polymorphisms:  
  Several genes encoding immune-related molecules have been studied for single-nucleotide polymorphisms (SNPs) associated with AR, including:
  + Chemokines and their receptors: e.g., *RANTES* (CCL5), *eotaxin* family genes involved in eosinophil and Th2 lymphocyte recruitment.
  + Interleukins and their receptors: Variants in *IL-4*, *IL-4R*, *IL-18*, *IL-28RA* influence susceptibility and disease severity.
  + Toll-like receptors (TLRs): Variations in *TLR1*, *TLR6*, *TLR7*, *TLR8*, and *TLR10* genes modulate immune responses and have been linked to AR in different populations.
  + Human Leukocyte Antigen (HLA) genes: Specific alleles like *HLA-DQB1*, *HLA-DRB1*, and *HLA-DRA* play roles in antigen presentation and allergic sensitization.
  + Other genes: *TSLP* (thymic stromal lymphopoietin) and *OX40L* involved in dendritic cell activation and T-cell responses.
* Epigenetic Factors:  
  Epigenetic modifications such as DNA methylation, histone acetylation, and microRNA regulation also influence gene expression relevant to AR. For example, pollen exposure can induce methylation changes in genes like *ZNF667-AS1*, *AHNAK*, and *ORMDL3*, which are linked to allergic inflammation.
* Rare Variants and Whole Genome Studies:  
  Recent whole genome sequencing studies have identified rare genetic variants that may contribute to AR risk, providing new insights into the genetic architecture of the disease.
* Population-Specific Findings:  
  Many genetic associations vary between ethnic groups, highlighting the importance of studying diverse populations to understand AR genetics fully

*REFERENCES:*

[Allergic Rhinitis (Hay Fever): Symptoms & Treatment](https://my.clevelandclinic.org/health/diseases/8622-allergic-rhinitis-hay-fever#overview)

<https://www.aafp.org/pubs/afp/issues/2006/0501/p1583.html>

<https://emedicine.medscape.com/article/134825-differential>

<https://www.ncbi.nlm.nih.gov/books/NBK538186/>

**ANKYLOGLOSSIA (TONGUE-TIE)**

ALTERNATIVE NAMES: Ankyloglossia is also known as tongue-tie. This condition is characterized by a short, thick lingual frenulum that restricts the movement of the tongue. The term "tongue-tie" is commonly used to describe this congenital oral anomaly.

**DEFINITION / DESCRIPTION**

Tongue-tie (ankyloglossia) is a condition present at birth that restricts the tongue's range of motion.

With tongue-tie, an unusually short, thick or tight band of tissue (lingual frenulum) tethers the bottom of the tongue's tip to the floor of the mouth. Depending on how much the tissue restricts tongue movement, it may interfere with breastfeeding. Someone who has tongue-tie might have difficulty sticking out the tongue. Tongue-tie can also affect eating or speaking.

Sometimes tongue-tie may not cause problems. Some cases may require a simple surgical procedure for correction.

**CAUSES**

Typically, the lingual frenulum separates before birth, allowing the tongue free range of motion. With tongue-tie, the lingual frenulum remains attached to the bottom of the tongue. Why this happens is largely unknown, although some cases of tongue-tie have been associated with certain genetic factors.

**RISK FACTORS**

Although tongue-tie can affect anyone, it's more common in boys than girls. Tongue-tie sometimes runs in families.

**SIGNS / SYMPTOMS**

Signs and symptoms of tongue-tie include:

* Difficulty lifting the tongue to the upper teeth or moving the tongue from side to side.
* Trouble sticking out the tongue past the lower front teeth.
* A tongue that appears notched or heart shaped when stuck out.

**WHEN TO SEE A DOCTOR / RED FLAG**

See a doctor if:

* Your baby has signs of tongue-tie that cause problems, such as having trouble breastfeeding.
* A speech-language pathologist thinks your child's speech is affected by tongue-tie.
* Your older child complains of tongue problems that interfere with eating, speaking or reaching the back teeth.
* You're bothered by your own symptoms of tongue-tie.

If your baby has trouble with nursing, reach out to a healthcare provider. Whether or not tongue-tie is the cause, a lactation consultant can work with your pediatrician to give you the support you need.

**DIAGNOSIS METHODS**

Tongue-tie is typically diagnosed during a physical exam. For infants, the doctor might use a screening tool to score various aspects of the tongue's appearance and ability to move.

**TREATMENT OPTIONS**

Treatment for tongue-tie is controversial. Some doctors and lactation consultants recommend correcting it right away — even before a newborn is discharged from the hospital. Others prefer to take a wait-and-see approach.

The lingual frenulum may loosen over time, resolving tongue-tie. In other cases, tongue-tie persists without causing problems. In some cases, consultation with a lactation consultant can assist with breastfeeding, and speech therapy with a speech-language pathologist may help improve speech sounds.

Surgical treatment of tongue-tie may be needed for infants, children or adults if tongue-tie causes problems. Surgical procedures include frenotomy and frenuloplasty.

A simple surgical procedure called a frenotomy can be done with or without anesthesia in the hospital nursery or doctor's office.

The doctor examines the lingual frenulum and then uses sterile scissors or cautery to snip the frenulum free. The procedure is quick and discomfort is minimal since there are few nerve endings or blood vessels in the lingual frenulum.

If any bleeding occurs, it's likely to be only a drop or two of blood. After the procedure, a baby can breastfeed immediately.

Complications of a frenotomy are rare — but could include bleeding or infection, or damage to the tongue or salivary glands. It's also possible to have scarring or for the lingual frenulum to reattach to the base of the tongue.

***Frenuloplasty***

A more extensive procedure known as a frenuloplasty might be recommended if additional repair is needed or the lingual frenulum is too thick for a frenotomy.

A frenuloplasty is usually done under general anesthesia with surgical tools. In an adult, the procedure may be done using a type of anesthesia that reduces pain and helps you relax. After the lingual frenulum is released, the wound is usually closed with sutures that absorb on their own as the tongue heals.

Possible complications of a frenuloplasty are like those of a frenotomy and are rare — bleeding or infection, or damage to the tongue or salivary glands. Scarring is possible due to the more extensive nature of the procedure, as are reactions to anesthesia.

After a frenuloplasty, tongue exercises might be recommended to enhance tongue movement and reduce the potential for scarring.

**POSSIBLE COMPLICATIONS**

Tongue-tie may affect a baby's oral development, as well as the way the child eats, speaks and swallows.

For example, tongue-tie can sometimes lead to:

* **Breastfeeding problems.** Breastfeeding requires a baby to keep the tongue over the lower gum while sucking. If unable to move the tongue or keep it in the right position, the baby might chew instead of suck on the nipple. This can cause significant nipple pain and interfere with a baby's ability to get breast milk. Ultimately, poor breastfeeding can lead to inadequate nutrition and failure to thrive.
* **Speech difficulties.** Tongue-tie can interfere with the ability to make certain sounds — such as "t," "d," "z," "s," "th," "n" and "l."
* **Poor oral hygiene.** For an older child or adult, tongue-tie can make it difficult to sweep food debris from the teeth. This can contribute to tooth decay and inflammation of the gums (gingivitis).
* **Challenges with other oral activities.** Tongue-tie can interfere with activities such as licking an ice cream cone, licking the lips, kissing or playing a wind instrument.

***Disadvantages of clipping tongue-tie***

A frenotomy is generally a safe procedure and has a low risk of complications. Rarely, babies experience:

* Bleeding.
* Infection.
* Scarring.
* Feeding aversion.
* Injury to the saliva ducts in their mouth.

**OUTLOOK / PROGNOSIS**

Tongue-tie isn’t usually a cause for worry. It’s common and often manageable without doing a procedure. The key is seeking help early. Don’t wait or think the situation will get better if you just try harder. Breastfeeding difficulties aren’t your fault, and they’re very common. Even experienced mothers sometimes need expert advice to solve issues that come up.

***Does tongue-tie affect bottle feeding?***

Tongue-tie rarely poses problems with bottle feeding. Your baby’s tongue works differently when feeding from a bottle compared with feeding from a breast. If needed, a lactation consultant can modify the bottle’s nipple or flow to help with any issues that arise.

If your baby continues struggling with bottle feeding, there may be other factors at work. Your lactation consultant and pediatrician will work together to find the cause.

**PREVENTION TIPS**

There’s no known way to prevent tongue-tie. For more severe cases, early diagnosis and treatment can prevent issues with breastfeeding.

**Predefined Common Frequently Asked Questions**

***Question 1: “Does tongue-tie cause sleep apnea?”***

Answer: “There’s currently no evidence that tongue-tie causes sleep apnea in children, according to a clinical consensus statement published in 2020.”

***Question 2: “Does tongue-tie affect speech?”***

Answer: “Experts agree that tongue-tie usually doesn’t affect a child’s speech. So, there’s no need for a baby to have a frenotomy in an attempt to prevent future speech disorders.”

***Question 3: “What is posterior tongue-tie?”***

Answer: “The term posterior tongue-tie refers to a portion of the lingual frenulum that extends more into the substance of a baby’s tongue in the floor of the mouth, as opposed to closer to the tip.

However, this is a controversial term. Some healthcare providers have suggested it’s anatomically inaccurate and recommend getting rid of it. They prefer just using the term tongue-tie regardless of the exact location of the lingual frenulum.”

***Question 4: “What is a lip tie?”***

Answer: “A lip tie typically refers to the band of tissue that connects your baby’s upper gum with their upper lip.

This band of tissue, called the maxillary labial frenulum, has many normal variations. Just because it connects farther down on your baby’s gumline or seems more prominent doesn’t mean it’s going to cause problems.

Still, lip tie is a controversial topic among healthcare providers. Some believe that a lip tie can cause breastfeeding issues or later dental issues. Others believe there’s not enough evidence to prove these connections.

When it comes to breastfeeding, the latest research shows procedures to treat lip tie aren’t necessary. There’s simply not enough evidence to show that releasing a lip tie improves milk transfer or eases nipple pain. However, if you’re concerned about your baby’s latch, talk to a lactation consultant.”

***Question 5: “Is there tongue-tie in adults?”***

Answer: “Tongue-tie can affect some adults, but it’s usually diagnosed and treated in babies. The lingual frenulum (below the tongue) is just one example of a fold or band of tissue inside your mouth.

Other tissues, like the buccal (cheek) frenula, provide support in other areas of your mouth. Depending on their size or location, they can make it hard to clean your teeth or gums fully. Your dentist can evaluate all the structures inside your mouth and let you know if there are any concerns.

**DIFFERENTIAL DIAGNOSIS**

Breastfeeding difficulties can be caused by many other factors besides ankyloglossia. In neonates experiencing problems with breastfeeding, it is crucial to rule out the following pathologies:

1. Craniofacial pathologies, like retrognathia and cleft palate
2. Nasal obstruction, like in piriform aperture stenosis and choanal atresia
3. Airway obstruction, like bilateral vocal fold paralysis and laryngomalacia
4. Laryngopharyngeal reflux

Patient morbidity and outcomes may worsen if these conditions are not identified and treated before deciding to perform a frenotomy

**EPIDEMIOLOGY**

The prevalence of tongue-tie ranges from 0.1% to 10.7%.This is partly because of the lack of a single definition and the differences among investigators.Also, an increase in the incidence of ankyloglossia was noticed in recent years, again mainly because of the several definitions of ankyloglossia being used by clinicians. This has led to overdiagnosing infants and children with tongue-tie and unnecessary surgery.

Some less severe forms of tongue-tie may resolve spontaneously with time, explaining why its prevalence is higher in studies evaluating only newborns (1.72% to 10.7%) than in those investigating children, teenagers, and adults (0.1% to 2.08%). Regarding sex, ankyloglossia seems more prevalent in males; no racial preference is observed

**DOCTOR PATIENT CONVERSATION**

Doctor: Hello, I understand you’re concerned about your baby’s tongue movement and feeding. Can you tell me what difficulties you’ve noticed?

Parent: Yes, my baby seems to have trouble latching during breastfeeding, and I’m experiencing nipple pain. I’ve heard it might be tongue-tie.

Doctor: Ankyloglossia, or tongue-tie, is when the band of tissue under the tongue is shorter or tighter than usual, which can restrict tongue movement. This sometimes causes breastfeeding difficulties like poor latch or nipple pain.

Parent: What can be done about it?

Doctor: First, we’ll do a thorough assessment of your baby’s tongue function and feeding. Sometimes, breastfeeding support with a lactation consultant can help improve the latch without any procedure. If the tongue-tie is causing significant problems, a simple procedure called a frenotomy can be done to release the tight tissue.

Parent: Is the procedure safe? What does it involve?

Doctor: Yes, it’s generally very safe and quick. It involves snipping the tight frenulum with sterile scissors or a laser. The baby usually tolerates it well, and feeding often improves soon after. We provide information beforehand and answer any questions you have.

Parent: Are there any risks or side effects?

Doctor: Risks are minimal but can include minor bleeding, infection, or discomfort. Sometimes, the frenulum can reattach and need a repeat procedure. We’ll also give you guidance on feeding and tongue exercises after the procedure.

Parent: What if we decide not to do the procedure?

Doctor: That’s okay too. Some babies adapt over time, and feeding difficulties may improve with support. We’ll monitor your baby’s feeding and weight gain closely. If speech difficulties arise later, speech therapy can help.

Parent: How do I know if the tongue-tie is causing the problem?

Doctor: We use specific assessment tools that look at tongue movement and feeding effectiveness. We also consider your baby’s weight gain and your comfort during breastfeeding. We’ll work together to decide the best approach for your family.

Parent: Thank you, Doctor. It’s helpful to understand the options.

Doctor: You’re welcome. I’ll give you an information leaflet about tongue-tie and connect you with our infant feeding team for extra support. Please feel free to ask any questions anytime.

*REFERENCES*

[Tongue-Tie (Ankyloglossia) Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/17931-tongue-tie-ankyloglossia#management-and-treatment)

[Tongue-tie (ankyloglossia) - Diagnosis and treatment - Mayo Clinic](https://www.mayoclinic.org/diseases-conditions/tongue-tie/diagnosis-treatment/drc-20378456)

<https://www.ncbi.nlm.nih.gov/books/NBK482295/#article-17608.s8>

**ANAPLASTIC THYROID CANCER**

ALTERNATIVE NAMES: Anaplastic thyroid cancer is also known as anaplastic thyroid carcinoma, undifferentiated thyroid cancer, and undifferentiated thyroid carcinoma.

***Overview***

Anaplastic thyroid cancer (ATC) is a rare and very aggressive form of thyroid cancer.

Your thyroid is a small, butterfly-shaped gland located at the front of your neck under your skin. It’s a part of your endocrine system and controls many of your body’s important functions by producing and releasing (secreting) certain hormones.

ATC is also known as undifferentiated thyroid cancer because the cells don’t look or behave like typical thyroid cells.

Due to the extremely aggressive behavior of ATC, the American Joint Committee on Cancer (AJCC) defines all of its stages as stage IV.

Most cases of anaplastic thyroid cancer (ATC) are diagnosed in people over 60 years old. Females are more likely to be affected by ATC.

Anaplastic thyroid cancer is rare. It consists of about 2% of all thyroid cancer cases. About 1 to 2 people per million are diagnosed in the United States every year.

Anaplastic thyroid cancer is one of the most aggressive and fastest-growing types of cancer. It can grow and spread rapidly in a matter of weeks.

About 50% of people with ATC have metastasis (cancer spread) in distant areas of their body at diagnosis. The most common sites of distant metastasis in ATC are your lungs, bones and brain.

**SIGNS / SYMPTOMS**

Anaplastic thyroid cancer most often presents as a lump or nodule on your thyroid in the front of your neck.

ATC tumors grow very quickly and are often visible to the person with ATC or their family and friends. The tumor is typically painful and firm.

If the tumor grows large enough, it can compress other structures in your neck and cause the following symptoms:

* Difficulty swallowing (dysphagia).
* Difficulty breathing (dyspnea).
* Hoarseness or changing voice.
* Persistent cough.
* Vocal cord paralysis.

People with anaplastic thyroid cancer that has spread (metastasized) may also have the following symptoms:

* Bone pain.
* Swollen lymph nodes.
* Weakness.
* Neurological issues.

**CAUSES**

Scientists still don’t know the exact cause of anaplastic thyroid cancer (ATC). In some cases, however, it occurs in the setting of differentiated thyroid cancers, such as papillary or follicular thyroid cancers.

Up to 80% of ATC cases occur in the setting of a long-standing goiter (enlarged thyroid), possibly in the background of undiagnosed differentiated thyroid cancer.

**DIAGNOSIS METHODS AND TESTS**

Healthcare providers typically perform a fine needle aspiration (needle biopsy) to diagnose anaplastic thyroid cancer (ATC). During this procedure, your provider takes a small tissue sample, called a biopsy, from the mass on your thyroid using a very thin needle. A pathologist will look at the tissue under a microscope to see if there are cancer cells and, if so, what type of thyroid cancer it is.

In some cases, your provider may recommend a core biopsy (a biopsy obtained using a larger needle).

Once your healthcare team has confirmed the diagnosis of ATC, they’ll recommend tests to get a full assessment of your overall health to determine if and where the cancer has spread. This may include blood tests and imaging tests, such as:

* CT (computed tomography) scan.
* Magnetic resonance imaging (MRI) scan.
* F-fluorodeoxyglucose positron emission tomography (FDG-PET).

All people with anaplastic thyroid cancer are diagnosed as stage IV due to the aggressive nature of this tumor. There are three sub-stages, including:

* Stage IVA: ATC is present only in your thyroid. This is the case in about 10% of diagnoses.
* Stage IVB: ATC is present in your thyroid and your neck (typically your lymph nodes), but not in other parts of your body. This is the case in about 40% of diagnoses.
* Stage IVC: ATC is present in your thyroid as well as other parts of your body, such as your bones, lungs or brain. This is the case in about 50% of diagnoses.

**TREATMENT OPTIONS**

***MANAGEMENT***

Anaplastic thyroid cancer (ATC) is difficult to treat because it’s very aggressive and can spread quickly within your neck and to distant parts of your body, such as your lungs, bones and brain.

Because of this, it’s important to start treatment as soon as possible and to work with healthcare providers who are experienced in treating ATC. Treatment of ATC often involves a multidisciplinary team of specialists, including:

* Endocrinologists.
* Medical oncologists.
* Radiation oncologists.
* Surgeons.

Treatment for ATC typically consists of a combination of the following:

* Surgery.
* Radiation therapy.
* Chemotherapy.
* Palliative care.

#### **Surgery for anaplastic thyroid cancer**

If you have ATC, your healthcare team will likely recommend surgery to remove the tumor unless you have other medical conditions that would make surgery too risky.

Debulking surgery is the most common procedure in ATC treatment. It involves surgically removing as much of the tumor as possible, especially any part of the tumor that’s potentially threatening your airway, with the aim of preserving your larynx (voice box).

Unfortunately, in many cases, surgery isn’t possible due to the large size, location and invasiveness of the tumor.

It’s important to know that there are some cases of people with ATC who lived several years after treatment who weren’t able to have surgery but did have an aggressive combination of radiation and chemotherapy.

#### **Radiation therapy for anaplastic thyroid cancer**

Radiation therapy is a form of cancer treatment that uses radiation (strong beams of energy) to kill cancer cells or keep them from growing and dividing.

If you have ATC, your healthcare team will likely recommend a certain type of radiation therapy called external beam radiation therapy (EBRT). This therapy directs precisely focused X-rays to areas that need to be treated — often the tumor itself or cancer that has spread to bones or other organs.

#### **Chemotherapy for anaplastic thyroid cancer**

Chemotherapy is a type of cancer treatment that works by destroying cancer cells and preventing them from multiplying.

If you have ATC, your healthcare team may recommend chemotherapy as adjuvant therapy. This means that chemotherapy destroys cancer cells after surgery or radiation therapy. More specifically, chemotherapy for ATC enhances the radiation therapy to make the cancer more susceptible to the radiation or make the radiation more effective.

New chemotherapy drugs that have shown promise in treating other advanced cancers are becoming more widely available for advanced thyroid cancer treatment. These drugs rarely cure advanced cancers that have spread widely throughout your body, but they can slow down or partially reverse the growth of cancer.

Chemotherapy drugs used for thyroid cancer include:

* Taxanes (paclitaxel or docetaxel).
* Anthracyclines (doxorubicin).
* Platinum analogs (cisplatin or carboplatin).

#### **Palliative care for anaplastic thyroid cancer**

Palliative care is medical care that relieves pain, symptoms and stress caused by serious illnesses.

If you have ATC, your healthcare team may recommend palliative care to manage symptoms of ATC and the side effects of the treatment.

Palliative care for ATC may include:

* Placing a tube in your throat to help with breathing (tracheostomy).
* Placing a feeding tube in your stomach (gastrostomy tube or G-tube).
* Providing pain medication.

Providers offer palliative care in addition to treating cancer. Palliative care doesn’t necessarily mean the cancer treatment won’t be effective.

### ***Can anaplastic thyroid cancer be cured?***

Anaplastic thyroid cancer can’t be cured by surgery, unlike some cases in other types of thyroid cancer. Complete removal of the thyroid gland (thyroidectomy) doesn’t prolong the lives of people who have ATC.

**OUTLOOK / PROGNOSIS**

Just as each person is unique, each case of anaplastic thyroid cancer (ATC) presents differently and responds to treatment differently. ATC is characteristically difficult to predict.

Scientists are making advancements every day in the treatment of advanced thyroid cancers, including ATC. The treatment is challenging, but it’s important to not give up hope when you’re first diagnosed.

It’s important to work with a team of healthcare providers who have experience with anaplastic thyroid cancer. If you’re unable to travel to a major medical facility that has experience with ATC, don’t be afraid to ask your local providers to collaborate with experts at more experienced centers on your treatment plan.

Understanding the risks and benefits involved with various treatment options is essential. You must advocate for yourself and lean on family and friends for support.

### ***Survival rate for anaplastic thyroid cancer***

The average survival rate of anaplastic thyroid cancer (ATC) is five to six months after diagnosis. Less than 20% of people with ATC are alive one year after diagnosis.

While these overall survival statistics are discouraging, it’s important to note that some people have lived for several years after anaplastic thyroid cancer treatment.

### ***Prognosis (outlook) of anaplastic thyroid cancer***

Due to the aggressive nature of anaplastic thyroid cancer and the lack of effective treatment options, the prognosis is often poor.

Most people who have ATC die from airway obstruction from the tumor or complications of pulmonary metastases (cancer spread in your lungs) within one year.

People with ATC who have the following factors generally have a better prognosis:

* Being younger than 60 years old.
* Having a unilateral tumor.
* Having a tumor size of less than 5 centimeters (cm).
* Having no lymph node involvement or distant metastases.

**PREVENTION TIPS**

Unfortunately, in most cases, anaplastic thyroid cancer (ATC) can’t be prevented.

If you’ve been diagnosed with goiter or a benign (noncancerous) thyroid nodule, it’s important to see your healthcare provider regularly to monitor the health of your thyroid. ATC can sometimes develop from other types of thyroid cancer and/or goiter.

***Living With***

If you have anaplastic thyroid cancer, having a clear view of your prognosis may be the best way to take care of yourself. Ask your healthcare provider what you can expect, given your specific situation.

These aren’t easy conversations for you or your provider, but they’re important. Your provider can help you understand what’s happening to your body and what might happen. They can help you to think about your options and suggest helpful resources.

***Should I consider hospice care if I have anaplastic thyroid cancer?***

Hospice care helps people who have advanced, life-limiting illnesses to spend their final days comfortably, with dignity, control and quality of life.

When people are fighting a serious illness, their time and energy are often focused on their medical treatment. Thinking about hospice shifts the focus from illness to how they want to spend the time they have. Most people decide to enter hospice care after discussing the idea with their healthcare provider, family and other loved ones. If you’re considering hospice care, ask your provider for help finding information and resources.

## 

**DIFFERENTIAL DIAGNOSTIC CONSIDERATIONS**

Differential diagnosis of anaplastic thyroid carcinoma (ATC) includes thyroid lymphoma, well-differentiated, poorly differentiated thyroid cancer, and metastasis to the thyroid from a solid tumor.

The prognosis for thyroid lymphomas is far better than that of ATC. Thyroid lymphomas are responsive to medical treatment and should never be treated surgically, thus, distinguishing this treatable malignancy from ATC is critical.

A study by Wong et al examined oncocytic adrenocortical neoplasms (OANs), which are believed to have a more favorable overall median survival than conventional adrenocortical carcinomas. They are rare, but the study emphasized the importance of recognition.

## 

***Differential Diagnoses***

* Follicular Thyroid Carcinoma
* Goiter
* Hyperthyroidism and Thyrotoxicosis
* Hypothyroidism
* Medullary Thyroid Carcinoma
* Papillary Thyroid Carcinoma
* Parathyroid Carcinoma
* Thyroid Lymphoma
* Thyroid Nodule
* Thyroiditis, Subacute

## 

**EPIDEMIOLOGY**

Anaplastic carcinoma of the thyroid (ATC) constitutes less than 2% of all thyroid malignancies in the United States, which equates to slightly more than 1000 new cases annually.Fortunately, the incidence of thyroid cancer appears to be declining. Worldwide frequency likely approximates that in the United States.

Although papillary thyroid cancer shows a strong female predominance, with a female-to-male ratio of approximately 3:1, ATC affects females and males relatively equally. Peak incidence occurs during the sixth to seventh decades of life. The age range of affected patients reportedly is 15-90 years.

Although ATC remains deadly, in recent years the prognosis for patients with ATC appears to have improved. A review of the Surveillance, Epidemiology, and End Results (SEER) database found that estimated 1-year survival rose from 15% for patients diagnosed from 2011 to 2016, to 25% for patients diagnosed from 2017 to 2020

## 

***STAGING***

All patients with anaplastic thyroid carcinoma are classified as having stage IV disease, because of the high mortality of the disease. Stage subdivisions are as follows:

* Stage IVA – Intrathyroidal tumors
* Stage IVB – Extrathyroidal tumors but no distant metastatic disease
* Stage IVC – Distant metastasis

**RECENT GUIDELINE OR UPDATES**

Recommendations regarding diagnosis and staging of anaplastic thyroid carcinoma (ATC):

* FNA cytology can play an important diagnostic role in the initial evaluation of ATC, but parallel core biopsy may be necessary for definitive diagnosis and to obtain sufficient material for molecular testing.
* Every effort should be made to establish a diagnosis via biopsy before proceeding with surgical resection.
* Routine surgical pathology evaluation of resection specimens should focus on confirming a definitive diagnosis of ATC, documenting the extent of disease, and defining the presence of any coexisting differentiated thyroid cancer and/or other pathologies.
* Once the diagnosis of ATC is considered, expeditious assessment of *BRAF* V600E mutation should be performed by immunohistochemistry (IHC) and confirmed/assessed by molecular testing.
* Molecular profiling should be performed at the time of ATC diagnosis to inform decisions about targeted therapies.
* Initial radiologic tumor staging should include cross-sectional imaging—in particular, CT with contrast (or MRI) of the neck, chest, abdomen, and pelvis and, if available, FDG PET/CT. Contrast-enhanced imaging of the brain (MRI preferred) should also be performed, if clinically indicated.
* Evaluation of the vocal cords should be performed in every patient with ATC at initial presentation, and subsequently as indicated by changing symptoms.
* Comprehensive disease-specific input from a multidisciplinary team — including specialists highly experienced in treating ATC — should be attained before defining goals of care or conducting therapeutic discussions with patients.

***Treatment***

No curative treatment currently exists for ATC. The majority of patients present with unresectable or metastatic disease. NCCN guidelines recommend attempting total thyroidectomy in patients with resectable disease.

The ATA guidelines strongly recommend surgical resection for patients with confined (stage IVA/IVB) ATC in whom R0/R1 resection is anticipated. Radical resection (eg, laryngectomy, tracheal resections, esophageal resections, major vascular or mediastinal resections) is generally not recommended, given the poor prognosis of ATC and should be considered only very selectively after thorough discussion by the multidisciplinary team.

If a primary tumor is deemed unresectable, ATA guidelines advise that in carefully selected patients, neoadjuvant therapy (eg, full or partial course external beam radiotherapy, chemotherapy, or chemoradiotherapy) may permit delayed primary resection.

NCCN guidelines recommend considering molecularly targeted neoadjuvant therapy for borderline resectable disease when safe to do so. Targeted regimens for neoadjuvant therapy include the following:

* *BRAF* V600E mutations - Dabrafenib/trametinib
* *RET* fusion–positive tumors - Selpercatinib or pralsetinib
* *NTRK* gene fusion–positive tumors - Larotrectinib or entrectinib

Both the NCCN and ATA guidelines recommend adjuvant radiation therapy, chemotherapy, or both.ATA recommendations for adjuvant therapy include the following:

* After R0/R1 resection, patients with good performance status (PS) and no evidence of metastatic disease who wish an aggressive approach should be offered standard fractionation intensity-modulated radiation therapy (IMRT) with concurrent systemic therapy.
* Patients who have undergone R2 resection or have unresectable but nonmetastatic disease with good performance status and who wish an aggressive approach should be offered standard fractionation IMRT with systemic therapy. In *BRAF* V600E–mutated ATC, combined BRAF/MEK inhibitors can be considered. In some patients with initially unresectable disease, response to this treatment may permit reconsideration of surgical resection.
* For patients treated with definitive-intention radiation therapy, cytotoxic chemotherapy involving a taxane, with or without an anthracycline or a platin, is recommended.
* In *BRAF* V600E*–*mutated stage IVC ATC and unresectable stage IVB ATC in patients who decline radiation therapy, initiation of BRAF/MEK inhibitors (dabrafenib plus trametinib) is preferred.

***TREATMENT DRUG INFORMATION AND THEIR SIDE EFFECTS*** Chemotherapy

* Common regimens:
  + Doxorubicin (Adriamycin) alone or combined with cisplatin
  + Paclitaxel or docetaxel may also be used
  + Combination chemotherapy is often given alongside radiation (chemoradiation)
* Efficacy: Limited survival benefit; median overall survival around 6 months with chemotherapy-based regimens.
* Side effects:
  + Bone marrow suppression (anemia, neutropenia, thrombocytopenia)
  + Nausea, vomiting
  + Hair loss
  + Cardiotoxicity (especially with doxorubicin)
  + Peripheral neuropathy (taxanes)
  + Fatigue

## 2. Targeted Therapy

* BRAF and MEK inhibitors:
  + Dabrafenib (BRAF inhibitor) + trametinib (MEK inhibitor) for patients with *BRAF V600E* mutation
  + Shown to improve outcomes in mutation-positive patients
* Multi-tyrosine kinase inhibitors (TKIs):
  + Lenvatinib and sorafenib target angiogenesis and tumor growth pathways
* RET and NTRK inhibitors:
  + Selpercatinib (RET), larotrectinib or entrectinib (NTRK) for tumors with respective gene fusions
* Side effects:
  + Hypertension
  + Diarrhea
  + Fatigue
  + Hand-foot skin reaction
  + Liver enzyme elevations
  + Cardiac effects (rare)

## 3. Immunotherapy

* Checkpoint inhibitors:
  + Pembrolizumab (anti-PD-1) combined with lenvatinib has shown promising results in ATC and poorly differentiated thyroid cancers.
* Side effects:
  + Immune-related adverse events such as colitis, pneumonitis, hepatitis, endocrinopathies
  + Fatigue, rash

## 4. Radiation Therapy

* Often combined with chemotherapy (chemoradiation) to control local disease and improve survival.
* Side effects include mucositis, skin irritation, fatigue, and potential damage to surrounding tissues.

## 5. Surgery

* Usually palliative due to advanced disease at diagnosis.
* May relieve airway obstruction or improve quality of life.

**DOCTOR-PATIENT CONVERSATION**

Doctor: Hello, thank you for coming in today. I want to talk with you about the results of your recent tests and what they mean.

Patient: Thank you, Doctor. I’m anxious to know what’s going on.

Doctor: I understand this is a difficult time. The biopsy and imaging show that you have a type of thyroid cancer called anaplastic thyroid cancer. It is a rare but very aggressive form of thyroid cancer.

Patient: What does aggressive mean? Is it serious?

Doctor: Yes, it means this cancer grows quickly and can spread to nearby tissues and other parts of the body. Because of that, it is classified as stage IV at diagnosis. However, we have several treatment options that we can consider to help control the cancer and manage symptoms.

Patient: What kind of treatments are available?

Doctor: Treatment usually involves a combination of approaches. Surgery may be possible if the tumor can be removed safely, especially if it’s causing problems with your breathing or swallowing. Radiation therapy and chemotherapy can help slow the tumor’s growth. We also have newer targeted therapies and immunotherapy options, especially if your tumor has certain genetic mutations, which we will test for.

Patient: Will these treatments cure the cancer?

Doctor: Unfortunately, anaplastic thyroid cancer is very challenging to cure. Our goal is to control the disease as much as possible, improve your quality of life, and extend survival. Every patient’s case is different, and we will tailor the treatment plan to your health and preferences.

Patient: What about side effects? Will the treatments be hard to tolerate?

Doctor: Each treatment has potential side effects. Surgery carries risks like any operation, radiation can cause fatigue and skin irritation, and chemotherapy can cause nausea and low blood counts. Targeted therapies and immunotherapies have their own side effects, which we will monitor closely. We will support you throughout treatment to manage symptoms and side effects.

Patient: Is there anything I can do to prepare or help myself?

Doctor: Maintaining good nutrition and staying as active as you can will help. We also have support services including nutritionists, social workers, and counselors to help you cope emotionally and physically. It’s important you feel supported throughout this process.

Patient: Should I get a second opinion?

Doctor: That’s a very reasonable idea. Many patients find a second opinion helpful for peace of mind or to explore all treatment options. I can help you arrange that if you wish.

Patient: Thank you for explaining everything. It’s a lot to take in.

Doctor: I know it is. Please take your time, and feel free to bring a family member or friend to our next appointment. We will answer all your questions and support you every step of the way.

**PREDEFINED Q & A SET**

***Question 1: “What is Anaplastic Thyroid Cancer (ATC)?”***

***Answer: “***

* ATC is a rare but extremely aggressive form of thyroid cancer, accounting for about 2% of thyroid cancers. It is the least common but most lethal thyroid cancer type.
* It typically occurs in older adults, often over age 60.”

***Question 2: “What are the symptoms of ATC?”***

***Answer:***

* Rapidly growing neck mass or lump
* Hoarseness, difficulty breathing or swallowing, choking-like symptoms due to tumor compression of nearby structures.
* Neck swelling that worsens quickly.”

***Question 3: “How is ATC diagnosed?”***

***Answer: “***

* Physical exam and imaging (ultrasound, CT scans)
* Needle biopsy to confirm cancer type
* Blood tests for thyroid function may be done but are less definitive for ATC diagnosis.”

***Question 4: “What is the prognosis for ATC?”***

***Answer: “***

* The prognosis is generally poor, with most patients classified as stage IV at diagnosis due to aggressive nature and early spread.
* Survival depends heavily on the extent of disease and treatment completeness.”

***Question 5: “What are the treatment options?”***

***Answer: “***

* Multimodal approach is recommended: surgery (if feasible), high-dose external beam radiation therapy (preferably intensity modulated radiation therapy - IMRT), and chemotherapy.
* Surgery aims to remove as much tumor as possible but is often limited by tumor invasion into surrounding tissues.
* Radiation therapy is given daily over several weeks to control local disease.
* Chemotherapy may be combined with radiation; drugs like doxorubicin are used.
* Targeted therapies for tumors with specific mutations (e.g., BRAF mutations) have improved outcomes in some patients.
* Clinical trials are an important option for access to new treatments.”

***Question 6: “What should patients expect during treatment?”***

***Answer: “***

* Treatment is intensive and may include daily radiation for weeks, chemotherapy sessions, and sometimes radioactive iodine if other thyroid cancer types coexist.
* Side effects can include weight loss, feeding tube placement if swallowing is impaired, and fatigue.
* Patients often require close monitoring and supportive care.

***Question 7: “How can patients cope with the diagnosis?”***

***Answer: “***

* Joining support groups such as the Anaplastic E-mail Support Group can provide emotional support and information sharing.
* Open communication with the oncology team about fears, treatment goals, and quality of life is crucial.
* Palliative care discussions should be part of early planning due to the aggressive nature of the disease.”

***Question 8: “Are there any success stories or hope?”***

***Answer: “***

* While prognosis is grim, some patients have achieved longer survival with aggressive multimodal treatment and participation in clinical trials.
* Advances in targeted therapies and clinical trials continue to improve the outlook for subsets of patients.”

*REFERENCES*

[Anaplastic Thyroid Cancer (ATC): Symptoms & Treatment](https://my.clevelandclinic.org/health/diseases/23539-anaplastic-thyroid-cancer-atc#overview)

<https://emedicine.medscape.com/article/283165-overview#a6>

<https://www.ncbi.nlm.nih.gov/books/NBK538179/>

**AGING AND SWALLOWING DISORDER**

ALTERNATIVE NAMES: Swallowing disorders in older adults are also referred to as “dysphagia”. This condition is common among the elderly and can be associated with various factors, including nerve or muscle problems.

**DEFINITION / DESCRIPTION**

Dysphagia is a medical term for difficulty swallowing. Dysphagia can be a painful condition. In some cases, swallowing is impossible.

Occasional difficulty swallowing, such as when you eat too fast or don't chew your food well enough, usually isn't cause for concern. But ongoing dysphagia can be a serious medical condition that needs treatment.

Dysphagia can happen at any age, but it's more common in older adults. The causes of swallowing problems vary, and treatment depends on the cause.

***Types of dysphagia***

Healthcare providers separate dysphagia into three types based on where the problem is. Think of swallowing as a journey that foods and liquids take to your stomach. There are three main stops along the way: your mouth (oral cavity), throat (pharynx) and the food tube that connects to your stomach (esophagus).

Issues at any of these key stops can create slowdowns, making it difficult or impossible to swallow.

* Oral dysphagia: The problem is in your mouth. Your jaw, teeth and tongue work together to tear food into smaller pieces when you chew. Your salivary glands produce spit that softens the food so it breaks apart easily.
* Oropharyngeal dysphagia: The problem is in your throat. After your mouth prepares the food, your tongue pushes it to the back of your throat. Your voice box (larynx) closes to prevent food or liquid from slipping into your airway (trachea) on its way to your esophagus. Oropharyngeal dysphagia is also known as transfer dysphagia. Think of it this way: it involves problems transferring food from your mouth to your throat.
* Esophageal dysphagia: The problem is in your esophagus. Your esophagus squeezes the food or liquid down in a wave-like motion (peristalsis) until it reaches your stomach.

**CAUSES**

Swallowing is complex, involving many muscles and nerves. Any condition that weakens or damages these muscles and nerves or causes narrowing of the back of the throat or esophagus can cause dysphagia.

Dysphagia generally falls into one of the following categories.

***Esophageal dysphagia***

Esophageal dysphagia refers to the sensation of food sticking or getting caught in the base of the throat or in the chest after swallowing begins. Some causes of esophageal dysphagia include:

* **Achalasia.** Achalasia is a condition that leads to trouble swallowing. Damaged nerves or muscles make it hard for the esophagus to squeeze food and liquid into the stomach. Achalasia tends to worsen over time.
* **Esophageal spasm.** This condition causes high-pressure, poorly coordinated contractions of the esophagus, usually after swallowing. Esophageal spasm affects the involuntary muscles in the walls of the lower esophagus.
* **A narrowed esophagus.** Known as a stricture, a narrowed esophagus can trap large pieces of food. Tumors or scar tissue, often caused by gastroesophageal reflux disease (GERD), can cause narrowing.
* **Esophageal tumors.** Difficulty swallowing tends to get progressively worse when esophageal tumors are present. Growing tumors steadily narrow the esophagus.
* **Foreign bodies.** Sometimes food or another object can partially block the throat or esophagus. Older adults with dentures and people who have difficulty chewing their food may be more likely to have a piece of food become stuck in the throat or esophagus.
* **Esophageal ring.** A thin area of narrowing in the lower esophagus can occasionally cause difficulty swallowing solid foods.
* **GERD.** Stomach acid backing up into the esophagus can damage esophageal tissues. This can lead to spasm or scarring and narrowing of the lower esophagus.
* **Eosinophilic esophagitis.** Eosinophilic esophagitis is a disease of the immune system. It is caused when white blood cells, called eosinophils, build up in the esophagus.
* **Scleroderma.** Scleroderma causes the development of scar-like tissue, resulting in stiffening and hardening of tissues. This can weaken the lower esophageal sphincter. As a result, acid backs up into the esophagus and causes frequent heartburn.
* **Radiation therapy.** This cancer treatment can lead to inflammation and scarring of the esophagus.

***Oropharyngeal dysphagia***

Certain conditions can weaken the throat muscles, making it difficult to move food from the mouth into the throat and esophagus during swallowing. A person might choke, gag or cough when trying to swallow, or have the sensation of food or fluids going down the windpipe, called the trachea, or up the nose. This can lead to pneumonia.

***Nervous system and brain disorders***

Conditions and injuries affecting your brain and nervous system (the network of nerves that controls muscles and organs) that cause dysphagia include:

* Amyotrophic lateral sclerosis (ALS): A condition that weakens the nerves that control your muscles.
* Brain tumors: Growths in your brain (both cancerous and benign) that can disrupt the nerve signals that tell your muscles to move.
* Cerebral palsy: A developmental disorder (one you’re born with) that makes it hard to move and coordinate muscles.
* Dementia: A mental state associated with different diseases that involve trouble thinking and coordinating movement.
* Multiple sclerosis (MS): An autoimmune disease that damages the nerves in your brain and spinal cord. With an autoimmune disease, your immune system attacks your body’s healthy cells.
* Parkinson’s disease: A condition that causes tissue in your brain to deteriorate, creating problems with movement and coordination.

***Muscle disorders***

Conditions that prevent the muscles in your head and neck from helping you swallow include:

* Achalasia: A rare disorder where muscles at the bottom of your esophagus don’t relax to allow food to enter your stomach.
* Cricopharyngeal spasms: Spasms (abnormal contractions) that happen when the muscle at the top of your esophagus squeezes too much, creating the sensation that something’s stuck in your throat.
* Esophageal spasms. Spasms that happen when various muscles in your esophagus squeeze too much.
* Muscular dystrophy: A group of inherited conditions that cause muscles to weaken over time.
* Myasthenia gravis: An autoimmune disease that interrupts the signals nerves send to muscles, making it hard to control movements.
* Myositis: An autoimmune disease that can cause muscle weakness in your throat and esophagus.
* Scleroderma: An autoimmune disease that causes scar tissue to form in your esophagus. The stiff tissue prevents your esophagus muscles from squeezing to move food toward your stomach.

***Narrowing, blockages and structural issues***

Conditions that create blockages or cause your throat or esophagus to be too narrow can make it hard to swallow. Causes include:

* Cancer: Tumors in your head and neck can obstruct food and drink. Esophageal cancer is the most common type of cancer that causes dysphagia.
* Eosinophilic esophagitis. A condition that happens when too many white blood cells (eosinophils) build up in your esophagus, causing stiffness.
* Esophageal diverticulum: A weakened pouch that forms in the lining of your esophagus. Food bits can collect in the pouch, creating the sensation that something’s stuck in your throat. The most common type is called Zenker’s diverticulum.
* Esophageal webs and (Schatzki) rings: Atypical tissue inside your esophagus that narrows the tube. The smaller tube can cause food to get stuck.
* GERD (acid reflux disease): Stomach acid can flow backward into your esophagus, causing scar tissue. The tissue can cause tightening called esophageal strictures and irritation called Barrett’s esophagus. These conditions can make swallowing painful and difficult.

***Other causes***

Infections, like strep throat (bacterial tonsillitis), can cause pain and inflammation that lead to dysphagia. Dysphagia can occur after surgery to your head and neck or other types of treatment. For example, radiation therapy for head and neck cancer destroys tumors but can also damage tissue involved in swallowing.

Causes of oropharyngeal dysphagia include:

* **Neurological disorders.** Certain disorders — such as multiple sclerosis, muscular dystrophy and Parkinson's disease — can cause dysphagia.
* **Neurological damage.** Sudden neurological damage, such as from a stroke or a brain or spinal cord injury, can affect the ability to swallow.
* **Pharyngoesophageal diverticulum, also known as Zenker diverticulum.** A small pouch, known as a diverticulum, that forms and collects food particles in the throat, often just above the esophagus, leads to difficulty swallowing, gurgling sounds, bad breath, and repeated throat clearing or coughing.
* **Cancer.** Certain cancers and some cancer treatments, such as radiation, can cause difficulty swallowing.

**RISK FACTORS**

The following are risk factors for dysphagia:

* **Aging.** Older adults are at higher risk of swallowing difficulties. This is due to natural aging and wear and tear on the esophagus as well as a greater risk of certain conditions, such as stroke or Parkinson's disease. But dysphagia isn't considered a typical sign of aging.
* **Certain health conditions.** People with certain neurological or nervous system disorders are more likely to have difficulty swallowing.

**SIGNS / SYMPTOMS**

Symptoms associated with dysphagia can include:

* Pain while swallowing.
* Not being able to swallow.
* Feeling as if food is stuck in the throat or chest or behind the breastbone.
* Drooling.
* Hoarseness.
* Food coming back up, called regurgitation.
* Frequent heartburn.
* Food or stomach acid backing up into the throat.
* Weight loss.
* Coughing or gagging when swallowing.

### 

**WHEN TO SEE A DOCTOR / RED FLAG**

See a healthcare professional if you regularly have difficulty swallowing or if weight loss, regurgitation or vomiting happens with your dysphagia.

If a blockage makes it hard to breathe, call for emergency help immediately. If you're unable to swallow because you feel that food is stuck in your throat or chest, go to the nearest emergency department.

**DIAGNOSIS METHODS**

A member of your healthcare team will likely ask you for a description and history of your swallowing difficulties, perform a physical exam, and use various tests to find the cause of your swallowing problem.

Tests can include:

* **X-ray with a contrast material, called a barium X-ray.** You drink a barium solution that coats the esophagus, making it easier to see on X-rays. A healthcare team can then see changes in the shape of the esophagus and can check the muscular activity.  
  You also may be asked to swallow solid food or a pill coated with barium. This allows the healthcare team to watch the muscles in the throat during swallowing or to look for blockages in the esophagus that the liquid barium solution might not show.
* **Dynamic swallowing study.** This study involves swallowing barium-coated foods of different consistencies. It provides an image of these foods as they travel down the throat. The images might show problems in the coordination of the mouth and throat muscles during swallowing. The images also can show if food is going into the breathing tube.
* **Endoscopy.** Endoscopy involves passing a thin, flexible lighted instrument, called an endoscope, down the throat. This allows your healthcare team to see your esophagus. Tissue samples, called biopsies, may be collected. The samples are studied to look for inflammation, eosinophilic esophagitis, narrowing or a tumor.
* **Fiber-optic endoscopic evaluation of swallowing (FEES).** During a FEES study, a healthcare professional examines the throat with an endoscope during swallowing.
* **Esophageal muscle test, called manometry.** In manometry (muh-NOM-uh-tree), a small tube is inserted into the esophagus and connected to a pressure recorder to measure the muscle contractions of the esophagus during swallowing.
* **Imaging scans.** These can include a CT scan or an MRI scan. A CT scan combines a series of X-ray views and computer processing to create cross-sectional images of the body's bones and soft tissues. An MRI scan uses a magnetic field and radio waves to create detailed images of organs and tissues.

**TREATMENT OPTIONS**

Treatment for dysphagia depends on the type or cause of your swallowing disorder.

***Oropharyngeal dysphagia***

For oropharyngeal dysphagia, you may be referred to a speech or swallowing therapist. Therapy might include:

* **Learning exercises.** Certain exercises might help coordinate your swallowing muscles or restimulate the nerves that trigger the swallowing reflex.
* **Learning swallowing techniques.** You also might learn ways to place food in your mouth or position your body and head to help you swallow. Exercises and new swallowing techniques might help if your dysphagia is caused by neurological problems such as Alzheimer's disease or Parkinson's disease.

***Esophageal dysphagia***

Treatment approaches for esophageal dysphagia might include:

* **Esophageal dilation.** Dilation involves placing an endoscope into the esophagus and inflating an attached balloon to stretch it. This treatment is used for achalasia, esophageal stricture, motility disorders, or an irregular ring of tissue at the junction of the esophagus and stomach, known as Schatzki ring. Long, flexible tubes of varying diameter also may be inserted through the mouth into the esophagus to treat strictures and rings.
* **Surgery.** For an esophageal tumor, achalasia or pharyngoesophageal diverticulum, you might need surgery to clear your esophageal path.
* **Medicines.** Difficulty swallowing caused by GERD can be treated with prescription medicines to reduce stomach acid. You might need to take these medicines for a long time.  
  Corticosteroids might be recommended for eosinophilic esophagitis. For esophageal spasm, smooth muscle relaxants might help.
* **Diet.** You may be prescribed a special diet to help with your symptoms depending on the cause of the dysphagia. If you have eosinophilic esophagitis, diet might be used as treatment.

***Severe dysphagia***

If difficulty swallowing prevents you from eating and drinking enough and treatment doesn't allow you to swallow safely, a feeding tube may be recommended. A feeding tube provides nutrients without the need to swallow.

***Surgery***

Surgery might be needed to relieve swallowing problems caused by throat narrowing or blockages. Blockages include bony outgrowths, vocal cord paralysis, pharyngoesophageal diverticula, GERD and achalasia. Surgery also can treat esophageal cancer. Speech and swallowing therapy is usually helpful after surgery.

The type of surgical treatment depends on the cause of dysphagia. Some examples are:

* **Laparoscopic Heller myotomy.** This involves cutting the muscle at the lower end of the esophagus, called the esophageal sphincter. In people who have achalasia, the esophageal sphincter fails to open and release food into the stomach. Heller myotomy helps correct this problem.
* **Peroral endoscopic myotomy (POEM).** The POEM procedure involves creating an incision in the inside lining of the esophagus to treat achalasia. Then, as in a Heller myotomy, the surgeon or gastroenterologist cuts the muscle at the lower end of the esophageal sphincter.
* **Stent placement.** A metal or plastic tube called a stent may be used to prop open a narrowed or blocked esophagus. Some stents are permanent, such as those for people with esophageal cancer, while others are removed later.
* **OnabotulinumtoxinA (Botox).** This can be injected into the muscle at the end of the esophagus, called the esophageal sphincter. This causes it to relax, improving swallowing in achalasia. Less invasive than surgery, this technique might require repeat injections. More study is needed.

**Lifestyle and home remedies**

If you have trouble swallowing, be sure to see a healthcare professional. You also may try these approaches to help ease symptoms:

* **Changing your eating habits.** Try eating smaller, more frequent meals. Cut your food into smaller pieces, chew food thoroughly and eat more slowly. If you have difficulty swallowing liquids, there are products you can buy to thicken liquids.
* **Try foods with different textures to see if some cause you more trouble.** Thin liquids, such as coffee and juice, are a problem for some people, and sticky foods, such as peanut butter or caramel, can make swallowing difficult. Avoid foods that cause you trouble.
* **Limiting alcohol and caffeine.** These can dry your mouth and throat, making swallowing more difficult.

**POSSIBLE COMPLICATIONS**

Difficulty swallowing can lead to:

* **Malnutrition, weight loss and dehydration.** Dysphagia can make it difficult to take in enough food and fluids.
* **Aspiration pneumonia.** Food or liquid entering the airway during attempts to swallow can cause aspiration pneumonia as a result of the food introducing bacteria into the lungs.
* **Choking.** Food stuck in the throat can cause choking. If food completely blocks the airway and no one intervenes with a successful Heimlich maneuver, death can occur.

**PREVENTION TIPS**

Although swallowing difficulties can't be prevented, you can reduce your risk of occasional difficulty swallowing by eating slowly and chewing your food well. However, if you have symptoms of dysphagia, see a healthcare professional.

If you have GERD, see a healthcare professional for treatment.

***Diagnostic Considerations***

See the list below:

* Cerebrovascular accident
* Brainstem tumors
* Degenerative diseases, such as ALS, multiple sclerosis (MS), and Huntington disease
* Peripheral neuropathy
* Muscular dystrophy (myotonic dystrophy, oculopharyngeal dystrophy)
* Cricopharyngeal achalasia
* Obstructive lesions, such as tumors, inflammatory masses, Zenker diverticulum, esophageal webs, extrinsic structural lesions, anterior mediastinal masses, and cervical spondylosis
* Spastic motor disorders, such as diffuse esophageal spasm, hypertensive lower esophageal sphincter, and nutcracker esophagus
* Scleroderma
* Obstructive lesions (eg, tumors, strictures, lower esophageal rings [Schatzki rings], esophageal webs, foreign bodies, vascular compression, mediastinal masses)

***Differential Diagnoses***

* Achalasia
* Dermatomyositis
* Myasthenia Gravis
* Parkinson Disease
* Pediatric Poliomyelitis
* Polymyositis
* Syphilis

## 

**EPIDEMIOLOGY**

Occurrence in the United States

Neurologic swallowing disorders are encountered more frequently in rehabilitation medicine than in most other medical specialties. Stroke is the leading cause of neurologic dysphagia, with the condition occurring in approximately 51-73% of patients with stroke. Dysphagia can delay functional recovery in patients with stroke and is also the most significant risk factor for the development of pneumonia in this population.

***Race- and age-related demographics***

According to the US National Medicare database, the incidence of poststroke dysphagia is higher in Asians and other minority groups than in whites, suggesting racial disparities in the development of dysphagia after stroke.

As previously mentioned, the prevalence of dysphagia increases with age, and dysphagia is a major health-care problem in elderly patients.

A study by Kooi-van Es et al found that 295 children with neuromuscular disease, dysphagia and dysarthria had a pooled overall prevalence of 47.2% and 31.5%, respectively.

The investigators reported that 90.0% of children with dysphagia had chewing problems, while 43.0% had swallowing problems, and 33.3% demonstrated difficulties with both chewing and swallowing.

**TREATMENT DRUG INFORMATION AND THEIR SIDE EFFECTS**

## Swallowing Rehabilitation and Exercises

* Speech-language pathologists (SLPs) provide swallowing exercises targeting lips, tongue, jaw, soft palate, pharynx, and larynx to improve muscle strength and coordination.
* Techniques include range-of-motion, resistance exercises, and sensory stimulation.
* Benefits include improved safe oral intake, reduced risk of aspiration, and better nutritional status.
* Side effects: Generally safe; some patients may experience fatigue or mild discomfort during exercises.

## 2. Dietary Modifications

* Thickened fluids and modified texture diets (e.g., pureed or soft foods) reduce aspiration risk.
* Smaller, more frequent meals and careful chewing are recommended.
* Use of specialized feeding equipment or positioning may aid safe swallowing.
* Side effects: Potential reduced enjoyment of food and risk of dehydration if fluid intake is limited.

## 3. Pharmacologic Treatments

| **Drug/Medication Type** | **Indication** | **Common Side Effects** | **Notes** |
| --- | --- | --- | --- |
| Proton Pump Inhibitors (PPIs) (e.g., omeprazole) | Treat reflux esophagitis causing dysphagia | Headache, diarrhea, risk of C. difficile infection with long-term use | Reduces acid reflux that can worsen swallowing |
| Corticosteroids (e.g., prednisone) | Used in eosinophilic esophagitis or inflammatory causes | Immunosuppression, hyperglycemia, mood changes | Short courses preferred to reduce side effects |
| Smooth Muscle Relaxants (e.g., nitrates, calcium channel blockers) | Esophageal motility disorders like spasm or achalasia | Headache, hypotension, dizziness | Used cautiously in elderly due to cardiovascular effects |
| Botulinum toxin (Botox) injections | Relieve cricopharyngeal or esophageal muscle spasms | Local pain, dysphagia worsening temporarily | Requires specialist administration; effect temporary |
| Saliva substitutes or stimulants (e.g., pilocarpine) | Manage dry mouth contributing to dysphagia | Sweating, flushing, urinary frequency | Used if xerostomia is present |

## 4. Medical and Surgical Interventions

* Esophageal dilation for strictures or rings to improve passage of food.
* Surgery for tumors, diverticula (e.g., Zenker’s), or severe structural abnormalities.
* Feeding tubes (PEG or NG tubes) may be necessary if oral intake is unsafe or inadequate.

## 5. Supportive Care and Prevention

* Oral hygiene to reduce aspiration pneumonia risk.
* Positioning during meals (upright posture) and paced feeding.
* Multidisciplinary team involvement (SLPs, dietitians, occupational therapists, nurses).

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you’ve been having some trouble swallowing. Can you tell me more about what you’re experiencing?

Patient: Yes, lately I’ve noticed it’s harder to swallow food, especially solids, and sometimes I cough when I eat or drink.

Doctor: Thank you for sharing that. Difficulty swallowing, or dysphagia, is quite common as we age and can have many causes. It’s important we understand your specific symptoms so we can tailor the treatment to your needs.

Patient: What could be causing this?

Doctor: It could be related to changes in muscle strength or coordination that happen with aging. Sometimes neurological conditions like stroke or Parkinson’s disease, or structural issues like narrowing of the esophagus, can also cause swallowing problems. We’ll do some tests to find the exact cause.

Patient: Is this dangerous?

Doctor: Dysphagia can increase the risk of food or liquids going into your lungs, which can cause pneumonia. It can also affect your nutrition and quality of life. That’s why it’s important to manage it properly.

Patient: What can be done to help me?

Doctor: There are several approaches. A speech-language therapist can teach you exercises to strengthen your swallowing muscles and strategies to swallow more safely, like changing your head position during meals. We may also recommend modifying the texture of your food or liquids to make swallowing easier and safer.

Patient: Will I have to change my diet completely?

Doctor: Not necessarily. We aim to balance safety with your enjoyment of food. Sometimes just small adjustments can make a big difference. We’ll work with you and your caregivers to find what works best for you.

Patient: Are there medications that can help?

Doctor: Depending on the cause, medications like those reducing acid reflux or treating infections might be needed. But exercises and dietary changes are often the first steps. We’ll review your current medications too, as some can affect swallowing.

Patient: What about feeding tubes? I’ve heard about those.

Doctor: Feeding tubes are considered if swallowing is very unsafe or if nutrition can’t be maintained by mouth. But we try to avoid that if possible, focusing first on therapies to improve swallowing.

Patient: How will I know if the treatment is working?

Doctor: We’ll monitor your swallowing function, nutrition, and overall health regularly. Your feedback is very important, and we’ll adjust the plan as needed to make sure you’re comfortable and safe.

Patient: Thank you, Doctor. It helps to understand what’s going on and what can be done.

Doctor: You’re welcome. Remember, managing dysphagia is a team effort involving you, your family, and healthcare providers. We’re here to support you every step of the way.

**PREDEFINED Q & A SETS**

Q1: What is a swallowing disorder (dysphagia)?  
A: Dysphagia is difficulty swallowing food or liquids due to problems in the mouth, throat, esophagus, or gastroesophageal junction. It can cause choking, coughing, pain, or the sensation of food sticking, and may lead to malnutrition, dehydration, or pneumonia if untreated.

Q2: Why are swallowing disorders common in older adults?  
A: Aging can affect muscle strength and coordination involved in swallowing, increasing the risk of dysphagia. Neurological conditions common in older adults, such as Parkinson’s disease or stroke, also contribute to swallowing difficulties.

Q3: What are the signs I should watch for that indicate a swallowing problem?  
A: Common signs include coughing or choking during meals, sensation of food sticking in the throat, pain when swallowing, drooling, wet or gurgly voice after eating, unexplained weight loss, and frequent heartburn or regurgitation.

Q4: How is dysphagia diagnosed?  
A: Diagnosis involves a detailed medical history and physical exam, followed by clinical swallowing assessments. Instrumental tests such as videofluoroscopy or flexible endoscopic evaluation of swallowing (FEES) may be used to visualize swallowing function.

Q5: Who manages swallowing disorders?  
A: Speech-language pathologists (SLPs) are the primary specialists for diagnosing and managing dysphagia. They work within an interdisciplinary team including physicians, dietitians, and nurses to provide comprehensive care.

Q6: What treatment options are available for swallowing disorders?  
A: Treatments include swallowing exercises, compensatory strategies like posture adjustments, modifying food and liquid consistency, and patient/caregiver education. Nutritional management is also critical to prevent malnutrition.

Q7: How can caregivers support patients with dysphagia?  
A: Caregivers should be educated about safe feeding techniques, signs of aspiration, and dietary modifications. Tools like the Caregiver Analysis of Reported Experiences with Swallowing Disorders (CARES) questionnaire can help identify caregiver burden and improve support.

Q8: Are there screening tools to detect swallowing problems early?  
A: Yes, standardized tools such as the Swallowing Disturbance Questionnaire (SDQ) and the Standardized Swallowing Assessment (SSA) are validated for early detection of dysphagia, especially in high-risk populations.

Q9: Can swallowing disorders be prevented in aging?  
A: Some swallowing disorders may be preventable by managing underlying conditions, maintaining good oral health, and early screening in high-risk individuals. Interdisciplinary collaboration improves prevention and management.

Q10: What are the risks if dysphagia is left untreated?  
A: Untreated dysphagia can lead to serious complications such as aspiration pneumonia, malnutrition, dehydration, chronic lung disease, and reduced quality of life due to social isolation and embarrassment.

*REFERENCES:*

[Dysphagia - Diagnosis and treatment - Mayo Clinic](https://www.mayoclinic.org/diseases-conditions/dysphagia/diagnosis-treatment/drc-20372033)

<https://www.aafp.org/pubs/afp/issues/2000/0615/p3639.html>

<https://pmc.ncbi.nlm.nih.gov/articles/PMC3999993/>

<https://my.clevelandclinic.org/health/symptoms/21195-dysphagia-difficulty-swallowing#overview>

**ANOSMIA**

ALTERNATIVE NAMES: Alternative names for anosmia include "loss of smell," "smell blindness," and "odor blindness".

**OVERVIEW:**

Anosmia is when you can’t detect an odor, whether it comes from pies fresh from the oven or smelly socks piled in a corner. It’s usually a temporary side effect of a cold or sinus infection. Our sense of smell fades as we age, so people age 50 and older may have long-lasting anosmia. In some cases, anosmia may be a symptom of other, more serious medical issues like a traumatic brain injury (TBI).

***How does my sense of smell work?***

The process starts with substances that smell and give off tiny molecules. When you inhale, the molecules glide into your nose and land on a tiny patch of tissue high inside it.

The patch is home to specialized cells called olfactory sensory neurons. These cells have a direct connection to your brain. When scent-bearing molecules attach to them, the cells notify your brain, which identifies the smell. Your brain then lets you know if something smells good or bad.

**SIGNS / SYMPTOMS**

You can lose your sense of smell suddenly or over time. Early on, you may notice familiar scents are different, like a favorite cologne that seems to smell less potent than it did before.

Anosmia is the inability or decreased ability to smell. The signs of anosmia include a complete loss of smell or a reduced sensitivity to certain smells. People with anosmia may notice that they can no longer detect familiar odors or that food tastes different. Other signs may include a distorted sense of smell, known as parosmia, where a person may perceive a smell as something else, such as spoiled milk instead of a cherry pie. Additionally, individuals with anosmia may experience a decreased quality of life due to the inability to enjoy foods and the potential risks associated with not being able to detect dangerous odors such as gas leaks or spoiled food. It is important to note that anosmia can be a symptom of various underlying conditions, including upper respiratory infections, head trauma, or neurodegenerative diseases. If someone experiences a sudden loss of smell, it is recommended to consult a healthcare professional for a proper diagnosis and treatment.

**CAUSES**

Anosmia may be a side effect of many common medical issues, including conditions that block your nose or interfere with signals sent from your special scent cells to your brain.

Conditions that block your nose are:

* Nasal polyps.
* Common cold.
* Influenza (flu).
* Nasal congestion.
* Sinus infection (Sinusitis).
* Deviated septum.
* Hay fever or other allergies.
* COVID-19.

Conditions that affect receptors in your nose include:

* Alzheimer’s disease.
* Brain tumors.
* Multiple sclerosis (MS).
* High blood pressure (hypertension).
* Kallmann syndrome.
* Parkinson’s disease.
* Sjogren’s syndrome.

Other causes may include:

* Taking certain medications, such as antibiotics and antihistamines.
* Smoking.
* Having obesity (a BMI or body mass index of 30 or higher).
* Diabetes.
* Traumatic brain injury.

Rarely, people are born with anosmia, or congenital anosmia. That means they’ll never be able to detect odors. About 1,000 people in the United States have congenital anosmia.

### 

**RISK FACTORS**

Anosmia, the loss of the sense of smell, can be caused by various factors, and several risk factors have been identified. These include age-related changes, where the sense of smell decreases due to the loss of cells in the olfactory bulb and the olfactory epithelium. Additionally, viral respiratory infections, such as the common cold, can damage or destroy the smell receptor cells. Head injuries can also lead to anosmia by severing the olfactory nerve fibers or damaging parts of the brain that process smell information.

Other risk factors include chronic nasal-sinus diseases, such as rhinitis, nasal polyps, and chronic sinus infections, which can block the passage of odor molecules to the smell receptors or interfere with how the receptors detect odors. The presence of anosmia and dysgeusia during the acute phase of SARS-CoV-2 infection and being infected with a pre-Omicron variant were found to be significant risk factors for persistent olfactory and gustatory dysfunction.

Furthermore, genetic factors can play a role, as seen in conditions like Kallmann syndrome and Turner syndrome, which are associated with congenital anosmia. The impact of the SARS-CoV-2 virus variants on the development of anosmia and dysgeusia in children has also been studied, with the Omicron variant being less likely to cause chronic anosmia and dysgeusia compared to other variants.

**POSSIBLE COMPLICATIONS**

There’s more to anosmia than not being able to enjoy sweet or savory scents. Complications may include:

* Food poisoning: Lack of smell and taste puts you at risk of food poisoning because you can’t tell when foods have spoiled.
* Increased risk of being hurt by smoke or fire: Anosmia can keep you from realizing there’s smoke in your home or workplace.
* Increased risk of inhaling natural gas or harmful chemicals: Because you can’t smell, you may not realize you’re exposed to gas or chemicals.

**DIAGNOSIS METHODS**

Otolaryngologists diagnose anosmia. They’ll ask you when you first noticed you can’t detect odors and if the issue developed over time or suddenly. They’ll look inside your nose and do an odor identification test.

Odor identification tests involve sniffing and identifying different substances and telling the difference between substances. Your provider will also check your ability to identify odors as they become increasingly faint because they dilute the substance making the smell.

Your provider may do imaging tests like magnetic resonance imaging (MRI) or computed tomography (CT) scan.

**TREATMENT OPTIONS**

In most cases, treating the underlying condition improves your sense of smell. For example, if you have sinusitis, antibiotics can help clear up the infection. If certain medications affect your sense of smell, switching medications may help ease your anosmia symptoms. If something is blocking your nose, like a nasal polyp, or you have a deviated septum, you may need surgery.

**OUTLOOK / PROGNOSIS**

Often, anosmia is a side effect of many common medical issues. You’ll be able to smell again once the underlying issue goes away. Rarely, people have congenital anosmia, for which there’s no known cure.

**PREVENTION TIPS**

You can’t always prevent anosmia because so many things can cause it. In general, protecting yourself from colds and other respiratory conditions may reduce your risk of losing your sense of smell.

***Living With***

If you have anosmia, you can’t detect troubling odors like smoke in your house or workplace or spoiled food. But you can take precautions:

* Be sure to install smoke detectors and to change their batteries often.
* Don’t take a chance that food that looks OK is safe to eat. Take a minute to read food expiration dates.

**WHEN TO SEE A DOCTOR / RED FLAG**

Anosmia related to colds, flus and infections usually goes away within a few days. Talk to a healthcare provider if your cold or flu clears up and you still can’t detect odors.

**PREDEFINED Q & A SETS**

### **Question 1: “Can you taste food and drink without having a sense of smell?”**

Answer: “Yes, but tasting things won’t seem the same as it did before you had anosmia. Your tongue can detect sweet, sour, salty, bitter and umami flavors. But without your sense of smell, you wouldn’t be able to detect subtle differences between them.”

### **Question 2: “What’s the difference between ageusia and anosmia?”**

Answer: “Anosmia means you can’t detect odors. Ageusia means you can’t taste food or drink. You can have anosmia without having ageusia, but you can have both conditions, given the close connection between your sense of smell and taste.”

### **Question 3: “What’s the connection between my sense of smell and my sense of taste?”**

Answer: “Taste and smell are chemical senses that work together. When you can’t smell foods and drinks, it affects how they taste. Say you take a bite of warm cherry pie:

* That first bite releases molecules in your mouth and nose.
* Receptors in your nose and mouth react to the taste and smell of cherry pie and alert your brain.
* Your brain gathers up the messages about how the cherry pie smells and tastes and lets you know that cherry pie smells sweet. When you taste it, you know cherry pie has a tart fruit filling and a buttery crust.”

### **Question 4: “What’s the difference between anosmia and parosmia?”**

Answer: “If you have parosmia, your sense of smell is distorted. For example, you may smell a cherry pie, but your brain tells you that you’re smelling spoiled milk.”

**Question 5: “Is my loss of smell due to a cold, flu or infection, or a more serious medical issue?”**

Answer: “Your loss of smell (anosmia) is most commonly caused by a cold, flu, or other upper respiratory infections. These infections cause inflammation and swelling in your nasal passages and sinuses, which block odor molecules from reaching the olfactory receptors in your nose, leading to a reduced or lost sense of smell. Viral infections such as influenza or COVID-19 are well-known triggers of temporary anosmia”

**Question 6: “Could any of my medications cause anosmia?”**

Answer: “More serious medical issues that can cause anosmia include head injuries, neurological diseases (like Alzheimer's or multiple sclerosis), tumors near the olfactory nerves, or damage to the olfactory pathways in the brain. If your anosmia started suddenly without a cold or flu, or if you have neurological symptoms (e.g., vision problems, weakness, confusion), you should seek medical evaluation promptly.

Regarding medications, some drugs can cause or contribute to anosmia in susceptible individuals. Examples include certain blood pressure medications (enalapril), estrogen, nasal decongestants if overused, and some psychiatric drugs. If you are taking such medications and notice smell loss, discuss this with your doctor”

**Question 7: “Can you estimate when my senses of smell will come back”**

Answer: “If your anosmia is due to a common cold, flu, or sinus infection, it usually improves gradually as the infection resolves and inflammation decreases—often within days to a few weeks. However, in some cases, especially with more severe infections or damage to olfactory nerves, recovery can take longer or may be incomplete. If your anosmia persists beyond a few weeks or worsens, a medical evaluation is recommended.”

**DIFFERENTIAL DIAGNOSIS**

## Conductive Causes (Nasal Obstruction or Mucosal Disease)

* Upper respiratory tract infections (common cold, flu, COVID-19) — most frequent cause of temporary anosmia
* Nasal polyps
* Chronic rhinosinusitis
* Allergic and nonallergic rhinitis
* Nasal septal deviation
* Intranasal tumors (e.g., ethmoid tumors)
* Post-surgical changes (e.g., nasal or sinus surgery)
* Granulomatous diseases (e.g., Wegener’s granulomatosis)
* Atrophic rhinitis

## Sensorineural Causes (Olfactory Nerve or Central Pathway Damage)

* Post-viral olfactory dysfunction (including COVID-19)
* Head trauma (with or without skull base fracture)
* Neurodegenerative diseases: Parkinson’s disease, Alzheimer’s disease
* Neurological disorders: temporal lobe epilepsy, multiple sclerosis, cerebrovascular disease
* Space-occupying lesions: meningioma of the olfactory groove, brain tumors
* Congenital anosmia: Kallmann syndrome, cleft palate
* Toxic exposures: tobacco, cocaine, certain medications (ACE inhibitors, diuretics, calcium channel blockers, statins), chemical inhalants
* Infections: meningitis, neurosyphilis
* Intracranial hemorrhages or increased intracranial pressure

## Other Important Considerations

* Aging: natural decline in olfaction, especially after age 60
* Smoking: causes olfactory dysfunction
* Systemic diseases: diabetes, hypertension, cancer, brain aneurysm
* Iatrogenic: pituitary surgery, laryngectomy

**EPIDEMIOLOGY**

In the United States, anosmia afflicts 3% of the adult population older than the age of 40. The prevalence of impaired olfaction increases with age. In 2016, the National Health and Nutrition Examination Survey (NHANES) measured olfactory dysfunction which involved 1818 participants. Data showed that olfactory dysfunction was 4% at age 40 to 49 years of age, 10% at 50 to 59, 13% at 60 to 69, 25% at 70 to 79, and 39% for those over 80 years of age. Anosmia affected 14% to 22% of those over 60 years of age.

## **Medications**

| **Medication Type** | **Indication** | **Common Side Effects** | **Notes** |
| --- | --- | --- | --- |
| Nasal corticosteroids (e.g., fluticasone, mometasone) | Reduce inflammation in nasal polyps, chronic rhinosinusitis | Nasal irritation, dryness, nosebleeds | Often first-line for inflammatory causes |
| Decongestants (e.g., pseudoephedrine, oxymetazoline nasal spray) | Temporary relief of nasal congestion from colds or allergies | Nasal dryness, rebound congestion (with prolonged use of sprays), increased blood pressure (oral) | Use nasal sprays short-term only to avoid rebound |
| Antihistamines (e.g., loratadine, cetirizine) | Allergic rhinitis causing nasal congestion | Drowsiness (some types), dry mouth | Helpful if allergy is a cause |
| Antibiotics (e.g., amoxicillin, ampicillin) | Bacterial sinus infections causing anosmia | Allergic reactions, GI upset, antibiotic resistance | Used only if bacterial infection is confirmed or strongly suspected |
| Systemic corticosteroids (e.g., prednisone) | Severe inflammation or post-viral anosmia | Immunosuppression, hyperglycemia, mood changes | Short courses preferred; risks increase with duration |
| Saline nasal sprays/rinses | Adjunct to clear nasal passages and reduce irritation | Minimal; nasal irritation possible | Safe and supportive therapy |

## 2. Smell Training (Olfactory Training)

* Involves regularly sniffing a set of distinct odors (e.g., rose, lemon, clove, eucalyptus) twice daily over several months.
* Helps retrain olfactory nerves and brain pathways.
* No significant side effects; requires patient motivation and adherence.
* Studies show improvement in post-viral and idiopathic anosmia.

## 3. Surgical Treatments

* Indicated for physical obstructions such as nasal polyps, deviated septum, or tumors.
* Procedures include endoscopic sinus surgery or septoplasty.
* Risks include bleeding, infection, and anesthesia-related complications.

## 4. Supportive Measures

* Avoidance of nasal irritants and allergens.
* Smoking cessation to improve olfactory function.
* Safety precautions at home due to inability to detect hazards like smoke or gas leaks.

## 5. Experimental and Emerging Therapies

* Cell-based therapies and novel pharmacologic agents are under investigation but not yet standard care.

**DOCTOR-PATIENT CONVERSATION**

Doctor: Hello, I understand you’ve noticed a loss of your sense of smell. Can you tell me when this started and if you have any other symptoms?

Patient: Yes, it began about two weeks ago. I had a cold before that, and now I can’t smell anything at all. Food tastes bland too.

Doctor: That’s quite common after viral infections like colds or flu, including COVID-19. The virus can affect the nerve endings responsible for smell. The good news is that most people recover their sense of smell within a few weeks.

Patient: Is there anything I can do to help it get better faster?

Doctor: One of the best-supported treatments is called smell training. It involves regularly sniffing a set of strong, familiar scents like rose, lemon, clove, and eucalyptus twice daily. This helps stimulate and retrain your olfactory nerves.

Patient: Are there any medications I should take?

Doctor: Usually, no specific medications are needed if it’s post-viral. If you have nasal congestion or allergies, nasal sprays or antihistamines might help. Steroid nasal sprays can reduce inflammation if there’s nasal swelling. Antibiotics are only used if there’s a bacterial infection.

Patient: How long does it usually take to get better?

Doctor: Around 90% of people improve within two to three weeks. For some

*REFERENCES*

[Anosmia (Loss of Smell): Causes & Treatment](https://my.clevelandclinic.org/health/diseases/21859-anosmia-loss-of-sense-of-smell#overview)

<https://www.mayoclinic.org/symptoms/loss-of-smell/basics/causes/sym-20050804>

<https://stanfordhealthcare.org/medical-conditions/ear-nose-and-throat/anosmia-loss-of-smell/treatments.html>

**ASPIRATION**

ALTERNATIVE NAMES: In medical terminology, "aspiration" can also be referred to as the act of removing a fluid, as pus or serum, from a cavity of the body, by a hollow needle or trocar connected with a suction syringe. This procedure may also be called a needle biopsy or aspirate.

**DEFINITION / DESCRIPTION**

Aspiration is when something other than air gets into your airways. Often, it’s something that you meant to swallow or that belongs in your digestive tract. This could include:

* Food
* Water or liquid
* Stomach acid
* Vomit
* Mucus or saliva (spit) from your mouth or throat
* A foreign object

We often talk about aspiration as something “going down the wrong pipe.” In most situations, it might cause minor irritation while you cough out the wayward food or water. But in some cases, it can cause you to choke, restrict your breathing or cause an infection.

**SIGNS / SYMPTOMS**

Symptoms of aspiration include:

* Coughing
* Feeling like something’s stuck in your throat
* Noisy breathing, like stridor or wheezing
* Shortness of breath (dyspnea) or difficulty breathing
* Bluish skin, lips, fingertips or nails (cyanosis)
* Trouble swallowing (dysphagia)
* Fever

**CAUSES OF ASPIRATION**

Anytime your epiglottis — a piece of cartilage that works like a lid that closes over your vocal cords when you swallow — fails to protect your airways, you can aspirate. Conditions that reduce your cough or gag reflex can also cause aspiration. These reflexes protect you when something makes it past your epiglottis and into your airways.

You have two tubes that run down your neck and chest — one for food (your esophagus) and one for air (your larynx and trachea/windpipe). They join in your throat (pharynx). Most of the time, the path from your nose or mouth is open from your throat to your airways and down to your lungs, so you can breathe. But when you swallow, your epiglottis covers your airways so food and liquids go down your esophagus instead of your windpipe.

Sometimes your epiglottis doesn’t move to protect your airways, causing you to aspirate. If your body can’t clear a substance out of your airways (for instance, by coughing or clearing your throat), it can get stuck or cause an infection.

**RISK FACTORS**

Most of us experience moments where we accidentally aspirate something — maybe you took a sip of water just as something surprised you. Or small crumbs trickle down the wrong way. But some medical conditions and medications can increase your risk. These include:

* Sedatives. Prescription and non-prescription drugs and alcohol can cause sedation — which may feel like sleepiness or a lower level of consciousness. Opioids are a common example of a sedative drug.
* Central nervous system These can reduce your body’s natural reflexes that keep you from aspirating. Examples include stroke, brain tumors and Parkinson’s disease.
* Neuromuscular disorders. These are conditions that affect your nerves or muscles, like myasthenia gravis or Guillain-Barré syndrome. They can prevent your muscles from responding the way they should to prevent aspiration.
* GERD (gastroesophageal reflux disease) and gastrointestinal motility disorders. Conditions like GERD and achalasia can cause large amounts of acid to back up into your esophagus, which can spill over into your airways.
* Anatomical differences. Difference in the structure of your airways or esophagus, like a tracheoesophageal fistula, can make it easier for food and other substances to go the wrong way.
* Medical devices.Nasogastric (NG) tubes can get in the way of your epiglottis working properly.

Newborns are also at risk of meconium aspiration syndrome, where they breathe in thick, sticky meconium just before or during birth.

**POSSIBLE COMPLICATIONS OF ASPIRATIONS**

If your body can’t clear out something you aspirated, it can cause serious complications, including:

* Aspiration pneumonia
* Lung abscess
* Acute respiratory distress syndrome (ARDS)
* Collapsed lung (pneumothorax)
* Air in the space between your lungs and chest wall (pneumomediastinum)
* Inflammation in your lungs (pneumonitis)
* Asphyxiation — airway blockages or large amounts of fluids can deprive your body of oxygen

Severe complications might be more likely to happen if you aspirate something without realizing it (silent aspiration) or if you have a lowered level of consciousness. For instance, if you throw up while under the influence of alcohol, sedative medications or non-prescription drugs.

**DIAGNOSIS METHODS**

Depending on your symptoms and whether you remember aspirating something, a provider might diagnose aspiration or its complications with:

* Chest X-ray or CT scan
* Bronchoscopy
* Sputum culture

If you think you’ve aspirated something or you have a condition that makes it more likely that you could aspirate without knowing it, let your provider know.

**TREATMENT OPTIONS**

Providers treat aspiration by removing the food or other substance if possible. They sometimes do this during a bronchoscopy. If you’re choking and need emergency treatment, they may use the Heimlich maneuver or other techniques to force it out.

They can also open your airways and treat complications with:

* Supplemental oxygen
* Bronchodilators
* Antibiotics

You might need ongoing treatment for underlying conditions that put you at higher risk for aspiration. You likely won’t need treatment if you cough up something you aspirated and don’t have any underlying medical conditions.

***Can aspiration clear up on its own?***

Your body can clear small amounts of liquid and particles from your lungs and airways. It does this by trapping particles in mucus and using hair-like structures (cilia) to push them out. Your body can also break it down and absorb it.

But larger amounts of food, liquid or other substances can grow bacteria, causing infections, especially if you have a compromised immune system. Aspirated stomach acid can damage your airways over time.

**PREVENTION TIPS**

You can reduce your risk for aspiration by managing underlying conditions and taking steps to make food more likely to go the right way when eating and drinking. A speech therapist can help you with specific techniques to reduce your risk of aspiration. Some common recommendations include:

* Always sit upright when eating or drinking. Stay upright (at least a 45-degree angle) for an hour after eating.
* Cut your food into bite-sized pieces and chew it well before swallowing.
* Use effortful swallowing techniques. This is a technique where you swallow forcefully, using your throat muscles to push foods and liquids down.

**WHEN TO SEE A DOCTOR / RED FLAG**

If you have a condition that makes you more likely to aspirate, talk to your provider about how to prevent aspiration. They can tell you what symptoms to look out for and when to seek medical care.

Call 911 or seek emergency medical attention if:

* You can’t swallow normally
* You’re short of breath or feel like you can’t breathe
* Your skin, lips or nails are blue or purple
* You have chest pain
* You think food or an object is stuck in your throat or airway

**EPIDEMIOLOGY**

A reliable estimate of incidence of chemical pneumonitis is not available. Few studies have been designed that distinguish between aspiration pneumonia and aspiration pneumonitis. Several studies suggest that 5-15% of the 4.5 million cases of community-acquired pneumonia (CAP) result from aspiration pneumonia.A retrospective review found that the 30-day mortality rate from aspiration pneumonia is 21% overall and slightly higher in healthcare-associated aspiration pneumonia (29.7%).

Nosocomial bacterial pneumonia is the second most likely cause of nosocomial infections, second only to urinary tract infection, and it is the leading cause of death from hospital-acquired infections. Approximately 10% of patients who are hospitalized after drug overdoses will have aspiration pneumonitis.

Nosocomial bacterial pneumonia caused by aspiration is much more frequent in adults than in children, and males are more commonly affected than females. Predisposing factors (see Predisposing Conditions for Aspiration Pneumonia) are more common among elderly people. Thus, this population is more prone to develop aspiration pneumonia.

Comparative studies of bacterial pneumonia in patients from the community with those in a continuing care facility have demonstrated a 3-fold increase of this disease in residents of the continuing care facilities (the majority of them had neurologic disease with dysphagia)

**KEY RECOMMENDATIONS FOR PREVENTING ASPIRATION PNEUMONIA INCLUDE THE FOLLOWING:**

* The practice of good dental hygiene should include brushing the teeth, tongue and palate with a soft toothbrush, using non-foaming toothpaste, at least two times per day.
* Oral examination should be performed in hospitalized patients at risk of AP and at least weekly in patients at long-term care facilities, checking for infection (eg, candidiasis), quality of dentition, food residue and cleanliness of mucosal surfaces. Any abnormalities should be treated.
* People with swallowing difficulties should be referred to a speech and language therapist (SLT).
* In patients with a newly diagnosed abnormality of swallowing that presents a high risk of AP, early nasogastric feeding (within 3 days of presentation with swallowing difficulties) can improve nutritional status and outcomes.
* Percutaneous endoscopic gastrostomy (PEG) should be considered when nasogastric tubes do not provide adequate nutrition. If safe swallow returns PEG tubes can be removed.

The BTS makes the following recommendations for the management of aspiration pneumonia:

* The antibiotic regimen for hospitalized patients should be informed by local epidemiology including recent antibiotic exposure, recent microbiology results when available, and where the patient was when the pneumonia began.
* Aspiration pneumonia should be treated with a 5-day course of antibiotics. Failure to improve should trigger investigation of alternative sources of illness and/or complications of aspiration pneumonia and alternative antibiotic regimens are needed
* Treatment should include thromboprophylaxis (unless contraindicated), adequate hydration and (if required) supplemental oxygen.

**TREATMENT DRUG INFORMATION AND THEIR SIDE EFFECTS**

The following antibiotics are recommended in adult patients with CAP who are otherwise healthy:

Amoxicillin 1 g three times daily OR

Doxycycline 100 mg twice daily OR

In areas with pneumococcal resistance to macrolides < 25%: a macrolide (azithromycin 500 mg on day one and then 250 mg daily or clarithromycin 500 mg twice daily or clarithromycin extended-release 1,000 mg daily)

In outpatient adults with CAP who have comorbidities, the following antibiotic regimens are recommended :

***Combination therapy:***

Amoxicillin/clavulanate 500 mg/125 mg 3 times daily or amoxicillin/clavulanate 875 mg/125 mg twice daily or 2,000 mg/125 mg twice daily or a cephalosporin (cefpodoxime 200 mg twice daily or cefuroxime 500 mg twice daily) AND

A macrolide (azithromycin 500 mg on day one then 250 mg daily or clarithromycin [500 mg twice daily or extended release 1,000 mg once daily]) or doxycycline 100 mg twice daily OR

***Monotherapy:***

Respiratory fluoroquinolone (levofloxacin 750 mg daily, moxifloxacin 400 mg daily)

The following empiric treatment regimens are recommended in inpatient adults with nonsevere CAP who do not have risk factors for MRSA or P aeruginosa :

***Combination therapy:***

A beta-lactam (ampicillin plus sulbactam 1.5-3 g every 6 hours or cefotaxime 1-2 g every 8 hours or ceftriaxone 1-2 g daily or ceftaroline 600 mg every 12 hours) AND

A macrolide (azithromycin 500 mg daily or clarithromycin 500 mg twice daily) OR

***Monotherapy:***

A respiratory fluoroquinolone (levofloxacin 750 mg daily, moxifloxacin 400 mg daily)

If macrolides and fluoroquinolones are contraindicated:

A beta-lactam as above AND doxycycline

The following regimens are recommended among inpatient adults with severe CAP without risk factors for MRSA or P aeruginosa (agents and doses as above):

A beta-lactam plus a macrolide OR

A beta-lactam plus a respiratory fluoroquinolone

Routine addition of anaerobic coverage for suspected aspiration pneumonia is not recommended except when lung abscess or empyema is suspected.

Empiric coverage for MRSA or P aeruginosa is recommended in adults with CAP only in the presence of locally validated risk factors. Empiric treatment options for MRSA include vancomycin (15 mg/kg every 12 hours) or linezolid (600 mg every 12 hours). Empiric treatment options for P aeruginosa include piperacillin-tazobactam (4.5 g every 6 hours), cefepime (2 g every 8 hours), ceftazidime (2 g every 8 hours), aztreonam (2 g every 8 hours), meropenem (1 g every 8 hours), or imipenem (500 mg every 6 hours).

The duration of antibiotic therapy should be guided by a validated measure of clinical stability. Antibiotics should be continued until stability is achieved, for a total antibiotic duration of at least 5 days.

**DIFFERENTIAL DIAGNOSIS**

Necrotizing pneumonia

* Lung abscess
* Bronchopleural fistula
* Lung carcinoma
* Mycoses (fungal infections)
* Hypersensitivity pneumonitis
* Chemical pneumonitis (caused by inhalation of gastric acid rather than infectious material)
* Other respiratory infections and conditions in children: bronchiolitis, croup (laryngotracheobronchitis), epiglottitis, asthma, reactive airway disease, respiratory distress syndrome, and foreign body aspiration
* Respiratory distress syndrome
* Respiratory syncytial virus infection
* Double aortic arch (a vascular anomaly that can cause airway symptoms)
* Respiratory failure from other causes

### 

**PREDEFINED Q & A SETS**

## **Question 1: “ What caused this?”**

Answer: “Aspiration occurs when food, liquid, saliva, or stomach contents accidentally enter your airway or lungs instead of going down your esophagus. Common causes include:

* Difficulty swallowing (dysphagia) due to neurological disorders like stroke, Parkinson’s disease, or dementia
* Reduced muscle control or coordination affecting chewing and swallowing
* Acid reflux or gastroesophageal reflux disease (GERD) causing stomach contents to backflow into the airway
* Sedatives or medications that impair your cough or gag reflex
* Head and neck injuries or surgeries
* Dental problems or mouth sores
* Use of feeding tubes or breathing machines
* Fatigue or loss of mental ability that affects swallowing safety
* Eating or drinking too quickly
* Throat cancer or radiation therapy affecting swallowing muscles

Silent aspiration can also occur without obvious symptoms, especially in people with weakened reflexes.”

## **Question 2: “How can I reduce my risk for aspiration?”**

Answer: “To reduce your risk of aspiration, you can:

* Eat slowly and chew food thoroughly
* Avoid talking or laughing while eating
* Follow any swallowing therapy or dietary recommendations from a speech therapist
* Manage underlying conditions like GERD or neurological diseases properly
* Avoid sedatives or medications that impair swallowing reflexes unless necessary
* Maintain good oral hygiene and dental care
* Use feeding tubes or breathing aids carefully under medical guidance
* Sit upright during and after meals to help prevent reflux and aspiration
* Inform your healthcare provider about any swallowing difficulties so they can evaluate and treat them early.”

## **Question 3: “What symptoms should I look out for?”**

Answer: “Symptoms that may indicate aspiration include:

* Coughing or choking during or after eating or drinking
* Frequent throat clearing or a sensation of something stuck in the throat
* Wheezing, noisy breathing, or shortness of breath
* Recurrent respiratory infections or pneumonia
* Fever, chest pain, or fatigue (signs of aspiration pneumonia)
* Wet or gurgly voice after eating
* Faster or labored breathing while eating
* Nasal congestion that improves after eating
* In infants or children: refusal to feed, breath-holding, or a wet-sounding cry after feeding”

**Doctor-Patient Conversation: Aspiration**

Doctor:  
Hello, I understand you’ve been having some coughing and difficulty breathing. Can you tell me more about your symptoms?

Patient:  
Yes, I’ve been coughing a lot, especially after eating or drinking. Sometimes I feel like food or liquid goes down the wrong way, and then I start coughing hard.

Doctor:  
Thank you for sharing that. Based on what you’re describing, it sounds like you might be experiencing something called aspiration. This happens when food, liquid, or even saliva accidentally enters your airway or lungs instead of going down your esophagus to your stomach.

Patient:  
Is that dangerous? What causes it?

Doctor:  
Aspiration can be serious because it can lead to lung infections or inflammation, called aspiration pneumonia. Causes include difficulty swallowing due to neurological problems, weak throat muscles, or sometimes after anesthesia or sedation. It can also happen if you have reflux or if your cough reflex isn’t working well.

Patient:  
What happens next? How do you treat it?

Doctor:  
First, we’ll do some tests to confirm if aspiration is happening, like a swallowing study or chest X-ray. Treatment depends on the cause and severity. Sometimes, it involves antibiotics if there’s an infection, swallowing therapy with a speech therapist, or dietary changes to reduce the risk. In severe cases, we might need to consider feeding tubes temporarily.

Patient:  
Will I get better? How long does it take?

Doctor:  
Many people improve with proper treatment and care. The timeline varies—if it’s mild, symptoms can improve in days to weeks. If there’s lung infection, it may take longer to fully recover. It’s important to follow the treatment plan and attend follow-ups to prevent complications.

Patient:  
Thank you, doctor. I’m glad to know what’s going on.

Doctor:  
You’re welcome. Please let me know if you have any new symptoms like fever, worsening cough, or difficulty breathing. We’re here to help you get better.

***REFERENCES:***

[Aspiration: Causes, Symptoms, Treatment & Prevention](https://my.clevelandclinic.org/health/diseases/aspiration#what-is-aspiration)

<https://emedicine.medscape.com/article/296198-overview#a29>

<https://www.ncbi.nlm.nih.gov/books/NBK470459/#article-17897.s9>

**ASTHMA (RELATED TO AIRWAY ISSUES)**

ALTERNATIVE NAMES: Alternative names for asthma include "asthmatic" , "wheeze" , and "cough". Additionally, specific types of asthma may have alternative names such as "allergic asthma" , "occupational asthma" , "cough-variant asthma" , "asthma-COPD overlap syndrome (ACOS)" , and "eosinophilic asthma".

***Overview***

Asthma is a chronic lung disease affecting people of all ages. It is caused by inflammation and muscle tightening around the airways, which makes it harder to breathe.

Symptoms can include coughing, wheezing, shortness of breath and chest tightness. These symptoms can be mild or severe and can come and go over time.

Although asthma can be a serious condition, it can be managed with the right treatment. People with symptoms of asthma should speak to a health professional.

***Impact***

Asthma is often under-diagnosed and under-treated, particularly in low- and middle-income countries.

People with under-treated asthma can suffer sleep disturbance, tiredness during the day, and poor concentration. Asthma sufferers and their families may miss school and work, with financial impact on the family and wider community. If symptoms are severe, people with asthma may need to receive emergency health care and they may be admitted to hospital for treatment and monitoring. In the most severe cases, asthma can lead to death.

**SIGNS / SYMPTOMS**

Symptoms of asthma can vary from person to person. Symptoms sometimes get significantly worse. This is known as an asthma attack. Symptoms are often worse at night or during exercise.

Common symptoms of asthma include:

* a persistent cough, especially at night
* wheezing when exhaling and sometimes when inhaling
* shortness of breath or difficulty breathing, sometimes even when resting
* chest tightness, making it difficult to breathe deeply.

Some people will have worse symptoms when they have a cold or during changes in the weather. Other triggers can include dust, smoke, fumes, grass and tree pollen, animal fur and feathers, strong soaps and perfume.

Symptoms can be caused by other conditions as well. People with symptoms should talk to a healthcare provider.

**CAUSES**

Many factors have been linked to an increased risk of developing asthma, although it is often difficult to find a single, direct cause.

* Asthma is more likely if other family members also have asthma – particularly a close relative, such as a parent or sibling.
* Asthma is more likely in people who have other allergic conditions, such as eczema and rhinitis (hay fever).
* Urbanization is associated with increased asthma prevalence, probably due to multiple lifestyle factors.
* Events in early life affect the developing lungs and can increase the risk of asthma. These include low birth weight, prematurity, exposure to tobacco smoke and other sources of air pollution, as well as viral respiratory infections.
* Exposure to a range of environmental allergens and irritants are also thought to increase the risk of asthma, including indoor and outdoor air pollution, house dust mites, moulds, and occupational exposure to chemicals, fumes or dust.
* Children and adults who are overweight or obese are at a greater risk of asthma.

**TREATMENT OPTIONS**

Asthma cannot be cured but there are several treatments available. The most common treatment is to use an inhaler, which delivers medication directly to the lungs.

Inhalers can help control the disease and enable people with asthma to enjoy a normal, active life.

There are two main types of inhaler:

* bronchodilators (such as salbutamol), that open the air passages and relieve symptoms; and
* steroids (such as beclometasone) that reduce inflammation in the air passages, which improves asthma symptoms and reduces the risk of severe asthma attacks and death.

People with asthma may need to use their inhaler every day. Their treatment will depend on the frequency of symptoms and the types of inhalers available.

Using an inhaler can be difficult, especially for children and during emergency situations. Using a spacer device makes it easier to use an aerosol inhaler. This helps the medicine to reach the lungs more easily. A spacer is a plastic container with a mouthpiece or mask at one end and a hole for the inhaler in the other. A homemade spacer, made from a 500ml plastic bottle, can be as effective as commercially manufactured spacers.

Access to inhalers is a problem in many countries. In 2021, bronchodilators were available in public primary health care facilities in half of low- and low-middle income countries, and steroid inhalers available in one third.

It is also important to raise community awareness to reduce the myths and stigma associated with asthma in some settings.

***Self-care***

People with asthma and their families need education to understand more about their asthma. This includes their treatment options, triggers to avoid, and how to manage their symptoms at home.

It is important for people with asthma to know how to increase their treatment when their symptoms are worsening to avoid a serious attack. Healthcare providers may give an asthma action plan to help people with asthma to take greater control of their treatment.

***Diagnostic Considerations***

Vocal cord dysfunction or inducible laryngeal obstruction (ILO)

Vocal cord dysfunction may exist alone or with asthma, it is caused by paradoxical adduction of the vocal cords during inspiration, and may disappear with panting, speech, or laughing.Patients with chronic symptoms suggestive of asthma, normal spirometry, poor response to asthma medications, and frequent evaluations should be evaluated for vocal cord dysfunction.Usually, the diagnosis can be made using direct laryngoscopy, but only during asymptomatic periods or after exercise. The presence of flattening of the inspiratory limb of the flow-volume loop may also suggest vocal cord dysfunction, but this is only seen in 28% of patients at baseline.

Other tracheal lesions can include bronchocentric granulomatosis, subglottic stenosis, subglottic web, tracheal hamartoma, bronchogenic cysts, leiomyoma, and tracheobronchopathia osteoplastica. All these types of tracheal lesions have been reported with symptoms similar to asthma.

***Foreign bodies***

Foreign body aspiration may cause not only localized wheezing but also generalized wheezing. Wheezing occurs in toddlers as well as in adults. As described in one patient, foreign body aspiration may necessitate bronchoscopic retrieval before the patient even recalls the inciting event, and as many as 25% of patients may never recall the event.Furthermore, aspirated foreign bodies may be radiolucent and therefore not be visible on a chest radiograph. Radiography may show unilateral hyperinflation (from air trapping), infiltrate (from occlusion of a bronchus), or may be normal.

***Pulmonary migraine***

Pulmonary migraine consists of combined recurrent asthma; cough with thick mucoid sputum; lower back pain radiating to the shoulder; subtotal or total atelectasis of a segment or lobe; and, occasionally, nausea with vomiting.The symptoms are often accompanied closely in time by focal headache. Spastic narrowing of the bronchi is postulated—along with retained mucous secretions, smooth muscle hypertrophy, and thickened bronchial walls—to cause expiratory collapse of selected airways. Cerebral and abdominal vascular migraine episodes are believed to accompany pulmonary migraine.

***Congestive heart failure***

Congestive heart failure causes engorged pulmonary vessels and interstitial pulmonary edema, which reduce lung compliance and contribute to the sensation of dyspnea and wheezing. Cardiac asthma is characterized by wheezing secondary to bronchospasm in congestive heart failure, and it is related to paroxysmal nocturnal dyspnea and nocturnal coughing.

***Diffuse panbronchiolitis***

Diffuse panbronchiolitis is prevalent in Japan and the Far East, and it may mimic bronchial asthma with wheezing, coughing, dyspnea on exertion, and sinusitis.High-resolution CT (HRCT) findings include centrilobular nodules and linear markings that usually are more profuse than the multifocal bronchiolar impaction sometimes observed with asthma.

***Aortic arch anomalies***

Aortic arch anomalies may occur later in adulthood. In one case, the anomalies, which simulated exercise-induced asthma, were noticed first in a young woman only after a vigorous exercise program.On testing, the flow-volume display of this patient suggested an intrathoracic obstruction. The patient had a right aortic arch with ligamentum arteriosum that extended anterior to the trachea. This condition caused constriction when increased pulmonary blood flow, oxygen demand, and tracheal airflow and decreased intratracheal pressure from downstream turbulence distal to the tracheal ring occurred with exercise; combined, these factors produced wheezing and dyspnea.

***Sinus disease***

Sinus disease, especially in children, is associated with bronchial asthma and wheezing. Although the association is not strong in patients with CT evidence of mild sinus mucosal thickening, a scoring system developed by Newman et al showed that extensive sinus disease was correlated with a substantially higher extent of wheezing than that in patients with only mild thickening. Of 104 adults, 39% had extensive disease, as visualized on CT scans, which was correlated with asthma and peripheral eosinophilia.

***Gastroesophageal reflux***

Cough, recurrent bronchitis, pneumonia, wheezing, and asthma are associated with gastroesophageal reflux (GER).The incidence of GER in patients with asthma ranges from 38% in patients with only asthma symptoms to 48% in patients with recurrent pneumonia. Scintigraphic studies performed after technetium-99m sulfur-colloid ingestion have shown radionuclide activity in the lungs the next day, but no causal relationship between reflux and asthma has been established. Nevertheless, evidence suggests that increased pulmonary resistance occurs with symptoms of reflux during acid provocation testing; as some have suggested, the changes may be sufficiently significant to produce clinically evident bronchoconstriction.

***Other conditions and factors***

Other extrinsic conditions, such as lymphadenopathy from sarcoidosis or Hodgkin lymphoma of the upper mediastinum, can contribute to asthma. In addition, aspirin or NSAID hypersensitivity and reactive airways dysfunction syndrome may be mistaken for asthma. Misdiagnoses as refractory bronchial asthma has resulted in inappropriate long-term treatment with corticosteroids.

A significant history of smoking greater than 20-pack years should make the diagnosis of chronic obstructive pulmonary disease (COPD) a stronger consideration than asthma.

Consideration for alternative diagnoses should be given in all patients, and in particular in those older than 30 years and younger than 2 years with new symptoms suggestive of asthma. An absence of airway obstruction on initial spirometry findings should prompt consideration for alternative diagnoses and additional testing.

## 

**DIFFERENTIAL DIAGNOSIS**

* Allergic and Environmental Asthma
* Alpha1-Antitrypsin (AAT) Deficiency
* Aspergillosis
* Bronchiectasis
* Bronchiolitis
* Chronic Obstructive Pulmonary Disease (COPD)
* Chronic Sinusitis
* Eosinophilic Granulomatosis with Polyangiitis (Churg-Strauss Syndrome)
* Cystic Fibrosis
* Exercise-Induced Anaphylaxis
* Food-Dependent Exercise-Induced Anaphylaxis (FDEIA)
* Foreign Body Aspiration
* Gastroesophageal Reflux Disease
* Heart Failure
* Pediatric Airway Foreign Body
* Pediatric Tracheomalacia
* Pulmonary Embolism (PE)
* Pulmonary Eosinophilia
* Sarcoidosis
* Upper Respiratory Tract Infection
* Vocal Cord Dysfunction
* Wheat-Dependent Exercise-Induced Anaphylaxis (WDEIA)

## 

**EPIDEMIOLOGY**

Asthma affects 5-10% of the US population or an estimated 25 million persons, including 4.7 million children.The overall prevalence rate of exercise-induced bronchospasm is 3-10% of the general population if persons who do not have asthma or allergy are excluded, but the rate increases to 12-15% of the general population if patients with underlying asthma are included. Asthma affects an estimated 300 million individuals worldwide. Annually, the World Health Organization (WHO) has estimated that 15 million disability-adjusted life-years are lost and 250,000 asthma deaths are reported worldwide.

In the United States, asthma prevalence, especially morbidity and mortality, is higher in blacks than in whites. Although genetic factors are of major importance in determining a predisposition to the development of asthma, environmental factors play a greater role than racial factors in asthma onset. A national concern is that some of the increased morbidity is due to differences in asthma treatment afforded certain minority groups. Larger asthma-associated lung function deficits are reported in Hispanics, especially females.

Asthma is common in industrialized nations such as Canada, England, Australia, Germany, and New Zealand, where much of the asthma data have been collected. The prevalence rate of severe asthma in industrialized countries ranges from 2-10%. Trends suggest an increase in both the prevalence and morbidity of asthma, especially in children younger than 6 years. Factors that have been implicated include urbanization, air pollution, passive smoking, and change in exposure to environmental allergens.

Asthma predominantly occurs in boys in childhood, with a male-to-female ratio of 2:1 until puberty, when the male-to-female ratio becomes 1:1. Asthma prevalence is greater in females after puberty, and the majority of adult-onset cases diagnosed in persons older than 40 years occur in females. Boys are more likely than girls to experience a decrease in symptoms by late adolescence.

Asthma prevalence is increased in very young persons and very old persons because of airway responsiveness and lower levels of lung function.Two thirds of all asthma cases are diagnosed before the patient is aged 18 years. Approximately half of all children diagnosed with asthma have a decrease or disappearance of symptoms by early adulthood.

**RECENT GUIDELINES OR RECOMMENDATIONS**

Intermittent asthma is characterized as follows:

* Symptoms of cough, wheezing, chest tightness, or difficulty breathing less than twice a week
* Flare-ups are brief, but intensity may vary
* Nighttime symptoms less than twice a month
* No symptoms between flare-ups
* Lung function test FEV1 is 80% or more above normal values
* Peak flow has less than 20% variability am-to-am or am-to-pm, day-to-day

Mild persistent asthma is characterized as follows:

* Symptoms of cough, wheezing, chest tightness, or difficulty breathing 3-6 times a week
* Flare-ups may affect activity level
* Nighttime symptoms 3-4 times a month
* Lung function test FEV1 is 80% or more above normal values
* Peak flow has less than 20-30% variability

Moderate persistent asthma is characterized as follows:

* Symptoms of cough, wheezing, chest tightness, or difficulty breathing daily
* Flare-ups may affect activity level
* Nighttime symptoms 5 or more times a month
* Lung function test FEV1 is above 60% but below 80% of normal values
* Peak flow has more than 30% variability

Severe persistent asthma is characterized as follows:

* Symptoms of cough, wheezing, chest tightness, or difficulty breathing that are continual
* Frequent nighttime symptoms
* Lung function test FEV1 is 60% or less of normal values
* Peak flow has more than 30% variability

Severity is assessed retrospectively from the level of treatment required to control symptoms and exacerbations, as follows:

* Mild asthma: Well-controlled with low-intensity treatment such as as-needed reliever medication alone or with low-intensity controller treatment such as low-dose inhaled corticosteroids (ICSs)
* Moderate asthma: Well-controlled with low- or medium-dose ICS/long-acting beta2-agonists (LABA)
* Severe asthma: Requires high-dose ICS/LABA to prevent it from becoming uncontrolled, or asthma that remains uncontrolled despite this treatment

Guidelines on evaluation and treatment of severe asthma reserves the definition of severe asthma for patients with refractory asthma and those in whom response to treatment of comorbidities is incomplete.

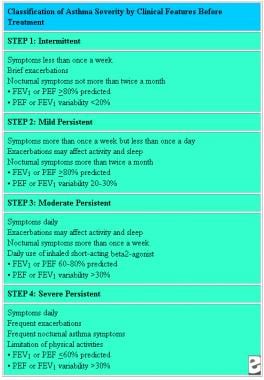
Guidelines stress the importance of distinguishing between severe asthma and uncontrolled asthma, as the latter is a much more common reason for persistent symptoms and exacerbations, and it may be more easily improved. The most common problems that need to be excluded before a diagnosis of severe asthma can be made are the following:

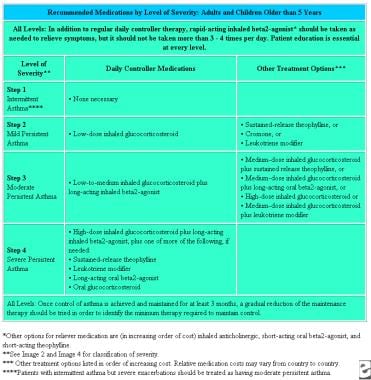
* Poor inhaler technique
* Poor medication adherence
* Incorrect diagnosis of asthma, with symptoms due to alternative conditions such as upper airway dysfunction, cardiac failure, or lack of fitness
* Comorbidities and complicating conditions such as rhinosinusitis, gastroesophageal reflux, obesity, and obstructive sleep apnea
* Ongoing exposure to sensitizing or irritant agents in the home or work environment.

## 

***MANAGEMENT GUIDELINES***

* Achieve and maintain control of asthma symptoms
* Maintain normal activity levels, including exercise
* Maintain pulmonary function as close to normal as possible
* Prevent asthma exacerbations
* Avoid adverse effects from asthma medications
* Prevent asthma mortality





### Stepwise pharmacologic therapy

Guidelines offer the recommendations below.

Step 1 for intermittent asthma is as follows:

* Controller medication not indicated
* Reliever medication is a short-acting beta-agonist (SABA) as needed for symptoms

Step 2 for mild persistent asthma is as follows:

* Preferred controller medication is a low-dose inhaled corticosteroid
* Alternatives include cromolyn, leukotriene receptor antagonist (LTRA),or theophylline

Step 3 for moderate persistent asthma is as follows:

* Preferred controller medication is either a low-dose inhaled corticosteroid (ICS) plus a long-acting beta-agonist (LABA) (combination medication is the preferred choice to improve compliance)or an inhaled medium-dose corticosteroid
* Alternatives include a low-dose ICS plus either an LTRA or theophylline

Step 4 for moderate-to-severe persistent asthma is as follows:

* Preferred controller medication is an inhaled medium-dose corticosteroid plus a LABA (combination therapy)
* Alternatives include an inhaled medium-dose corticosteroid plus either an LTRA or theophylline

Step 5 for severe persistent asthma is as follows:

* Preferred controller medication is an inhaled high-dose corticosteroid plus LABA

Step 6 for severe persistent asthma is as follows:

* Preferred controller medication is an inhaled high-dose corticosteroid plus LABA plus oral corticosteroid

For safety reasons, treatment with short-acting beta2-agonists (SABA) only is no longer recommended. To reduce risk of serious exacerbations and to control symptoms, all adults and adolescents with asthma should receive controller treatment containing inhaled corticosteroids (ICS).

For mild asthma, as-needed low-dose ICS and low-dose formoterol are recommended. If formoterol is not available, the patient should take low-dose ICS whenever SABA is taken. ICS-containing treatment should be initiated as soon as possible after asthma diagnosis. Asthma medications should be added or deleted as the frequency and severity of the patient's symptoms change. Track 1 is the preferred management approach with low dose ICS-formoterol taken at any step when the patient is symptomatic. The steps are as follows:

* Step 1-2: As-needed low-dose ICS-formoterol
* Step 3: Daily low-dose ICS-formoterol as maintenance and reliever
* Step 4: Daily medium-dose ICS-formoterol as maintenance and reliever
* Step 5: Refer for expert investigation and add-on LAMA treatment

The Track 2 approach is the alternative if Track 1 is not possible, or if a patient is stable, with good adherence and no exacerbations in the past year on their current therapy. The steps are as follows:

* Step 1: As-needed SABA and a low dose ICS are taken together (in combination, or with the ICS taken right after the SABA)
* Step 2: Daily low-dose ICS as maintenance plus as-needed SABA as reliever
* Step 3: Daily low-dose ICS-LABA as maintenance plus as-needed SABA as reliever
* Step 4: Medium- to high-dose ICS-LABA as maintenance plus as-needed SABA as reliever
* Step 5: Refer for expert investigation and add-on LAMA treatment

Additional recommendations for treatment of severe asthma:

* For severe allergic asthma, a therapeutic trial of omalizumab
* Do not use methotrexate or macrolide antibiotics to treat severe asthma
* For severe asthma and recurrent exacerbations of allergic bronchopulmonary aspergillosis (ABPA), antifungal agents should be given
* Do not use antifungal agents for severe asthma without ABPA irrespective of sensitization to fungi (ie, positive skin prick test or fungus-specific immunoglobulin E in serum)

*Diagnosis*

The JSA recommends spirometry for assessing the extent of airflow limitation or airway reversibility.

The JSA recommends daily measurement of peak expiratory flow for unstable asthma and patients lacking obvious dyspnea during attack.

Although useful for diagnosing asthma, the JSA does not recommend assessing bronchial hyperresponsiveness in patients with low FEV1 (≤1 L) or low %FEV1 (≤50%) since excess airway narrowing may occur due to irritant inhalation.

*Treatment of long-term adult asthma*

The JSA recommends using a jet nebulizer for budesonide (BUD) inhalation suspension.

The JSA recommends adding one or more agents other than inhaled corticosteroids (ICSs), as opposed to increasing the dose of an ICS, to control asthma.

The JSA recommends long-acting β2-agonists (LABAs), leukotriene receptor antagonists (LTRAs), sustained-release theophylline, and long-acting muscarinic antagonists as add-on drugs.

The JSA recommends that anti-immunoglobulin E antibodies and other biologics as well as oral steroids be reserved for very severe and persistent asthma related to allergic reactions.

The JSA recommends inhaled β2-agonists, aminophylline, corticosteroids, adrenaline, oxygen therapy, and other approaches be used as needed during acute exacerbations.

*Treatment during pregnancy*

The JSA recommends ICSs as first-line treatment for long-term management of pregnant women with asthma.

The JSA recommends a short-acting beta-agonist (SABA) as needed for pregnant women with mild intermittent asthma.

The JSA recommends low-dose ICS; LTRA, controlled-release theophylline, and/or disodium cromoglycate (DSCG) as needed in pregnant women with mild persistent asthma.

The JSA recommends low-dose ICS and LABA or moderate-dose ICS and LABA in combination with LTRA or controlled-release theophylline as needed in pregnant women with moderate persistent asthma.

The JSA recommends high-dose ICS and LABA; oral steroids as needed for pregnant women with severe persistent asthma.

## **Exercise-Induced Asthma Guidelines**

* Administration of an inhaled SABA before exercise (strong recommendation); the SABA is typically administered 15 minutes before exercise
* A controller agent is added whenever SABA therapy is used daily or more frequently
* Interval or combination warm-up exercise before planned exercise (strong recommendation)
* Recommend against daily use of an inhaled long-acting beta2-agonist as single therapy (strong recommendation)
* For patients who continue to have symptoms despite using an inhaled SABA before exercise or who require an inhaled SABA daily or more frequently: (1) Daily ICS (strong recommendation), (2) Daily administration of an LTRA (strong recommendation), (3) Administration of a mast cell‒stabilizing agent before exercise (strong recommendation), and (4) Inhaled anticholinergic agent before exercise (weak recommendation)
* For patients with EIB and allergies who continue to have symptoms despite using an inhaled SABA before exercise or who require an inhaled SABA daily or more frequently consider administration of an antihistamine (weak recommendation)
* For exercise in cold weather, routine use of a device (eg, mask) that warms and humidifies the air during exercise (weak recommendation)

**Asthma-related airway treatment drugs and their common side effects:**

## 1. Inhaled Corticosteroids (ICS)

*Examples:* fluticasone (Flovent), budesonide (Pulmicort), beclomethasone (Qvar), mometasone (Asmanex), ciclesonide (Alvesco)

* Use: Long-term control to reduce airway inflammation and prevent asthma attacks
* Common Side Effects:
  + Oral thrush (fungal infection in the mouth)
  + Hoarseness or voice changes
  + Cough or throat irritation
* Notes: Rinse mouth after use to reduce thrush risk.

## 2. Short-Acting Beta-2 Agonists (SABA)

*Examples:* albuterol (Ventolin, ProAir), levalbuterol (Xopenex), terbutaline

* Use: Quick relief of acute asthma symptoms by relaxing airway muscles
* Common Side Effects:
  + Increased heart rate (tachycardia)
  + Tremors or shakiness
  + Nervousness
* Notes: Used as rescue inhalers during asthma attacks.

## 3. Long-Acting Beta-2 Agonists (LABA)

*Examples:* salmeterol, formoterol, vilanterol (usually combined with ICS)

* Use: Maintenance therapy for ongoing airway relaxation; not for acute relief alone
* Common Side Effects:
  + Increased heart rate
  + Headache
  + Cough
* Notes: Should always be used with inhaled corticosteroids to reduce risk of asthma-related death.

## 4. Anticholinergics (Inhaled)

*Examples:* ipratropium (Atrovent), tiotropium

* Use: Bronchodilation by blocking muscarinic receptors; often combined with beta-agonists
* Common Side Effects:
  + Dry mouth
  + Rapid heartbeat (rare)
* Notes: Useful especially in patients with overlapping COPD symptoms.

## 5. Oral or Systemic Corticosteroids

*Examples:* prednisone, methylprednisolone, dexamethasone

* Use: Short-term treatment for severe asthma attacks or exacerbations
* Common Side Effects (especially with long-term use):
  + Weight gain
  + Elevated blood sugar
  + Insomnia
  + Osteoporosis
  + Cataracts
  + Skin thinning and easy bruising
  + Rarely, psychosis
* Notes: Used for days to weeks during exacerbations; long-term use reserved for severe uncontrolled asthma.

## 6. Leukotriene Modifiers

*Examples:* montelukast (Singulair), zafirlukast, zileuton

* Use: Long-term control by blocking leukotrienes that cause airway inflammation and bronchoconstriction
* Common Side Effects:
  + Headache
  + Elevated liver enzymes (zileuton)
  + Rare: mood changes or suicidal thoughts (montelukast)
* Notes: Oral medications often used as add-on therapy.

## 7. Immunomodulators (Biologics)

*Examples:* omalizumab, mepolizumab, benralizumab, dupilumab, reslizumab

* Use: Target specific immune pathways in severe asthma (e.g., IgE or interleukins)
* Common Side Effects:
  + Injection site reactions
  + Rare but serious: anaphylaxis
* Notes: Administered by injection in healthcare settings; reduce steroid needs and exacerbations.

## 8. Methylxanthines

*Example:* theophylline

* Use: Bronchodilator used less frequently; requires blood level monitoring
* Common Side Effects:
  + Nausea, vomiting
  + Headache, jitteriness
  + Insomnia
  + Serious: seizures, arrhythmias at high levels
* Notes: Narrow therapeutic window limits use

**Doctor-patient conversation about asthma related to airway issues,**

Doctor:  
Hello, I see you’ve been experiencing wheezing and shortness of breath. Can you tell me more about your symptoms and when they occur?

Patient:  
Yes, I often feel tightness in my chest and wheeze, especially when I exercise or at night. Sometimes I cough a lot too.

Doctor:  
Based on what you describe, it sounds like asthma, which is a condition where your airways become inflamed and narrow, making it harder to breathe. It’s important we manage it well to prevent attacks and keep you feeling your best.

Patient:  
What causes asthma?

Doctor:  
Asthma can be triggered by many things, such as allergens like dust, pollen, pet dander, smoke, cold air, exercise, or respiratory infections. It causes your airways to swell and produce extra mucus, leading to symptoms like wheezing and coughing.

Patient:  
How do we treat it?

Doctor:  
Treatment usually involves two types of inhalers: *long-term control inhalers* to reduce inflammation and prevent symptoms, and *quick-relief inhalers* to open your airways during an attack. I’ll also work with you to identify and avoid your triggers.

Patient:  
Are there side effects from these inhalers?

Doctor:  
Some inhaled steroids can cause a mild sore throat or oral thrush, so it’s important to rinse your mouth after using them. Quick-relief inhalers may cause a fast heartbeat or shakiness, but these side effects usually go away quickly.

Patient:  
What should I do if I have an asthma attack?

Doctor:  
I’ll give you a personalized asthma action plan that explains when to use your inhalers and when to seek emergency care. If you have trouble breathing, persistent coughing, or your quick-relief inhaler isn’t helping, you should get medical help immediately.

Patient:  
How can I keep track of my asthma?

Doctor:  
Keeping a symptom diary and monitoring your peak flow can help us see how well your asthma is controlled. We’ll review this regularly and adjust your treatment if needed.

Patient:  
Thank you. Is there anything else I should know?

Doctor:  
Yes, it’s important to take your long-term medication every day, even if you feel well, and to avoid smoking or exposure to smoke. Also, if you notice your symptoms worsening or needing your quick-relief inhaler more often, let me know right away.

REFERENCES

<https://www.nhlbi.nih.gov/sites/default/files/publications/LMBB-Asthma-FormativeResearchReport.pdf>

<https://www.mayoclinic.org/diseases-conditions/asthma/in-depth/asthma-medications/art-20045557>

<https://archive.cdc.gov/www_atsdr_cdc_gov/csem/asthma/differential_diagnosis_of_asthma.html>

<https://emedicine.medscape.com/article/296301-guidelines#showall>

[Asthma](https://www.who.int/news-room/fact-sheets/detail/asthma)

**Audiology**

### The word audiology is made up of two roots: Audio and Logy. ‘Audio’ refers to ‘hear’ and ‘logy’ to ‘the study of’. In essence, audiology is the study of hearing - as the inner ear is also required for balance, this is also included in the study. In medical terms it is the branch of science dedicated to the study of hearing, balance and their associated disorders.

### **Audiologist**

Audiologists are healthcare providers with expertise in audiology, the study of hearing and balance issues. Audiologists evaluate, treat and manage problems involving your ear, like hearing loss and frequent dizziness. They educate about hearing and balance disorders and share strategies for prevention.

Ultimately, they can help you feel more connected to the world around you by helping you hear better or feel steadier on your feet.

Audiologists work in all types of settings, including:

* Doctors’ offices, clinics and hospitals
* K-12 educational settings, colleges and universities
* Military settings and the Veterans Administration (VA)
* Residential care facilities
* Rehabilitation centers

They treat people of all ages, from infants to older adults.

#### **What does an audiologist do?**

Audiologists are hearing specialists who protect your hearing. They can also help with issues that arise from problems with your body’s balance system, the vestibular system.

Conditions audiologists manage include:

* Hearing loss. Audiologists manage all types of hearing loss across various causes, including aging (presbycusis), long-term damage (sensorineural hearing loss) and medication side effects (ototoxicity).
* Tinnitus. Audiologists can help you manage persistent ringing in your ears.
* Auditory processing disorders (APD). Audiologists diagnose conditions that involve having normal hearing but trouble understanding certain sounds.
* Vestibular disorders. Audiologists evaluate and treat balance issues, including common ones, like benign paroxysmal positional vertigo (BPPV).

As part of their work, audiologists:

* Perform hearing tests
* Fit you for hearing aids, cochlear implants or hearing assistive devices
* Perform vestibular testing to check how the balance system within your inner ear is working
* Help conduct vestibular rehabilitation therapy to manage symptoms like dizziness and vertigo
* Collaborate on treatment plans with other providers, like physical therapists and speech-language pathologists
* Engage in research to improve the current understanding of hearing and balance disorders within the field of audiology

#### **What is the difference between an ENT and an audiologist?**

ENTs, also known as otolaryngologists, are medical doctors who diagnose and treat many conditions affecting people’s ears, noses and throats. Audiologists help people manage inner ear conditions related to hearing loss and balance issues.

An ENT can help determine if an underlying medical condition is causing your issues. If so, they can prescribe medications or perform surgeries to help. They may refer you to an audiologist for hearing or vestibular tests.

## **Diagnostic Tests**

There are a number of diagnostic tests that can be employed by an audiologist to help better understand the disorder that a patient is suffering from. Some of these include auditory brainstem evoked response and auditory steady state response testing, otoacoustic emissions, acoustic immittance measures, visual reinforcement and play audiometry for children.

The type of diagnosis made will depend on the symptoms that the patient is complaining about. Not all diagnostic tests are done on all patients. It is the job of the audiologist to narrow down the testing options based on what he learns from the patient, their family history and other physical indications and symptoms.

## **Treatment Options**

The results of the diagnostic tests will help the audiologist to understand the disorder that a patient is suffering from so that they may plan the treatment. Most hearing related issues are resolved with auditory rehabilitation consultation, which includes the use of hearing aids.

Cochlear implant pre-evaluation and post- implantation care is also a regular treatment for hearing loss. The audiologist will also help the patient with communication skills counselling as well as helping the care givers of the patient and other family members counselling. Needless to say the audiologic evaluation is the basis of the treatment.

## **Audiology and Technology**

Since its inception, the field of audiology has been dependent on the type of technology available to it. Measuring hearing loss, the impact of the loss on the patient’s ability to communicate, the rehabilitation with hearing aids, all need technology based gadgets.

Over the last few decades, both the technology available has improved and the solutions being offered by audiologists. The new gadgets make recording hearing loss easier and more accurate. They allow screening for hearing loss in newborn babies – this has enabled treatment of hearing loss in early infancy and fitting of hearing aids within weeks of being born.

**Differential diagnosis (DDx) of hearing loss**

1. Conductive Hearing Loss  
This occurs when sound conduction is impeded through the external or middle ear .

* External Ear Canal Causes:
  + Cerumen impaction: Common cause of obstruction .
  + Foreign body: Presence of an object in the ear canal .
  + Benign tumors: Such as exostosis, osteoma, or polyps .
  + Otitis externa (ear canal infection): Uncomplicated cases .
  + External ear canal trauma: Injury to the canal .
  + Atresia: Congenital closure of the ear canal .
  + Neoplasm: External ear canal cancer (uncommon) .
* Middle Ear Causes:
  + Otitis media (middle ear infection): Acute otitis media and otitis media with effusion (fluid behind the eardrum) are common, especially in children . Long-standing fluid can cause up to 40 dB of hearing loss .
  + Tympanic membrane perforation: Tears in the eardrum, often due to chronic otitis media or trauma (e.g., water accidents, barotrauma, explosions) .
  + Cholesteatoma: A skin-lined cyst that can expand and damage middle ear structures .
  + Otosclerosis: Abnormal bone growth around the stapes bone, fixing it in place; common in middle-aged women and often hereditary .
  + Myringosclerosis/Tympanosclerosis: Hardening of the eardrum or middle ear structures due to inflammation or infection .
  + Ossicular injury: Damage to the small bones in the middle ear due to trauma .
  + Glomus tumor: A rare tumor in the middle ear .

2. Sensorineural Hearing Loss (SNHL)  
This results from problems within the cochlea (inner ear) or the neural pathway to the auditory cortex .

* Common Causes:
  + Presbycusis: Age-related, symmetrical, progressive deterioration of hearing, particularly high frequencies . It's a diagnosis of exclusion .
  + Noise-induced hearing loss: The most common preventable cause, affecting high frequencies first (typically 4,000 Hz) .
  + Inherited disorders: Genetic factors .
* Other Causes:
  + Labyrinthitis: Inflammation of the inner ear .
  + Meniere disease: Characterized by fluctuating hearing loss, tinnitus, and episodic vertigo .
  + Acoustic neuroma (vestibular schwannoma): A benign tumor on the auditory nerve, causing gradual unilateral hearing loss, tinnitus, and sometimes facial weakness .
  + Idiopathic sudden sensorineural hearing loss: Hearing loss of unknown cause that occurs rapidly .
  + Ototoxic drugs: Medications that can damage the inner ear (e.g., certain antibiotics, chemotherapy) .
  + Infections: Cytomegalovirus (CMV), toxoplasmosis, syphilis, complication of meningitis .
  + Autoimmune inner ear disease (AIED): Rapidly progressive, sometimes fluctuating, often bilateral hearing loss .
  + Temporal bone fracture: Can cause SNHL directly or indirectly .
  + Perilymphatic fistula: A leak of inner ear fluid, possibly caused by head trauma or straining .
  + Systemic diseases: Diabetes mellitus, Paget disease, Systemic Lupus Erythematosus (SLE), Granulomatosis with polyangiitis .
  + Neurological conditions: Stroke, Multiple Sclerosis (MS), Arnold-Chiari malformation .
  + Congenital hearing loss: Hearing loss present at birth .
  + Syndromic hearing loss: Associated with specific genetic syndromes (e.g., Alport, Jervell Lange-Nielsen, Waardenburg, craniofacial abnormalities like Pierre Robin, Crouzon, Apert syndromes, Down or Turner syndrome) .
  + Auditory neuropathy: Disruption of auditory nerve function .
  + Neonatal hyperbilirubinemia: Severe jaundice in newborns .
  + Vertebral artery dissection: Rare cause .

3. Mixed Hearing Loss  
This involves both conductive and sensorineural components

## **Epidemiology**

### United States and international statistics

Hearing loss occurs in approximately 5-10 per 1000 children in the United States. Roughly 1-3 in 1000 children are born with profound hearing loss, and 3-5 in 1000 are born with mild-to-moderate hearing loss that may affect language acquisition unless hearing, language, or both are aided.The prevalence of hearing loss requiring intervention among graduates from neonatal intensive care units (NICUs) is 1-4%. Acquired hearing loss in children may add another 10-20% to these numbers.

The prevalence of hearing loss in adolescents aged 12-19 years appears to be increasing in the United States. A 2010 study found that this increase in prevalence was approximately one third greater from 2005 to 2006 than from 1988 to 1994. Interestingly, significant hearing loss (≥25 dB) was particularly increased, to the point where approximately 1 in 20 adolescents has this type of hearing loss. Noise-induced hearing loss contributes substantially to the increased incidence of hearing loss in adolescents.

Data from the United States Census show that almost 3% of the population in the workforce reports having some hearing loss, including CHL, SNHL, or mixed loss.

Worldwide, SNHL occurs in 9-27 per 1000 children.

### Age- and sex-related demographics

Most hearing loss in children is congenital or acquired perinatally.However, hearing loss may occur at any age. Approximately 10-20% of all cases of deafness are acquired postnatally, though some genetic causes of deafness result in hearing loss that begins during childhood or adolescence or is slowly progressive and therefore diagnosed in childhood or adolescence.

No sex predilection is known. Some hereditary causes of deafness or acquired deafness may occur more frequently in one sex than in the other. However, the overall prevalence of deafness is equal in male and female individuals.

### **When would I need to see an audiologist?**

You may want to consult with an audiologist if:

* It’s hard for you to hear or understand what people are saying
* You have to turn up the volume on your television or other devices to hear
* You have ongoing ringing or other noise in your head or ears
* You have episodes of frequent dizziness or feeling as if the room is spinning

If you’re unsure about whether you should see an audiologist, make an appointment with your primary care provider. They can examine you and refer you to the specialty care you need.

**Recommendations included the following:**

* All newborns and infants with confirmed hearing loss should undergo a comprehensive evaluation that includes patient-focused medical and birth histories and a three-generation pedigree and family medical history are obtained, as well as a physical examination focusing on dysmorphic physical findings; evaluation of children and young adults with hearing loss should follow a similar approach.
* Elements of medical and birth histories focused on hearing loss include prenatal history (eg, maternal infections and illnesses or medication or drug exposures); neonatal history (eg, premature birth, low birth weight, birth hypoxia, hyperbilirubinemia, sepsis, and exposure to ototoxic medications); postnatal history (eg, viral illnesses, bacterial meningitis, head trauma, noise exposure, and exposure to ototoxic medications); and audiometric assessment of the hearing loss.
* The pedigree and family medical history should focus on identifying the following: first- and second-degree relatives with hearing loss or with features commonly associated with hearing loss (eg, pigmentary, branchial, or renal anomalies) or sudden cardiac death; a pattern of inheritance; ethnicity and country of origin; common origin from ethnically or geographically isolated areas; and consanguinity.
* The physical examination should focus on dysmorphic and other physical findings (eg, unusual facial appearance, with attention to asymmetry; pigmentary anomalies; neck, skin, facial, or ear anomalies; neurologic abnormalities; balance disturbances; and skeletal abnormalities).
* For individuals with findings that suggest a syndromic genetic etiology for their hearing loss, pretest genetic counseling should be provided, and, with informed consent, genetic testing, if available, should be ordered to confirm the diagnosis; appropriate studies should be undertaken to determine whether other organs are involved; appropriate near-term and long-term screening and management should be arranged as indicated by the associated manifestations of the particular syndrome.
* For individuals lacking physical findings suggestive of a known syndrome and having medical and birth histories that do not suggest an environmental cause of hearing loss, a tiered approach is advisable; pretest genetic counseling should be provided, and, with informed consent, genetic testing should be ordered; temporal bone imaging by CT or MRI should be considered as a complement to genetic testing; cytomegalovirus (CMV) should be done at the same time as genetic testing for infants with congenital hearing loss (for later-onset or progressive hearing loss, the likelihood that a positive CMV test result is due to postnatal exposure increases with age).
* Referral to a multidisciplinary care center, when available, is recommended; a team approach that includes otolaryngologists, clinical geneticists, genetic counselors, audiologists, speech and language specialists, early hearing intervention and family support specialists, and other appropriate specialists is optimal.
* When genetic evaluation has failed to identify an underlying cause, periodic follow-up care every 3 years with a geneticist may be appropriate.
* Regardless of whether genetic test results are positive, negative, or inconclusive, results should be communicated through the process of genetic counseling.

**PREDEFINED Q AND A**

## 1. What’s my diagnosis?

Your audiologist will explain the type of hearing loss you have—whether it is conductive (problems with the outer or middle ear), sensorineural (inner ear or nerve-related), or mixed. They will also describe the severity and whether it affects one or both ears.

## 2. What’s causing my hearing loss or balance issues?

Causes vary widely—from age-related changes, noise exposure, infections, earwax buildup, to medical conditions like Meniere’s disease or acoustic neuroma. Your audiologist will review your medical history, symptoms, and test results to identify the likely cause.

## 3. How severe is my condition?

Hearing loss severity is measured on an audiogram and classified as mild, moderate, severe, or profound. This helps guide treatment options and expectations for improvement.

## 4. What tests will I need?

Common tests include pure-tone audiometry (hearing thresholds), speech audiometry, tympanometry (middle ear function), otoacoustic emissions (inner ear function), and sometimes auditory brainstem response (ABR) testing. Your audiologist will explain which tests are needed based on your symptoms.

## 5. What treatments would you recommend?

Treatment depends on the diagnosis and severity. Options may include hearing aids, cochlear implants, medical or surgical treatment for underlying conditions, or auditory training. Your audiologist will tailor recommendations to your lifestyle and hearing needs.

## 6. What steps can I take to manage symptoms at home?

You can protect your hearing by avoiding loud noises, using hearing protection, keeping ears dry and clean, and following your audiologist’s advice on device use and maintenance. They may also suggest communication strategies to improve understanding in noisy environments

REFERENCES

<https://www.cdc.gov/hearing-loss-children/media/pdfs/audiologist_questions_eng.pdf>

<https://emedicine.medscape.com/article/994159-overview#a6>

[What Is an Audiologist?](https://my.clevelandclinic.org/health/articles/24037-audiologist)

**Aural polyps**

Aural polyps are the result of chronic inflammation of the middle ear or mastoid. As seen clinically, polyps represent granulation tissue or edematous mucosa arising from the mucous membrane of the middle ear protruding through a perforation in the tympanic membrane (also see Clinical Aspects). Granulation tissue polyps in the forming stage are soft, red, and bleed readily when touched. Later, polyps become more fibrous and the surface may be covered with metaplastic squamous epithelium so that they no longer are bright red but dull pink. Purulent otorrhea is invariably present. Microscopically, polyps show a chronic inflammatory reaction with many small blood vessels and histiocytes and some show fibrous tissue and cholesterol crystals. The surface of the polyp may be ulcerated or there may be pseudostratified columnar or cuboidal epithelium or squamous epithelium due to metaplasia in polyps of long duration. Polyps are commonly associated with cholesteatoma. Aural polyp from the middle ear composed of granulation tissue showing a mucous membrane side with low columnar cells (single arrow) and a squamous side (double arrows) facing outward (metaplasia). The large spaces with endothelial lining are blood vessels. There are also several budding capillaries (triangles) and many chronic inflammatory cells.When the polyp was removed and the ear treated with antibiotic drops, the inflammation subsided. In other cases, however, particularly if cholesteatoma were present, more radical surgical treatment may have been necessary

## **Symptoms of Aural Polyps**

Aural polyps can cause various symptoms in the ear, including pain, pressure, and a feeling of fullness. Patients may also experience hearing loss, ringing in the ear (tinnitus), and sometimes even drainage of fluid or pus from the ear. In some cases, aural polyps can lead to dizziness or vertigo. If you notice any of these symptoms, it's essential to seek medical attention for proper diagnosis and treatment.

* Hearing loss can be a symptom of aural polyps, manifesting as decreased ability to hear sounds clearly.
* Patients with aural polyps may experience a feeling of fullness or pressure in the affected ear.
* Tinnitus, characterized by ringing, buzzing, or other sounds in the ear, can be a symptom of aural polyps.
* Some individuals with aural polyps may develop recurrent ear infections, leading to symptoms such as drainage or discharge from the ear.

## **Causes of Aural Polyps**

Aural polyps, also known as ear polyps, can develop due to various factors. One common cause is chronic inflammation of the middle ear, often linked to recurrent ear infections. Trauma or injury to the ear can also lead to the formation of polyps. Additionally, exposure to irritants or allergens may trigger inflammation and polyp growth in the ear canal. In some cases, genetic predisposition or underlying health conditions like chronic sinusitis can contribute to the development of aural polyps. Understanding these potential causes is crucial for effective diagnosis and management of this condition.

* Chronic inflammation in the ear canal can lead to the development of aural polyps.
* Prolonged exposure to loud noises may contribute to the formation of aural polyps.
* Ear infections, especially when left untreated, can cause aural polyps to develop.
* Allergic reactions or sensitivities that affect the ear can trigger the growth of aural polyps.
* Trauma or injury to the ear, such as from inserting objects, can result in the formation of aural polyps.

**Types Of Aural Polyps**

Aural polyps can be categorized into different types based on their characteristics and location within the ear. Common types include mucosal polyps, which are non-cancerous growths that form in the middle ear or Eustachian tube, and cholesteatomatous polyps, which are associated with a chronic middle ear condition called cholesteatoma. Another type is the vocal cord polyp, which develops on the vocal cords and can affect speech and voice quality. Each type of aural polyp requires specific management and treatment based on its particular features and potential complications.

* Aural polyps are abnormal growths that can develop in the ear canal.
* There are two main types of aural polyps: mucosal and cholesteatomatous.
* Mucosal polyps are typically smaller and can be pink or red in color.
* Cholesteatomatous polyps are more complex and are often associated with chronic ear infections.
* Both types of aural polyps can cause symptoms such as hearing loss, ear pain, and discharge.
* Treatment for aural polyps may involve medications or surgical removal, depending on the size and location of the polyp.
* It is essential to seek medical attention if you suspect you have an aural polyp to prevent potential complications.

## **Risk Factors**

Aural polyps, also known as ear polyps, are noncancerous growths that can develop in the ear canal. Several risk factors can contribute to the formation of aural polyps, including chronic ear infections, trauma to the ear canal, exposure to irritants or allergens, and underlying inflammatory conditions such as chronic otitis media. Individuals who frequently swim in contaminated water or have a history of ear surgeries may also be at higher risk. Proper ear hygiene and prompt treatment of ear infections are essential in reducing the risk of developing aural polyps.

* Chronic inflammation of the ear canal due to recurrent infections increases the risk of developing aural polyps.
* Prolonged exposure to loud noises can lead to aural polyps as it can irritate and damage the ear tissues.
* Individuals with a history of ear trauma, such as perforated eardrum or barotrauma, are more susceptible to aural polyps.
* Poor ear hygiene practices, like inserting foreign objects into the ear or excessive ear cleaning, can contribute to aural polyp formation.
* Certain underlying conditions like chronic otitis media or Eustachian tube dysfunction may predispose individuals to aural polyps

## **Diagnosis of Aural Polyps**

Diagnosing aural polyps typically involves a combination of physical examination, otoscopy, and imaging studies. During the physical exam, the healthcare provider will visually inspect the ear canal and eardrum using an otoscope to look for any abnormal growths or obstructions. Imaging studies such as CT scans or MRI may be ordered to provide detailed images of the ear structures and help confirm the presence of a polyp. In some cases, a biopsy may also be performed to analyze the tissue sample for any signs of malignancy. These diagnostic methods are essential in determining the presence, location, and nature of aural polyps, guiding the appropriate treatment plan for the patient.

* Aural polyps are typically diagnosed through a physical examination of the ear by an ENT specialist.
* Imaging tests such as CT scans or MRI may be used to visualize the polyp's size and location.
* Audiometry tests can assess any hearing loss related to the presence of aural polyps.
* Biopsies may be performed to confirm the nature of the polyp and rule out any malignancy.
* Endoscopy allows for a detailed examination of the ear canal and eardrum to detect polyps.

## **Treatment for Aural Polyps**

Aural polyps, also known as ear polyps, can be effectively treated through various options depending on the severity and underlying cause. Treatment may involve the use of medications such as corticosteroids to reduce inflammation and shrink the polyps. In some cases, surgical removal of the polyps may be necessary, especially if they are large or causing significant symptoms. It is important to consult with an ear, nose, and throat specialist for proper evaluation and personalized treatment recommendations tailored to individual needs. Regular follow-up appointments are typically advised to monitor the condition and ensure optimal management of aural polyps.

**DIFFERENTIAL DIAGNOSIS**

## Common Causes:

* Chronic Otitis Media (COM): The most frequent cause, often associated with granulation tissue forming a polyp that protrudes through a perforated tympanic membrane.
* Cholesteatoma: A destructive growth of keratinizing squamous epithelium in the middle ear or mastoid that can present as an aural polyp.
* Retained Tympanostomy Tubes: Can cause polyp formation due to chronic irritation or infection.
* Inflammation/Infection: Otitis externa or media causing inflammatory polyps.

## Less Common and Rare Causes:

* Neoplastic Lesions:
  + Benign tumors such as meningioma, neurilemmoma (schwannoma), capillary hemangioma, mucosal adenoma, neuroendocrine adenoma of the middle ear.
  + Malignant tumors including squamous cell carcinoma, melanoma, adenocarcinoma of the endolymphatic sac.
* Granulomatous Diseases: Mycobacterial infections, Langerhans cell histiocytosis.
* Other Causes:
  + Foreign bodies in the ear canal causing reactive polyps.
  + Secondary invasion from adjacent structures like parotid gland or temporomandibular joint.
  + Rare entities like encephalocele presenting as a mass in the ear canal

**EPIDEMIOLOGY**

* Aural polyps are relatively uncommon lesions that arise most often due to chronic inflammatory conditions of the ear, especially chronic suppurative otitis media (CSOM). Studies show that approximately 55-60% of aural polyps are related to underlying inflammatory pathologies, primarily chronic otitis media and granulation tissue formation.
* Age distribution varies, but the highest frequency of aural polyps occurs in adults between their 30s and 50s, with some pediatric cases reported. One study found the mean age around 41 to 44 years.
* Gender distribution varies by study, but some report a slight male predominance (around 60% male), while others report more females affected. For example, one large retrospective study found 63% males and 37% females, whereas another reported 65% females and 35% males.
* The right ear is more commonly involved than the left in many cases (around 59% right ear involvement in one study).
* Besides inflammatory causes, other less common causes include cholesteatoma (up to 29%), retained tympanostomy tubes (23%), tumors (benign and malignant), and rare granulomatous diseases.
* Symptoms commonly associated with aural polyps include ear discharge (otorrhea) in over 90% of cases, hearing loss or ear blockage sensation in over 95%, tinnitus in about one-third, and ear pain in about 20%. Rarely, facial nerve palsy or other cranial nerve involvement can occur.
* The prevalence of aural polyps among otology patients varies, with some reports indicating about 11-15% prevalence in chronic otitis media cases.
* Recurrence rates can be significant if underlying pathology like cholesteatoma is not fully addressed; simple polypectomy alone often leads to persistent or recurrent disease

**Doctor-patient conversation about aural polyps**

Hello, I see that you have a growth in your ear canal called an aural polyp. This is a lump of inflamed tissue that often develops due to chronic ear infections or irritation.

Patient:  
What causes these polyps? Are they dangerous?

Doctor:  
Most aural polyps arise because of ongoing inflammation, usually from chronic otitis media, which is a long-term middle ear infection. Sometimes, they can also be caused by other issues like cholesteatoma (a type of abnormal skin growth), foreign objects in the ear, or, rarely, tumors. While many polyps are benign, it’s important to identify the underlying cause because some conditions can be serious if untreated.

Patient:  
What symptoms should I watch for?

Doctor:  
Common symptoms include ear discharge, hearing loss, a feeling of fullness in the ear, and sometimes bleeding. If you experience severe pain, sudden hearing loss, or heavy bleeding, you should contact us immediately.

Patient:  
How do you diagnose and treat this?

Doctor:  
We diagnose aural polyps by examining your ear with a special microscope. Imaging like a CT scan may be needed to see if there’s any deeper involvement, especially if we suspect cholesteatoma or other complications. Treatment usually starts with managing any infection using antibiotics or steroid drops and keeping the ear dry. If the polyp doesn’t improve or if there’s an underlying growth like cholesteatoma, surgery may be necessary.

Patient:  
Will it come back after treatment?

Doctor:  
If the underlying cause is properly treated, recurrence is less likely. However, chronic ear problems can sometimes cause polyps to return, so ongoing follow-up is important to monitor your ear health.

Patient:  
Is there anything I can do to help prevent this?

Doctor:  
Yes, keeping your ears dry, avoiding inserting objects into your ear canal, and promptly treating any ear infections can help prevent polyps. Also, regular check-ups if you have chronic ear issues are important.

REFERENCES

<https://www.tinnitusjournal.com/articles/causes-of-middle-ear-aural-polyps-in-adult-patients-from-kut-and-diwaniyah-cities-in-iraq.pdf>

**Autoimmune inner ear disease**

Autoimmune inner ear disease (AIED), is a rare disease that happens when your body's immune system mistakenly attacks your inner ear. It can cause dizziness, ringing in your ears, and hearing loss.

Less than 1% of the 28 million Americans who have hearing loss have it because of AIED. It's slightly more common in middle-aged women.

## **Symptoms**

If you have AIED, you'll have hearing loss that starts in one ear and then spreads to the other. This may take weeks, or it could happen over a few months.

Other symptoms can include:

* Dizziness or problems with your balance
* Fullness in your ear
* Tinnitus (ringing, roaring, or hissing in your ear)
* Vertigo (a sense that you're spinning)

## **Causes**

Your immune cells are always on the lookout for germs trying to invade your body. If they mistake cells in your inner ear for a virus or bacteria, they attack them. This is called an autoimmune reaction.

Your immune cells may harm other organs as well. Just under 30% of people who have AIED have another autoimmune disease that affects their whole body, such as rheumatoid arthritis, lupus, scleroderma, ulcerative colitis, or Sjoegren's syndrome (dry eye syndrome).

## **Diagnosis**

Because the symptoms of AIED are so common, it can be hard to diagnose. Many times, it's mistaken for an ear infection until hearing loss has spread to the second ear.

To diagnose AIED, your doctor will ask questions about your health and medical history, do a physical exam, and give you a hearing test. They'll also test your balance, which can show how well your inner ear is "talking" to your brain. You might also have blood work done.

There's no test that can tell for sure that you have AIED, but the results may show that you're having an autoimmune reaction. If they do, it's a good idea to see an otolaryngologist (ear doctor) who's also trained in autoimmune disorders.

Since you may not get a clear answer, your doctor may start you on treatment without a sure diagnosis to prevent damage to your hearing that can't be fixed. Many people aren't diagnosed with AIED until they start treatment and their symptoms get better.

## **Treatment**

Your doctor probably will give you a drug that helps with inflammation. High doses of steroids have been shown to work well for AIED, but they have many side effects. So you probably won't take them for more than a few weeks.

After you take the steroids, your doctor may prescribe a medication that can calm down your immune system. Other drugs like azathioprine (Imuran), cyclophosphamide (Cytoxan), and methotrexate are sometimes used for this.

A hearing aid can help you adjust to hearing loss, but in severe cases, your doctor might suggest a cochlear implant. This is a small device that affects the nerves in your inner ear that send signals to your brain. There, the brain turns them into sound. Part of the cochlear implant sits behind your ear. The other part is put under your skin during surgery.

As doctors learn more about AIED, more treatment options may be possible. These include drugs that work better with fewer side effects as well as gene therapy. New genes may be used to help damaged ear cells start working again.

## **Diagnostic Considerations**

These include the following:

* Ménière disease
* Syphilis
* Sudden sensorineural hearing loss
* Acoustic neuroma
* Other neoplasms

## Systemic immunologic disorders with otologic symptoms

These include the following:

* Cogan syndrome
* Polyarteritis nodosa
* Rheumatoid arthritis
* Systemic lupus erythematosus
* Wegener granulomatosis
* Sarcoidosis

## **Differential Diagnoses**

* Inner Ear, Meniere Disease, Medical Treatment
* Perilymphatic Fistula
* Sudden Hearing Loss

## **PREDEFINED Q AND A**

## 1. Do I have a systemic autoimmune disorder?

AIED can occur as a primary inner ear autoimmune condition or as part of a systemic autoimmune disease. To evaluate this, your doctor will order blood tests such as erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), antinuclear antibody (ANA), antineutrophil cytoplasmic antibody (ANCA), and others to check for systemic autoimmune activity. If these tests are abnormal or you have symptoms suggestive of systemic autoimmune disease, further rheumatologic evaluation is recommended.

## 2. What tests should I have performed to evaluate my hearing loss?

* Audiological tests: Pure tone audiometry to document sensorineural hearing loss (SNHL) and monitor fluctuations.
* Laboratory tests: ESR, CRP, ANA, ANCA, anticardiolipin antibodies, anti-β2-glycoprotein 1, anti-HSP70 antibodies (heat shock protein 70), and other autoimmune panels to support diagnosis.
* Other blood tests: Complete blood count, renal and thyroid function, Lyme disease titers, syphilis testing to exclude other causes.
* Vestibular function tests if balance symptoms are present.

## 3. Do I need to get an MRI to rule out other inner ear disorders?

Yes. An MRI of the brain and inner ear is important to exclude retrocochlear pathologies such as acoustic neuroma or other tumors, multiple sclerosis, or structural abnormalities. MRI can also help study inner ear features and rule out other causes of sudden or progressive hearing loss.

## 4. What are my treatment options for AIED?

* Corticosteroids: First-line treatment; they reduce inflammation and can improve hearing in some patients. A trial of steroids is often used diagnostically and therapeutically.
* Immunosuppressive agents: For steroid non-responders or those intolerant to steroids, drugs like methotrexate, cyclophosphamide, azathioprine, cyclosporine A, or mycophenolate mofetil may be considered.
* Biologic agents: Rituximab and plasmapheresis have been tried in refractory cases but require further study.
* Hearing aids and cochlear implants: For persistent or profound hearing loss despite medical treatment.

## 5. What medications are available to me?

* Oral corticosteroids (e.g., prednisone) are the mainstay.
* Steroid-sparing immunosuppressants such as methotrexate, azathioprine, cyclophosphamide for long-term management or steroid intolerance.
* Biologics like rituximab in select cases.
* Supportive medications for symptom control as needed.

## 6. What other healthcare professionals should I see for AIED?

* Rheumatologist: To evaluate and manage any systemic autoimmune disease and monitor immunosuppressive therapy.
* Audiologist: For hearing evaluation, monitoring, and rehabilitation with hearing aids or cochlear implants.
* Otolaryngologist (ENT specialist): For diagnosis, medical management, and coordination of care.
* Neurologist: If neurological symptoms or differential diagnoses like multiple sclerosis are suspected

**MEDICATIONS AND THEIR SIDE EFFECTS**

A variety of medications are available to tamp down your body’s immune system response and ease symptoms. You also have options when it comes to devices that improve hearing.

### **Corticosteroids**

Starting treatment with corticosteroids like prednisone. These can quickly reduce inflammation.

Your doctor may evaluate your response to corticosteroids to help diagnose AIED. If symptoms start to go away after starting treatment, your doctor may determine that AIED was the cause of your hearing loss and balance problems.

Side effects from corticosteroids can include:

* fluid retention and weight gain
* high blood pressure
* mood swings
* headaches
* nausea

AIED may present with sudden hearing loss. In this emergency situation, you’ll first be treated with a course of oral steroids. You may also receive steroid injections through the eardrum directly into the middle ear.

### **Biologics**

If you don’t respond well to corticosteroids, medications known as biologics may be helpful. Biologics are medications made from living organisms, and include rituximab and golimumab. These medications may be similarly effective to corticosteroids in reversing hearing loss, and may be useful as a maintenance medication in weaning individuals off of steroid dependence.

Biologics may present a heightened risk of infection because of the way the drugs work on the immune system.

### **Immunosuppressants**

Another AIED treatment option is immunosuppressants. Immunosuppressants are drugs that slow or reduce the body’s immune system response. Immunosuppressants are taken for a variety of autoimmune diseases, as well as to help keep the body from rejecting organ transplants. A commonly used AIED immunosuppressant is methotrexate, which is also widely used in chemotherapy.

Potential side effects of immunosuppressants include:

* diabetes
* fatigue
* high blood pressure
* increased risk of infections
* weight gain

### **Hearing devices**

To compensate for hearing loss related to AIED, you may benefit from auditory devices. These can amplify sound or otherwise improve your hearing.

A cochlear implant, for example, is a tiny electronic device that stimulates the cochlear nerve to improve hearing. The implant has an internal portion that reaches into the inner ear and an external component located behind the ear. Cochlear implants are usually reserved for cases of severe hearing loss or specific patterns of hearing loss.

Hearing aids are also effective options for many people with AIED. They are less invasive than a cochlear implant, and you can remove them when they’re not needed.

## **Outlook**

A diagnosis of AIED may seem alarming at first, but it can be reassuring to know the reason for your hearing loss and to know that treatment is possible in many cases.

Once you have received a proper diagnosis and begun treatment, you may remain on medications designed to keep your immune system in check. In some cases, the types and dosages of medications may need to be adjusted based on factors such as resistance to a drug or side effects.

Monitoring your hearing will also be an ongoing part of living with AIED. Expect to have regular hearing tests, such as audiograms, which use tones to show how loud sounds need to be for you to hear them clearly.

Home hearing tests can be helpful in tracking hearing changes in between visits to your doctor or a hearing lab.

Without treatment, AIED usually leads to complete hearing loss and balance difficulties. There isn’t a standard timeline for symptoms to progress. But the sooner you get an evaluation after symptoms begin, the greater the chance of limiting the impact of AIED.

## **Epidemiology**

### Frequency

*United States*

Because the existence of autoimmune inner ear disease (AIED) has been recognized only since 1979, incidence is difficult to determine. Recent studies in the literature from large referral centers are based on relatively small sample sizes of patients who fit the criteria for diagnosis of AIED. As diagnostic tests for the condition become more specific and more is known about AIED, more patients will be identified who have an autoimmune basis for inner ear symptoms.

### Sex

The condition has been suggested to be more common in female patients who may or may not have concomitant systemic autoimmune disease than in male patients.

### Age

In most patients, initial onset of symptoms occurs at age 20-50 years. Cases in pediatric patients are uncommon

**Doctor-patient conversation about Autoimmune Inner Ear Disease (AIED)**

Doctor:  
Thank you for coming in today. Based on your symptoms and test results, we are considering a diagnosis called Autoimmune Inner Ear Disease, or AIED. This is a rare condition where your immune system mistakenly attacks your inner ear, causing progressive hearing loss and sometimes balance problems.

Patient:  
What causes this? Is it related to other autoimmune diseases?

Doctor:  
AIED can occur on its own or as part of a larger autoimmune disorder like rheumatoid arthritis or lupus. Sometimes people with AIED have other autoimmune conditions, but many do not. The immune system targets proteins in the inner ear, leading to inflammation and damage.

Patient:  
What tests do I need to confirm this?

Doctor:  
We’ll do a thorough hearing evaluation including audiometry to measure your hearing loss. Blood tests will check for autoimmune markers and inflammation. An MRI scan of your brain and inner ear is important to rule out other causes like tumors or multiple sclerosis.

Patient:  
What treatment options do I have?

Doctor:  
The first-line treatment is corticosteroids, which reduce inflammation and can often improve or stabilize your hearing if started early. If steroids alone aren’t enough or cause side effects, we may add other immunosuppressive medications such as methotrexate or azathioprine. In some cases, biologic drugs are considered. For hearing loss that persists, hearing aids or cochlear implants may help.

Patient:  
Are there any side effects from these medications?

Doctor:  
Steroids can cause side effects like weight gain, mood changes, and increased blood sugar, especially with long-term use. Immunosuppressants also have risks, so we monitor you closely with blood tests. We’ll balance treatment benefits with minimizing side effects.

Patient:  
Who else will be involved in my care?

Doctor:  
You’ll work with a team including an ENT specialist, an audiologist for hearing support, and a rheumatologist to manage any systemic autoimmune issues and help with immunosuppressive therapy. Sometimes physical therapy helps if you have balance problems.

Patient:  
What can I expect going forward?

Doctor:  
AIED can be challenging, but with early diagnosis and treatment, many patients maintain good hearing and quality of life. We’ll monitor your hearing regularly and adjust treatment as needed. It’s important to report any new symptoms promptly.

REFERENCES

<https://emedicine.medscape.com/article/857511-overview#a6>

[**Autoimmune Inner Ear Disease - ENT Health**](https://www.enthealth.org/conditions/autoimmune-inner-ear-disease/)

[**https://www.specsavers.co.uk/ear-health/autoimmune-inner-ear-disease**](https://www.specsavers.co.uk/ear-health/autoimmune-inner-ear-disease)

**Ameloblastoma**

## **Overview**

Ameloblastoma is a rare, slow-growing tumor that develops in your jaw. Ameloblastomas grow from the same type of cell that forms your tooth enamel. About 80% of the time, it develops in your lower jaw in the space behind your back teeth (molars).

Ameloblastomas are benign (noncancerous). But ameloblastomas aren’t benign in the way most people may think of the word, as in harmless. They can grow big enough to change the structure of your jaw or damage your teeth. They can also recur (return) after treatment.

Early treatment and careful monitoring after treatment can prevent an ameloblastoma from damaging your jaw.

#### **Types of ameloblastoma**

At first glance through a microscope, all ameloblastoma cells look like tiny honeycombs or soap bubbles. Healthcare providers study the cells closely to classify ameloblastomas into types, including:

* Conventional ameloblastoma. Conventional ameloblastomas represent 85% of all ameloblastomas. These tumors grow more quickly than the other types and are likely to spread from your jaw to other nearby areas of your mouth.
* Unicystic ameloblastoma. These tumors are less likely to spread beyond your jaw than conventional ameloblastomas.
* Peripheral (extraosseous) ameloblastoma. Researchers believe these tumors likely spread to your jaw from your lower gum or soft tissue in your mouth. They grow more slowly than conventional and unicystic ameloblastoma.

Although extremely rare, ameloblastoma can be (or become) malignant. Types include:

* Metastasizing ameloblastoma. These tumors look like benign ameloblastoma beneath a microscope. In reality, they’re a form of metastatic cancer. Metastatic cancer spreads from a tumor to other parts of your body. A provider may not know that an ameloblastoma is metastatic until they find that the cancer has spread to your lungs, brain or skin.
* Ameloblastic carcinoma. These tumors may start as cancer. Or they may start off as benign ameloblastomas and then become malignant.

Ameloblastomas are one of the most common benign jaw tumors, but they’re still rare overall. Studies estimate that every year, only 1 in 1 million people is diagnosed with ameloblastoma. And only 2% of those people have malignant ameloblastoma.

Anyone can develop ameloblastoma, but the condition is more common in people from ages 30 to 60. Diagnoses are more common in Africa and Asia.

## **Symptoms and Causes**

Ameloblastomas grow slowly. You can have an ameloblastoma for 10 to 20 years before you or a healthcare provider notice an issue. As the tumor grows and invades tissue, you may notice changes in the shape of your face and jaw or problems with your teeth.

Signs and symptoms of ameloblastoma include:

* Painless swelling in your jaw that only affects one side of your face.
* A new growth that looks like you’ve tucked nuts or small balls inside your cheek.
* Teeth with pink or red spots or that chip and shatter easily.
* Difficulty moving your jaw.
* Red and swollen gums.
* A misaligned bite (malocclusion).
* Loose teeth.

### **What causes ameloblastoma?**

Ameloblastomas form when the cells that create your tooth enamel (ameloblasts) keep growing even after your enamel is in place. Experts don’t know why this happens.

Recent studies show that many people with ameloblastoma have common genetic mutations associated with cell division problems that fuel tumor growth. Mutations involving the *BRAF* and *SMO* genes are common with ameloblastomas.

Experts are currently researching these mutations to identify treatments that target the abnormal cell changes (targeted therapy) and destroy tumor-causing cells.

## **Diagnosis and Tests**

Your dentist may spot a potential ameloblastoma while taking X-rays as part of your regular dental check-up. They’ll refer you to a specialist for additional tests if they suspect an issue. Those tests may include:

* Imaging tests: You may need additional X-rays and other tests, like magnetic resonance imaging (MRI) and a computed tomography (CT) scan, to show the tumor’s location and size. These tests can help your provider rule out other tumors that look like ameloblastoma. You may need a positron emission tomography (PET) scan to look for cancer spread (with malignant types).
* Biopsy: A biopsy allows your provider to collect tissue from the tumor so a pathologist can examine its cells beneath a microscope. The type of cells helps your provider identify the type of ameloblastoma, so they know the best treatments.

## **Management and Treatment**

Surgery that removes the tumor and some nearby tissue (enough to ensure no abnormal cells remain) is the best treatment for ameloblastoma. Healthcare providers classify tumor surgeries as radical or conservative:

* Radical surgery: Most people with ameloblastomas need radical surgery. Your provider will remove the tumor and a large amount of bone and tissue to reduce the chance of your tumor growing back. They may remove part or all of your lower jaw (mandibulectomy) or all or part of your upper jaw (maxillectomy).
* Conservative surgery: Your provider will remove your tumor and a small amount of healthy tissue and bone. Conservative surgery may be an option if your tumor is small and unlikely to invade nearby bone and tissue.

If you’re not a candidate for surgery, your provider may recommend radiation therapy to get rid of the tumor. Or you may need radiation therapy after surgery to destroy any remaining tumor cells. This treatment directs high-powered X-rays toward the tumor to kill cells.

#### Additional treatments following surgery

Radical surgeries for ameloblastomas usually require a lengthy recovery period (several months). Afterward, you may need additional treatments to get back to feeling like yourself again.

You may need:

* Reconstructive surgery: You may need to work with a plastic surgeon to restore the appearance of your face and jaw. These procedures involve transferring bone from one part of your body (like your hip or your shoulder blade) to rebuild your jaw.
* Dental implants: You may need prosthetics (like false teeth) to replace the ones that your provider removed during surgery. These devices can help you regain your ability to chew. They can also restore your confidence in how your mouth looks.
* Speech therapy: A speech-language pathologist can help you adjust to the changes in your jaw and face so you can chew, eat and speak.
* Nutrition guidance: A dietitian can help you choose nutritious foods that are easy to chew and swallow while you’re healing.

## **Outlook / Prognosis**

Your prognosis, or expected outcome, depends on your health, the type of ameloblastoma, where it’s located and the kind of surgery to remove the tumor.

Most people treated for ameloblastomas will need life-long monitoring to check for recurrences. Ameloblastoma grows back after surgery in up to 20% of people. More than half of the time, tumors recur within the first five years after surgery.

Ask your healthcare provider about how often you’ll need monitoring to check for tumor regrowth.

### What happens if ameloblastoma is left untreated?

Ameloblastomas can damage important structures in your face and jaw and can even be fatal without treatment. Left unchecked, tumors can cause facial disfigurement and make it difficult to chew and swallow. With continued growth, they can invade tissue in your brain and central nervous system and block airways.

Seeking treatment for an ameloblastoma can prevent these worst-case scenarios from happening.

## **Prevention**

There’s no way to prevent ameloblastoma. But you can catch growths early by seeing your dentist every six months for check-ups and oral cancer screenings. Early treatment can prevent an ameloblastoma from damaging tissue in your jaw and face.

**EPIDEMIOLOGY**

Ameloblastomas can occur over a broad age range, and most commonly affect patients between the ages of 20 to 40 years. They are uncommon in children younger than ten years. Males and females are equally affected. Ameloblastomas are located most commonly in the posterior mandible, with fewer tumors arising in the maxilla.

Rizzitelli A et al. conducted a population-based study of malignant ameloblastoma to determine it’s incidence rate and absolute survival. They looked at 293 patients across the United States and found that the overall incidence rate of malignant ameloblastoma was 1.79 per 10 million persons/year. The rate of incidence was higher in males than females and also higher in the black versus white population. They also found that malignant ameloblastoma, comprising the two types, metastasizing ameloblastoma, and ameloblastic carcinoma, represents 1.6 to 2.2% of all odontogenic tumors. Their findings confirmed previous epidemiologic research, which showed the male to female ratio to be between 2.3 and 5.

There do exist variations that tend to arise in specific populations. The ameloblastic fibroma is similar to ameloblastoma, but with a different histopathologic presentation. They generally occur in the age group between 10 to 16 years of age. Treatment involves simple enucleation and curettage as opposed to 10 mm margins with ameloblastoma. The ameloblastic fibro-odontoma is another variation and typically arise in patients aged 6 to 10. Treatment is enucleation and curettage. Radiographs and demographics are vital in making these diagnoses.

Malignant variations of the ameloblastoma can occur between the teenage years up to older age.

**Differential diagnosis (DDx) of ameloblastoma**

* Dentigerous cyst: A cyst associated with the crown of an unerupted tooth; often unilocular and well-defined.
* Odontogenic keratocyst (OKC): Usually unilocular or multilocular cystic lesion with thin, poorly enhancing walls; can be difficult to distinguish from ameloblastoma on imaging.
* Odontogenic myxoma: A benign but locally aggressive tumor that can appear similar radiographically.
* Aneurysmal bone cyst: Expansile, blood-filled cystic lesion of bone.
* Fibrous dysplasia: A fibro-osseous lesion causing bone expansion with a ground-glass appearance.
* Hard odontoma: A benign odontogenic tumor composed of dental tissues.
* Osteosarcoma: A malignant bone tumor, which must be differentiated especially if aggressive features are present.
* Globulomaxillary cyst: Historically described cyst in the maxillary region, now considered a misnomer but sometimes included in differential.
* Central giant-cell granuloma: A benign intraosseous lesion that can mimic ameloblastoma radiographically.
* Keratocystic odontogenic tumor: Former term for odontogenic keratocyst, emphasizing its neoplastic nature.

### **When should I see my healthcare provider?**

Make sure you understand how often you’ll need follow-up visits after treatment to check for recurrences. Unfortunately, many ameloblastomas can come back years after your surgery. If an ameloblastoma comes back, your provider can recommend new treatments to prevent it from damaging your jaw and face.

Your healthcare provider will talk to you about what you can expect as you recover from surgery. But you should go to the emergency room if:

* You have a fever higher than 101 degrees Fahrenheit (38.3 degrees Celsius).
* You have pain that doesn’t improve with the medications your provider prescribed for you.
* You have more drainage or swelling than you expected.
* You have shortness of breath or a feeling that you can’t catch your breath.

## **Key Genetic Mutations in Ameloblastoma**

* BRAF mutations are the most common genetic alteration in ameloblastomas, found in approximately 46% to 90% of cases, with a mean prevalence around 68-71%.
  + The most frequent mutation is BRAF V600E, which leads to constitutive activation of the MAPK (mitogen-activated protein kinase) pathway, promoting tumor cell proliferation.
  + Other less common BRAF mutations include T440P and L597R.
* SMO mutations (Smoothened gene) occur in about 10-11% of cases, particularly in maxillary tumors. These mutations activate the Hedgehog signaling pathway and are generally mutually exclusive with BRAF mutations, although some co-occurrence has been reported.
* Additional mutations have been identified in genes such as KRAS, NRAS, EGFR, PIK3CA, PTEN, CDKN2A, FGFR, and CTNNB1, often co-occurring with BRAF or SMO mutations, especially in more aggressive or recurrent tumors.
* KRAS mutations are more commonly associated with adenomatoid odontogenic tumors (AOTs) rather than ameloblastomas, highlighting differences in tumor biology.

## Molecular Pathways Involved

* The MAPK pathway is the primary driver in most ameloblastomas, especially those with BRAF mutations.
* The Hedgehog signaling pathway is implicated in tumors with SMO mutations.
* Other pathways, including Wnt/β-catenin signaling and matrix metalloproteinase (MMP) activity, contribute to tumor invasion and progression.

### **What questions should I ask my healthcare provider?**

## 1. What type of surgery will I need?

The type of surgery depends on the tumor’s size, location, and type:

* Radical surgery (segmental or marginal resection of the jaw with 1–1.5 cm margins) is the most recommended for solid, multicystic, or large unicystic ameloblastomas. This approach removes the tumor completely and reduces recurrence risk to about 0–10%.
* Conservative surgery (enucleation, curettage, marsupialization) may be considered for small unicystic tumors or in young patients but carries a high recurrence rate (up to 60–80%).
* Surgical planning also considers your overall health, tumor extent, and surgeon’s experience.

## 2. Why do you recommend that surgery?

Radical surgery is recommended because ameloblastomas are locally aggressive tumors that infiltrate beyond visible margins. Conservative treatments often leave residual tumor cells, leading to high recurrence rates and more complicated future surgeries. Radical resection aims to completely remove the tumor, minimizing recurrence and the need for multiple surgeries.

## 3. Will I need treatments in addition to surgery to get rid of the tumor?

* Additional treatments such as cryotherapy, peripheral osteotomy, application of Carnoy’s solution, or electrocauterization may be used alongside surgery to destroy residual tumor cells and reduce recurrence risk.
* Radiation therapy is generally reserved for rare, unresectable cases or when surgery would cause unacceptable morbidity.
* Targeted therapies (e.g., BRAF inhibitors) are being researched but are not yet standard treatment.

## 4. Will I need plastic surgery or speech therapy?

* Yes, reconstructive surgery is often necessary after radical resection to restore jaw function and facial aesthetics. Techniques include bone grafts and free flap reconstructions.
* Depending on the extent of surgery, you may need speech therapy and rehabilitation to help with chewing, swallowing, and speaking.

## 5. What are possible complications or side effects?

* Complications can include facial deformity, masticatory dysfunction, abnormal jaw movement, numbness, infection, and difficulty eating or speaking.
* Radical surgery involves longer recovery and potential functional and aesthetic impacts, but reduces the risk of tumor recurrence.
* Conservative surgery has fewer immediate side effects but a much higher chance of recurrence, which can lead to more complex surgeries later.

## 6. How likely is it that the ameloblastoma will return?

* Recurrence rates after radical surgery are low, around 0–10%.
* After conservative treatment, recurrence rates can be very high, between 60% and 90%, especially with simple enucleation or curettage alone.
* Long-term follow-up (often beyond 10 years) is essential because recurrences can occur late

**Doctor-patient conversation about ameloblastoma,**

Doctor:  
Thank you for coming in today. We have reviewed your scans and biopsy results, and it appears you have a condition called ameloblastoma. This is a benign but locally aggressive tumor that arises from the cells that form your tooth enamel.

Patient:  
What does that mean? Is it cancer?

Doctor:  
Ameloblastoma is not cancer, but it can grow and invade nearby bone and tissues if left untreated. Because of its growth pattern, it requires careful treatment to remove it completely and prevent it from coming back.

Patient:  
What kind of treatment will I need?

Doctor:  
Treatment depends on the size, location, and type of your tumor. For most cases, especially larger or solid tumors, we recommend surgical removal with a margin of healthy tissue to ensure complete excision. This often means removing a segment of your jawbone.

Patient:  
Will this surgery change how I look or affect my ability to eat or speak?

Doctor:  
Because the surgery involves removing part of your jaw, reconstructive surgery is usually needed to restore the shape of your face and jaw function. This may involve bone grafts or tissue flaps. After surgery, you may also need speech therapy or rehabilitation to help with chewing and speaking.

Patient:  
Are there other treatments besides surgery?

Doctor:  
Sometimes, we use additional treatments like applying special chemicals or cryotherapy during surgery to destroy any leftover tumor cells. Radiation therapy is rarely used and only in cases where surgery isn’t possible. Research is ongoing into targeted drug therapies, but these are not yet standard.

Patient:  
What are the risks or side effects of surgery?

Doctor:  
Possible complications include swelling, infection, numbness, changes in facial appearance, and difficulty with jaw movement. However, the surgery is necessary to prevent the tumor from growing back, which can cause more serious problems.

Patient:  
How likely is it that the tumor will come back?

Doctor:  
If the tumor is completely removed with an adequate margin, recurrence rates are low—around 0 to 10%. Conservative treatments like simple curettage have much higher recurrence rates, sometimes over 60%. That’s why we recommend a more definitive surgery.

Patient:  
Will I need long-term follow-up?

Doctor:  
Yes, follow-up is very important. Ameloblastoma can recur even years after treatment, so we usually monitor patients for at least 10 years with regular clinical exams and imaging.

Patient:  
Thank you, doctor. This helps me understand what to expect.

Doctor:  
You’re welcome. We will work closely with you throughout the process to ensure the best outcome and support your recovery.

**REFERENCES**

[**https://www.mayoclinic.org/diseases-conditions/ameloblastoma/diagnosis-treatment/drc-20449426**](https://www.mayoclinic.org/diseases-conditions/ameloblastoma/diagnosis-treatment/drc-20449426)

[**Ameloblastoma: Symptoms, Causes & Treatment**](https://my.clevelandclinic.org/health/diseases/22143-ameloblastoma#overview)

[**https://www.ncbi.nlm.nih.gov/books/NBK545165/#article-17438.s10**](https://www.ncbi.nlm.nih.gov/books/NBK545165/#article-17438.s10)

**Aerodigestive disorders**

**Aerodigestive disorders** are conditions or diseases of the aerodigestive tract—including the **airway** (pharynx and larynx), **pulmonary tract** (trachea, bronchi, and lungs), and **upper digestive tract** (esophagus)—that may affect respiratory and swallowing functions. Aerodigestive disorders, or the management of them (e.g. surgery, intubation), may result in voice, feeding, and/or swallowing problems as well as **laryngeal airway problems**—the term used in this Practice Portal page to refer to paradoxical vocal fold movement (PVFM) and chronic cough.

Aerodigestive disorders may be congenital, developmental, or acquired. They are not mutually exclusive—individuals may have more than one disorder. In children, some aerodigestive disorders may resolve with maturity or with behavioral management, but others may require medical and/or surgical intervention.

Examples of common aerodigestive disorders (grouped by anatomical location) include, but are not limited to, the following:

**Airway (Pharynx and Larynx)**

* chronic cough
* dystussia
* epiglottitis
* fungal infections of the pharynx or the larynx (e.g., blastomycosis [rare], histoplasmosis, candidiasis)
* irritable larynx
* laryngeal clefts
* laryngeal or pharyngeal paralysis/paresis (unilateral or bilateral)
* laryngeal stenosis (supraglottic, glottic, or subglottic)
* laryngeal webs
* laryngomalacia (moderate to severe)
* laryngopharyngeal reflux
* laryngospasm
* muscle tension dysphagia
* muscle tension dysphonia
* PVFM
* breathing–swallowing incoordination (secondary to medical conditions such as chronic obstructive pulmonary disease (COPD), neurological insult, or head and neck cancer)
* structural or physiologic changes secondary to injury, neoplasms, radiation therapy, or surgery (e.g., pharyngeal or laryngeal resections, radiation for head and neck cancer treatment, prolonged intubation)
* velopharyngeal dysfunction

**Pulmonary Tract (Trachea, Bronchi, and Lungs)**

* bronchomalacia
* chronic lung disease (e.g., asthma, emphysema, COPD)
* infectious diseases affecting pulmonary function (e.g., upper respiratory infection, pertussis [whooping cough], pneumonia, tuberculosis)
* neoplasms
* structural or physiologic changes affecting pulmonary function secondary to injury or surgery (e.g., pneumothorax [collapsed lung], pneumonectomy, lung transplantation)
* tracheal stenosis
* tracheoesophageal fistula
* tracheomalacia

**Upper Digestive Tract (Esophagus)**

* esophageal motility disorder, including spasm and achalasia
* esophageal structural disorder, including stricture, web, diverticulum, and ring
* gastroesophageal reflux
* inflammatory forms of esophagitis (e.g., eosinophilic, viral, reflux-related)

### **Speech-Language Pathologist (SLP) Involvement in Aerodigestive Disorders**

Aerodigestive disorders can cause secondary problems in feeding, swallowing, voice, and/or laryngeal airway function. SLPs play a role in the screening, assessment, diagnosis, and treatment of these secondary problems and often work collaboratively with other professionals in providing services to individuals with aerodigestive disorders.

#### **Paradoxical Vocal Fold Movement (PVFM)**

**Paradoxical vocal fold movement, or PVFM,** is the intermittent, episodic adduction of the vocal folds during inspiration. During episodes, the vocal folds adduct partially or fully and restrict the passage of air to the lungs. PVFM can occur in isolation, or it can co-occur with other conditions, including pulmonary disorders (e.g., asthma), laryngeal abnormalities, and cardiac pathology. About 29%–40% of those with PVFM also have asthma. SLPs are involved in the diagnosis and direct behavioral management of PVFM.

#### **Chronic Cough**

**Chronic cough** is most commonly defined as a cough lasting more than 8 weeks in adults and more than 4 weeks in children . Chronic cough may be termed “somatic cough syndrome” in the absence of a known cause or “tic cough” when it is accompanied by core clinical features of tics (e.g., suppressibility, distractibility, suggestibility, variability, and presence of a warning sensation; . SLP intervention is an effective treatment for chronic cough and addresses the management of cough regardless of the initiating cause.

CAUSES

There are many ways to categorize the causes of aerodigestive disorders, given the overlap of structures and functions involved.

**Congenital**

* embryologic origins, including incomplete or atypical development, innervation, structure, and function of the aerodigestive tract structures

**Structural/Anatomical**

* injury or surgery affecting airway, pulmonary, or digestive structure and function
* weakness or dysfunction of the upper esophageal sphincter, allowing for regurgitation of acidic content into the pharynx, larynx, or nasal airway
* weakness or dysfunction of the lower esophageal sphincter, allowing acidic stomach contents to reenter the esophagus

**Functional**

* emotional stressors, fear, and/or anxiety that contribute to increased muscle tension
* environmental irritants or exercise
* laryngeal hyperreactivity
* laryngotracheal hyporeactivity

**Other Medical Conditions**

* autonomic dysfunction (e.g., diabetic neuropathy, vasovagal syncope)
* cardiovascular, pulmonary, or neurological diseases, or cancer, leading to breathing–swallowing incoordination (e.g., congenital heart defects, meconium aspiration syndrome, chronic lung disease, cystic fibrosis, head and neck cancer, motor neuron disease)
* irregular, unsynchronized, inappropriate, or absent esophageal contractions causing motility problems
* neurological diseases affecting aerodigestive sensorimotor function (e.g., stroke, Parkinson's disease, prematurity, hypoxic ischemic encephalopathy, cerebral palsy, muscular dystrophy, myopathies)
* neurological problems that trigger coughing, laryngospasm, bronchial constriction, or long-term bronchial changes affecting lung function
* recovery from respiratory failure or aerodigestive disuse during periods of critical care due to the use of artificial airways

**Paradoxical Vocal Fold Movement (PVFM)**

The exact cause of PVFM is not known, although PVFM may be related to laryngeal hyperresponsiveness.

PVFM may be triggered by

* organic factors, such as gastroesophageal reflux or environmental irritants, or
* nonorganic factors, such as exercise or psychological stress.

**Chronic Cough**

* asthma syndrome
* esophageal diseases, such as gastroesophageal reflux
* idiopathic heightened cough response, particularly in females
* rhinitis and sinusitis
* postnasal drip
* use of angiotensin-converting enzyme inhibitors (medications for the treatment of high blood pressure and heart failure)

**SIGNS AND SYMPTOMS**

**Signs** are observations made by a third party (e.g., clinician or family member). For example, observations of coughing when someone swallows may be a sign of aspiration, and observations of changes in someone's vocal pitch may be a sign that the vocal folds are swollen or inflamed.

**Symptoms** are a person's own perception of changes in their swallowing, voice, breathing, or desire to eat or drink. Symptoms are usually described in terms of severity, location, frequency, and duration. For example, a person may notice that, recently, they have been coughing a great deal following exercise.

Signs and symptoms of aerodigestive disorders can vary depending on the specific disorder and the severity of the condition causing the disorder.

The following signs and symptoms are grouped by the function that can be affected:

**Feeding and Swallowing**

* aversion, disinterest, or refusal behaviors surrounding eating or drinking
* avoidance of certain foods and/or food characteristics
* avoidance of eating and drinking in public
* coughing or choking during or after eating
* globus sensation (feeling of something stuck in the pharynx)
* increased duration of feeding and/or mealtimes
* increased swallowing effort
* odynophagia (painful swallowing)
* pharyngonasal backflow (often referred to as “nasopharyngeal reflux”)
* poor weight gain in infants and children
* recurrent pulmonary infections, such as pneumonia
* regurgitation of swallowed food back into the pharynx or into the oral or nasal cavity
* slow or uncoordinated feeding in infants and children
* throat clearing during or after eating
* unexplained weight loss in adults or children
* wet breath sounds or wet vocal quality during or after eating

**Voice**

* aphonia (no voicing)
* breathiness
* increased vocal effort
* pain while voicing (odynophonia)
* rough vocal quality
* strained vocal quality
* vocal fatigue
* vocal pitch changes (e.g., in response to inflammation and edema)
* weak or inadequate vocal volume

**Respiration**

* chronic cough
* discoordinated or weak voluntary cough
* excessive mucous secretion
* excessive sputum production
* inability to manage oral and/or pharyngeal secretions independently
* increased effort of breathing
* overwhelming need to want to “take a breath”
* pneumonia
* rapid respiratory rate
* recurrent respiratory infections
* stridor (secondary to vocal fold paralysis or other airway obstruction; inspiratory or biphasic)
* weak reflexive cough
* wheezing

**Paradoxical Vocal Fold Movement (PVFM)**

* cough and rough vocal quality before or during an episode of vocal fold adduction
* difficulty inhaling, exhaling, or both (sole report of difficulty exhaling suggests asthma)
* lightheadedness that resolves quickly when trigger is removed
* stridor on inhalation (stridor for both inhalation and exhalation suggests laryngeal obstruction)
* sudden adduction of the vocal folds induced by triggering stimuli, such as activity, stress, or environmental irritants
* sudden and total loss of voice
* tightness in the throat

**Chronic Cough**

* productive (wet) or nonproductive (dry) cough
* cough lasting more than 8 weeks in adults and more than 4 weeks in children

**DIAGNOSIS**

Assessment and treatment of aerodigestive disorders may require use of appropriate personal protective equipment.

Most aerodigestive disorders are identified by a physician on the basis of physical examination and one or more of the following:

* gastrointestinal evaluation (e.g., esophageal motility study; gastric emptying test; esophagogastroduodenoscopy; esophagram; esophageal manometry; 24-hour pH or impedance test; Raman spectroscopy)
* instrumental examinations (e.g., endoscopy; videofluoroscopy; airway fluoroscopy; flexible bronchoscopy; bronchoalveolar lavage; direct microlaryngoscopy; high-resolution pharyngeal manometry)
* pulmonary function tests
* X-ray and other imaging studies (e.g., chest X-ray; chest computed tomography scan; magnetic resonance imaging; electromyography; ultrasound)

Assessment of impairments caused by aerodigestive disorders often requires a multidisciplinary approach involving the speech-language pathologist (SLP) and other medical, surgical, and rehabilitation specialists. In collaboration with other health care specialists, the SLP provides expertise on feeding, swallowing, voice, and laryngeal airway problems related to aerodigestive disorders.

These collaborations may be a part of an established aerodigestive disorders team or may occur as a result of informed, targeted referrals within or outside the SLP's area of expertise.

A multidisciplinary approach may include

* a team of medical and other professionals,
* team meetings,
* combined assessment procedures,
* care coordination, and
* follow-up clinic visits.

A core multidisciplinary team may include one or more of the following professionals:

* allergist
* anesthesiologist
* gastroenterologist
* nurse
* nurse practitioner
* oncologist
* otolaryngologist
* physician assistant
* primary care physician (pediatrician in the case of a child, geriatrician in the case of elderly patients)
* pulmonologist
* registered dietitian
* SLP

Depending on the age of the individual and the specific concerns, other team members may include the following:

* cardiologist
* coach/athletic trainer
* medical geneticist
* neurologist
* occupational therapist
* physical therapist
* psychologist
* radiologist
* respiratory therapist
* sleep specialist
* social worker or case manager
* sports medicine physician
* surgeon

### **Screening by an SLP**

An SLP may be the first to see an individual who is experiencing voice or swallowing problems. These individuals may or may not have an underlying aerodigestive disorder. The purpose of screening is to identify individuals who require further assessment by an SLP or referral for other professional services. Screening may uncover findings that suggest underlying medical problems.

It is important for SLPs to

* be familiar with anatomical structures affected by various aerodigestive disorders;
* be familiar with changes in feeding, swallowing, voice, and respiration problems that can be caused by aerodigestive disorders;
* recognize deviations in structure and function that warrant an aerodigestive evaluation by a physician; and
* make appropriate referrals, as needed.

SLPs screen for the following observed and reported changes:

* **Voice and respiration**
  + vocal quality (e.g., rough voice, strained voice)
  + vocal effort (e.g., vocal fatigue, report of pain while voicing)
  + presence of stridor or labored breathing that affects breath support for voicing
  + rapid respiratory rate
  + chronic cough
* **Swallowing and dietary changes**
  + clinical signs of feeding and swallowing problems (e.g., coughing, throat clearing, discomfort or globus sensation when swallowing
  + other indicators such as poor weight gain in infants and unintentional weight loss in adults, or purposeful avoidance of previously enjoyed liquids or foods

SLPs also look for signs of neurologic conditions (e.g., abnormal sensorimotor function) that can affect voice, swallowing, or respiration, or that signal an underlying medical condition.

If screening results indicate feeding, swallowing, or respiratory difficulties that suggest an underlying disease process, referral is made to an appropriate medical professional.

### **Comprehensive Assessment**

Aerodigestive disorders may involve the interaction of multiple systems, including laryngeal, pulmonary, phonatory, digestive, and sensorimotor. Individuals may present with multiple complaints and varied symptoms. A thorough case history and sign/symptom assessment—gathered by members of a multidisciplinary team that includes an SLP—facilitate assessment and differential diagnosis.

comprehensive assessment is conducted to identify and describe

* **impairments in body structure and function,** including those related to aerodigestive disorders and the effect of impairments in feeding, swallowing, voice, and laryngeal airway function;
* **limitations in activity and participation,** including functional communication and social interactions;
* **contextual (environmental and personal) factors** that serve as barriers to or facilitators of successful communication and life participation; and
* the impact of feeding, swallowing, voice, and laryngeal airway problems on **quality of life,** including the impact of limitations on the individual's social roles within their community.

###### Additional Considerations

When completing videofluoroscopic swallow assessments, SLPs need to consider the potential impact of the barium concentration and viscosity of the test stimuli for all individuals. This is particularly important for infants and young children with aerodigestive disorders.

Using the appropriate weight per volume of barium concentrate reduces residual coating, which may affect the diagnosis or interpretation of the study. Viscosity of test fluids should approximate the customary or recommended fluid consistency as closely as possible (Cichero et al., 2011; Dodrill & Gosa, 2015). Use of a standardized flow test ensures that the tested consistency matches the defined consistency.

Potential interventions and treatment recommendations (positioning, utensils, bottle and nipple types, textures and liquid viscosity, and compensatory strategies) should be assessed during the examination.

**TREATMENT**

Decisions about goals and treatment options are made in partnership with the person, their family/caregiver, and other caregiving professionals. As part of a multidisciplinary team (see the Assessment section above), the speech-language pathologist (SLP) may be involved in assessing the individual's response to medical treatment and in implementing both indirect and direct strategies during or following medical treatment**.**

Comprehensive multidisciplinary treatment of aerodigestive disorders may include

* medical management (including pharmacotherapy and/or surgery) of underlying causes;
* indirect or compensatory treatment via environmental, dietary, and lifestyle modification; and
* direct or restorative intervention via voice, swallowing, and/or laryngeal airway treatment by an SLP.

### **Medical Management**

Medical management decisions in aerodigestive disorders balance airway needs for breathing with optimal preservation of vocal quality and swallowing integrity. Approaches vary from “wait and watch” to complex surgical interventions.

Examples of medical approaches by appropriate medical professionals include, but are not limited to, the following:

* endoscopic treatment of structural abnormalities (e.g., dilation)
* medical or surgical management of the underlying disease/condition leading to the aerodigestive disorder
* surgical repair of structural abnormalities affecting aerodigestive function (e.g., arytenoidopexy, fundoplication, laryngeal cleft repair, supraglottoplasty, arytenoidectomy)

### **Dietary and Environmental Management**

Dietary, compensatory, and environmental management may include the following:

* Dietary changes, such as
  + implementing elimination diets,
  + conducting food challenges (systematic introduction of new foods or textures),
  + reducing acid-producing foods, and
  + increasing water intake to hydrate the vocal folds and to support healthy phonation.
* Compensatory changes, such as
  + using positional strategies while eating or drinking (e.g., elevating the head of the bed, turning the head) and
  + implementing maneuver-based strategies when eating and drinking (e.g., supraglottic swallow).
* Environmental management, such as
  + avoiding triggers (e.g., environmental pollutants, strenuous exercise).

### Direct or Restorative Intervention

SLPs provide direct or restorative treatment to address functional voice problems (including respiratory support for voicing) and feeding and swallowing problems. SLPs also provide direct treatment for laryngeal airway problems, including paradoxical vocal fold movement (PVFM), and chronic cough.

The nature, scope, and duration of SLP management depend on

* the underlying aerodigestive disorder, structures and functions affected, severity, and relevant history;
* the type and course of medications to treat underlying and co-occurring diseases; and
* the type and extent of surgical management required (e.g., surgical intervention and healing time, need for a temporary feeding tube).

### **Treatment Considerations for Pediatrics**

Infants and young children with aerodigestive disorders may benefit from alterations of liquid viscosity to improve airway protection during swallowing and/or to reduce the impact of reflux when tube feeding. This may include the use of natural foods or commercial dietary thickening agents to increase liquid viscosity. When making such recommendations, SLPs should consult with the medical team and be aware of the possible impact of thickening agents on nutritional status and overall health. For example, the addition of a thickener may alter the nutritional composition of the formula or breast milk. This may require the child to ingest more volume in order to obtain the necessary nutrients, or it may provide more than the recommended calories or the amount of certain nutrients (e.g., more than the recommended iron, if rice cereal is the thickening agent).

In addition, children with a history of necrotizing enterocolitis are advised to avoid gel-based thickeners containing the agent xanthan gum. Food allergies must also be considered when thickening agents are being considered.

Precaution

The U.S. Food and Drug Administration (FDA) has cautioned consumers about using commercial, gum-based thickeners for infants from birth to 1 year of age, especially when using the product to thicken breast milk. SLPs should be aware of these cautions and consult, as appropriate, with their facility to develop guidelines for using thickened liquids with infants**.**

**Intervention for PVFM**

The goal of treatment is to establish consistent vocal fold abduction during the breathing cycle to maintain a patent airway. This reduces anxiety and affirms that breathing is consistently achievable, even in the presence of environmental or activity-related triggers.

Behavioral management by an SLP is the preferred treatment approach to PVFM . Other disciplines may also be involved in treatment (e.g., medical intervention to treat reflux or allergy triggers, when present).

SLPs may implement the following procedures with most individuals with PVFM. Procedures are individualized based on triggers or other factors and include the following:

* Relaxed throat breathing—trains the vocal folds to abduct and remain abducted throughout the breathing cycle. Techniques include
  + sniffing in through the nose with the tongue relaxed on the floor of the mouth and the lips gently touching, followed by exhalation through pursed lips or the production of a strident sound such as /s/, an
  + sipping air in through pursed lips, followed by an exhalation through pursed lips or the production of a strident sound such as /s/.
* Diaphragmatic/abdominal breathing—trains attention to expansion of the lower rib cage and abdomen during inhalation to avoid clavicular breathing patterns and shoulder/neck tension.

Once the individual has identified their most effective breathing technique, the SLP may introduce challenges (triggers) while using the technique. These include the following:

* Sports or exercise-specific training—implementing breathing techniques during a routine exercise activity or competitive sports training
* Training in the presence of environmental triggers (if applicable)—implementing breathing techniques during exposure to odors or other environmental triggers, beginning with non-noxious stimuli and progressing through noxious stimuli

### **Intervention for Chronic Cough**

Treatment activities include the following:

* Educating the individual about chronic cough and its treatment, including
  + discussing the difference between acute cough and chronic cough, emphasizing that chronic cough does not have physiological benefits;
  + establishing cough suppression as a safe and achievable goal;
  + defining the cough trigger threshold and desensitization of the cough response; and
  + emphasizing the importance of adhering to medications prescribed by physicians to manage cough.
* Implementing healthy vocal hygiene practices to maximize hydration and reduce irritation of the vocal folds, including helping the individual
  + identify behaviors that are contributing to the cough (e.g., poor hydration, mouth breathing) and
  + practice healthy vocal hygiene behaviors (e.g., drinking plenty of water and talking at moderate volume).
* Teaching cough suppression strategies (as appropriate), including
  + monitoring the cough precursor or trigger;
  + using relaxed throat breathing or prolonged, slow exhalation (see PVFM above);
  + using pursed-lip breathing; and
  + substituting coughing with other behaviors or distractions such as
    - sucking on ice or non-medicated candy and
    - swallowing dry or with sips of water.

The SLP typically introduces strategies without the presence of triggers to establish functional behaviors and to determine the person's most consistent response. The SLP may then introduce stimulants such as strong odors, increased activity levels, or other identified triggers to help the individual use the strategies before the “need” to cough. Treatment ends when the person can manage cough across a variety of contexts and in the presence of triggers.

**DIFFERENTIAL DIAGNOSIS**

* Airway Malacias
  + Laryngomalacia
  + Tracheomalacia
  + Bronchomalacia
* Airway Obstructions
  + Laryngeal cysts
  + Laryngeal tumors
  + Laryngeal and Tracheal stenosis
* Aspiration
  + Chronic aspiration and recurrent aspiration pneumonia
* Bronchiectasis
* Chronic Cough
* Congenital Anomalies
  + Laryngeal clefts and webs
  + Esophageal atresia
  + Esophageal strictures and webs
  + Tracheoesophageal fistula (TEF)
  + Vascular Rings and Slings
* Dysphagia (swallowing difficulties)
* Eosinophilic Gastrointestinal Diseases (EGIDs)
  + Eosinophilic esophagitis (EoE)
* Esophageal Motility Disorders
  + Achalasia
  + Esophageal hypomotility
* Feeding Disorders
  + Oral aversions
  + Feeding tube dependency
* Gastroesophageal Reflux Disease (GERD)
  + With persistent symptoms
  + Extraesophageal reflux (EER)
* Infections and Inflammation
  + Recurrent croup
  + Recurrent pneumonia
  + Recurrent respiratory infections
  + Esophagitis
  + Gastritis
  + Aspiration Pneumonitis
* Noisy or High-Pitched Breathing (Stridor)
* Respiratory Papillomatosis
* Tracheostomy Dependency
* Vocal Cord Dysfunction or Paralysis
  + Paradoxical Vocal Fold Movement (PVFM)

**Epidemiology of aerodigestive disorders**

* Prevalence of Aerodigestive Foreign Bodies:  
  Among large patient populations consulting ENT departments, aerodigestive foreign bodies accounted for approximately 0.6% to 0.74% of cases over multi-year periods. Toddlers (1–3 years) are the most affected age group, representing about 50% of cases, followed by preschoolers and school-aged children. Males are slightly more affected than females (about 57% male).
* Age Distribution:  
  Aerodigestive disorders and emergencies primarily affect young children, especially toddlers and preschoolers, but can occur at any age, including infants and adults. For example, one study reported cases ranging from 1 month to 80 years, with a mean age around 17 years.
* Gender Distribution:  
  There is a male predominance in aerodigestive foreign body cases and related emergencies, with male-to-female ratios reported around 1.3:1 to 2.2:1 depending on the study.
* Upper Aerodigestive Tract Cancers:  
  Cancers of the upper aerodigestive tract (including larynx, pharynx, oral cavity, and esophagus) represent a significant health burden worldwide, with an estimated 500,000 new cases annually. The mean age of patients is typically in the fifth to sixth decade (around 50–55 years), with a strong male predominance (up to 85%) largely attributed to tobacco and alcohol use as major risk factors.
* Neonatal and Pediatric Aerodigestive Disorders:  
  In neonates and infants, aerodigestive disorders are often related to developmental or congenital issues affecting feeding and airway protection. These disorders can have significant morbidity and healthcare costs, with feeding by mouth at discharge being an important neurodevelopmental milestone.
* Common Symptoms and Morbidity:  
  Aerodigestive disorders may present with symptoms such as choking, cough, dysphagia, recurrent respiratory infections, and airway obstruction. They often require multidisciplinary management involving ENT, pulmonology, gastroenterology, and speech therapy

**REFERENCES**

[**https://applications.emro.who.int/imemrf/Sudan\_Med\_Monit/Sudan\_Med\_Monit\_2014\_9\_1\_39\_43.pdf**](https://applications.emro.who.int/imemrf/Sudan_Med_Monit/Sudan_Med_Monit_2014_9_1_39_43.pdf)

[**https://pmc.ncbi.nlm.nih.gov/articles/PMC4317603/**](https://pmc.ncbi.nlm.nih.gov/articles/PMC4317603/)

[**https://www.childrenshospital.org/programs/aerodigestive-center/conditions-and-treatments**](https://www.childrenshospital.org/programs/aerodigestive-center/conditions-and-treatments)

[**Aerodigestive Disorders**](https://www.asha.org/Practice-Portal/Clinical-Topics/Aerodigestive-Disorders/#collapse_0)

**Aspirin-exacerbated respiratory disease (Samter's triad)**

Aspirin-exacerbated respiratory disease (AERD), also called Samter's triad, has three features:

* Asthma, although only a small number of people with asthma will develop AERD.
* Nasal polyps that often come back, even after being taken out by surgery.
* Problems with taking aspirin and nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen (Advil, Motrin IB, others) and naproxen. Keep in mind that aspirin or NSAIDs may be in cold medicines and other medicines.

Usually, warning signs of AERD don't show up until people have reached their 30s or 40s, but AERD can sometimes happen in children.

### **What happens when people with AERD take aspirin or NSAIDs?**

Problems usually start suddenly and can be serious. Symptoms may include trouble breathing, which could be an asthma flare-up, wheezing, coughing, sneezing, and a stuffy or runny nose. Some people with AERD also have these types of problems if they drink alcohol, such as beer or wine.

### **What causes AERD?**

The exact cause of AERD is not known but it is not an allergic response. There is no proof to show that it's genetic or inherited. The disease is not caused by taking aspirin or NSAIDs, but AERD sinus or asthma symptoms get worse when taking these medicines.

### **DIAGNOSIS**

There is no special test to find AERD. There are lab tests that can help in finding the cause of your illness. There is a blood test to look for higher than usual levels of white blood cells called eosinophils. And there is a urine test to look for raised leukotrienes, which are chemicals that can cause tightening of the airways. AERD also may affect your sense of smell. Finding AERD is possible if you have all three of these things: asthma, nasal polyps, and respiratory problems when taking aspirin or NSAIDs.

When it's not clear whether you have a problem taking aspirin or NSAIDs, your health care provider may do an aspirin challenge called desensitization. This is done to check if you have AERD. Your provider and medical team give you aspirin in a safe medical surrounding and follow special safety rules.

### **How is AERD treated? Is there a cure?**

There is no cure for AERD, but several treatments can be given, depending on your illness. A blend of treatments often work best. Choices are:

* Stay away from aspirin and NSAIDs, unless your health care provider prescribes desensitization to aspirin.
* Taking medicines to treat asthma, such as corticosteroids that you breathe in.
* Surgery to remove nasal polyps, although they can come back.
* Taking medicines such as montelukast (Singulair, zafirlukast (Accolate) or zileuton (Zyflo) to block leukotrienes.
* Injecting man-made proteins into your body that connect to certain targets. These proteins, called monoclonal antibodies, try to affect cells that are causing your problem.
* Having desensitization to aspirin. Aspirin is given in the health care provider's office in slowly increasing doses over two days. After that, it is taken daily at high doses, which may help lessen the need for oral steroids. It also may stop nasal polyps from coming back.

## **Differential Diagnoses for AERD**

* Allergic Rhinitis:  
  Seasonal or perennial allergic symptoms without aspirin sensitivity or asthma.
* Nonallergic Rhinitis:  
  Nasal congestion and rhinorrhea without asthma or aspirin/NSAID sensitivity.
* Chronic Rhinosinusitis without AERD:  
  Nasal polyps and sinus inflammation but no aspirin intolerance or asthma.
* Asthma (Aspirin-Tolerant):  
  Asthma without nasal polyps or NSAID sensitivity.
* Nasal Polyposis without Asthma:  
  Nasal polyps present but no asthma or aspirin sensitivity.
* Eosinophilic Granulomatosis with Polyangiitis (EGPA, formerly Churg-Strauss Syndrome):  
  Systemic vasculitis with asthma and eosinophilia, but accompanied by systemic symptoms (neuropathy, skin lesions) absent in AERD.
* Idiopathic Hypereosinophilic Syndrome:  
  Marked eosinophilia with systemic organ involvement, unlike isolated respiratory disease in AERD.
* Vasomotor Rhinitis:  
  Nonallergic nasal symptoms without asthma or aspirin sensitivity.
* Drug-Induced Respiratory Reactions (Non-AERD NSAID Reactions):  
  NSAID hypersensitivity without asthma or nasal polyps.
* Cystic Fibrosis:  
  Nasal polyps and chronic sinusitis with systemic features like pancreatic insufficiency.
* Primary Ciliary Dyskinesia:  
  Chronic sinusitis and bronchiectasis due to impaired mucociliary clearance, no aspirin sensitivity.
* Infectious Sinusitis:  
  Acute or chronic infection without aspirin sensitivity or asthma.

**Epidemiology of Aspirin-Exacerbated Respiratory Disease (AERD) / Samter’s Triad**

* Prevalence in Asthmatic Adults:  
  AERD affects approximately 7% (range 5.5% to 12.4%) of adult patients with asthma based on meta-analyses of multiple studies. The prevalence is higher in patients with severe asthma, reaching nearly 15%.
* Prevalence in Patients with Nasal Polyps and Chronic Rhinosinusitis:  
  Among patients with nasal polyposis, AERD prevalence is about 9.7%, and in chronic rhinosinusitis patients, it is around 8.7%.
* General Population:  
  The prevalence in the general population is much lower, estimated between 0.3% and 2.5%.
* Age and Gender:  
  AERD typically presents in adults, often with adult-onset asthma and nasal polyps. It is rare in children. Most studies include middle-aged adults (mean age around 45–55 years). There is no strong gender predilection reported.
* Geographic and Ethnic Variability:  
  Prevalence rates vary by region and population studied, influenced by genetic and environmental factors.
* Clinical Importance:  
  Early recognition is critical due to increased morbidity, frequent asthma exacerbations, and healthcare costs associated with AERD. It also guides treatment options such as aspirin desensitization

**Doctor-patient conversation about Samter's Triad (Aspirin-Exacerbated Respiratory Disease, or AERD)**:

Doctor:  
"Hello [Patient's Name]. Based on your symptoms and our recent tests, I believe you have a condition called Samter's Triad, also known as Aspirin-Exacerbated Respiratory Disease, or AERD."

Patient:  
"Samter's Triad? What exactly is that?"

Doctor:  
"It's a chronic condition characterized by three main features : asthma, nasal polyps—which are non-cancerous growths in your nose and sinuses—and a sensitivity to aspirin and other non-steroidal anti-inflammatory drugs, or NSAIDs, like ibuprofen . When you take these medications, they can trigger your asthma symptoms or cause severe nasal congestion."

Patient:  
"So, it's not just an allergy? I've been told I have chronic sinusitis and asthma, and the polyps always come back."

Doctor:  
"That's exactly it. AERD is not a true allergy in the typical sense, but rather a unique type of hypersensitivity reaction. The fact that your nasal polyps keep recurring and you have chronic sinus disease, along with your asthma, fits the pattern of AERD . Patients with Samter's Triad often experience more severe symptoms of nasal polyposis and asthma, and their rhinosinusitis can be quite aggressive ."

Patient:  
"What are the typical symptoms I should watch out for if I have this?"

Doctor:  
"You might experience worsening asthma symptoms, severe nasal congestion, a loss of smell, and a runny nose, particularly after taking aspirin or an NSAID . Many patients also have chronic sinusitis and sleep disturbances due to nasal obstruction ."

Patient:  
"How is this managed? Do I just avoid all those medications?"

Doctor:  
"Avoiding aspirin and NSAIDs is crucial, but that's just one part of the management . We'll need to manage your asthma and the nasal polyps. This often involves specific medications for asthma and sometimes nasal steroids for the polyps. For persistent or recurrent nasal polyps, surgery might be necessary. However, polyps can recur even after surgery in AERD patients ."

Patient:  
"Is there anything else I should know?"

Doctor:  
"For some patients, a treatment called aspirin desensitization can be very beneficial. This involves gradually introducing increasing doses of aspirin under careful medical supervision until your body tolerates it . Once desensitized, you'd take a daily dose of aspirin, which can help control polyp regrowth and improve asthma symptoms . We can discuss if that's an option for you. Also, it's highly recommended that you wear a medical ID, such as a bracelet or a card, indicating your AERD and aspirin sensitivity, especially in emergencies . Many patients don't know this is recommended, but it's a simple prevention strategy to avoid accidental exposure to NSAIDs ."

Patient:  
"Thank you, Doctor. This is a lot to take in, but I appreciate the clear explanation."

Doctor:  
"You're welcome. We'll work together to create a comprehensive management plan. Please don't hesitate to ask any more questions as they come up."

REFERENCES

<https://www.aaaai.org/tools-for-the-public/conditions-library/asthma/aspirin-exacerbated-respiratory-disease-(aerd)>

[**What is aspirin-exacerbated respiratory disease (AERD)? - Mayo Clinic**](https://www.mayoclinic.org/diseases-conditions/asthma/in-depth/aerd/art-20482797#:~:text=AERD%2C%20also%20called%20Samter%27s%20triad%2C%20has%20three%20features%3A,aspirin%20and%20drugs%20such%20as%20ibuprofen%20and%20naproxen.)

**Auditory processing disorder (APD)**

Auditory processing disorder (APD) is a condition that makes it harder to process sounds and language. You hear words, but it might take your brain a bit longer to understand them. You may also have trouble focusing in environments with lots of background noise. With APD, you have trouble understanding speech even though you don’t have hearing loss. You may also be more of a visual learner.

APD is usually discovered in childhood. But it can be found in adults, too. Although there’s no cure for APD, audiologists have treatments that can help manage your symptoms.

Another name for APD is central processing disorder.

### **Types of auditory processing disorders**

People with APD often experience it in unique ways. There are several different types of auditory processing disorders. A few of them include:

* Decoding. You hear sounds but your brain can’t process them as words.
* Integration. It’s hard to multitask when you’re listening. Taking notes in school is one example.
* Organizational. You have trouble recalling information in a specific order.
* Prosodic. You have difficulty interpreting tone and inflection. For instance, you might not notice that the tone of a person’s voice scoops up at the end of a question.

You may only have one type of APD. Or you might have a combination of two or more.

## **Symptoms and Causes**

Auditory processing disorder symptoms can vary. You might have difficulty:

* Following verbal directions
* Having long conversations or conversations in loud environments
* Reading, spelling and writing
* Responding immediately during conversations
* Telling the difference between words
* Understanding rapid speech

### **Auditory processing disorder causes**

With auditory processing disorder, your brain has trouble interpreting what your ears hear. Many different things can cause it, including:

* Central nervous system disorders like stroke, epilepsy, multiple sclerosis (MS) or Alzheimer’s disease
* Frequent ear infections
* Genetics
* Head injuries
* Low birth weight or premature birth
* Neurodivergent conditions like ADHD or autism spectrum disorder

### **Complications of auditory processing disorder**

If you have APD, you might have more trouble communicating compared to your peers. Over time, this may lead to mental health disorders like anxiety and depression. It’s important to tell your healthcare provider how you’re feeling so they can help.

## **Diagnosis and Tests**

Your healthcare provider will need to run some tests to diagnose auditory processing disorder. These tests might include:

* Auditory processing tests to measure your brain’s ability to process sounds
* Hearing tests to rule out hearing loss as the cause
* Language tests to rule out language disorders
* Psychological tests to check for ADHD or other similar conditions

## **Management and Treatment**

Auditory processing disorder treatment may include:

* Changing your environment, like sitting closer to the front of a classroom, for instance
* Getting specialized speech and auditory therapy that focuses on building auditory skills
* Using coping strategies, like using a recording device

### **When should I see my healthcare provider?**

If you think you or your child might have APD, tell your healthcare provider. Many conditions share similar symptoms with APD. A diagnosis is key to getting the right treatment.

#### **Who treats auditory processing disorder?**

Several healthcare providers can help treat auditory processing disorder, including:

* Audiologists
* Otolaryngologists (ENTs)
* Psychologists
* Speech-language pathologists (SLPs)

## **Outlook / Prognosis**

APD affects each person differently. Self-care starts with understanding how APD impacts you.

For children and adults, APD treatment can help manage symptoms. Additionally, children with APD may notice an improvement in their symptoms as they grow older.

## **Common Questions**

### **Is auditory processing disorder a form of autism?**

No, APD isn’t a form of autism spectrum disorder. But sometimes, the two conditions occur together. For instance, a child with autism might have communication challenges that could worsen APD symptoms.

## Main Conditions to Differentiate from APD:

* Language Comprehension Disorders:  
  Difficulties in understanding spoken language that may mimic APD symptoms but primarily involve language processing rather than auditory processing.
* Attention Deficit Hyperactivity Disorder (ADHD):  
  Attention deficits and distractibility can cause poor auditory task performance and listening difficulties similar to APD.
* Cognitive Impairment:  
  General intellectual disabilities affect auditory processing tests and listening behavior.
* Autism Spectrum Disorders (ASD):  
  Social communication deficits and sensory processing differences can overlap with APD symptoms.
* Peripheral Hearing Loss:  
  Conductive or sensorineural hearing loss can cause difficulty hearing speech, especially in noise, mimicking APD.
* Auditory Neuropathy Spectrum Disorder (ANSD):  
  A disorder of neural transmission in the auditory pathway causing poor speech perception despite normal cochlear function.
* Specific Language Impairment (SLI) / Developmental Language Disorder:  
  Language deficits that may coexist with or be mistaken for APD.
* Dyslexia and Reading Disorders:  
  Phonological processing deficits can overlap with auditory processing difficulties.
* Phonological Awareness Disorders:  
  Problems with sound structure awareness affecting reading and speech.
* Higher-Order Processing Disorders:  
  Disorders involving memory, attention, or executive functioning that impact auditory performance.

**Epidemiology of Auditory Processing Disorder (APD):**

* Prevalence in Children:  
  APD affects approximately 1.9 to 5% of school-aged children according to various studies. One large study reported a prevalence of about 1.94 per 1,000 children (0.19%), though other estimates range from 0.5% to 7% depending on diagnostic criteria and population studied. The prevalence tends to be higher in children attending private schools compared to public schools, possibly due to referral bias.
* Prevalence in Adults:  
  APD is less commonly diagnosed in adults but may affect about 0.9% to 10% of adults referred to audiology clinics. In older adults, especially those over 55, prevalence estimates rise dramatically, ranging from 27% up to 75% or even 95% in some studies, likely related to age-related auditory decline and central nervous system changes.
* Gender and Demographics:  
  Some studies report a slightly higher prevalence in males compared to females. There is also evidence that minority groups (e.g., Hispanic, African American) may be underrepresented in APD diagnoses, possibly due to socioeconomic and linguistic factors affecting referrals and testing.
* Coexisting Conditions:  
  APD frequently coexists with other developmental and neurological disorders such as ADHD (up to 50% overlap), dyslexia (up to 70%), autism spectrum disorder, speech/language disorders, and sensory processing disorders. This can complicate diagnosis and affect prevalence estimates.
* Impact:  
  APD can significantly impair listening, communication, learning, and social skills in both children and adults, emphasizing the importance of early identification and intervention.

REFERENCES

<https://www.nhs.uk/conditions/auditory-processing-disorder/>

<https://www.mayoclinic.org/diseases-conditions/auditory-processing-disorder/diagnosis-treatment/drc-20555277>

<https://auditorycenter.com/what-is-auditory-processing-disorder/prevalence-of-apd/>

[Auditory Processing Disorder (APD): Symptoms & Treatment](https://my.clevelandclinic.org/health/diseases/24938-auditory-processing-disorder#what-is-auditory-processing-disorder)

**Aural atresia**

Aural atresia is when a baby is born without an ear canal. The baby's eardrum either didn't form normally or is missing. There also are problems with the middle ear bones (called ossicles). The parts of the inner ear, including the auditory (hearing) nerve, are usually normal. Most babies with aural atresia also have microtia (a small, misshapen outside part of the ear).Aural atresia (OR-ul eh-TREE-zhuh) causes hearing loss, but treatments can help most children hear better.

### **Signs & Symptoms of Aural Atresia**

Aural atresia can happen in one or both ears, but most commonly affects only one ear. If it happens in one ear only, the hearing in the other ear usually is normal.

Because the canal did not form at all, there is no opening of the ear. Children with aural atresia may also have:

* trapped skin in the small ear canal called a cholesteatoma
* slowed speech and language development

### **Causes Aural Atresia**

Doctors don't know exactly why aural atresia happens. It is sometimes caused by genetic changes (mutations).

Some children with the condition also have a genetic syndrome such as Treacher Collins syndrome or Goldenhar syndrome**.**

### **Aural Atresia Diagnosis**

If a baby has problems with how their outer ear formed or fails a newborn hearing screen, doctors will check for other problems by doing an exam and more hearing tests.

Imaging studies, such as a CT scan, usually aren't done until children are closer to 6 years old. That's because the temporal bone around the ear grows a lot early in life**.**

### **Aural Atresia Treatment**

Babies with aural atresia need a care team to help them get the best treatment. They include:

* an otolaryngologist (ear, nose, and throat doctor) to help plan treatment and do surgery
* an audiologist (hearing specialist) to help treat hearing loss
* a speech therapist to help with talking and understanding language
* a pediatric plastic surgeon to rebuild the ear (if the child has microtia)
* a pediatrician to help coordinate care and treat any ear infections right away
* a geneticist to help families understand how aural atresia can run in families

Not every child with aural atresia will get surgery. It depends on how the middle and inner ear are formed and how the temporal bone grows over the first few years of life. A hearing device can help improve hearing for almost all kids with the condition.

### **Treatment Hearing Loss in Aural Atresia**

It’s important for a baby’s development to treat any hearing loss as soon as possible. Most children with aural atresia have a normal hearing nerve, so they can use a bone conduction device. This device bypasses the missing ear canal and takes sound vibrations directly to the hearing nerve.

On babies, the device usually is attached with an elastic band that goes around the child’s head. As kids grow, other hearing devices can help. Some can be surgically placed in the bone behind the ear or inside the ear.

**Differential Diagnosis (DDx) of Aural Atresia**

* Congenital Aural Stenosis:  
  Narrowing (rather than complete absence) of the external auditory canal, which may cause conductive hearing loss but with a patent canal.
* External Auditory Canal (EAC) Exostosis (Surfer’s Ear):  
  Bony growths in the ear canal causing narrowing and conductive hearing loss, typically bilateral and related to cold water exposure.
* Acquired Aural Atresia:  
  Resulting from trauma, infection, inflammation, or previous otologic surgery leading to canal closure.
* Congenital Microtia without Atresia:  
  Malformation of the auricle (pinna) without canal atresia; hearing loss may be present if canal and middle ear are normal.
* Cholesteatoma:  
  Especially congenital cholesteatoma behind an atretic plate or in a stenotic canal, which can mimic or complicate atresia.
* Middle Ear Malformations:  
  Sometimes associated with aural atresia but can present with conductive hearing loss without canal abnormalities.
* External Ear Canal Obstruction by Soft Tissue Masses or Foreign Bodies:  
  Rare but can mimic atresia on examination.

## **Key Genetic Findings and Associated Genes**

* HOXA2 gene:  
  Mutations in the HOXA2 gene, located on chromosome 7p14.3, have been implicated in familial cases of microtia with aural atresia. HOXA genes encode transcription factors critical for embryonic development, including ear formation.
* TSHZ1 gene:  
  Haploinsufficiency or mutations in the TSHZ1 gene (Teashirt Zinc Finger Homeobox 1) have been strongly associated with congenital aural atresia. TSHZ1 plays a role in ear morphogenesis, and deletions or mutations can lead to atresia.
* BAPX1 gene:  
  Suggested as a candidate gene contributing to ear malformations, though its exact role is less well defined.
* FGFR2 gene:  
  Mutations in FGFR2 have been reported in some cases, especially syndromic forms involving craniofacial abnormalities.
* Chromosomal abnormalities:  
  Aural atresia is seen in several chromosomal disorders and syndromes, including:
  + Branchio-oto-renal (BOR) syndrome
  + CHARGE syndrome
  + Treacher Collins syndrome
  + Goldenhar syndrome
  + Trisomies 13, 18, 21
  + Partial deletions of 5p, 18p, 18q, and 22q11.2
* Microdeletions and Copy Number Variations:  
  Deletions in regions such as 16p13.11 (associated with developmental delay and facial dysmorphism) and 18q22.3–18q23 have been linked to microtia and aural atresia.

## Inheritance Patterns

* Aural atresia may occur sporadically or as part of syndromic presentations.
* Inheritance patterns vary: autosomal dominant, autosomal recessive, multifactorial, or due to chromosomal abnormalities.
* Familial cases with autosomal recessive inheritance have been reported, especially in consanguineous populations.

**Epidemiology of Aural Atresia**

* Incidence:  
  The global incidence of congenital aural atresia is estimated to be approximately 1 in 10,000 to 20,000 live births. This means that for every 10,000 to 20,000 babies born, one is affected by this condition.
* Laterality:  
  Aural atresia is typically unilateral in most cases, with the right ear more commonly affected than the left. Bilateral involvement occurs in about 10% to 33% of cases, depending on the study.
* Gender:  
  There is a male predominance reported in several studies, though exact ratios vary.
* Associated Conditions:  
  Aural atresia frequently occurs in association with microtia (malformation of the external ear), with reported co-occurrence rates ranging from 55% to 93%. It can also be part of syndromic presentations such as Treacher Collins syndrome, Goldenhar syndrome, Branchio-oto-renal syndrome, and others.
* Geographic and Ethnic Variations:  
  Certain populations, such as Hispanics, have been reported to have higher prevalence rates. Regional variations exist, but comprehensive global epidemiological data remain limited.
* Maternal Risk Factors:  
  Studies suggest that prenatal exposures, including TORCH infections (toxoplasmosis, rubella, cytomegalovirus, herpes simplex), alcohol consumption, antibiotic use, and chemical exposures during pregnancy, may increase the risk of microtia and aural atresia.
* Clinical Impact:  
  Aural atresia causes conductive hearing loss from birth, leading to potential speech and language development delays if untreated

**REFERENCES**

[**https://www.ncbi.nlm.nih.gov/gtr/conditions/C1842937**](https://www.ncbi.nlm.nih.gov/gtr/conditions/C1842937)

**Balance disorders / problems**

Balance problems, also known as balance disorders, can make you feel unsteady or dizzy. Balance helps you stay steady when you walk, stand or move. To do that, your body relies on signals from your eyes, inner ears, muscles and brain. These systems work together to tell you where you are in space and how to stay upright. When something disrupts that process, you might feel wobbly or off-balance.

Balance issues often point to another health problem. Treating the cause — and sometimes, doing physical therapy — can help you feel steady again.

### **How your body maintains balance**

Balance depends on how your senses and nervous system work together.

Here’s how it works:

* Inner ears (vestibular system): Sense motion and gravity through canals and tiny organs in your ears
* Eyes (vision): Track your surroundings to help your brain know where your body is in space
* Skin, joints and muscles: Send signals about pressure and movement (for example, if you lean back, pressure in your heels tells your brain you’re off balance)

Your brain uses all this input to keep you balanced. If something goes wrong, it may not process the signals right, and you might feel dizzy or off.

## **Symptoms and Causes**

Balance problems feel different depending on the cause. You may notice:

* Blurred vision: Trouble seeing clearly, especially when moving
* Dizziness: A woozy or disoriented feeling
* Lightheadedness: Feeling faint or like you might pass out
* Unsteadiness: Feeling wobbly when you stand or walk
* Vertigo: A spinning feeling, even when you’re still

These symptoms can come on fast or slowly. Some people feel them only in certain situations, like when standing up quickly or being in a crowded place.

### **Balance problem causes**

Many things can affect your balance. It’s more common with age, but it can happen to anyone. Causes usually fall into two groups: inner ear problems and other health conditions.

#### **Inner ear disorders**

Your inner ear plays a major role in helping you stay balanced. Conditions that affect this area include:

* Acoustic neuroma: A noncancerous tumor on the nerve that helps with hearing and balance
* BPPV (benign paroxysmal positional vertigo): Short bursts of dizziness when you move your head, like when lying down or rolling over in bed
* Labyrinthitis: Swelling in the inner ear, which affects balance and hearing
* Ménière’s disease: Sudden dizziness, often with hearing loss, ear pressure and ringing in the ear
* PPPD (persistent postural perceptual dizziness): Ongoing dizziness triggered by motion, crowds or screens
* Vestibular neuritis: Swelling in a nerve that helps your brain process balance signals

#### **Other health conditions**

Balance issues can also result from a wide range of health problems, including:

* Head injuries: Concussions or brain injuries can affect balance short- or long-term.
* Heart disease: Poor blood flow may cause dizziness or fainting.
* Migraines: These can cause dizziness during episodes.
* Motion sickness: Travel or screen time can trigger dizziness and nausea.
* Neurological disorders: Diseases like Parkinson’s or Alzheimer’s can affect balance control.
* Orthostatic hypotension: This is a sudden blood pressure drop when you stand up.
* Peripheral neuropathy: Nerve damage in hands or feet affects your body’s signals.

## **Diagnosis and Tests**

Your provider will start with a physical exam and ask about your symptoms. They may do vestibular tests to see how your eyes, ears and brain work together to keep you balanced.

Here are some of the most common tests:

* DVA (dynamic visual acuity test): You read while your head is still and again while moving to see how motion affects your vision.
* mCTSIB (Modified Clinical Test of Sensory Interaction on Balance): You stand on different surfaces with your eyes open and closed to test balance.
* Rotary chair test: You sit in a turning chair while goggles measure your eye and ear response.
* vHIT (Video Head Impulse Test): You focus on a target while your provider quickly moves your head. Goggles track your eyes.
* VEMP (vestibular-evoked myogenic potentials): You hear sounds while sensors track how your neck or eye muscles respond.
* VNG (videonystagmography): You’ll wear goggles that track your eyes while you follow a moving object.

## **Management and Treatment**

Treatment depends on the cause of your balance problems. Your provider will treat that condition, whether it’s in your ear, brain or somewhere else.

They may also suggest vestibular rehabilitation therapy (VRT) — a special kind of physical therapy that uses exercises to improve balance and reduce dizziness.

### **When should I see my healthcare provider?**

If you often feel unsteady or off balance, talk to your healthcare provider. It’s especially important to let them know if your symptoms aren’t improving with treatment — or if they’re getting worse. You could be dealing with an underlying issue that needs a different approach. In some cases, you may need adjustments or updates to your care plan to help you feel more stable and safe.

## **Outlook / Prognosis**

Your provider will help you through diagnosis and treatment. If a health issue is causing your balance problems, they’ll focus on treating that first.

You may also need therapy to help your brain and body adjust. Recovery takes time, but with care, most people feel better and more confident.

## **Diagnostic Considerations**

On the basis of the patient’s history and physical findings, the examining physician should be able to formulate a differential diagnosis and determine whether the symptoms are likely to be peripheral or central (see the Table below).

Table. Features Differentiating Peripheral from Central Nystagmus

| System or Reflex | Peripheral Lesions | Central Lesions |
| --- | --- | --- |
| Oculomotor | Spontaneous nystagmus with eyes closed | Saccades (velocity, accuracy), internuclear ophthalmoplegia, saccadic pursuit, gaze-evoked nystagmus |
| Vestibulo-ocular reflex (VOR) | Nystagmus without fixation, nystagmus after head shaking, eye-head mismatch, unilateral and bilateral vestibular loss | Hyperactive VOR, failure of fixation suppression (FFS), positional nystagmus, bilateral vestibular loss |
| Vestibulospinal reflex (VSR) | Cautious gait; normal spontaneous movement; normal, spontaneous, and correct movement | Wide-based gait, minimal spontaneous movement |

## 

## **Differential Diagnoses**

* Benign Paroxysmal Positional Vertigo
* Immune-mediated inner-ear disease
* Meniere Disease (Idiopathic Endolymphatic Hydrops)
* Migraine Headache
* Vestibular Neuritis
* Vestibular schwannoma

## **Epidemiology**

Dizziness, including vertigo, affects about 15% to more than 20% of adults yearly in large population-based studies. The overall incidence of dizziness, vertigo, and imbalance is 5–10%, and it reaches 40% in patients older than 40 years. The incidence of falling is 25% in subjects older than 65 years. A report reviewing presentations to US emergency departments (EDs) from 1995 through 2004 indicated that vertigo and dizziness accounted for 2.5% of presentations.The estimated number of 2011 US ED visits for dizziness or vertigo was 3.9 million.

A report using data from the Swedish National study on Aging and Care (SNAC) found that in patients younger than 80 years, the prevalence of falls was 16.5% and that of dizziness 17.8%, whereas in patients older than 80 years, the prevalence of falls was 31.7% and that of dizziness 31%.The younger patients tended to have more specific predictive factors, whereas the older patients tended to have more general ones.

REFERENCES

<https://emedicine.medscape.com/article/2149881-guidelines>

[Balance Problems: Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/21021-balance-problems#what-are-balance-problems)

**BARRETT’S ESOPHAGUS**

Barrett’s esophagus is a change in the cellular structure of your esophagus lining. Your esophagus is the swallowing tube that carries food from your mouth to your stomach. Like all of your gastrointestinal (GI) tract, your esophagus has a protective mucous lining on the inside. But if something irritates this lining for a long time, it can damage the tissues. Sometimes, this damage actually reprograms the cells.

These changes affect the structure and appearance of your esophagus lining. To scientists, it now looks more like the lining of your intestines. They call this intestinal metaplasia. Metaplasia is when tissues in your body replace themselves with a different type of tissue that isn’t normally found there. This is a risk factor for cancer. Although the risk is small, metaplasia makes cancerous changes more likely.

Because of the small chance it might progress to esophageal cancer, healthcare providers like to keep an eye on Barrett’s esophagus. But the risk is only about half a percent per year. Cellular changes happen slowly, and metaplasia passes through another precancerous stage (dysplasia) before progressing to cancer. If your provider notices any dysplasia, they’ll remove it to stop it from progressing further.

## **Symptoms and Causes**

On its own, Barrett’s esophagus doesn’t produce any symptoms. But if something is irritating your esophagus lining for a long time, you’re likely to have symptoms from that. Chronic esophagitis — inflammation in your esophagus — may feel like heartburn or chest pain on the lower end, or like a sore throat if it’s higher. It may make your esophagus feel swollen or cause difficulties swallowing.

It takes years of chronic esophagitis to damage your esophagus tissues enough to trigger metaplasia. If you have any chronic symptoms, even if they’re mild or they come and go, check in with a healthcare provider. Chronic acid reflux is the most common cause of esophagitis leading to Barrett’s esophagus. If you ever feel or taste stomach juices backwashing into your esophagus after you eat, take notice.

### **What causes Barrett’s esophagus?**

Scientists don’t completely understand why Barrett’s esophagus occurs, but it seems to relate to chronic irritation or injury inside your esophagus. It may be a result of constant cellular repair. Most people who develop Barrett’s esophagus have had gastroesophageal reflux disease (GERD) for at least 10 years. But not everyone fits this profile, and other irritants may also lead to Barrett’s esophagus.

The ways that Barrett’s esophagus changes your esophagus lining suggest that it’s trying to protect itself. Your esophagus lining normally has some protection from acids and other irritants, but not as much as your intestinal lining. Since acids and digestive enzymes do most of their work inside your small intestine, it needs extra protection. Intestinal metaplasia in your esophagus suggests that it does, too.

#### **Risk factors for getting Barrett’s esophagus**

You may be more likely to develop Barrett’s esophagus if you:

* Are male. Males get it two to three times more often than females.
* Are older than 55. This condition takes time to develop.
* Have GERD. Between 10% and 15% of people with GERD get Barrett’s esophagus.
* Smoke. Smoking may be a contributing factor.

## **Diagnosis and Tests**

A gastroenterologist, a specialist in gastrointestinal diseases, usually diagnoses Barrett’s esophagus. They’ll look inside your esophagus for evidence of the tissue changes and take small tissue samples to confirm them (biopsies). They’ll do this in a procedure called an endoscopy. This means putting a tiny camera on a long tube down your throat to examine your esophagus, while you’re under sedation.

### **Signs of Barrett’s esophagus on examination**

In general, normal esophageal lining is pale pink and smooth, while intestinal metaplasia is salmon-colored and coarse. But inflammation in your esophagus could obscure these features. Your provider might need to take multiple biopsy samples from different places to study under a microscope. This is how they’ll confirm the structural changes in the cells of your esophagus lining (epithelium).

Normal esophageal epithelium consists of stratified squamous cells. These are flat, square cells arranged in layers (“squamous” means flat, and “stratified” means in layers). The lower part of your GI tract (your intestine) is lined with columnar epithelium. Columnar cells are rectangular and lay side-by-side in a single layer. If these appear in your esophagus, your provider will diagnose Barrett’s esophagus.

#### **Classifying Barrett’s esophagus**

Your provider might describe your condition as:

* Short-segment Barrett’s esophagus. This means the affected area is less than 3 cm long.
* Long-segment Barrett’s esophagus. This means the affected tissue is longer than 3 cm.

They might define the stage as:

* Non-dysplastic metaplasia. This means there’s no dysplasia yet and a low cancer risk.
* Metaplasia with low-grade dysplasia. This means there’s some dysplasia and cancer risk.
* Metaplasia with high-grade dysplasia. This means there’s significant dysplasia and cancer risk.
* Carcinoma. This means dysplasia has progressed to cancer.

#### **Other findings**

People with Barrett’s esophagus may also have:

* Esophageal stricture. This means your esophagus has become narrower, often due to scarring.
* Peptic ulcers. These are open sores caused by stomach acid or enzymes.

## **Management and Treatment**

Treatment for Barrett’s esophagus includes:

* Treating the cause to stop it from progressing.
* Regular surveillance to check for precancerous changes.
* Removing precancerous tissue if necessary.

#### **Treating the cause**

Chronic acid reflux, the most common condition leading to Barrett’s esophagus, is treatable. Healthcare providers usually recommend a combination of diet and lifestyle changes and acid-blocking medications. Medications called proton pump inhibitors (PPIs) are very effective in protecting your esophagus from acid reflux and helping the tissues heal. A minor procedure can also fix the underlying defect that causes it.

##### **Medications**

Prescription medications to treat acid reflux include:

* Omeprazole.
* Lansoprazole.
* Pantoprazole.
* Rabeprazole.
* Esomeprazole.
* Dexlansoprazole.

## Common Side Effects of PPIs (All Agents)

* Gastrointestinal:
  + Abdominal pain
  + Nausea
  + Vomiting
  + Diarrhea or constipation
  + Flatulence (wind)
  + Headache
  + Taste disturbances or tongue discoloration
* Neurological:
  + Headache
  + Dizziness (less common)
* Other:
  + Rash or skin reactions
  + Fatigue or weakness (rare)

## Long-Term or Serious Potential Side Effects

* Increased risk of bone fractures (hip, wrist, spine), especially with high-dose or prolonged use (>1 year)
* Increased susceptibility to Clostridium difficile-associated diarrhea and other gastrointestinal infections
* Possible risk of community-acquired pneumonia
* Hypomagnesemia (low magnesium levels), potentially causing muscle cramps or arrhythmias
* Vitamin B12 deficiency with long-term use, leading to anemia or neuropathy
* Rare cases of acute interstitial nephritis (kidney inflammation)
* Possible association with increased risk of gastric cancer remains unclear but under investigation
* Rare severe hypersensitivity reactions such as Stevens-Johnson syndrome, toxic epidermal necrolysis, anaphylaxis
* Potential interaction reducing effectiveness of clopidogrel (a blood thinner)

#### **Surveillance**

You’ll need to have periodic endoscopy exams to check on your metaplasia and see if it’s progressing. Your provider will tell you how often you should have them, depending on whether you have any dysplasia yet (precancerous changes). Barrett’s esophagus without dysplasia only needs to be examined every few years. Barrett’s esophagus after dysplasia should be examined yearly.

#### **Treatments for dysplasia**

Dysplasia is the next stage of cellular changes in your tissues between metaplasia and cancer. If a pathologist confirms you have dysplasia, they’ll characterize it as either low-grade or high-grade (mild or severe). Your provider may recommend treatment or more frequent surveillance for low-grade dysplasia. For high-grade dysplasia, they’ll recommend treatment to remove the affected tissue.

##### **Procedures**

Procedures to treat dysplasia include:

* Ablation therapy. Ablation means using very high or low temperatures to eliminate the affected tissue. Your provider can freeze or burn off the layer of intestinal metaplasia with cold gas (cryotherapy), a thermal balloon, a laser or radiofrequency. These are endoscopic procedures, meaning your provider treats you through an endoscope during an endoscopy exam.
* Endoscopic mucosal resection. Endoscopic surgery is a minimally invasive surgery technique that allows an endoscopist to perform minor surgery through an endoscope. Mucosal resection simply means that surgeons cut out the affected tissue from your esophageal lining (the mucosa). This might be a second-line treatment if ablation therapy fails to prevent further dysplasia.
* Surgery (esophagectomy). Surgery might be necessary if you have extensive, high-grade dysplasia, carcinoma or other complications, like a severe esophageal stricture. A surgeon removes the affected portion of your esophagus, then rebuilds it using pieces from your GI tract.

## **Outlook / Prognosis**

Metaplasia won’t go away by itself, though medical procedures can remove the affected tissue. Healthcare providers don’t recommend these procedures unless you have dysplasia. Barrett’s esophagus without dysplasia won’t affect you much. It just means you have to have periodic endoscopy exams. But it’s important to address what’s injuring your esophagus. You can make GERD go away.

### **Can treatment fix Barrett’s esophagus?**

If you remove the affected tissue and stop whatever was injuring your esophagus, Barrett’s esophagus may be cured. But it can return. Sometimes, a layer of metaplasia hides underneath a layer of new, normal tissue. Sometimes, the injury continues, and so the process of metaplasia continues. Because of this risk, your healthcare provider will probably recommend continued surveillance, just to be safe.

### **How long can you live with Barrett’s esophagus?**

You can live a normal life with Barrett’s esophagus, as long as it doesn’t continue to progress. Precancerous or cancerous changes will affect your life expectancy. But most people with Barrett’s esophagus will never develop these changes. In general, your prognosis (outlook) is better the sooner you seek treatment. You can prevent and even remove cancerous changes if you catch them early enough.

## **Prevention**

The known causes of chronic esophagitis leading to Barrett’s esophagus are treatable. Most people have these conditions for a long time before they progress to Barrett’s esophagus. You can help prevent this from happening by paying attention to your symptoms and seeking treatment for these conditions. You can also reduce your risk by avoiding or quitting smoking. A healthcare provider can help you quit.

**DIFFERENTIAL DIAGNOSIS**

When symptoms are present (eg, GERD) the differential diagnosis of Barrett esophagus is based on endoscopic findings and includes the following:

* Esophageal mucosa with gastric metaplasia: This is identical in endoscopic appearance to Barrett esophagus (intestinal metaplasia), but biopsies show gastric fundic- or junctional-type epithelium instead. These types of gastric metaplasia are not risk factors for esophageal cancer.
* Acute gastritis
* Chronic gastritis with or without *Helicobacter pylori* infection
* Coronary artery atherosclerosis
* Reflux esophagitis
* Esophageal cancer
* Esophageal motility disorders
* Gallstones

**EPIDEMIOLOGY**

Barrett esophagus is usually but not always found in patients with GERD. The prevalence is 0.8% in the general population, 3% in patients with GERD, 12.2% with GERD plus any other risk factor, 23.4% with a family history of Barrett esophagus or esophageal adenocarcinoma, 6.1% in individuals older than 50, 1.9% in people with obesity, and 6.8% in men. The prevalence of Barrett esophagus increases linearly with more risk factors, with each additional risk factor adding 1.2%. The condition is the only known endoscopically identifiable precursor lesion for esophageal adenocarcinoma. Both Barrett esophagus and adenocarcinoma are much more common in men than in women, by ratios of 2:1 and 9:1, respectively.

The overall incidence of GERD, Barrett esophagus, and esophageal adenocarcinoma has been increasing significantly over the last 3 to 5 decades, partially attributable to increased numbers of endoscopies. However, fewer than 5% of patients with Barrett esophagus will develop esophageal adenocarcinoma. Study results indicate the absolute annual risk of adenocarcinoma in nondysplastic Barrett esophagus is 0.1% to 0.5% per year, a highly variable 1% to 43% per year for low-grade dysplasia, and 23% to 60% per year for high-grade dysplasia. A greater extent of dysplasia has a significantly higher risk of cancer, as well as the presence of an endoscopic abnormality, such as a nodule or mass

**GENOMIC DATA**

* Driver Genes:  
  Recurrently mutated tumor suppressor genes include:
  + TP53: Mutations in TP53 are strongly associated with progression to high-grade dysplasia and adenocarcinoma. TP53 mutations occur in a stage-specific manner, being rare in non-dysplastic BE (~2.5%) but present in up to 72% of BE with high-grade dysplasia.
  + CDKN2A (p16): Early mutations in p16 are thought to provide a growth advantage, leading to clonal expansion in Barrett’s epithelium.
  + SMAD4: Also implicated in progression to malignancy.
  + Other genes reported include MLL2, MSR1, CTHRC1, and ASCC1, associated with BE and esophageal adenocarcinoma.
* Clonal Evolution and Heterogeneity:  
  BE is genetically heterogeneous, with multiple independent clones evolving separately within Barrett's segment. This polyclonal mosaicism complicates histopathological grading and risk stratification.
* Copy Number Alterations and Chromosomal Instability:  
  Larger scale genomic changes, including copy-number variations and chromosomal catastrophes (e.g., chromothripsis), may drive rapid progression to cancer in some patients.
* Epigenetic Changes:  
  Epigenetic modifications such as DNA methylation (e.g., methylation of Cdx1 promoter, keratin 8 promoter) and altered gene expression (e.g., Cdx2 induction by acid reflux) contribute to the metaplastic transformation and carcinogenesis.
* Germline Mutations and Susceptibility:  
  Pathogenic germline mutations have been identified in about 9% of patients with Barrett’s esophagus with high-grade dysplasia or cancer, suggesting inherited susceptibility in a subse

**Doctor-patient conversation explaining Barrett’s esophagus**

Doctor:  
“Hello [Patient’s Name]. I want to talk with you about the results from your endoscopy. You have a condition called Barrett’s esophagus. This means that the cells lining the lower part of your esophagus—the tube that carries food from your mouth to your stomach—have changed from their normal type to a different kind of cell, similar to those found in the intestine.”

Patient:  
“What causes this? Is it serious?”

Doctor:  
“The main cause is long-standing acid reflux, where stomach acid frequently flows back into the esophagus and irritates the lining. Over time, this irritation can cause the cells to change as a way to protect themselves. This change is called intestinal metaplasia.”

Patient:  
“Does this mean I have cancer?”

Doctor:  
“Not at all. Barrett’s esophagus itself is not cancer, but it is considered a risk factor because it can sometimes progress to esophageal cancer over many years. The risk is relatively low, but that’s why we do regular check-ups and biopsies to monitor the cells closely.”

Patient:  
“What symptoms should I watch for? And what can I do to manage it?”

Doctor:  
“Many people with Barrett’s don’t have specific symptoms beyond those caused by acid reflux, like heartburn or regurgitation. Managing your reflux is very important. This includes lifestyle changes such as avoiding spicy or fatty foods, not eating close to bedtime, losing weight if needed, and elevating the head of your bed. We also use medications called proton pump inhibitors to reduce stomach acid.”

Patient:  
“Will I need surgery or other treatments?”

Doctor:  
“Most people manage Barrett’s with medication and lifestyle changes. If we find any abnormal or precancerous cells during surveillance, there are treatments like endoscopic removal or ablation. Surgery is usually reserved for advanced cases. The key is regular monitoring through endoscopy to catch any changes early.”

Patient:  
“How often will I need these check-ups?”

Doctor:  
“That depends on whether any dysplasia (precancerous changes) is found. If there’s no dysplasia, we usually repeat endoscopy every 3 to 5 years. If low-grade dysplasia is present, it’s more frequent—about every year. For high-grade dysplasia, we recommend more immediate treatment or very close monitoring.”

Patient:  
“Thank you for explaining. I feel better knowing what to expect.”

Doctor:  
“You’re welcome. We’ll work together to manage your condition and keep a close eye on it. Please let me know if you have any new symptoms or questions.”

REFERENCES

<https://www.ncbi.nlm.nih.gov/books/NBK430979/#article-18143.s10>

[Barrett’s Esophagus: Symptoms, Causes, Treatments & Medications](https://my.clevelandclinic.org/health/diseases/14432-barretts-esophagus#overview)

<https://www.mayoclinic.org/diseases-conditions/barretts-esophagus/symptoms-causes/syc-20352841>

**Branchial cleft abnormality**

A branchial cleft abnormality is a cluster of abnormally formed tissue in the neck. Branchial cleft abnormalities may form:

* **Cysts or sinuses.** These are pockets full of fluid.
* **Fistulas.** These are passages that drain to an opening in the skin surface.

Branchial cleft abnormalities are often found in front of the large muscles on either side of the neck.

This health problem can cause local infections that keep coming back. This may happen when your child has another infection, such as a cold, cough, or sore throat.

## **What causes a branchial cleft abnormality in a child?**

A branchial cleft abnormality is a birth defect. It happens when the tissue in the neck does not form as it should during the early stages of an embryo’s development.

## **Symptoms of a branchial cleft abnormality in a child**

These are the most common symptoms of a branchial cleft abnormality:

* Small lump or mass on one side of the neck that is often painless
* Small opening in the skin on the side of the neck that drains mucus or fluid
* Redness, warmth, swelling, pain, and drainage if there is an infection

The symptoms of a branchial cleft abnormality can seem like other health conditions. Make sure your child sees their healthcare provider for a diagnosis.

## **How is a branchial cleft abnormality diagnosed in a child?**

This health problem may be seen at birth. Or it may be noticed when your child is older.

To diagnose the problem, your child’s healthcare provider will ask you questions about your child’s health history and current symptoms. They will examine your child, paying close attention to their neck. A branchial cleft abnormality may not be noticed unless it becomes infected and is painful.

Diagnostic tests may include:

* **Ultrasound.** Sound waves are used to look at the area.
* **CT scan.** X-rays and a computer are used to make detailed images of the body. CT scans help to find the exact location of the abnormality and how large it is. Sometimes dye may also be used during the scan to get even more detailed information.
* **Biopsy.** For this test, tissue samples are removed from the body to be looked at under a microscope. This may be done to check for other conditions.

## **How is a branchial cleft abnormality treated in a child?**

Treatment will depend on your child’s symptoms, age, and general health. It will also depend on how severe the condition is.

A branchial cleft abnormality will not go away without treatment. Treatment may include:

* **Antibiotic medicine if your child has an infection.** In some children, the healthcare provider may need to cut into and drain the area.
* **Surgery to remove the tissue.** This may be advised to prevent repeated infections.

## **Possible complications of a branchial cleft abnormality in a child**

Branchial cleft abnormalities are often small. But they can become large enough to cause trouble swallowing and breathing. Repeated infections are common.

**.DIFFERENTIAL DIAGNOSIS**

Other neck masses that may present similarly to branchial cleft anomalies include:

* Lymphadenopathy (reactive, infectious, inflammatory, and malignant)
* Dermoid/epidermoid cyst
* Hemangioma
* Plunging ranula
* Carotid body tumor
* Lymphatic malformation (cystic hygroma)
* Ectopic thyroid/salivary tissue
* Vascular neoplasm/malformation
* Thyroglossal duct cyst
* Foregut duplication cyst
* Cat scratch disease
* Atypical mycobacterial infections
* Cystic squamous cell carcinoma
* Thyroid goiter
* Thyroid neoplasm
* Thyroid abscess

**EPIDEMIOLOGY**

The true incidence of branchial cleft anomalies is unknown despite their relatively high frequency as the most common congenital anomaly of the neck. This is likely due to the variety of both the anomalies and their presentations, which complicates accurate reporting, particularly when the clinicians to whom these patients present are unaware of the condition.

Branchial cleft anomalies have no ethnic predilection, although first branchial cleft anomalies are more common in females, and fourth branchial cleft anomalies are more common on the left side. Most branchial cleft anomalies arise from the second pouch, while the first, third, and fourth pouches are rarer, and 10% of branchial cleft anomalies are bilateral. These typically present in the first decade of life, but the presentation may be delayed into adulthood if no external communication is present

**STAGING**

## Bailey Classification of Second Branchial Cleft Cysts

| **Type** | **Anatomic Location** | **Description** |
| --- | --- | --- |
| Type I | Between the platysma and the sternocleidomastoid muscle | Superficial cyst located just beneath the skin and superficial fascia |
| Type II | Between the sternocleidomastoid muscle and the submandibular gland, lateral to the carotid sheath | The most common type; classic location in the submandibular space |
| Type III | Extends between the internal and external carotid arteries | Deep cyst located between carotid vessels, more medial than Type II |
| Type IV | Medial to the carotid sheath, in the parapharyngeal or pharyngeal mucosal space | Deepest cyst, located adjacent to the pharynx, potentially communicating with the oropharynx |

**Treatment of Branchial Cleft Abnormalities: Drug Information and Side Effects**

## 1. Antibiotic Therapy

* Indication:  
  Antibiotics are prescribed only if the branchial cleft cyst or sinus becomes infected or if there is abscess formation. Infection symptoms include swelling, redness, tenderness, and sometimes fever.
* Common Antibiotics Used:
  + Amoxicillin-clavulanate
  + Cephalosporins (e.g., cefuroxime)
  + Clindamycin (for anaerobic coverage or penicillin allergy)
  + Macrolides (for penicillin-allergic patients)
* Purpose:  
  To treat or prevent infection before definitive surgical treatment.
* Side Effects of Antibiotics:
  + Gastrointestinal upset (nausea, diarrhea)
  + Allergic reactions (rash, anaphylaxis rarely)
  + Clostridium difficile infection (with broad-spectrum antibiotics)
  + Yeast infections

## 2. Surgical Excision

* Definitive Treatment:  
  Complete surgical removal of the cyst, sinus, or fistula tract is the only curative treatment. Surgery is usually recommended after infection control.
* Surgical Approach:
  + Typically performed via a transverse neck incision (stairstep or stepladder incisions) to fully excise the cyst and any associated tract.
  + Surgery may be more complex if the cyst is deep or near critical structures (carotid artery, cranial nerves).
* Risks and Side Effects of Surgery:
  + Infection
  + Bleeding or hematoma
  + Nerve injury (e.g., marginal mandibular branch of facial nerve, spinal accessory nerve)
  + Scar formation
  + Recurrence if excision is incomplete

## 3. Other Treatments

* Watchful Waiting:  
  In asymptomatic, non-infected cases, especially in very young children, a “watch and wait” approach may be taken until surgery is safer.
* Ethanol Ablation:  
  A minimally invasive option for patients who cannot undergo surgery, involving injection of alcohol to sclerose the cyst. Side effects can include local pain, swelling, and rarely nerve injury.

**Doctor-patient conversation explaining branchial cleft abnormalities**

Doctor:  
“Hello [Patient’s Name]. I want to talk with you about the lump we found on your neck. It appears to be a branchial cleft abnormality, which is a congenital condition—meaning it’s something you were born with.”

Patient:  
“What exactly is a branchial cleft abnormality?”

Doctor:  
“During early development in the womb, certain structures called branchial clefts normally disappear as the neck and face form. Sometimes, these clefts don’t close completely, leaving behind cysts, sinuses, or fistulas—fluid-filled sacs or tracts that can cause swelling or drainage on the neck.”

Patient:  
“Is it dangerous? Could it be cancer?”

Doctor:  
“Branchial cleft cysts themselves are benign, meaning they are not cancerous. However, they can become infected or cause discomfort if they enlarge or get irritated. It’s important to treat them properly to avoid complications.”

Patient:  
“How do you treat this condition?”

Doctor:  
“The main treatment is surgical removal of the cyst or tract. Before surgery, if the cyst is infected, we’ll treat the infection with antibiotics. Surgery is usually done through a small incision on the neck to completely remove the abnormal tissue, which helps prevent recurrence.”

Patient:  
“What are the risks of surgery?”

Doctor:  
“Like any surgery, there are risks such as infection, bleeding, or scarring. Because the cyst can be near important nerves, there is a small risk of nerve injury, which could affect facial movement or sensation, but these complications are uncommon. Overall, surgery is very safe and effective.”

Patient:  
“Will I need any other treatments or follow-up?”

Doctor:  
“After surgery, you’ll have follow-up visits to check healing and ensure the cyst does not come back. If the cyst was infected, antibiotics will be prescribed beforehand or afterward as needed. Most patients recover well and have no further problems.”

Patient:  
“Thank you for explaining. I feel more comfortable knowing what to expect.”

Doctor:  
“You’re welcome. Please let me know if you notice any new swelling, pain, or drainage before your surgery. We’ll plan everything carefully to ensure the best outcome.”

REFERENCES

<https://emedicine.medscape.com/article/1110351-treatment>

[Branchial Cleft Abnormalities in Children | Johns Hopkins Medicine](https://www.hopkinsmedicine.org/health/conditions-and-diseases/branchial-cleft-abnormalities-in-children)

<https://www.ncbi.nlm.nih.gov/books/NBK499914/>

**Branchial cleft congenital cysts**

Branchial cleft cysts are small, fluid-filled sacs that appear under your skin on one or both sides of your neck. You can usually see them somewhere between your jaw and collarbone. Healthcare providers may refer to branchial cleft cysts as pharyngeal cleft cysts or as a type of neck mass.

These cysts are congenital, meaning you’re born with them. It’s possible to have a branchial cyst for many years and not know it. Some people only realize they have a cyst if it gets infected.

Branchial cleft cysts are typically benign (noncancerous). In very rare instances, these cysts can turn into cancer. Even if the branchial cyst doesn’t cause issues, you might need surgery to remove it and prevent future infections.

#### **Types of branchial cleft cyst**

Healthcare providers categorize branchial cleft cysts according to where they develop:

* First branchial cleft cysts: Located between your ear and the area just below your jaw on either side, these make up about 5% to 25% of all branchial cleft cases.
* Second branchial cleft cysts: These cysts usually appear under the skin of your neck muscles on either side. They’re the most common type of branchial cleft cyst, representing between 40% to 95% of cases.
* Third branchial cleft cysts: These cysts form on the left side of your neck near your thyroid gland. They’re less common than first and second branchial cleft cysts.
* Fourth branchial cleft cysts: Located on the lower left side of your neck, these cysts are rare.

Branchial cleft cysts are one of the most common types of neck masses, especially in children. Overall, it’s hard to know exactly how many people have branchial cysts because they don’t always cause symptoms.

## **Symptoms and Causes**

Sometimes, branchial cleft cysts don’t cause symptoms. It’s possible to have one and not know it.

If you do develop branchial cleft cyst symptoms, they could include:

* A lump on your neck that might grow larger over time.
* Neck swelling that gets worse after upper respiratory infections.
* Painful swallowing.
* Small pits or openings on your neck that may or may not drain fluid.
* Stridor (noisy breathing).

If you have an infected branchial cleft cyst, you might have:

* Difficulty swallowing.
* Irritated or itchy skin.
* Neck pain.

### **What causes a branchial cleft cyst?**

Unexpected changes during fetal development cause branchial cleft cysts. Tissues around the fetus’s neck and collarbone area don’t form correctly. When this happens, it creates empty spaces. Fluid fills these empty spaces, causing cysts to form.

### **Complications of branchial cleft cysts**

Untreated branchial cysts can cause several complications like:

* Abscesses.
* Difficulty breathing.
* Difficulty swallowing.
* Secondary hypertension if a cyst presses on blood vessels.
* Repeated infections.

## **Diagnosis and Tests**

Healthcare providers will examine your neck and ask about your symptoms. They might need to take imaging tests like:

* CT scans (computed tomography scans).
* MRI (magnetic resonance imaging).
* Chest X-ray.
* Ultrasound.

If you have a first branchial cleft cyst, your healthcare provider may also do a hearing test. That’s because these cysts form near your ear and may affect nearby structures.

## **Management and Treatment**

Branchial cleft cyst treatment depends on the type of cyst, its location and whether it’s infected. Options include:

* Antibiotics to treat infected cysts.
* Surgery to remove the cysts.
* Partial thyroidectomy to treat third/fourth branchial cleft cysts near your thyroid.

#### **Complications of branchial cleft cyst surgery**

Like any surgical procedure, removing a branchial cleft cyst comes with some risk. Possible complications include:

* Excessive bleeding.
* Nerve damage.
* Reactions to anesthesia.
* Scarring.
* Recurrence

Your healthcare provider can help you weigh the risks and benefits of surgery. Talk to them if you have questions about your treatment plan.

## **Outlook / Prognosis**

If you have a branchial cleft cyst that doesn’t cause problems, you might not need to do anything. But if it gets infected, you’ll need antibiotics. If the infection keeps returning, your healthcare provider might recommend surgery to remove it. Very few branchial cysts recur (come back) after surgery.

### **What’s the outlook for branchial cleft cysts?**

The outlook is good. Most people who have cyst removal surgery recover with good results and no complications.

## **Prevention**

You can’t prevent branchial cleft cysts because they form during fetal development. There’s no way to keep them from occurring. If your baby was born with a branchial cyst, it’s not because of something you did or didn’t do. It’s just something that happens.

### **When should I see my healthcare provider?**

If you’ve had surgery to remove a branchial cleft cyst, let your healthcare provider know if you develop:

* A fever higher than 101 degrees Fahrenheit (38.3 degrees Celsius).
* Pain that doesn’t get better with medication.
* More drainage or swelling than you expected.

## **Diagnostic Considerations**

The following should be considered in the differential diagnosis:

* Lymphadenopathy (reactive, neoplastic, lymphoma, metastasis)
* Vascular neoplasms and malformations
* Capillary hemangioma
* Carotid body tumor
* Lymphatic malformation (cystic hygroma)
* Ectopic thyroid tissue
* Ectopic salivary tissue
* Hydatid cyst of the neck

## **Epidemiology**

The exact incidence of branchial cleft cysts in the US population is unknown. In the pediatric population, branchial cleft cysts are the second most common congenital cause of a neck mass.An estimated 2-3% of cases are bilateral. A tendency exists for cases to cluster in families.

Although branchial cleft cysts are congenital in nature, they may not present clinically until later in life, usually by early adulthood. No sexual predilection is recognized for branchial cleft cysts, nor has any racial predilection been reported.

#### **What questions should I ask my doctor?**

## 1. Why did I develop this cyst?

Branchial cleft cysts are congenital, meaning they develop before birth during early fetal growth. Normally, certain structures in the neck called branchial clefts close and disappear by about the 7th week of embryonic development. If these clefts fail to close completely, fluid-filled cysts or sinus tracts can form. This is not caused by anything you did; it is an unexpected developmental change during pregnancy.

## 2. Is the cyst cancerous?

No, branchial cleft cysts are benign (non-cancerous) growths. They are developmental anomalies and do not contain cancer cells.

## 3. Can this cyst become cancerous?

Branchial cleft cysts themselves do not usually become cancerous. However, very rarely, malignant transformation has been reported, but this is extremely uncommon. Most cysts remain benign throughout life.

## 4. Will the cyst go away on its own?

No, branchial cleft cysts do not typically resolve spontaneously. They may remain asymptomatic for years but often become noticeable when they enlarge or become infected. Definitive treatment usually requires surgical removal.

## 5. What treatment do you recommend?

The recommended treatment is surgical excision of the cyst and any associated sinus or fistula tract. If the cyst is infected, antibiotics are given first to control the infection before surgery. Surgery is the only way to cure the cyst and prevent recurrence.

## 6. What are typical treatment side effects?

* Antibiotics (if infection present): Possible side effects include gastrointestinal upset (nausea, diarrhea), allergic reactions, and rarely, Clostridium difficile infection.
* Surgery: Risks include infection, bleeding, scarring, and rarely nerve injury (which could affect facial movement or sensation). Recurrence can occur if the cyst is not completely removed. Most patients recover well with minimal complications

**Doctor-patient conversation about branchial cleft cysts,:**

Doctor:  
“Hello [Patient’s Name]. We’ve found a lump on your neck called a branchial cleft cyst. This is a congenital condition, meaning it developed before you were born due to incomplete closure of certain structures in the neck during fetal development.”

Patient:  
“What causes this cyst? Is it dangerous?”

Doctor:  
“It’s caused by leftover tissue from embryonic development that didn’t disappear as it normally should. The cyst itself is benign, so it’s not cancerous and usually doesn’t cause serious problems unless it becomes infected or grows large enough to cause discomfort.”

Patient:  
“What symptoms should I watch for?”

Doctor:  
“You might notice a painless lump on the side of your neck that can sometimes swell or become tender, especially if it gets infected. Signs of infection include redness, warmth, pain, fever, or if the cyst starts draining fluid. If you experience rapid swelling, severe pain, fever, or difficulty swallowing or breathing, you should seek medical attention promptly.”

Patient:  
“How do you diagnose it?”

Doctor:  
“We start with a thorough physical exam and your medical history. Imaging tests like an ultrasound or CT scan help us see the cyst’s size and its relation to nearby structures. Sometimes we take a small sample of fluid from the cyst to rule out infection or other causes.”

Patient:  
“What treatment options do I have?”

Doctor:  
“The best treatment is surgical removal of the cyst and any associated tracts. If the cyst is infected, we first treat the infection with antibiotics and sometimes drainage. Surgery is usually planned once the infection is controlled to prevent recurrence. Surgery is safe and effective, and most patients recover well.”

Patient:  
“Are there any risks with surgery?”

Doctor:  
“As with any surgery, there are risks such as infection, bleeding, scarring, and rarely nerve injury, since the cyst can be near important nerves in the neck. However, with experienced surgeons, complications are uncommon. Complete removal lowers the chance of the cyst coming back.”

Patient:  
“Can this cyst go away on its own?”

Doctor:  
“Typically, branchial cleft cysts do not disappear on their own. They tend to stay the same size or grow slowly. Surgery is the only way to completely remove them.”

Patient:  
“Is this hereditary? Could my children have it?”

Doctor:  
“Branchial cleft cysts are usually sporadic developmental anomalies. There’s no strong evidence that they are inherited, so your children are unlikely to have the same condition.”

Patient:  
“Thank you, doctor. This helps me understand what to expect.”

Doctor:  
“You’re welcome. We’ll monitor your condition closely and plan the best treatment for you. Please contact us if you notice any new symptoms or changes.”

**REFERENCES**

<https://www.ncbi.nlm.nih.gov/books/NBK482467/>

[Branchial Cleft Cyst: Symptoms, Types & Treatment](https://my.clevelandclinic.org/health/diseases/22547-branchial-cleft-cyst#overview)

<https://emedicine.medscape.com/article/1110351-treatment>

**Bell's palsy**

Bell’s palsy is a condition that causes temporary facial paralysis (palsy). It usually only affects the muscles on one side of your face. You may have a lopsided smile or an eyelid that you can’t fully close. It rarely affects both sides of your face.

Bell’s palsy happens when there’s inflammation and swelling of your seventh cranial nerve — the nerve that controls facial muscles. Certain conditions (like viral infections) can cause inflammation, but many cases of Bell’s palsy have no clear cause (idiopathic).

Bell’s palsy can affect anyone at any age. But it’s most likely to affect people between the ages of 15 and 60. The average age of onset is 40 years.

The condition gets its name from Sir Charles Bell, a Scottish surgeon who first described it during the 19th century.

#### **Is Bell’s palsy a serious condition?**

Bell’s palsy isn’t a serious condition. Most cases go away on their own with time. However, the symptoms of Bell’s palsy are similar to those of serious medical conditions, like a stroke. This is why it’s important to see a healthcare provider as soon as you notice muscle weakness in your face.

Signs of a stroke include:

* One-sided weakness or paralysis.
* Aphasia (difficulty with or loss of speaking ability).
* Loss of muscle control on one side of your face.
* Sudden loss — either partial or total — of one or more senses (vision, hearing, smell, taste and touch).
* Blurred or double vision (diplopia).
* Loss of coordination or clumsiness (ataxia).
* Dizziness.
* Nausea and vomiting.
* Neck stiffness.
* Emotional instability and personality changes.
* Seizures.
* Memory loss (amnesia).
* Headaches (usually sudden and severe).

A stroke is a life-threatening emergency condition where every second counts. If you or someone with you has symptoms of a stroke, IMMEDIATELY call 911 (or your local emergency services number).

Bell’s palsy is relatively common. About 15 to 30 people out of 100,000 develop it every year. About 1 in 60 people will get it at some point in their life. It’s the most common cause of one-sided facial paralysis.

## **Symptoms and Causes**

The main sign of Bell’s palsy is facial muscle paralysis — usually on one side of your face. It looks like one side of your face is drooping. This includes your:

* Forehead.
* Eyebrow.
* Eye and eyelid.
* Corner of your mouth.

Symptoms of Bell’s palsy tend to come on suddenly and reach peak severity within 48 to 72 hours. Some people develop mild facial muscle weakness. Others experience total muscle paralysis in their face.

It’s difficult to make full expressions with Bell’s palsy. Wrinkling your forehead, blinking and grimacing may be difficult or impossible on the affected side. Your face may feel numb or heavy. But you can still feel touch and temperatures (like heat and coolness) on the affected side of your face.

Other symptoms of Bell’s palsy may include:

* Drooling.
* Dry eyes.
* Difficulty speaking, eating or drinking.
* Facial or ear pain.
* Headache.
* Loss of taste.
* Ringing in your ears (tinnitus).
* Sensitivity to sounds (hyperacusis).

#### **Are there warning signs of Bell’s palsy?**

Early symptoms of Bell’s palsy — or warning signs — may include a slight fever and pain behind your ear. However, there’s nothing you can do to stop Bell’s palsy from developing once it begins. In addition, you could have these symptoms for another reason and not develop Bell’s palsy.

### **What causes Bell’s palsy?**

Inflammation and compression of your seventh cranial nerve is the main cause of Bell’s palsy.

The seventh cranial nerve carries nerve signals that control your facial movements and expressions. It also carries nerve signals involved in taste and produces tears in your eyes. You have two of these nerves — each controlling one side of your face. When one becomes inflamed, it affects how you can move the muscles on one side of your face.

Scientists have found that some viral infections may trigger inflammation of the seventh cranial nerve and cause Bell’s palsy. They include:

* Herpes simplex 1 (a virus that causes mouth infections, like cold sores).
* Varicella-zoster virus (chickenpox and shingles).
* Epstein-Barr virus (mononucleosis).
* COVID-19.

Other triggers may include having a weakened immune system from:

* Stress.
* Illnesses.
* Sleep deprivation.
* Physical trauma.
* Autoimmune conditions.

Healthcare providers usually can’t find a specific trigger of Bell’s palsy.

#### **Risk factors for Bell’s palsy**

Having the following may increase your risk of getting Bell’s palsy:

* Diabetes.
* Pregnancy.
* Preeclampsia.
* Obesity (BMI of 30 or higher).
* High blood pressure (hypertension).
* Having had Bell’s palsy before.

## **Diagnosis and Tests**

Your healthcare provider can diagnose Bell’s palsy based on your symptoms. They’ll ask about when your symptoms started and if they’ve changed. They’ll also do a physical exam and ask you to try to move your facial muscles in certain ways. The key physical exam finding of Bell’s palsy is partial or complete weakness of your forehead.

Other conditions, including stroke, sarcoidosis, Lyme disease, middle ear bacterial infections, multiple sclerosis and tumors near your facial nerve can sometimes cause facial paralysis that’s similar to Bell’s palsy. Your provider can usually accurately diagnose Bell’s palsy based on your history of symptoms and examination alone. But they may sometimes suggest that you have one or more of these tests:

* Blood tests to check for conditions like Lyme disease or sarcoidosis.
* Electromyography (EMG) to measure nerve activity and damage. This test may help your provider predict how quickly you’ll recover.
* Magnetic resonance imaging (MRI) or computed tomography (CT) scans to rule out stroke, tumor, multiple sclerosis or other causes of nerve damage.
* Lumbar puncture (spinal tap) to check for meningitis, Lyme disease or sarcoidosis.

## **Management and Treatment**

Most cases of Bell’s palsy improve without treatment. Still, your healthcare provider may recommend one or more of these therapies for symptom relief and faster recovery:

* Eye care: Eye drops, including artificial tears, soothe dry, irritated eyes. If your eyelid won’t close, you may need to wear an eye patch to protect that eye from drying, irritants and injuries. Eye care is very important to prevent damage to your cornea, a serious complication of Bell’s palsy.
* Oral corticosteroids: Oral corticosteroids (like prednisone) can help decrease nerve swelling. It may help you regain facial movement faster. This treatment is most effective when you start it within 48 hours of noticing symptoms.
* Antiviral medications: Antiviral medications may speed up recovery. But it’s unclear how much benefit they provide. Providers typically only prescribe them for severe Bell’s palsy. This treatment works best when you combine it with oral corticosteroids.
* Electrical stimulation: Although some providers recommend electrical stimulation to prevent facial muscle loss after Bell’s palsy, studies haven’t shown any benefit of this treatment.

In the rare case that Bell’s palsy doesn’t go away, functional facial plastic surgery procedures are an option. They can help correct facial asymmetry and assist with eyelid closure.

## **Outlook / Prognosis**

Bell’s palsy can last a few weeks to six months. Symptoms usually start to gradually improve in three weeks. Up to 80% of people fully recover and show no signs of Bell’s palsy within three months.

Bell’s palsy can come back (recur) later in life. This happens to about 5% to 10% of people who’ve had it.

### **Is Bell’s palsy permanent?**

Most cases of Bell’s palsy aren’t permanent. After some time, you’ll likely regain your full normal facial muscle function. This happens in about 80% of cases.

For others, facial weakness can be long-lasting. The longer the recovery, the more likely you’ll have lasting issues. The risk factors that are associated with poor outcomes include:

* Complete facial paralysis.
* Being over 60.
* Having decreased salivation or taste.

## **Prevention**

Unfortunately, there’s nothing you can do to prevent Bell’s palsy. It’s linked to certain viral infections, but not everyone who has those viral infections develops Bell’s palsy.

If you have risk factors for the condition, like diabetes, obesity or high blood pressure, managing them well may help reduce your risk.

### **When should I see my healthcare provider about Bell’s palsy?**

If you have facial drooping, see a healthcare provider as soon as possible. Facial drooping is also a symptom of serious medical conditions, like a stroke. It’s better to know the cause right away.

Taking corticosteroids soon after symptoms of Bell’s palsy begin may also help speed up your recovery.

If you’ve received a diagnosis of Bell’s palsy, you should see your healthcare provider if you experience:

* Symptoms that don’t improve within three months.
* Chronic eye irritation.
* An eyelid that won’t close.
* Dehydration due to difficulty drinking and swallowing.
* Hearing loss or dizziness/vertigo.

**Differential Diagnosis (DDx) of Bell’s Palsy**

:1. Central (Upper Motor Neuron - UMN) Causes

* Stroke (ischemic or hemorrhagic)
* Multiple sclerosis
* Brain tumors (e.g., cerebellopontine angle tumors)
* Subdural hematoma*:*UMN lesions typically cause forehead sparing (patients can still wrinkle their forehead), because the upper facial muscles receive bilateral cortical innervation.

## 2. Peripheral (Lower Motor Neuron - LMN) Causes Other Than Bell’s Palsy

* Infectious:
  + Ramsay Hunt syndrome (Herpes Zoster Oticus): Facial palsy with vesicular rash in the ear canal or auricle, severe pain, sometimes hearing loss.
  + Lyme disease: Often bilateral facial palsy; history of tick exposure, rash, or systemic symptoms.
  + Acute otitis media or mastoiditis: Usually with ear pain, fever, and gradual onset.
  + Viral infections: HSV-1, CMV, EBV can cause facial nerve inflammation.
* Neoplastic:
  + Parotid gland tumors (benign or malignant)
  + Cerebellopontine angle tumors (e.g., acoustic neuroma)
  + Metastatic lesions or lymphoma
* Trauma:
  + Temporal bone fracture
  + Iatrogenic injury (e.g., during parotid or mastoid surgery)
* Inflammatory/Autoimmune:
  + Sarcoidosis (can cause recurrent or bilateral palsy)
  + Guillain-Barré syndrome (often bilateral facial weakness)
  + Bell’s palsy is a diagnosis of exclusion after ruling out these causes.

## 3. Other Causes

* Congenital facial nerve palsy
* Diabetic mononeuropathy
* Toxic or metabolic neuropathies

**EPIDEMIOLOGY**

The annual incidence of Bell palsy is 15 to 40 per 100,000 individuals, and the lifetime risk is 1 in 60, with a recurrence rate of 8% to 12%.There is no sex, ethnic, or laterality predilection, and Bell palsy can occur at any age; there is a bimodal distribution with incidence peaks between 20 and 30 years and between 60 and 70. There are multiple known risk factors for developing Bell palsy, including diabetes, pregnancy, preeclampsia, obesity, dental procedures, and, debatably, hypertension. Pregnant patients and those with diabetes are specifically at higher risk for worse outcomes and are potentially more likely to present with worse paralysis than patients without diabetes and who aren't pregnant with Bell palsy.

According to a 2022 paper published by Escalante et al, the most common severity of Bell palsy is House-Brackmann grade III (mild-moderate), accounting for 41.9% of patients. Grade VI palsy (total hemifacial paralysis) occurs in 20.1% of patients. House-Brackmann grades II (mild) and V (severe) each comprise 16.3% of patients, and grade IV accounts for only 5.4%. The same study also assessed the chance of recovery as a function of palsy severity and found that patients with House-Brackmann grade VI palsy had a 60% chance of recovery to grade I or II, and grade V patients had an 83% chance if provided steroids and antivirals. Patients with grade II to IV paralysis all recovered to grade I or II in this series

## . **Genetic Association and Heritability**

* A significant association between Bell’s palsy and a common genetic variant, rs9357446-A, which modestly increases risk (odds ratio ~1.23). This variant is intergenic and was found across multiple European cohorts, suggesting a heritable component with an estimated heritability of 4–14%.
* Familial cases of Bell’s palsy have been reported, with some families showing an autosomal dominant inheritance pattern with variable penetrance. This means that in some families, Bell’s palsy can be inherited from one affected parent, though not all carriers develop the condition.

## 2. Human Leukocyte Antigen (HLA) Associations

* Several studies have linked Bell’s palsy to specific HLA class II alleles, implicating an autoimmune mechanism:
  + Decreased HLA-DR antigen levels and altered T-cell populations were observed in patients during acute episodes.
  + Specific HLA antigens such as DR2, DR4, DRW6, DRW7, Bw67, and Cw7 have been associated with susceptibility, recurrent episodes, or persistent paralysis

**Bell’s Palsy: Procedure and Timelines**

1. Initial Diagnosis and Onset

Bell’s palsy typically presents with acute onset of unilateral facial weakness, reaching maximum severity within 72 hours.

Early diagnosis is clinical, often confirmed by excluding other causes.

2. Medical Treatment

Corticosteroids:

Start within 72 hours of symptom onset for best outcomes.

Common regimen: Prednisolone 60 mg daily for 5 days, then taper by 10 mg every 2 days over the next 5 days (total ~10 days).

Corticosteroids reduce inflammation and swelling of the facial nerve, improving recovery rates.

Evidence shows steroids increase the chance of complete recovery and shorten recovery time.

Antivirals:

Not routinely recommended alone.

May be added to corticosteroids in severe or complete facial paralysis cases, but evidence is weak.

Common antivirals: Acyclovir or valacyclovir for 7 days.

Initiation also ideally within 72 hours.

Eye Care:

Essential from the start if eye closure is incomplete to prevent corneal damage.

Use lubricating eye drops during the day, ointment at night, and eye patching if needed.

3. Physical Therapy

Role in acute phase is unclear; no strong recommendation for routine use.

Suggested for chronic cases with persistent weakness to improve muscle tone and prevent contractures.

4. Surgical Treatment

Decompression surgery is generally not recommended routinely due to lack of strong evidence and potential complications.

Considered only in very rare, severe, and non-improving cases after specialist evaluation.

5. Recovery Timeline

Most patients begin to improve within 2 weeks of onset.

Complete recovery occurs in about 70–85% of patients within 3 to 6 months.

Some patients may have residual weakness or synkinesis (involuntary muscle movements).

6. Follow-Up and Referral

Patients with no improvement or worsening symptoms after 3 weeks should be referred to a specialist.

Imaging (MRI) may be indicated to rule out other causes if symptoms progress or do not improve.

**Doctor-patient conversation about Bell’s palsy**

Doctor:  
“Hello [Patient’s Name]. You have a condition called Bell’s palsy, which means that one side of your face has become weak or paralyzed due to inflammation of the facial nerve. This usually happens suddenly and can be quite distressing.”

Patient:  
“What causes Bell’s palsy? Is it permanent?”

Doctor:  
“The exact cause isn’t always clear, but it’s often linked to viral infections, like the herpes simplex virus. The good news is that most people recover fully or nearly fully within a few weeks to months. Early treatment with steroids can help speed up recovery.”

Patient:  
“What treatments will I need?”

Doctor:  
“We typically start with corticosteroids to reduce nerve inflammation. Sometimes antivirals are added if a viral cause is suspected. Protecting your eye is very important because you might not be able to close it completely. We’ll teach you how to keep your eye moist with drops and ointments, and sometimes you may need to wear an eye patch, especially at night.”

Patient:  
“I’m worried about communicating and facial expressions while I recover. Any advice?”

Doctor:  
“That’s a common concern. When talking with others, it helps if they face you directly in good lighting so they can see your lips and facial movements. We also have guides with tips on communication techniques, like speaking clearly and using gestures to help convey your message. Physical therapy can help you regain muscle control as you recover.”

Patient:  
“How long will recovery take?”

Doctor:  
“Most people start to see improvement within two weeks, and about 70 to 85% recover completely within six months. Some may have mild residual weakness or involuntary movements, but we’ll monitor you closely and adjust treatment if needed.”

Patient:  
“What should I do if I notice worsening symptoms or new problems?”

Doctor:  
“If you experience increased pain, hearing loss, rash around your ear, or if the weakness spreads or doesn’t improve after a few weeks, please contact us immediately. These signs may suggest a different or more serious condition.”

REFERENCES

<https://www.mayoclinic.org/diseases-conditions/bells-palsy/symptoms-causes/syc-20370028>

<https://www.ncbi.nlm.nih.gov/books/NBK482290/#article-18195.s4>

<https://www.aafp.org/pubs/afp/issues/2007/1001/p997.html>

<https://emedicine.medscape.com/article/1146903-differential>

[Bell’s Palsy: What It Is, Causes, Symptoms & Treatment](https://my.clevelandclinic.org/health/diseases/5457-bells-palsy#overview)

### **Benign paroxysmal positional vertigo (BPPV)**

Benign paroxysmal positional vertigo (BPPV) is a common inner ear disorder. With BPPV, changes in your head position — such as tipping your head backward or sitting up in bed — lead to sudden vertigo (a feeling that the room is spinning).

BPPV isn’t a sign of a serious problem, and it usually disappears on its own within a few days of the first episode. (It could take several weeks for some people.) However, the symptoms of BPPV can be very frightening and may be dangerous, especially in adults over the age of 65. The unsteadiness of BPPV can lead to falls, which are a leading cause of fractures.

### **Who does benign paroxysmal positional vertigo affect?**

BPPV can affect people of all ages, but it’s most common in adults over the age of 50. About half of all people in this age range experience at least one episode of BPPV in their lifetime.

BPPV can affect children, but it’s rare.

Benign paroxysmal positional vertigo is the most common inner ear disorder. In fact, approximately 20% of people who are evaluated for dizziness are diagnosed with BPPV.

### **Is BPPV permanent?**

BPPV usually goes away on its own. However, until it’s successfully treated, it can come back. In some cases, months — or even years — go by before another episode occurs.

## **Symptoms and Causes**

Vertigo is the main symptom of BPPV. This vertigo sensation can range from mild to severe and may last seconds, or up to 1 minute. It may be accompanied by other benign paroxysmal positional vertigo symptoms, including:

* Dizziness.
* Lightheadedness.
* Balance problems.
* Nausea and vomiting.
* Blurred vision.
* Nystagmus (rapid, involuntary eye movements).

While BPPV usually only affects one ear at a time, it can potentially affect both ears.

### **What triggers BPPV?**

BPPV is almost always triggered by a change in your head’s position. Some people may notice symptoms when lying down or sitting up in bed. Others might notice symptoms when they tilt their head back or to the side. These symptoms often worsen with age due to normal wear and tear of the inner ear structures.

In some instances, BPPV may be a symptom of another inner ear condition, such as:

* Labyrinthitis.
* Vestibular neuritis.
* Acoustic neuroma.

Additionally, BPPV may accompany migraines, or it may develop after a traumatic event — such as a fall, accident or sports injury.

### **Why do changes in head position cause BPPV?**

BPPV develops when calcium carbonate particles (otoconia) move into your semicircular canals (inner ear structures that control balance) and become trapped. Normally, the otoconia are part of your utricle, a vestibular organ next to your semicircular canals.

In your utricle, the otoconia may become loose due to injury, infection or age. As your head position changes, the otoconia roll around and push on tiny hair-like structures (cilia) within your semicircular canals. Those cilia help transmit information about balance to your brain. Vertigo develops when the cilia are stimulated by the rolling otoconia.

## **Diagnosis and Tests**

Your healthcare provider can diagnose BPPV during an office visit. They’ll perform a physical examination and ask questions about your symptoms and medical history.

## **Management and Treatment**

The most effective benign paroxysmal positional vertigo treatments involve physical therapy exercises. The goal of these exercises is to move the calcium carbonate particles out of your semicircular canals and back into your utricle. Here, the particles resorb more easily and don’t cause uncomfortable symptoms.

You can also take motion sickness medications to relieve your symptoms. However, you shouldn’t take these medications long term.

### **Benign paroxysmal positional vertigo exercises: How do they work?**

BPPV exercises — sometimes called canalith repositioning procedures — typically take about 15 minutes to complete. Particle repositioning involves a series of physical movements that change the position of your head and body. These actions shift the otoconia out of your semicircular canals and back into their proper location in your utricle.

A single particle repositioning procedure is effective in treating about 80% to 90% of cases of BPPV. Additional BPPV exercises may be needed if symptoms continue.

Your healthcare provider can perform this maneuver during an office visit. They can also demonstrate how to do these exercises at home to ease your BPPV symptoms.

In the meantime, here are some step-by-step instructions to try:

* Step 1: Start by sitting up on a bed or table. Turn your head 45 degrees toward the affected ear.
* Step 2: Quickly lie back, keeping your head turned toward the affected ear as you lie back with your head slightly over the edge of the bed or table. Wait about a minute or until you stop having symptoms.
* Step 3: Without raising your head, turn your head quickly in the opposite direction so that your “good” ear is parallel with — but slightly over the edge of — the table or bed. Wait about a minute or until you stop having symptoms.
* Step 4: Roll onto your side. Continue to turn your head another 90 degrees in the same direction as step 3 so that your nose is now facing the floor. Wait about a minute.
* Step 5: Keeping your chin tucked in toward your shoulder, sit up in the direction your body is facing. Follow any post-particle repositioning instructions given to you by your healthcare provider.

### **Can BPPV go away on its own?**

Yes. In many cases, BPPV goes away on its own eventually. But it can come back. If it does, your healthcare provider can tell you how to manage your symptoms when they occur.

## **Outlook / Prognosis**

The good news is that BPPV doesn’t indicate a serious health problem. Even so, dealing with your symptoms can be scary and frustrating. Your healthcare provider can teach you how to do BPPV exercises at home so you can manage your symptoms at the first sign of trouble.

#### **How long does BPPV last?**

In most cases, a BPPV episode lasts 1 to 2 minutes. Your symptoms may be mild, or they may be so severe that you throw up. You might even lose your balance when you try to stand or walk.

## **Prevention**

You can’t prevent BPPV, but you can manage it with particle repositioning exercises. To reduce your risk of trauma-related BPPV, be sure to wear a helmet when biking, playing contact sports or participating in other similar activities.

### **When should I see my healthcare provider?**

If you’ve experienced a BPPV episode, schedule an appointment with your healthcare provider. They can demonstrate physical therapy exercises to reduce your symptoms.

If you have dizziness combined with a severe headache, chest pain or an irregular heartbeat, call 911 right away.

## **Diagnostic Considerations**

Differential diagnosis for benign paroxysmal positional vertigo (BPPV) can be divided into 3 main areas of pathology: labyrinthine, vestibular nerve, and central sites of lesions. These are subdivided further as follows:

* Ménière disease is probably the most frequent misdiagnosis applied to chronic BPPV because patients may fail to recognize the positional provocation. It is also confusing because BPPV can occur concomitantly.
* Inner ear concussion may cause transient positional vertigo and nystagmus and can be confused with BPPV.
* Alcohol intoxication can cause positional nystagmus, is persistent in a given position, and varies according to head position.
* With labyrinthitis, the nystagmus is spontaneous, persistent, predominantly linear-horizontal and affected little by head position. Caloric testing often reveals unilateral weakness.
* For vascular loop syndrome, the diagnostic criteria have been defined poorly. This diagnosis should be considered only after all other possibilities are exhausted.
* Positional nystagmus of central origin is seldom transient and may be down-beating, whereas BPPV is usually up-beating. Frequently, other CNS signs are present.
* Positional down-beating nystagmus is often associated with a lesion of the nodulus (which normally inhibits vertical vestibuloocular reflex gain) from stroke, multiple sclerosis, Arnold-Chiari malformation, ischemia, cerebellar degeneration, and intoxication.
* Central positional nystagmus may indicate a posterior fossa lesion such as acoustic neuroma or meningioma.
* Vertebral artery insufficiency is also a differential diagnosis for BPPV.
* Cervical vertigo, or head extension vertigo, is a somewhat ill-defined entity of symptoms that arises with head extension, quite possibly a manifestation of vascular compression (vertebral arteries).
* With orthostatic hypotension, low blood volume or poor systemic arterial tone can account for hypoperfusion of the brain and cause dizziness. Patients feel better when lying down and are symptomatic when sitting up.

## **Differential Diagnoses**

* Inner Ear, Meniere Disease, Medical Treatment
* Inner Ear, Meniere Disease, Surgical Treatment
* Labyrinthitis Ossificans

## 

## **Epidemiology**

### Frequency

United States

In one study, the age- and sex-adjusted prevalence of BPPV was 64 per 100,000. Other studies corroborate this finding.

### Race

Little published information is available on racial predilection.

### Sex

The sex distribution seems to indicate a predilection for women (64%).

### Age

BPPV seems to have a predilection for the older population (average age, 51-57.2 y). It is rarely observed in individuals younger than 35 years without a history of antecedent head trauma.

**BPPV Treatment: Medications and Their Side Effects**

## Primary Treatment for BPPV

* The first-line and most effective treatment for BPPV is canalith repositioning maneuvers (e.g., Epley maneuver), which physically move the dislodged otoconia back into the utricle. These maneuvers are performed by trained healthcare providers or via guided home exercises.
* Medications are generally not recommended as primary treatment because they do not address the underlying cause and only mask symptoms.

## Medications Used in BPPV

* Vestibular suppressants (used short-term to relieve severe vertigo and nausea):
  + Antihistamines: Meclizine, dimenhydrinate
  + Benzodiazepines: Diazepam, clonazepam
  + Anticholinergics: Scopolamine
  + Antiemetics: Promethazine, ondansetron

## Side Effects of Medications

| **Medication Class** | **Common Side Effects** | **Notes** |
| --- | --- | --- |
| Antihistamines | Drowsiness, dry mouth, dizziness, blurred vision | Can cause sedation and impair balance, increasing fall risk |
| Benzodiazepines | Sedation, dizziness, cognitive impairment, dependence risk | Should be used short-term due to tolerance and addiction potential |
| Anticholinergics | Dry mouth, blurred vision, urinary retention, confusion | Not recommended for elderly due to cognitive side effects |
| Antiemetics | Drowsiness, dry mouth, constipation | Used to control nausea during acute vertigo episodes |

## **Key Genomic Findings:**

* Familial Inheritance:  
  Several studies have shown that BPPV can run in families, often with an autosomal dominant inheritance pattern with reduced penetrance. This means that a single copy of a mutated gene can increase susceptibility, but not everyone with the mutation will develop BPPV.
* Candidate Genes and Variants:
  + PCDHGA10 (Protocadherin Gamma A10):  
    A frameshift insertion variant (rs113784532) in this gene was identified in familial BPPV cases. This mutation leads to protein aggregation in vestibular tissues and is associated with earlier disease onset.
  + LOXL1 and LOXL1-AS1:  
    Variants in these genes, particularly an intronic variant rs1078967 in LOXL1, have been linked to BPPV susceptibility, though their functional significance is still unclear.
  + Vitamin D Receptor (VDR) Gene:  
    Some studies investigated VDR variants due to the role of calcium metabolism in otoconia maintenance, but no definitive causative variants have been confirmed

**Recommendations that clinicians do as follows**:

* Diagnose posterior semicircular canal BPPV when vertigo associated with torsional, upbeating nystagmus is provoked by the Dix-Hallpike maneuver, performed by bringing the patient from an upright to a supine position with the head turned 45° to one side, the neck extended 20°, and the affected ear aimed downward
* Treat, or refer to a clinician who can treat, patients with posterior canal BPPV with a canalith repositioning procedure
* Not impose postprocedural postural restrictions after canalith repositioning procedure for posterior canal BPPV
* Perform, or refer the patient to a clinician who can perform, a supine roll test to assess for lateral semicircular canal BPPV if the patient has a history compatible with BPPV and the Dix-Hallpike test results in horizontal or no nystagmus
* Differentiate, or refer the patient to a clinician who can differentiate, BPPV from other causes of imbalance, dizziness, and vertigo
* Assess patients with BPPV for factors that modify management, including impaired mobility or balance, central nervous system disorders, a lack of home support, and/or increased risk for falling
* Reassess patients within 1 month after an initial period of observation or treatment to document resolution or persistence of symptoms
* Evaluate, or refer to a clinician who can evaluate, patients with persistent symptoms for unresolved BPPV and/or underlying peripheral vestibular or CNS disorders
* Educate patients regarding the impact of BPPV on their safety, the potential for disease recurrence, and the importance of follow-up
* Not perform radiographic imaging in a patient who meets diagnostic criteria for BPPV in the absence of additional signs and/or symptoms inconsistent with BPPV that warrant imaging
* Not perform vestibular testing in a patient who meets diagnostic criteria for BPPV in the absence of additional vestibular signs and/or symptoms inconsistent with BPPV that warrant testing
* Not routinely treat BPPV with vestibular suppressant medications such as antihistamines and/or benzodiazepines

**Doctor-patient conversation about Benign Paroxysmal Positional Vertigo (BPPV)**

Doctor:  
“Hello [Patient’s Name]. Based on your symptoms and examination, you have a condition called Benign Paroxysmal Positional Vertigo, or BPPV. This is a common cause of dizziness where tiny crystals inside your inner ear become dislodged and move into the semicircular canals, which affects your balance.”

Patient:  
“What causes these crystals to move? Is it serious?”

Doctor:  
“The crystals, called otoconia, can become loose for various reasons, including age-related changes, minor head injuries, or sometimes without any clear cause. The condition is benign, meaning it’s not dangerous or life-threatening, but it can cause brief episodes of spinning dizziness, especially when you move your head in certain positions.”

Patient:  
“How long will the dizziness last? Will it go away on its own?”

Doctor:  
“BPPV often improves on its own within a few weeks to months, but symptoms can recur. About one-third of patients may have a recurrence within four years. Meanwhile, you can reduce symptoms by moving your head slowly, especially when getting out of bed.”

Patient:  
“What treatments are available?”

Doctor:  
“The most effective treatment is a series of head and body movements called the Epley maneuver, which helps reposition the crystals back to where they belong in your ear. This can often be done in the clinic and may provide immediate relief. If needed, you can also learn exercises like the Brandt-Daroff exercises to do at home.”

Patient:  
“Are there any medications I should take?”

Doctor:  
“Medications like anti-nausea drugs or vestibular suppressants can help with severe symptoms but don’t cure BPPV. They are usually not recommended for long-term use because they can delay your recovery.”

Patient:  
“Is it safe for me to drive or work?”

Doctor:  
“If you feel dizzy or if certain activities trigger your vertigo, it’s best to avoid driving or operating machinery until your symptoms improve. You should also inform your employer if your job involves any safety risks, like working at heights.”

Patient:  
“When should I come back or see a specialist?”

Doctor:  
“If your symptoms don’t improve within four weeks, if they worsen, or if you have frequent recurrences, you should return for further evaluation. Also, if the diagnosis is uncertain or if repositioning maneuvers don’t help, a specialist referral may be necessary.”

Patient:  
“Thank you, doctor. That helps me understand what to expect and how to manage this.”

Doctor:  
“You’re welcome. We’ll work together to manage your symptoms and keep you safe. Please don’t hesitate to contact us if you have any questions or concerns.”

REFERENCES

<https://www.mayoclinic.org/diseases-conditions/vertigo/symptoms-causes/syc-20370055>

<https://www.hopkinsmedicine.org/health/conditions-and-diseases/benign-paroxysmal-positional-vertigo-bppv>

<https://www.ncbi.nlm.nih.gov/books/NBK470308/#article-38044.s9>

<https://emedicine.medscape.com/article/884261-overview#a6>

[Benign Paroxysmal Positional Vertigo (BPPV): Treatment, Symptoms & Causes](https://my.clevelandclinic.org/health/diseases/11858-benign-paroxysmal-positional-vertigo-bppv#overview)

**Benign ear cysts or tumor**

An ear tumor is a mass or lump of abnormal cells that forms in your ear. Most ear tumors are benign, or noncancerous. But some ear tumors are malignant (cancerous).

Ear tumors can form in any part of your ear, including your inner ear, middle ear or outer ear. They may affect your hearing. It’s important to get tumors checked early on, before they potentially cause long-term issues.

#### **Ear cyst and an ear tumor**

Both cysts and tumors can cause a bump or lump on or in your ear:

* Cysts are small sacs that often contain fluid and usually aren’t cancerous. The most common ear cysts are sebaceous cysts (epidermal inclusion cysts). They can develop in your ear canal, behind your ear or on your earlobe.
* Tumors are solid masses of tissue that may or may not be cancerous. Most ear tumors are benign growths that form on your outer ear.

#### **Types of benign (noncancerous) ear tumors**

Noncancerous ear tumors can block your ear canal, leading to earwax buildup. Some types that form inside your ear can grow big enough to harm the organs that help you hear and balance:

* Acoustic neuromas (also called vestibular schwannomas) form on your vestibulocochlear nerve. This nerve in your inner ear connects to your brain.
* Adenomas are rare noncancerous tumors that develop in your middle ear.
* Cholesteatomas are sacs of fluid, air or skin cells that form behind your eardrum in your middle ear. They can lead to hearing loss if not treated.
* Exostoses and osteomas are benign bone tumors that form on bones in your external ear canal.
* Glomus tympanicum paraganglioma affects your tympanic nerve. This nerve in your middle ear connects to your eardrum.
* Keloids are a type of fibrous scar tissue. They can form after an ear piercing or trauma to your outer ear.

#### **Types of malignant (cancerous) ear tumors**

Cancer can form inside or on the outside of your ear. But ear cancer is rare.

Most cancer that affects your ear is actually skin cancer. Approximately 6% to 10% of skin cancers start on the outer ear. Skin cancers that may affect your ear include:

* Basal cell carcinoma.
* Melanoma.
* Squamous cell carcinoma.

Cancers that directly affect your middle or inner ear are even more uncommon:

* Adenoid cystic carcinoma is a rare cancer that most often forms in your salivary glands. In even rarer instances, it may form in your ear canal.
* Ceruminous adenoma forms in the cells that make earwax. This cancer doesn’t spread, but it can destroy parts of your ear canal.
* Rhabdomyosarcoma is a rare childhood cancer that affects muscle tissue. It may develop in your head or neck, including your middle ear.

## **Symptoms and Causes**

Symptoms of an ear tumor vary depending on the tumor type and the part of your ear it affects. Signs of an ear tumor include:

* A bump on the outer part of your ear.
* Dizziness or balance problems.
* Ear bleeding or discharge.
* Ear pain.
* Headaches.
* Hearing loss.
* Non Healing wound or sore.
* Skin discoloration, new moles or changes to a mole.
* Swollen lymph nodes.
* Tinnitus (ringing in your ears).
* Weak facial muscles.

### **What causes an ear tumor?**

Ear tumors occur when your body makes new cells faster than usual. Sometimes, old, damaged cells don’t die off the way they should. Clumps of old and new cells group together, forming a tumor.

Cancerous ear tumors occur when the cells grow uncontrollably. Untreated, these malignant cells may spread to other locations in your body (metastatic cancer).

#### **Risk factors for ear tumors**

People of all ages, including children, can get ear tumors. Factors that increase your chances of developing an ear tumor include:

* Chronic ear infections.
* Ear piercings.
* Inherited conditions, such as neurofibromatosis (NFS).
* Prior radiation exposure.
* Repeated exposure to cold water, such as from scuba diving (surfer’s ear).
* Smoking, including exposure to secondhand smoke.

### **Complications of ear tumors**

Ear tumors, even ones that aren’t ear cancer, can cause hearing loss. They can cause frequent infections and impact the organs inside your ear that help you hear and balance.

Your healthcare provider can advise you on when it’s safe to monitor a tumor versus when you’ll need treatment to prevent issues like these.

## **Diagnosis and Tests**

Your healthcare provider may notice a tumor by examining your ear during a physical exam. They may refer you to an audiologist (hearing specialist) for a hearing test. You’ll likely also see an ear, nose and throat doctor (an ENT or otolaryngologist) who specializes in ear disorders.

If your provider suspects your ear tumor may be cancerous, they’ll perform a biopsy. This procedure removes the tumor or cells from the tumor. A pathologist (a doctor who studies diseases) examines the samples in a lab to make a diagnosis.

Because inner ear tumors are difficult to reach and biopsy, your provider may order a CT scan or MRI to learn more about them. In rare cases, you may need surgery to remove the tumor before a provider can diagnose it.

## **Management and Treatment**

Some noncancerous ear tumors don’t need treatment unless the tumor affects your hearing or balance. Your healthcare provider may monitor the tumor to keep an eye on its growth and check in with you about any symptoms you’re experiencing.

The most common treatments remove the growth through surgery or other methods. For example, providers often use radiosurgery (gamma knife surgery) to remove benign ear tumors like acoustic neuromas. This procedure directs high doses of radiation directly to the tumor. It’s not surgery, but it removes tumors with surgical-like precision.

To treat keloids, your healthcare provider may inject the tumor with a corticosteroid. Some keloids require surgical removal followed by radiation therapy to destroy any remaining cells.

### **How are malignant ear tumors treated?**

Dermatologists (doctors who specialize in skin diseases) treat skin cancer on the outer ear. Treatment for cancerous ear tumors depends on the cancer type and location. Treatment might include:

* Mohs surgery to remove the cancerous skin cells.
* Radiation therapy, radiosurgery or chemotherapy to destroy cancer cells.
* Surgery to remove tumors and (potentially) nearby lymph nodes where cancer cells may have spread.

## **Outlook / Prognosis**

Small ear tumors that aren’t causing symptoms may not need treatment at all. But if a tumor is causing hearing loss or other issues, you may need surgery to remove it. Most people who get surgery or other treatments for benign ear tumors recover well.

The prognosis for ear cancer depends on things like the type of tumor, where it’s located and its stage (how much it’s spread). But even with melanoma (the deadliest form of skin cancer), the five-year survival rate is 99% when surgery removes the cancer before it’s spread.

Skin cancer on your outer ear can sometimes come back and spread to other parts of your body. You’ll need regular skin exams to keep an eye out for returning cancer.

### **When should I see my healthcare provider?**

Call your healthcare provider if you experience:

* Balance problems or dizziness.
* Ear bleeding, discharge or pain.
* Hearing loss.
* Ringing in the ears (tinnitus).
* Skin changes to your ear, including a new lump, mole or sore.

### **What questions should I ask my healthcare provider?**

## 1. Is my ear tumor malignant or benign?

Most ear tumors are benign (noncancerous), such as sebaceous cysts, osteomas, exostoses, or epidermal inclusion cysts. However, some tumors can be malignant (cancerous), including squamous cell carcinoma or other rare cancers affecting the outer, middle, or inner ear. Your healthcare provider will determine this based on clinical evaluation, imaging, and sometimes biopsy.

## 2. What type of ear tumor do I have?

Ear tumors can arise in different parts of the ear and include:

* Benign tumors: Sebaceous cysts, osteomas (bony growths), exostoses (bony outgrowths often from cold water exposure), keloids, and epidermal cysts.
* Malignant tumors: Squamous cell carcinoma (common in the outer ear), basal cell carcinoma, and rare tumors affecting the middle or inner ear.  
  Your doctor will classify the tumor type after examination and diagnostic tests such as MRI, CT scans, and possibly biopsy.

## 3. What’s the best treatment for me?

* Benign tumors: Often monitored if asymptomatic. If causing symptoms like hearing loss, infection, or cosmetic issues, surgical removal is the preferred treatment. Keloids may be treated with corticosteroid injections or surgery with adjunct radiation.
* Malignant tumors: Require more aggressive treatment including surgery, radiation therapy, and sometimes chemotherapy depending on the tumor type and stage. Early diagnosis improves outcomes.  
  Treatment choice depends on tumor size, location, symptoms, and whether it is benign or malignant.

## 4. What are the treatment risks and side effects?

* Surgery: Risks include infection, bleeding, hearing loss, facial nerve injury (leading to weakness), dizziness, and scarring. Hearing usually improves after benign tumor removal but may be affected in malignant cases or extensive surgery.
* Radiation therapy: May cause skin irritation, hearing changes, and rarely damage to surrounding tissues.
* Medications (e.g., corticosteroid injections for keloids): Possible local skin thinning, discoloration, or discomfort.  
  Your healthcare provider will discuss specific risks based on your treatment plan.

## 5. Should I look out for signs of complications?

Yes, watch for:

* Sudden or worsening hearing loss
* Persistent or severe ear pain
* Ear discharge, especially if bloody or foul-smelling
* Facial weakness or paralysis
* Swelling or lumps around the ear or neck
* Dizziness or balance problems
* Non-healing sores or ulcers on the ear  
  If you notice any of these, seek medical attention promptly

**Differential Diagnosis (DDx) of Ear Tumors**

Outer Ear Tumors

* Benign:
  + Sebaceous cysts
  + Osteomas (bony growths)
  + Exostoses (bony outgrowths, often from cold water exposure)
  + Keloids
  + Ceruminous gland adenomas
* Malignant:
  + Squamous cell carcinoma (most common skin cancer of the ear)
  + Basal cell carcinoma
  + Melanoma

## Middle Ear Tumors

Middle ear tumors are rare and mostly benign but can be malignant. Common types include:

* Benign:
  + Middle ear adenoma: Rare epithelial tumor with neuroendocrine features; presents with hearing loss and tinnitus.
  + Paraganglioma (glomus tympanicum): Highly vascular tumor causing pulsatile tinnitus and conductive hearing loss.
  + Schwannoma: Arises from facial nerve or other cranial nerves; may cause facial weakness.
  + Ceruminous adenoma: Arises from ceruminous glands, usually in the external auditory canal but can extend.
  + Pleomorphic adenoma: Rarely in middle ear.
  + Meningioma: Can extend from intracranial sites into the middle ear.
  + Endolymphatic sac tumor: Rare, locally aggressive tumor causing bone destruction.
* Malignant:
  + Adenoid cystic carcinoma
  + Squamous cell carcinoma invading middle ear
  + Metastatic tumors (lung, breast, thyroid, colon)
* Other conditions mimicking tumors:
  + Cholesteatoma (non-neoplastic but destructive)
  + Chronic otitis media with granulation tissue
  + Malignant otitis externa

## Inner Ear Tumors

* Vestibular schwannoma (acoustic neuroma): Most common tumor of the cerebellopontine angle/internal auditory canal causing hearing loss, tinnitus, and balance issues.
* Meningioma: Can occur in the internal auditory canal or cerebellopontine angle.
* Lipoma, arachnoid cyst, hemangioma: Rare benign lesions.
* Metastatic lesions: Secondary involvement from distant cancers.

**Epidemiology of Ear Cysts**

* Preauricular cysts and sinuses are congenital malformations related to developmental defects of the first and second pharyngeal arches. Their frequency varies by population:
  + About 0.1–0.9% in the US,
  + Around 0.9% in the UK,
  + Higher prevalence of 4–10% in parts of Asia and Africa.  
    These cysts are often asymptomatic but can become infected.
* Preauricular malformations (including cysts and pits) occur in approximately 1 in 12,500 births.
* Dermoid cysts of the auricle (ear) are considered very rare, but some studies suggest they may be more common than previously thought, with reported prevalence in the auricular area ranging from about 3% to 10% among all dermoid cysts of the head and neck. These cysts usually present in childhood.
* Epidermoid cysts of the external auditory canal are extremely rare, with only a handful of cases reported in adults. They arise from epidermal elements and may occasionally undergo malignant transformation, though this is very uncommon.
* Overall, malformations and cysts of the external ear are uncommon but not rare, with congenital cystic lesions representing a small subset of external ear anomalies.
* Sebaceous (epidermal inclusion) cysts are among the most common types of ear cysts and can occur on the ear canal, behind the ear, or on the earlobe

**Doctor-patient conversation for discussing an ear tumor**

Doctor:  
“Hello [Patient’s Name]. I want to discuss the findings regarding the lump in your ear. Based on the tests we’ve done, you have a tumor in your ear. I understand this news can be concerning, so I want to explain what this means and answer any questions you have.”

Patient:  
“Is the tumor cancerous? Should I be worried?”

Doctor:  
“At this point, we need to determine whether the tumor is benign (noncancerous) or malignant (cancerous). Many ear tumors are benign and can be treated effectively. We will likely need a biopsy or further imaging to be sure. I will explain all the options and what to expect as we move forward.”

Patient:  
“What kind of tumor do I have?”

Doctor:  
“There are different types of ear tumors depending on their location and tissue of origin. Some are benign growths like cysts or osteomas, while others can be more aggressive. Once we have all the test results, I will share the exact diagnosis with you in clear terms.”

Patient:  
“What treatment do you recommend?”

Doctor:  
“The best treatment depends on the tumor type, size, and whether it’s benign or malignant. For benign tumors, surgery to remove the growth is often sufficient. For malignant tumors, treatment may involve surgery, radiation, or other therapies. I will discuss the best approach tailored to your situation.”

Patient:  
“What are the risks and side effects of treatment?”

Doctor:  
“All treatments carry some risks. Surgery may involve risks like infection, bleeding, or damage to nearby nerves, which could affect hearing or facial movement. Radiation can cause skin irritation or hearing changes. I will explain these risks in detail and answer any questions you have.”

Patient:  
“Are there signs I should watch for that mean complications?”

Doctor:  
“Yes. You should contact us if you notice sudden hearing loss, severe pain, facial weakness, dizziness, or any new swelling or discharge from the ear. Early reporting of symptoms helps us manage complications promptly.”

Doctor:  
“Please feel free to ask any questions now or at any time. We will work together to ensure you understand your condition and treatment options.”

REFERENCES

<https://emedicine.medscape.com/article/845288-overview>

[Ear Tumors: Symptoms, Types & Treatment](https://my.clevelandclinic.org/health/diseases/17587-ear-tumors#overview)

**Bronchitis**

Bronchitis is an inflammation of the lining of your bronchial tubes. These tubes carry air to and from your lungs. People who have bronchitis often cough up thickened mucus, which can be discolored. Bronchitis may start suddenly and be short term (acute) or start gradually and become long term (chronic).

Acute bronchitis, which often develops from a cold or other respiratory infection, is very common. Also called a chest cold, acute bronchitis usually improves within a week to 10 days without lasting effects, although the cough may linger for weeks.

Chronic bronchitis, a more serious condition, is a constant irritation or inflammation of the lining of the bronchial tubes, often due to smoking. If you have repeated bouts of bronchitis, you may have chronic bronchitis, which requires medical attention. Chronic bronchitis is one of the conditions included in chronic obstructive pulmonary disease (COPD).

**Symptoms**

If you have acute bronchitis, you may have cold symptoms, such as:

* Cough
* Production of mucus (sputum), which can be clear, white, yellowish-gray or green in color — rarely, it may be streaked with blood
* Sore throat
* Mild headache and body aches
* Slight fever and chills
* Fatigue
* Chest discomfort
* Shortness of breath and wheezing

While these symptoms usually improve in about a week, you may have a nagging cough that lingers for several weeks.

For chronic bronchitis, signs and symptoms may include:

* Cough
* Production of mucus
* Fatigue
* Chest discomfort
* Shortness of breath

Chronic bronchitis is typically defined as a productive cough that lasts at least three months, with bouts that recur for at least two consecutive years. If you have chronic bronchitis, you're likely to have periods when your cough or other symptoms worsen. It's also possible to have an acute infection on top of chronic bronchitis.

### **When to see a doctor**

Contact your doctor or clinic for advice if your cough:

* Is accompanied by a fever higher than 100.4 F (38 C).
* Produces blood.
* Is associated with serious or worsening shortness of breath or wheezing.
* Includes other serious signs and symptoms, for example, you appear pale and lethargic, have a bluish tinge to your lips and nail beds, or have trouble thinking clearly or concentrating.
* Lasts more than three weeks.

Before you go in, your doctor or clinic can give you guidance on how to prepare for your appointment.

**Causes**

Acute bronchitis is usually caused by viruses, typically the same viruses that cause colds and flu (influenza). Many different viruses — all of which are very contagious — can cause acute bronchitis. Antibiotics don't kill viruses, so this type of medication isn't useful in most cases of bronchitis.

Viruses spread mainly from person to person by droplets produced when an ill person coughs, sneezes or talks and you inhale the droplets. Viruses may also spread through contact with an infected object. This happens when you touch something with the virus on it and then touch your mouth, eyes or nose.

The most common cause of chronic bronchitis is cigarette smoking. Air pollution and dust or toxic gases in the environment or workplace also can contribute to the condition.

**Risk factors**

Factors that increase your risk of bronchitis include:

* **Cigarette smoke.** People who smoke or who live with a smoker are at higher risk of both acute bronchitis and chronic bronchitis.
* **Low resistance.** This may result from another acute illness, such as a cold, or from a chronic condition that compromises your immune system. Older adults, infants and young children have greater vulnerability to infection.
* **Exposure to irritants on the job.** Your risk of developing bronchitis is greater if you work around certain lung irritants, such as grains or textiles, or are exposed to chemical fumes.
* **Gastric reflux.** Repeated bouts of severe heartburn can irritate your throat and make you more prone to developing bronchitis

**Complications**

Although a single episode of bronchitis usually isn't cause for concern, it can lead to pneumonia in some people. Repeated bouts of bronchitis, however, may mean that you have chronic obstructive pulmonary disease (COPD).

**Prevention**

To reduce your risk of bronchitis, follow these tips:

* **Get an annual flu shot.** Many cases of acute bronchitis result from influenza, a virus. Getting a yearly flu vaccine can help protect you from getting the flu. Also ask your doctor or clinic if you need a vaccination that protects against certain types of pneumonia.
* **Wash your hands.** To reduce your risk of catching a viral infection, wash your hands frequently and get in the habit of using alcohol-based hand sanitizers. Also, avoid touching your eyes, nose and mouth.
* **Avoid close contact with people who have a viral infection.** Stay away from people who have the flu or another respiratory illness.
* **Avoid cigarette smoke.** Cigarette smoke increases your risk of chronic bronchitis.
* **Wear appropriate face covering.** If you have COPD, consider wearing a face mask at work if you're exposed to dust or fumes. Talk to your employer about the appropriate protection. Wearing a face mask when you're going to be among crowds helps reduce exposure to infections.

**DIAGNOSIS**

During the first few days of illness, it can be difficult to distinguish the signs and symptoms of acute bronchitis from those of a common cold. During the physical exam, your doctor will use a stethoscope to listen closely to your lungs as you breathe.

In some cases, your doctor may suggest the following tests:

* **Chest X-ray.** A chest X-ray can help determine if you have pneumonia or another condition that may explain your cough. This is especially important if you smoke or have ever smoked.
* **Sputum tests.** Sputum is the mucus that you cough up from your lungs. It can be tested to see if you have illnesses that could be helped by antibiotics. Sputum can also be tested for signs of allergies.
* **Pulmonary function test.** During a pulmonary function test, you blow into a device called a spirometer, which measures how much air your lungs can hold and how quickly you can get air out of your lungs. This test checks for signs of asthma, chronic bronchitis or emphysema.

**Treatment**

Most cases of acute bronchitis get better without treatment, usually within a couple of weeks.

### **Medications**

In some circumstances, your doctor may recommend other medications, including:

* **Cough medicine.** If your cough keeps you from sleeping, you might try cough suppressants at bedtime.
* **Other medications.** If you have allergies, asthma or chronic obstructive pulmonary disease (COPD), your doctor may recommend an inhaler and other medications to reduce inflammation and open narrowed passages in your lungs.
* **Antibiotics.** Because most cases of acute bronchitis are caused by viral infections, antibiotics aren't effective. However, if your doctor suspects that you have a bacterial infection, he or she may prescribe an antibiotic.

### **Therapies**

If you have chronic bronchitis, you may benefit from:

* **Pulmonary rehabilitation.** This is a breathing exercise program in which a respiratory therapist teaches you how to breathe more easily and increase your ability to be physically active.
* **Oxygen therapy.** This delivers extra oxygen to help you breathe.

**Lifestyle and home remedies**

If you have bronchitis, to help you feel better, you may want to try the following self-care measures:

* **Get enough rest.** Rest and sleep help your body heal.
* **Drink plenty of fluids.** Staying hydrated can help to thin mucus.
* **Avoid lung irritants.** Don't smoke. Wear a mask when the air is polluted or if you're exposed to irritants, such as paint or household cleaners with strong fumes.
* **Use a humidifier.** Warm, moist air helps relieve coughs and loosens mucus in your airways. Be sure to clean the humidifier according to the manufacturer's recommendations to avoid the growth of bacteria and fungi in the water container.
* **Consider a face covered in cold air.** If cold air makes your cough worse and causes shortness of breath, put on a face mask or cover your mouth and nose with a scarf before you go outside.

## **Outlook / Prognosis**

Acute bronchitis usually isn’t serious. While frustrating, you have to wait out the symptoms for a few weeks. If you’re living with a heart condition or another breathing condition, like asthma, it could make your symptoms worse or last longer.

Chronic bronchitis can be a serious condition and might mean you have lung damage. While the damage can’t be reversed, your provider can help you manage your symptoms and have fewer flare-ups.

#### **Complications of bronchitis**

If you have an ongoing condition like asthma, diabetes, chronic obstructive pulmonary disease or heart failure, bronchitis might make it worse (exacerbation). Tell your healthcare provider if you have any ongoing conditions.

### **Can bronchitis go away on its own?**

Yes, acute bronchitis usually goes away on its own. It’s almost always caused by a virus, and you can’t get rid of most viruses with medicine. You can treat the symptoms at home while you wait for the inflammation to go down.

Bronchitis caused by something else may need treatment to help it go away. Chronic bronchitis usually doesn’t go away completely, but can get better with treatment.

### **How long does it take to get over bronchitis?**

Most people get over bronchitis in about two weeks, but it might take as long as three to six weeks. You can manage your symptoms at home with over-the-counter medicines while you get better. If you don’t feel better after three weeks, see your healthcare provider.

## **Living With**

If you have chronic bronchitis, you can reduce the frequency of your symptoms by treating underlying conditions, like COPD. You and your healthcare provider can make a plan together to treat your specific concerns

## **Common Questions**

Bronchitis vs. Pneumonia: How are they Different?

### **What’s the difference between bronchitis and pneumonia?**

Bronchitis is an inflammation of the airways leading to the lungs. Pneumonia is an inflammation of the lungs themselves.

Bronchitis causes inflammation and mucus in your trachea and bronchi that make you cough a lot. Pneumonia causes inflammation and fluid in the small sacs in your lungs (alveoli) that makes it hard to breathe. You also usually have a cough and a fever. Pneumonia is more serious than bronchitis.

While you could have an infection that causes both, bronchitis doesn’t usually turn into pneumonia.

### **What’s the difference between bronchitis and bronchiolitis?**

Bronchitis is inflammation in the larger airways (trachea and bronchi) coming into the lungs. Bronchiolitis is an inflammation of the next smaller airways (bronchioles) that come off of the bronchi. Children usually get bronchiolitis while adults get bronchitis.

### **Is menthol vapor rub good for bronchitis?**

You might use vapor rubs, like Vicks VapoRub® or Mentholatum® ointment, for anything that ails you and wonder if they work for bronchitis. Vapor rubs have ingredients in them intended to calm down coughs, so they may help your bronchitis symptoms. Don’t use vapor rubs on children under two without asking your pediatrician first.

## **Diagnostic Considerations**

Streptococcal pharyngitis is most commonly caused by group A streptococci (45%) and anaerobes (18%), which often occur as a co-infection.

Much of the concern about diagnosing streptococcal pharyngitis is related to the complications of infection, particularly acute rheumatic fever and poststreptococcal glomerulonephritis as a late complication. Therefore, maintaining a high level of suspicion for streptococci group A in the presence of pharyngitis is advisable.

Other medical issues/problems to consider include the following:

* Exercise-induced asthma
* Bacterial tracheitis
* Cough
* Cystic fibrosis
* Influenza
* Hyperreactive airway disease
* Retained foreign body
* Tonsillitis
* Occupational exposures

## 

## **Differential Diagnoses**

* Acute Sinusitis
* Alpha1-Antitrypsin (AAT) Deficiency
* Asthma
* Bacterial Pharyngitis
* Bronchiectasis
* Bronchiolitis
* Bronchitis
* Chronic Obstructive Pulmonary Disease (COPD)
* Chronic Sinusitis
* Gastroesophageal Reflux Disease
* Group A Streptococcal (GAS) Infections
* Influenza
* Viral Pharyngitis

## 

## **Epidemiology**

According to estimates from national interviews taken by the National Center for Health Statistics in 2006, approximately 9.5 million people, or 4% of the population, were diagnosed with chronic bronchitis. These statistics may underestimate the prevalence of chronic obstructive pulmonary disease by as much as 50%, because many patients underreport their symptoms, and their conditions remain undiagnosed.

An overdiagnosis of chronic bronchitis by patients and clinicians has also been suggested, however. The term bronchitis is often used as a common descriptor for a nonspecific and self-limited cough, thereby falsely increasing its incidence even though the patient does not meet the criteria for diagnosis.

In one study, acute bronchitis affected 44 of 1000 adults annually, and 82% of episodes occurred in fall or winter.By way of comparison, 91 million cases of influenza, 66 million cases of the common cold, and 31 million cases of other acute upper respiratory tract infections occurred that year.

Acute bronchitis is common throughout the world and is one of the top 5 reasons for seeking medical care in countries that collect such data. No difference in racial distribution is reported, though bronchitis occurs more frequently in populations with a low socioeconomic status and in people who live in urban and highly industrialized areas.

In terms of gender-specific incidence, bronchitis affects males more than females. In the United States, up to two thirds of men and one fourth of women have emphysema at death. Although found in all age groups, acute bronchitis is most frequently diagnosed in children younger than 5 years, whereas chronic bronchitis is more prevalent in people older than 50 years.

**Bronchitis Treatment: Drugs and Their Side Effects**

## 1. General Approach

* Most cases of acute bronchitis are viral and resolve without antibiotics. Treatment focuses on symptom relief.
* Chronic bronchitis or bacterial infections may require additional therapies.

## 2. Medications Commonly Used

| **Drug Class** | **Examples** | **Purpose** | **Common Side Effects** |
| --- | --- | --- | --- |
| Antibiotics | Azithromycin, Amoxicillin, Doxycycline, Levofloxacin, Augmentin | Used if bacterial infection suspected or confirmed | Diarrhea, nausea, allergic reactions, antibiotic resistance risk |
| Cough Suppressants | Dextromethorphan, Codeine | Reduce cough, especially if non-productive and disturbing sleep | Drowsiness, dizziness, constipation (codeine), potential for dependence |
| Expectorants | Guaifenesin (Mucinex) | Loosen mucus to help clear airways | Nausea, vomiting, dizziness |
| Bronchodilators | Albuterol (inhaler), Ipratropium | Relax airway muscles, improve airflow | Tremor, nervousness, increased heart rate, dry mouth |
| Corticosteroids | Inhaled (Beclomethasone), Oral (Prednisone) | Reduce airway inflammation, especially in chronic bronchitis or asthma overlap | Oral thrush (inhaled), increased blood sugar, mood changes, immunosuppression (systemic) |
| Pain Relievers/Fever Reducers | Acetaminophen, Ibuprofen, Naproxen | Reduce fever, body aches | Liver toxicity (acetaminophen in overdose), stomach upset, bleeding risk (NSAIDs) |

## 3. Additional Treatments

* Antiviral medications:  
  Used if bronchitis is caused by influenza or other viral infections; e.g., oseltamivir. Side effects include nausea and vomiting.
* Supportive care:  
  Rest, hydration, humidified air, and avoiding irritants like smoke.

## 4. Important Notes

* Antibiotics are not routinely recommended for acute bronchitis unless bacterial infection is suspected (e.g., prolonged symptoms, high fever, purulent sputum).
* Overuse of antibiotics can lead to resistance and side effects.
* Bronchodilators are helpful if wheezing or airflow obstruction is present.
* Corticosteroids are generally reserved for chronic bronchitis or bronchospasm.
* Cough suppressants should be used cautiously and only if cough is non-productive and interfering with sleep.

## **GENOMIC DATA**

## 1. CFTR Gene Mutations

* Mutations in the CFTR (Cystic Fibrosis Transmembrane Conductance Regulator) gene, well-known for causing cystic fibrosis, have been linked to chronic bronchitis and bronchial asthma.
* Common mutations such as F508del, W1282X, and N1303K were found in a subset of patients with chronic bronchitis, suggesting a hereditary predisposition.
* About 32.3% of parents of affected children showed hereditary predisposition, reinforcing the genetic basis of chronic bronchitis in these populations.
* CFTR dysfunction may impair mucociliary clearance, increasing susceptibility to chronic airway inflammation.

## 2. Heritability Estimates from Twin Studies

* Twin studies show moderate heritability of chronic bronchitis, especially in women, with estimates around 40–55% after adjusting for smoking and age.
* In women, genetic factors appear to play a stronger role, while in men familial environmental factors contribute more.
* This suggests that genetics influences susceptibility beyond environmental exposures like smoking.

## 3. Other Genetic Variants Linked to Bronchiolitis and Bronchitis

* Variants in genes such as CDHR3 and GSDMB have been associated with susceptibility to acute viral bronchiolitis in infants, which can predispose to chronic respiratory conditions including asthma and bronchitis later in life.
* These genes are involved in immune responses and epithelial integrity in the airways.

**Doctor-patient conversation about bronchitis**

Doctor:

“Hello [Patient’s Name]. You’ve come in with symptoms of bronchitis, which is an inflammation of the airways in your lungs. It usually causes coughing, sometimes with mucus, and can make you feel tired or short of breath.”

Patient:

“Is this something serious? How long will it last?”

Doctor:

“Most cases of bronchitis are caused by viruses, similar to a chest cold, and they tend to improve on their own within about three weeks. It’s important to know that antibiotics usually don’t help because they don’t work against viruses.”

Patient:

“But I’ve heard antibiotics can help with coughs. Why shouldn’t I take them?”

Doctor:

“That’s a great question. Antibiotics are only effective if a bacterial infection is causing the illness, which is rare in bronchitis. Taking antibiotics unnecessarily can cause side effects like stomach upset and can lead to antibiotic resistance, making future infections harder to treat. Instead, we focus on relieving your symptoms.”

Patient:

“What can I do to feel better?”

Doctor:

“You can rest, stay well hydrated, and use over-the-counter pain relievers like acetaminophen or ibuprofen if you have fever or body aches. Using a humidifier or inhaling steam may help ease your cough. If your cough is keeping you awake, we can consider cough suppressants for short-term relief.”

Patient:

“What if my symptoms don’t get better or get worse?”

Doctor:

“If your symptoms last longer than three weeks, if you develop a high fever, difficulty breathing, chest pain, or if you cough up blood, you should come back for a reassessment. Sometimes, these signs suggest complications like pneumonia, which require different treatment.”

Patient:

“Is there anything I should avoid?”

Doctor:

“Definitely avoid smoking and exposure to secondhand smoke, as these irritate your airways and can prolong your symptoms. Also, try to avoid other lung irritants like dust or strong fumes.”

Patient:

“Do I need any tests or follow-up?”

Doctor:

“Usually, we don’t need tests for uncomplicated bronchitis. If you have risk factors like underlying lung disease or if your symptoms are severe or persistent, we might order a chest X-ray or lung function tests. I’d like to schedule a follow-up in two weeks to check on your progress.”

Patient:

“Thank you, doctor. That helps me understand what to expect.”

Doctor:

“You’re welcome. Feel free to call or come in if you have any concerns or if your symptoms change. We’re here to support you.”

REFERENCES

[Bronchitis: Causes, Symptoms, Diagnosis & Treatment](https://my.clevelandclinic.org/health/diseases/3993-bronchitis#outlook-prognosis)

<https://www.mayoclinic.org/diseases-conditions/bronchitis/diagnosis-treatment/drc-20355572>

[**https://www.aafp.org/pubs/afp/issues/2010/1201/p1345.html**](https://www.aafp.org/pubs/afp/issues/2010/1201/p1345.html)

[**https://emedicine.medscape.com/article/297108-overview#a5**](https://emedicine.medscape.com/article/297108-overview#a5)

### **Burning mouth syndrome**

Burning mouth syndrome (BMS) is when your tongue, roof of your mouth or lips feel like they’re burning. It can also occur anywhere else in your mouth or throat. BMS can happen fast, and you might not know why. It might feel like something really hot (like coffee) burns your tongue. The medical term for burning mouth syndrome is “glossodynia” (pronounced “glaa-sow-DI-nee-uh”).

If you have BMS, the burning feeling might get worse as the day goes on. Your mouth might feel fine when you first wake up, but then start to burn later. When you go to sleep, the pain might fade. But then, when you wake up, it starts all over again.

Along with the burning feeling, your mouth might taste bitter or metallic. Some people have the sensation of dry mouth even though they have enough saliva. The burning can get so bad that it causes people to feel depressed or anxious.

It’s frustrating to have pain and not know why. Treatment can’t cure burning mouth syndrome, but it can help manage your symptoms. And learning more about possible triggers can help reduce the frequency of flare-ups.

#### **Types of burning mouth syndrome**

There are two types of burning mouth syndrome:

* Primary BMS is when your mouth feels like it’s burning, but there’s no clear reason why.
* Secondary BMS is when your mouth burns because of another condition. If you fix that condition, the burning mouth sensation usually goes away, too.

#### **Who is most at risk for burning mouth syndrome?**

Burning mouth is most common in postmenopausal people over 60. That’s because lower estrogen levels cause decreased taste bud sensitivity.

Your genetic ability to taste also plays a role. You might be a:

* Nontaster who doesn’t taste things very strongly
* Medium taster who tastes things the way most other people do
* Supertaster, who tastes things really strongly

A lot of people with burning mouth syndrome are supertasters who don’t taste things as strongly as they used to. Research shows that many people with BMS also grind their teeth. This can make the burning feeling worse.

## **Symptoms and Causes**

Burning mouth syndrome symptoms include:

* Altered taste
* Dry mouth
* Mouth pain that feels like tingling, scalding or burning
* Numbness in your mouth that comes and goes

Burning mouth syndrome doesn’t cause visible symptoms like bumps or discoloration.

### **Causes of burning mouth syndrome**

Researchers believe the cause of primary BMS is nerve damage affecting the area of your tongue that controls taste and pain. This makes your mouth feel like it’s burning and changes how things taste to you. Researchers think the nerve damage comes from factors like stress, certain medications, nutritional deficiencies or underlying medical conditions.

Medical conditions that can cause secondary BMS include:

* Acid reflux
* Allergies to certain foods or dental products
* Dry mouth
* Hormonal changes
* Nerve damage
* Oral infections like thrush
* Stress
* Teeth grinding or jaw clenching

#### **Risk factors**

You’re more likely to develop burning mouth syndrome if you:

* Are in postmenopause
* Have certain health conditions like diabetes or Sjögren’s syndrome
* Have chronic anxiety and/or depression
* Have geographic tongue
* Have nutritional deficiencies (a lack of iron, zinc or vitamins B6 and B12, for example)
* Take certain medications prescribed for depression or high blood pressure
* Are female

## **Diagnosis and Tests**

If you have symptoms, see a dentist first. They can start with a visual exam and refer you to a specialist if needed. A healthcare provider will need to run tests to rule out other conditions. Possible tests include:

* Allergy test
* Blood test
* Imaging tests like dental X-rays, CT scans or MRI
* Oral swab test
* Saliva test
* Tissue biopsy

## **Management and Treatment**

These burning mouth syndrome remedies may help ease general discomfort:

* Mouth rinses with mild numbing effects
* Pain relievers like acetaminophen (Tylenol®) or ibuprofen (Advil®)
* Saliva substitutes like Biotene®
* Some antidepressant and antiseizure medications

The U.S. Food and Drug Administration (FDA) hasn’t approved any drugs specifically for BMS. But the medications mentioned may help manage your symptoms. Sometimes, it can take a while to find the medication that works best. Your healthcare provider can help.

If your healthcare provider knows what’s causing burning mouth syndrome, treating that cause can help. For example, if you grind your teeth, your dentist can make you a custom mouth guard for you to wear. If menopause triggers BMS, hormone replacement therapy may help.

Identifying the root cause isn’t always possible. But when it is, it may help find treatment quicker.

### **How can I get instant relief from burning mouth syndrome?**

You may be able to ease burning mouth pain by doing the following:

* Chew sugar-free gum. (This encourages saliva production.)
* Drink cold water.
* Sip on cold beverages throughout the day.
* Suck on ice chips.

These actions won’t get rid of burning mouth syndrome. But they can help reduce pain during flare-ups.

## **Outlook / Prognosis**

Without treatment, burning mouth syndrome can last for months or even years. That can be a long time to live with mouth pain. BMS treatment can provide relief within days or weeks. Talk to your healthcare provider about your specific treatment and when you can expect to feel better.

## **Prevention**

You can’t prevent BMS. But you can reduce your risk for flare-ups by avoiding anything that irritates your mouth, including:

* Beverages containing alcohol
* Extremely hot foods or beverages
* High-acidic foods or drinks (like citrus juices)
* Hot and spicy foods or drinks
* Mouthwash containing alcohol
* Smoking or vaping

Also, make sure you’re getting enough vitamin B12, folate and iron.

### **When should I see my healthcare provider?**

Schedule an appointment with a healthcare provider if the burning in your mouth:

* Comes with additional symptoms like swelling or blisters
* Gets worse
* Lasts longer than a few days
* Occurs for no apparent reason

#### **What questions should I ask my doctor?**

## 1. Do you know what might have caused this flare-up?

Burning mouth syndrome can be caused by various factors. Sometimes it is primary (idiopathic), meaning no clear cause is found. Other times, it is secondary to underlying conditions such as nutritional deficiencies (e.g., vitamin B12, iron), dry mouth, oral infections, allergies, acid reflux, diabetes, or thyroid problems. Your doctor will review your medical history and may order tests to identify any treatable causes.

## 2. What tests will I need?

To determine the cause of your symptoms, your healthcare provider may order:

* Blood tests to check for vitamin deficiencies, diabetes, thyroid function, or anemia
* Oral swabs or cultures to rule out infections such as oral thrush
* Allergy testing if an allergic reaction is suspected
* Possibly imaging or referral to specialists if neurological or other systemic causes are considered
* Mental health screening since anxiety or depression can be linked to BMS symptoms.

## 3. What kind of treatment do you recommend?

Treatment depends on whether your BMS is primary or secondary:

* For secondary BMS, treating the underlying condition (e.g., supplementing vitamins, managing infections) often relieves symptoms.
* For primary BMS, there is no cure, but several treatments may help control symptoms, including:
  + Topical agents such as capsaicin rinses or gels (derived from chili peppers) to reduce pain
  + Alpha-lipoic acid, an antioxidant that may relieve nerve pain
  + Medications like clonazepam (a seizure medication), certain antidepressants, or gabapentin (nerve pain medication)
  + Saliva substitutes if dry mouth is present
  + Cognitive behavioral therapy to help manage stress, anxiety, and pain coping
  + Other emerging treatments include low-level laser therapy and alternative medicines.

## 4. How long should I try one treatment before trying another?

Because BMS treatments often take time to work and responses vary, it may take several weeks to months to assess effectiveness. Your healthcare provider will usually recommend trying a treatment for at least 4 to 8 weeks before considering a change or adding another therapy. Sometimes a combination of treatments is needed. Patience and close follow-up are important, as symptom relief can be gradual

## 

## **Differential Diagnosis**

Distinguishing primary (idiopathic) burning mouth syndrome (BMS) from secondary burning mouth syndrome (BMS) is important. The following conditions may produce BMS-like symptoms:

* Candidiasis
* Sjögren Syndrome
* Scleroderma
* GERD
* Anemia
* Diabetes
* Vitamin deficiency (B1, B2, B6, B12, folate, iron)
* Hypothyroidism
* Multiple sclerosis
* Anxiety
* Dehydration
* Mouth breathing/nasal obstruction
* Alcohol-based mouthwash
* Medication reaction (eg, ACE inhibitors, ARBs, antiretrovirals, psychotropic, anticholinergic, clonazepam,chemotherapeutic agents)
* Radiation-induced stomatitis
* Aphthous stomatitis
* Contact stomatitis
* Erosive lichen planus
* Pemphigoid
* Pemphigus
* Geographic tongue
* Mandibular fracture
* Neoplasia
* Impacted teeth
* Infections of bone, teeth, or implants
* Ciguatera neurotoxin exposure
* Chewing tobacco use
* Areca nut extract exposure
* Leukoplakia
* Bacterial infection

## **Epidemiology**

Good epidemiologic data documenting incidence and prevalence of burning mouth syndrome (BMS) are lacking. Statistical values vary widely and are likely affected by variable definitions of burning mouth syndrome (BMS).

The overall prevalence is roughly 4%.Women are 3-7 times more likely than men of a similar age to experience burning mouth syndrome (BMS) symptoms.Burning mouth syndrome (BMS) is rarely observed in patients younger than age 30 years, and prevalence may increase from 3- to 12-fold with increasing age.No racial or ethnic predilections have been reported.

Similar prevalence was found in a literature review by Wu et al, although the investigators reported the overall pooled prevalence of burning mouth syndrome (BMS) in the worldwide general population to be 1.73%. This prevalence was found to vary by region, being 1.05% in Asia, 1.10% in North America, and 5.58% in Europe. The prevalence in the general female population was estimated to be 1.15%, compared with 0.38% in the general male population. Moreover, older age was also seen here to increase the risk of burning mouth syndrome (BMS), with the prevalence being 1.92% in people under age 50 years and 3.31% in those over 50 years

**Burning Mouth Syndrome (BMS): Treatment Drugs and Their Side Effects**

## 1. Clonazepam (Benzodiazepine)

* Use: Often prescribed off-label as oral tablets or topical mouth rinses to reduce neuropathic pain.
* Side Effects: Drowsiness, dizziness, fatigue, risk of dependence, withdrawal symptoms if stopped abruptly.
* Notes: Topical use may reduce systemic effects; requires careful medical supervision.

## 2. Gabapentin (Anticonvulsant)

* Use: Used off-label to control nerve pain associated with BMS.
* Side Effects: Dizziness, fatigue, peripheral edema, weight gain, cognitive impairment.
* Notes: Mixed efficacy; dose titration needed; ongoing studies on pregabalin as alternative.

## 3. Tricyclic Antidepressants (TCAs)

* Examples: Amitriptyline, Nortriptyline, Doxepin
* Use: Low-dose TCAs help neuropathic pain and may improve mood.
* Side Effects: Dry mouth, drowsiness, constipation, blurred vision, weight gain, cardiac effects (rare).
* Notes: Use cautiously in patients with dry mouth or cardiac conditions.

## 4. Capsaicin (Topical)

* Use: Derived from chili peppers; applied as mouth rinses or creams to desensitize nerve endings and reduce burning sensation.
* Side Effects: Initial burning or irritation, taste disturbance, limited long-term efficacy.
* Notes: Some patients find the taste unpleasant; gradual desensitization effect.

## 5. Alpha-Lipoic Acid (ALA) (Antioxidant Supplement)

* Use: May reduce oxidative stress and neuropathic pain in BMS.
* Side Effects: Mild gastrointestinal upset, skin rash (rare).
* Notes: Over-the-counter supplement; evidence suggests modest benefit.

## 6. Lidocaine (Topical Anesthetic)

* Use: Provides temporary numbness and pain relief when applied as a mouth rinse or gel.
* Side Effects: Local irritation, numbness affecting speech or swallowing if overused.
* Notes: Short-term use recommended.

## 7. Other Medications

* Selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs): Sometimes used for associated anxiety or depression; side effects include nausea, sexual dysfunction, and insomnia.
* Saliva substitutes: Used if dry mouth is present; generally safe with minimal side effects.

**Doctor-patient conversation about Burning Mouth Syndrome (BMS)**,

Doctor:  
“Hello [Patient’s Name]. I understand you’ve been experiencing a burning sensation in your mouth, which can be very uncomfortable. Based on your symptoms and examination, you likely have a condition called Burning Mouth Syndrome, or BMS.”

Patient:  
“What exactly is Burning Mouth Syndrome? Why is this happening to me?”

Doctor:  
“BMS is a condition where you feel a persistent burning or scalding sensation in your mouth, often without any visible signs. The exact cause isn’t always clear. Sometimes it’s related to nerve changes, hormonal factors, nutritional deficiencies, or other medical conditions. In some cases, no specific cause is found, which we call primary BMS.”

Patient:  
“Is there any test to confirm this?”

Doctor:  
“We usually diagnose BMS after ruling out other causes like infections, vitamin deficiencies, or allergies. So, I’ll order some blood tests to check your vitamin levels, blood sugar, and thyroid function. We may also check for oral infections or allergies if needed.”

Patient:  
“What treatments are available? Can this be cured?”

Doctor:  
“While there is no definitive cure for primary BMS, there are treatments that can help reduce the burning sensation and improve your quality of life. These include medications like topical treatments, certain nerve pain medications, and sometimes supplements like alpha-lipoic acid. Managing any underlying conditions is also important.”

Patient:  
“How long will it take to feel better?”

Doctor:  
“Treatment response varies. It may take several weeks to months to notice improvement. Sometimes we try one treatment for a few weeks and then adjust if needed. We’ll work together to find what helps you best.”

Patient:  
“Are there any side effects from the treatments?”

Doctor:  
“Some medications can cause drowsiness, dry mouth, or mild dizziness. Topical treatments might cause temporary irritation. I’ll explain the potential side effects for any medication we consider and monitor you closely.”

Patient:  
“Is there anything I can do myself to help?”

Doctor:  
“Yes, avoiding spicy or acidic foods, staying hydrated, and managing stress can help reduce symptoms. Sometimes counseling or therapy can assist if anxiety or depression is contributing.”

Patient:  
“What should I watch for, and when should I come back?”

Doctor:  
“If your symptoms worsen, you develop new symptoms like mouth sores, difficulty swallowing, or if the burning sensation changes significantly, please contact me. We’ll schedule follow-ups to monitor your progress.”

Patient:  
“Thank you, doctor. I feel more hopeful now.”

Doctor:  
“You’re welcome. We’ll take this step by step, and I’m here to support you.”

REFERENCES

<https://maaom.memberclicks.net/index.php?option=com_content&view=article&id=81%3Aburning-mouth-syndrome&catid=22%3Apatient-condition-information&Itemid=120>

<https://www.ncbi.nlm.nih.gov/books/NBK519529/#article-18715.s10>

<https://emedicine.medscape.com/article/1508869-overview#a4>

[Burning Mouth Syndrome: Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/14463-burning-mouth-syndrome#overview)

**Broken or dislocated jaw**

## **Overview**

If you have a broken jaw (fractured jaw), it means something hit your lower jawbone (mandible) or your upper jawbone (maxilla) hard enough to break the bone. This article focuses on lower jawbone fractures. You can break your lower jawbone in more than one place, from the top of your lower jawbone (condyle) to the angle in your jaw that curves up and back toward your ears. A broken jaw is a medical emergency regardless of what part of your jawbone is broken.

Broken jawbones are the second most common facial fracture. Fractured noses (nasal fractures) account for 40% to 50% of all facial fractures.

## **Symptoms and Causes**

Broken lower jaws hurt a lot, particularly if you try move your lower jaw back and forth or up and down. You may not be able to close your mouth or open it wide. If you have a broken jaw, you also may notice that:

* Your nose or mouth is bleeding.
* Your jaw or cheek is bruised.
* Your jaw or cheek is swollen.
* You have chipped or loose teeth or that teeth in your upper and lower jaws don’t match up when you close your mouth.
* You have trouble breathing.
* It hurts when you try to chew food or talk.
* You can’t open or close your mouth.
* Your ears hurt.
* Your face — particularly your lower lip — feels numb.

#### **What does a broken jaw look like?**

If you have a broken jaw, you may notice symptoms, including:

* A lump on your jaw or cheek.
* Swelling.
* Bruising.

### **What causes broken jaws?**

Research shows interpersonal violence — being hit in the jaw by another person — is the most common cause of broken jaws, followed by vehicle accidents. Other causes include workplace accidents and sports injuries.

### **Complications of a broken jaw**

A broken jaw may affect your ability to eat, speak and breathe. Left untreated, your jawbone may not heal or heal in a way that affects the way it looks or works.

## **Diagnosis and Tests**

A healthcare provider will ask how you hurt your jaw and gently examine it. They’ll also order imaging tests, including:

* X-rays.
* Computed tomography (CT) scan to check for other broken bones in your face or internal bleeding.

## **Management and Treatment**

Treatment depends on whether the jaw fracture was mild or more severe, meaning your lower jawbone fractured in more than one place:

* Mild fracture treatment. Your healthcare provider may prescribe that you stay on a liquid diet for four to six weeks.
* Severe fracture treatment. Your provider may do surgery, putting metal plates or bars on the broken area of your jaw. The plates or bars hold the bone in place to allow it to heal. Your surgeon may also hold your jaw closed with wires or elastics to aid in healing.

#### **Treatment side effects**

One study suggests that hardware failure and infection are the most common treatment side effects. Hardware failure happens when the plates, screws and wires break or don’t work like they should.

### **Recovery time**

It may take weeks for your broken jaw to heal, even if you didn’t need surgery to repair it. While your jaw heals, you may need to:

* Go on a liquid diet if you had surgery, drinking fluids through a straw. You won’t be able to brush your teeth and may need to use a dental rinse. If you don't need surgery, you may need to have a soft-food-only diet.
* Place ice packs on your jaw. This will help with swelling.
* Take nonsteroidal anti-inflammatory drugs (NSAIDs) to ease pain and swelling.
* If your jaw is wired shut, remember to carry a wire cutter to cut the wire if you feel like you’re going to vomit, or you feel like you’re choking on something you need to spit out.
* Place your fist or hand under your chin when you yawn or sneeze so that your jaw doesn’t move.

## **Outlook / Prognosis**

That depends on your situation. If you had surgery, it may be a month or more before your jawbone heals completely. Your healthcare provider may recommend you stay on a liquid diet until your jaw heals and they can remove the plates and wires holding your jawbone together. You may talk to a nutritionist for ways to incorporate nutritious foods into a liquid diet.

## **Prevention**

Most people break their jaws after being injured in an accident or being hit in the jaw. You may not be able to prevent accidents or situations where someone could hit you in the jaw. But there are steps you can take to reduce your risk. For example:

* Remember to wear a full-face helmet when riding motorcycles, bikes or scooters.
* Always wear your seatbelt when riding in or driving a vehicle.
* Consider wearing a protective face mask and mouth guard if you play contact sports, including skiing.
* Wear protective headgear at work if your job involves an activity where you could be hit in the face.

## **Living With**

Broken jaws heal very slowly. It may be weeks or months before you can resume your usual daily activity, including participating in sports.

### **When should I call a healthcare provider?**

Contact your provider if you have:

* Pain that doesn’t improve with at-home treatments.
* Shortness of breath or difficulty breathing.
* Signs of infection, such as fever and chills.
* Nausea and vomiting.

## **Common Questions**

### **What’s the difference between a dislocated jaw and a broken jaw?**

The difference is a dislocated jaw doesn’t involve a broken jawbone. It happens when your lower jawbone pulls away from your temporomandibular joints. But both dislocated and broken jawbones are medical emergencies.

### **What’s the best way to sleep with a broken jaw?**

You need to protect your broken jaw even while you’re asleep. The best way to do that is to sleep on your back so you don’t put pressure on your jaw.

**EPIDEMIOLOGY**

Vehicular accidents and altercations are the primary causes of mandibular fractures in the United States and throughout the world. In an urban trauma setting, altercations account for most fractures (50%), and motor vehicle accidents are less likely (29%). Males suffer approximately three times as many mandible fractures as females, with the majority occurring in the third decade of life.

Mandibular fractures are uncommon in children under the age of six, likely because of the relative prominence of the forehead compared to the chin. When they do occur, they are often greenstick fractures.

**Differential Diagnosis (DDx) of Broken Jaw (Mandibular Fracture)**

## 1. Mandibular Dislocation

* The lower jaw (mandible) moves out of its normal position at the temporomandibular joint (TMJ).
* Symptoms: Severe pain near the ear, inability to close the mouth, jaw locked open or protruded, difficulty speaking, abnormal bite, drooling.
* Unlike fractures, dislocation usually does not involve bone breakage but causes joint dysfunction.

## 2. Mandibular Contusion (Bruise)

* Soft tissue injury without bone fracture, causing pain, swelling, and tenderness.
* No malocclusion or instability of jaw segments.

## 3. Dental Trauma (Isolated Tooth Injury)

* Loose, fractured, or avulsed teeth without underlying jaw fracture.
* May cause localized pain and bleeding but no jaw deformity or malocclusion.

## 4. Temporomandibular Joint Disorders (TMD)

* Disorders affecting TMJ function causing jaw pain, stiffness, clicking, or limited mouth opening.
* No fracture or displacement of bone; symptoms often chronic and related to muscle or joint dysfunction.

## 5. Soft Tissue Injuries and Hematoma

* Facial soft tissue swelling and bruising from trauma without bone involvement.
* No malocclusion or jaw instability.

## 6. Other Facial Bone Fractures

* Zygomatic (cheekbone) fractures, maxillary fractures, or nasal bone fractures can cause facial swelling and pain but differ in location and clinical signs.

**Doctor-patient conversation about a broken jaw,**

Doctor:  
“Hello [Patient’s Name]. I understand you’ve had an injury to your jaw. After examining you and reviewing your imaging, it appears that you have a broken jaw, also called a mandibular fracture.”

Patient:  
“Oh no, that sounds serious. What exactly does that mean?”

Doctor:  
“A broken jaw means that one or more of the bones in your lower jaw have cracked or fractured. This injury involves not just the bone but also the muscles, ligaments, and sometimes your teeth. It can cause pain, swelling, difficulty opening or closing your mouth, and problems with chewing or speaking.”

Patient:  
“How did this happen? And what caused it?”

Doctor:  
“Broken jaws most commonly occur due to trauma, such as a fall, a car accident, sports injury, or being hit in the face. The force causes the bone to break or crack.”

Patient:  
“What kind of treatment will I need? Will I need surgery?”

Doctor:  
“The treatment depends on how severe the fracture is. Some broken jaws can be treated without surgery, using techniques to immobilize the jaw and allow it to heal naturally. However, if the fracture is displaced or involves multiple breaks, surgery may be necessary to realign the bones and fix them with plates and screws.”

Patient:  
“What happens during surgery? Is it risky?”

Doctor:  
“During surgery, an oral and maxillofacial surgeon will carefully reposition the broken bone segments so they fit together properly. They use hardware like small plates and screws to hold the bones in place while they heal. The procedure is done under general anesthesia. Like all surgeries, there are risks such as infection, bleeding, or hardware failure, but these are uncommon and we take steps to minimize them.”

Patient:  
“How long will it take to heal? Will I be able to eat normally?”

Doctor:  
“Healing usually takes several weeks. During this time, you may need to follow a soft or liquid diet to avoid stressing the jaw. You might also have your jaw immobilized with wires or a splint. We’ll monitor your progress closely and guide you on when you can return to normal eating and activities.”

Patient:  
“Are there any complications I should watch out for?”

Doctor:  
“Yes. You should contact us if you notice increased pain, swelling, fever, difficulty breathing, numbness in your lip or chin, or if your bite feels off or your jaw becomes more difficult to move. Early detection of complications helps us manage them effectively.”

Patient:  
“Thank you, doctor. What should I do now?”

Doctor:  
“Right now, keep your jaw as still as possible, apply ice packs to reduce swelling, and avoid hard or chewy foods. I’ll provide you with detailed instructions and schedule follow-up appointments. If you experience any urgent symptoms, come to the emergency room immediately.”

Patient:  
“Okay, I understand. I appreciate your help.”

Doctor:  
“You’re welcome. We’ll work together to get you healed and back to normal.”

REFERENCES

<https://www.ncbi.nlm.nih.gov/books/NBK507705/#article-24715.s9>

[Broken Jaw (Fractured Jaw): Symptoms, Treatment & Recovery](https://my.clevelandclinic.org/health/diseases/25072-broken-jaw#overview)

**Cancers of the head and neck**

Head and neck cancers are cancers that start in the head and neck area. There are many kinds of cancer that can happen in the head and neck. Each kind begins as a growth of cells that can invade and destroy healthy body tissue.

Head and neck cancer often refers to cancers that start in the mouth, throat, sinuses and salivary glands. But other cancers can happen in the head and neck and are sometimes considered part of this category too.

Head and neck cancer isn't a diagnosis. Instead, it's a category of cancers that have some things in common. For example, many head and neck cancers share some risk factors and treatments. Most head and neck cancers begin in squamous cells. These thin, flat cells make up the outer layer of the skin. They also line the inside of the nose, mouth and throat. Cancers that begin in the squamous cells are called squamous cell carcinomas. Cancers can begin in other kinds of cells in the head and neck area, though these are less common.

Which treatment you'll have for your head and neck cancer depends on many factors. These might include the location of the cancer, its size and the type of cells involved. Your healthcare team also considers your overall health. Treatment options might include surgery, radiation therapy, chemotherapy and others.

**Types**

* Esthesioneuroblastoma
* Floor of the mouth cancer
* Lip cancer
* Mouth cancer
* Nasal and paranasal tumors
* Nasopharyngeal carcinoma
* Pituitary tumors
* Salivary gland tumors
* Skin cancer
* Soft palate cancer
* Throat cancer
* Thyroid cancer
* Tongue cancer
* Tonsil cancer

**Symptoms**

Head and neck cancer symptoms may include a sore in the mouth and pain when swallowing. Symptoms might depend on where the cancer starts. Head and neck cancers include cancers that start in the mouth, throat, sinuses and salivary glands.

Symptoms in the mouth and throat:

* A lump in the neck that you might be able to feel through the skin. Typically the lump isn't painful.
* A sore in the mouth that won't heal.
* Coughing up blood.
* Hoarse voice.
* Loose teeth.
* Pain when swallowing.

Symptoms in the nose:

* Nosebleeds.
* Stuffy or blocked nose that doesn't go away.

Other symptoms:

* A sore on the skin of the face, neck or lips that doesn't heal.
* Ear pain.
* Losing weight without trying.

### **When to see a doctor**

Make an appointment with a doctor or other healthcare professional if you have any symptoms that worry you.

**Causes**

Experts aren't certain exactly what causes head and neck cancers. What causes cancer may depend on where the cancer starts. Head and neck cancers include cancers that start in the mouth, throat, sinuses and salivary glands.

In general, head and neck cancer starts when a cell in the head and neck area develops changes in its DNA. A cell's DNA holds the instructions that tell a cell what to do. In healthy cells, the DNA gives instructions to grow and multiply at a set rate. The instructions tell the cells to die at a set time. In cancer cells, the changes give different instructions. The changes tell the cancer cells to make many more cells quickly. Cancer cells can keep living when healthy cells die. This causes too many cells.

The cancer cells might form a mass called a tumor. The tumor can grow to invade and destroy healthy body tissue. In time, cancer cells can break away and spread to other parts of the body. When cancer spreads, it's called metastatic cancer.

**Risk factors**

Head and neck cancers have some risk factors in common. These include using tobacco and drinking alcohol. Other risk factors depend on the location of the cancer. Head and neck cancers include cancers that start in the mouth, throat, sinuses and salivary glands.

In general, things that increase the risk of head and neck cancers include:

* **Using tobacco.** Using tobacco of any kind increases the risk of many types of head and neck cancer. Examples of kinds of tobacco include cigarettes, cigars, pipes, chewing tobacco and snuff.
* **Drinking alcohol.** Frequent and heavy drinking increases the risk of many types of head and neck cancer.
* **Being exposed to human papillomavirus, also called HPV.** HPV is a common virus that's passed through sexual contact. For most people, it causes no problems and goes away on its own. For others, it can cause changes in cells that can lead to many types of cancer. Many throat cancers are thought to be caused by HPV.
* **Breathing chemicals in the air.** Exposure to chemicals in the air can increase the risk of cancer in the nose and sinuses. Chemicals at home and at work can increase the risk.
* **Being exposed to the sun or tanning lamps.** Ultraviolet light from the sun increases the risk of skin cancer of the head and neck. Ultraviolet light also can come from the lights used in tanning beds.

## **Diagnosis**

Head and neck cancer diagnosis often begins with an exam of the head and neck area. Other tests might include imaging tests and a procedure to remove some cells for testing. The tests used for diagnosis may depend on the cancer's location. Head and neck cancers include cancers that start in the mouth, throat, sinuses and salivary glands.

### **Examining the head and neck area**

A healthcare professional may look at your head and neck area for sores or other issues. The health professional might feel your neck for lumps or swelling. To see inside your mouth, the health professional might use a light and a mirror. To see inside the throat, sometimes a tiny camera is put down the throat. The camera transmits images that let the health professional look for signs of cancer. To see inside the nose, a tiny camera can go through the nostrils.

### **Imaging tests**

Imaging tests make pictures of the inside of the body. The pictures can show the size and location of the cancer. Imaging tests used for head and neck cancer include CT, MRI and positron emission tomography scans, also called PET scans.

### **Removing a sample of tissue for testing**

A biopsy is a procedure to remove a sample of tissue for testing in a lab. How the cells are collected depends on the cancer's location. If the cancer is easy to access, a healthcare professional might cut out some of the tissue with a cutting tool. Sometimes a needle can go through the skin and into the cancer to draw out some cells. Special tools can collect cells from inside the throat or inside the nose.

### **Testing the tissue sample in the lab**

The tissue sample collected during a biopsy goes to a lab for testing. Tests can show if the cells are cancerous. Other special tests give more details about the cancer cells. For instance, the cells might be tested for signs of HPV infection. Your healthcare team uses this information to make a treatment plan.

**Treatment**

Head and neck cancer treatment often involves surgery to remove the cancer. Other treatments might include radiation therapy, chemotherapy and other medicines. Treatment may depend on the location of the cancer. Head and neck cancers include cancers that start in the mouth, throat, sinuses and salivary glands.

### **Surgery**

When possible, surgeons use cutting tools to cut out all of the cancer. They also take a small amount of the healthy tissue around the cancer. This margin of healthy tissue helps ensure that all the cancer cells are removed.

Sometimes the cancer grows into nearby structures and can't be removed. Treatment might start with other options instead, such as radiation therapy and chemotherapy.

Some operations for head and neck cancer can affect your ability to eat and speak. Your healthcare team works to minimize this risk. Reconstructive surgery can help replace bones and tissue that are removed during an operation. Rehabilitation specialists can help you regain the ability to eat and speak.

### **Radiation therapy**

Radiation therapy treats cancer with powerful energy beams. The energy can come from X-rays, protons or other sources. During radiation therapy, you lie on a table while a machine moves around you. The machine directs radiation to precise points on your body.

Radiation might be used after surgery to kill any cancer cells that are left. If surgery isn't an option, treatment might start with radiation instead.

### **Chemotherapy**

Chemotherapy treats cancer with strong medicines. Chemotherapy is sometimes used at the same time as radiation therapy. When they are used at the same time, chemotherapy helps the radiation therapy work better. If the cancer spreads to other parts of the body, chemotherapy might be used to control the cancer.

### **Targeted therapy**

Targeted therapy uses medicines that attack specific chemicals in the cancer cells. By blocking these chemicals, targeted treatments can cause cancer cells to die. For head and neck cancer, targeted therapy may be used when the cancer spreads to other parts of the body.

### **Immunotherapy**

Immunotherapy is a treatment with medicine that helps the body's immune system kill cancer cells. The immune system fights off diseases by attacking germs and other cells that shouldn't be in the body. Cancer cells survive by hiding from the immune system. Immunotherapy helps the immune system cells find and kill the cancer cells. It might be an option for head and neck cancer that spreads to other parts of the body.

### **Palliative care**

Palliative care is a special type of healthcare that helps you feel better when you have a serious illness. If you have cancer, palliative care can help relieve pain and other symptoms. Palliative care is done by a team of healthcare professionals. This can include doctors, nurses and other specially trained professionals. Their goal is to improve the quality of life for you and your family.

Palliative care specialists work with you, your family and your care team to help you feel better. They provide an extra layer of support while you have cancer treatment. You can have palliative care at the same time as strong cancer treatments, such as surgery, chemotherapy or radiation therapy. Ask your healthcare team if palliative care is an appropriate option for you.

When palliative care is used along with all of the other appropriate treatments, people with cancer may feel better and live longer.

**Prevention**

To help prevent head and neck cancers, don't smoke and limit the amount of alcohol you drink. Other steps you can take may depend on the specific type of cancer. Head and neck cancers include cancers that start in the mouth, throat, sinuses and salivary glands.

To lower the risk of head and neck cancer:

### **Don't use tobacco**

If you don't smoke or use other kinds of tobacco, don't start. If you do use tobacco, make a plan to quit. Talk with a healthcare professional about things that can help you quit.

### **Drink alcohol in moderation, if at all**

If you choose to drink alcohol, do so in moderation. For healthy adults, that means up to one drink a day for women and up to two drinks a day for men.

### **Ask about the HPV vaccine**

Receiving a vaccination to prevent HPV infection may reduce the risk of HPV-related cancers. Ask a healthcare professional whether the HPV vaccine is right for you.

### **Protect your head and neck from the sun**

Wear a hat with a wide brim to shade your head and neck. Use a broad-spectrum sunscreen with an SPF of at least 30, even on cloudy days. Apply sunscreen generously. Reapply every two hours, or more often if you're swimming or sweating.

## **Outlook / Prognosis**

### **Is head and neck cancer curable?**

Some head and neck cancers are potentially curable. The chance of a cure is best if your healthcare provider finds the cancer early and treats it immediately. Small tumors that haven’t spread are also sometimes curable.

Your outlook depends on many factors, including your cancer type, general health and response to treatment. Ask your healthcare provider about your prognosis based on your unique cancer diagnosis.

### **survival rate for head and neck cancer**

The survival rate for people with Stage I (1) or Stage II (2) oral and throat cancer ranges from approximately 70% to 90%. This means that 70% to 90% of people diagnosed with head and neck cancer at these stages are alive after five years.

But remember, these numbers are general. They don’t account for your cancer type, health or treatment response. They don’t consider the effects of newer treatments on improving the survival rate. Discuss these factors with your healthcare provider to better understand your prognosis.

### **What questions should I ask my healthcare provider?**

## 1. What’s my cancer type and stage?

Head and neck cancers include a variety of tumors that can arise in areas such as the mouth, throat, voice box, nasal cavity, and salivary glands. The most common type is squamous cell carcinoma.

The stage of your cancer describes how large the tumor is and whether it has spread to lymph nodes or other parts of the body. Staging uses the TNM system:

* T (Tumor): Size and extent of the primary tumor
* N (Node): Whether nearby lymph nodes are involved
* M (Metastasis): Whether cancer has spread to distant sites

Stages range from 0 (carcinoma in situ) to IV (advanced cancer):

* Stage 0: Abnormal cells confined to the surface lining
* Stage I & II: Small tumors (up to 4 cm) without lymph node spread
* Stage III: Larger tumors or spread to one lymph node smaller than 3 cm
* Stage IV: Larger tumors, spread to multiple or large lymph nodes, or distant metastasis

The exact stage depends on tumor size, lymph node involvement, and metastasis, and may vary based on cancer location and HPV status (especially for oropharyngeal cancers).

## 2. Who’ll be part of my care team?

Your care team will be multidisciplinary and may include:

* Head and neck surgeon or ENT specialist
* Medical oncologist (for chemotherapy)
* Radiation oncologist
* Radiologist (for imaging and diagnosis)
* Pathologist (to analyze biopsy samples)
* Speech and swallowing therapists
* Nutritionists
* Nurses and nurse navigators
* Social workers and palliative care specialists

This team works together to create and deliver a personalized treatment plan and support your overall well-being.

## 3. What treatments do you recommend?

Treatment depends on your cancer’s type, stage, location, and overall health. Common treatments include:

* Surgery: To remove the tumor and affected lymph nodes
* Radiation therapy: To destroy cancer cells, often used after surgery or as primary treatment
* Chemotherapy: Often combined with radiation for advanced cancers
* Targeted therapy or immunotherapy: For certain cases based on tumor markers
* Palliative care: To manage symptoms and improve quality of life, especially in advanced stages

Early-stage cancers (I and II) may be treated successfully with surgery or radiation alone, while advanced cancers (III and IV) often require combined treatments.

## 4. What treatment side effects should I expect?

Side effects vary by treatment type but may include:

* Surgery: Pain, swelling, difficulty swallowing or speaking, changes in appearance
* Radiation: Skin irritation, dry mouth, sore throat, difficulty swallowing, taste changes, fatigue
* Chemotherapy: Nausea, vomiting, hair loss, fatigue, increased infection risk
* Targeted therapies: Skin rash, diarrhea, fatigue
* Immunotherapy: Immune-related side effects affecting various organs

Some side effects improve after treatment ends, while others may be long-lasting. Your care team will monitor and manage these effects closely.

## 5. How can I manage treatment side effects?

Management strategies include:

* Medications: Pain relievers, anti-nausea drugs, saliva substitutes
* Nutritional support: Soft diets, feeding tubes if needed
* Speech and swallowing therapy: To maintain function and safety
* Skin care: For radiation-induced dermatitis
* Regular monitoring: To detect and treat infections or complications early
* Psychosocial support: Counseling, support groups, and palliative care services

Your care team will provide detailed guidance tailored to your treatments and symptoms to help you maintain quality of life

**Head and Neck Cancer Staging**

The staging of head and neck cancers primarily uses the TNM system, developed by the American Joint Committee on Cancer (AJCC) and the International Union Against Cancer (UICC). This system classifies cancer based on three key components:

## 1. T – Tumor (Primary Tumor)

* Describes the size and extent of the main tumor at the primary site.
* Categories range from Tis (carcinoma in situ) to T4 (large tumor invading nearby structures).
* For example:
  + T1: Tumor ≤ 2 cm in greatest dimension
  + T2: Tumor > 2 cm but ≤ 4 cm
  + T3: Tumor > 4 cm or extension to nearby areas
  + T4a: Moderately advanced, resectable tumor invading adjacent structures
  + T4b: Very advanced, unresectable tumor invading critical structures

## 2. N – Node (Regional Lymph Nodes)

* Indicates whether cancer has spread to nearby lymph nodes, and if so, how many, their size, and location.
* Categories:
  + N0: No regional lymph node metastasis
  + N1: Metastasis in a single ipsilateral lymph node ≤ 3 cm
  + N2: Metastasis in a single lymph node > 3 cm but ≤ 6 cm, or multiple ipsilateral nodes, or bilateral/contralateral nodes ≤ 6 cm
  + N3: Metastasis in a lymph node > 6 cm

## 3. M – Metastasis (Distant Spread)

* Indicates whether cancer has spread to distant organs.
* Categories:
  + M0: No distant metastasis
  + M1: Distant metastasis present

**Head and Neck Cancer Treatment Drugs and Their Side Effects**

## 1. Chemotherapy Drugs

* Cisplatin
  + *Use:* Most common platinum-based chemotherapy for advanced head and neck cancer, often combined with radiation or other chemo drugs.
  + *Side Effects:* Nausea, vomiting, kidney toxicity, hearing loss, neuropathy, low blood counts, fatigue.
* Docetaxel (Taxotere)
  + *Use:* Used alone or in combination (e.g., TPF regimen with cisplatin and fluorouracil).
  + *Side Effects:* Low blood counts, hair loss, fluid retention, neuropathy, fatigue.
* Fluorouracil (5-FU)
  + *Use:* Part of combination chemotherapy regimens.
  + *Side Effects:* Mouth sores, diarrhea, low blood counts, hand-foot syndrome.
* Methotrexate
  + *Use:* Sometimes used in recurrent or metastatic disease.
  + *Side Effects:* Mouth sores, liver toxicity, low blood counts.
* Hydroxyurea
  + *Use:* Occasionally used in specific cases.
  + *Side Effects:* Bone marrow suppression, skin reactions.

## 2. Targeted Therapy

* Cetuximab (Erbitux)
  + *Use:* Targets the epidermal growth factor receptor (EGFR); used with radiation or chemotherapy.
  + *Side Effects:* Skin rash, infusion reactions, low magnesium, diarrhea.
* Larotrectinib (Vitrakvi)
  + *Use:* For tumors with specific NTRK gene fusions (rare).
  + *Side Effects:* Fatigue, dizziness, nausea.

## 3. Immunotherapy

* Pembrolizumab (Keytruda)
  + *Use:* Immune checkpoint inhibitor targeting PD-1; used in recurrent/metastatic disease.
  + *Side Effects:* Fatigue, rash, diarrhea, immune-related inflammation of lungs, liver, thyroid.
* Nivolumab (Opdivo)
  + *Use:* Similar to pembrolizumab; used for advanced disease after chemotherapy failure.
  + *Side Effects:* Fatigue, rash, diarrhea, immune-related adverse events.
* Toripalimab, Penpulimab
  + *Use:* Emerging immunotherapies approved in some regions.
  + *Side Effects:* Similar immune-related effects.

## 4. Drug Combinations

* TPF regimen: Docetaxel + Cisplatin + Fluorouracil
  + *Use:* Intensive chemotherapy for advanced disease.
  + *Side Effects:* Combined toxicities including severe nausea, bone marrow suppression, mucositis.
* Chemoradiation: Chemotherapy (often cisplatin) combined with radiation therapy to enhance effectiveness.

## 5. General Side Effects Across Treatments

* Hematologic: Low blood counts (anemia, neutropenia, thrombocytopenia) increasing infection and bleeding risk.
* Gastrointestinal: Nausea, vomiting, diarrhea, mucositis (mouth sores).
* Neurological: Peripheral neuropathy, hearing loss (cisplatin).
* Skin: Rash (especially with EGFR inhibitors), photosensitivity.
* Fatigue: Common across all treatments.
* Immune-related: Autoimmune inflammation affecting lungs, liver, endocrine glands (immunotherapies).

**Differential Diagnosis (DDx) of Head and Neck Cancer**

1. Neoplastic Causes

* Primary Head and Neck Cancers:
  + Most commonly squamous cell carcinoma arising from mucosal sites (oral cavity, oropharynx, hypopharynx, larynx).
  + Other malignancies include salivary gland tumors, thyroid cancers, and rare sarcomas.
* Metastatic Lymphadenopathy:
  + Metastases to cervical lymph nodes from primary tumors in the head and neck or distant sites (lung, breast, melanoma, gastrointestinal tract).
  + HPV-related oropharyngeal squamous cell carcinoma often presents with cystic neck nodes.
* Lymphoma:
  + Both Hodgkin and non-Hodgkin lymphoma frequently present as painless neck masses.
* Branchiogenic Carcinoma:
  + Rare and controversial diagnosis; must exclude metastatic squamous cell carcinoma to cystic neck nodes.

## 2. Infectious and Inflammatory Causes

* Reactive Lymphadenopathy:
  + Enlargement of lymph nodes due to infections (viral, bacterial, fungal).
  + Common in children and young adults.
* Sialadenitis:
  + Infection or inflammation of salivary glands, often causing swelling and pain.
* Granulomatous Diseases:
  + Sarcoidosis, tuberculosis, and other granulomatous infections can cause neck masses.

## 3. Congenital and Developmental Lesions

* Branchial Cleft Cysts:
  + Typically present as painless lateral neck cystic masses, often in young adults.
* Thyroglossal Duct Cysts:
  + Midline neck masses that move with swallowing or tongue protrusion.
* Cystic Hygroma (Lymphangioma):
  + Congenital lymphatic malformations, usually in children.
* Dermoid Cysts:
  + Midline or lateral cystic masses arising from embryological fusion lines.

## 4. Other Causes

* Vascular Tumors:
  + Carotid body tumors (paragangliomas) present as pulsatile neck masses with characteristic imaging features.
* Traumatic or Autoimmune Conditions:
  + Thyroid diseases (e.g., Graves’ disease) and autoimmune disorders can cause neck swelling.
* Benign Skin and Soft Tissue Lesions:
  + Lipomas, sebaceous cysts, or benign skin tumors.

**Epidemiology of Head and Neck Cancer**

* Global burden: Approximately 890,000 new cases and 450,000 deaths occur annually worldwide, with head and neck squamous cell carcinoma (HNSCC) accounting for about 4.5% of all cancer diagnoses and deaths.
* United States:
  + Around 54,000 new cases of HNSCC were diagnosed in 2022, representing roughly 3% of all malignancies.
  + Estimated deaths were about 11,230, roughly 2% of all cancer deaths.
  + The median age at diagnosis is 64 years, with about half of patients diagnosed between 55 and 74 years.
  + Incidence rates are higher in men (17.2 per 100,000) than women (6.4 per 100,000), with the highest rates among non-Hispanic White and American Indian/Alaska Native populations.
  + Overall incidence has declined by approximately 14% since 1975, largely due to reduced tobacco use, but has increased by 15.5% since 2003 due to rising HPV-related oropharyngeal cancers.
  + About 27% of cases are diagnosed at localized stages (I and II), 51% at locally advanced stages (III-IVB), and 15% with distant metastases (stage IVC).
  + The 5-year survival rate varies by stage: 86.6% for localized disease, 69.1% for locally advanced, and 39.3% for metastatic disease.
* United Kingdom:
  + Head and neck cancer is the 8th most common cancer, accounting for 3% of all new cancer cases.
  + Incidence rates are projected to rise by about 3% between 2023-2025 and 2038-2040.
  + The cancer is more common in men (69% of cases) than women (31%), ranking as the 5th most common cancer in men and 13th in women.
  + Mortality rates are also expected to increase by 12% by 2038-2040.
* Trends and Risk Factors:
  + The incidence of oropharyngeal cancer is rising sharply, largely due to HPV infection, with rates increasing by over 78% in some populations.
  + Conversely, cancers such as laryngeal cancer have shown a decline in incidence.
  + Major risk factors include tobacco use, alcohol consumption, and HPV infection.
  + Other factors influencing epidemiology include age, sex (more common in men), race/ethnicity, and geographic variations.
* Survival:
  + The overall 5-year survival for head and neck cancers is approximately 60-70%, but varies widely depending on tumor site, stage at diagnosis, and HPV status

**Doctor-patient conversation about head and neck cancer,**

Doctor:  
“Hello [Patient’s Name]. I want to talk with you about your diagnosis of head and neck cancer. I know this can be overwhelming, so please feel free to ask any questions as we go along.”

Patient:  
“Thank you, doctor. What exactly does this mean? What kind of cancer do I have?”

Doctor:  
“Head and neck cancer refers to a group of cancers that start in the mouth, throat, voice box, or nearby areas. The most common type is squamous cell carcinoma, which arises from the lining of these areas. We’ve done tests to determine the exact location and stage of your cancer, which helps us plan the best treatment.”

Patient:  
“What treatments will I need? Will it be surgery or something else?”

Doctor:  
“Treatment depends on your cancer’s stage and location. Options include surgery to remove the tumor, radiation therapy, chemotherapy, or a combination of these. We will tailor the plan to your specific situation to maximize effectiveness while trying to preserve your ability to speak, swallow, and breathe as normally as possible.”

Patient:  
“What side effects should I expect from these treatments?”

Doctor:  
“Side effects vary by treatment but may include soreness in your mouth or throat, difficulty swallowing, changes in taste, dry mouth, fatigue, and sometimes changes in your voice. We have specialists like speech therapists and nutritionists who will support you through these challenges.”

Patient:  
“How can I manage these side effects? Is there anything I can do at home?”

Doctor:  
“Yes, we will provide you with strategies and support. For example, good oral hygiene, staying hydrated, and working with speech and swallowing therapists can help. We also have medications to manage pain and other symptoms. It’s important to keep us informed about how you’re feeling so we can adjust your care.”

Patient:  
“Who will be involved in my care?”

Doctor:  
“You will have a multidisciplinary team including surgeons, medical and radiation oncologists, nurses, speech and swallowing therapists, nutritionists, and social workers. This team will work together to support you medically and emotionally throughout your treatment and recovery.”

Patient:  
“What should I do if I feel anxious or overwhelmed?”

Doctor:  
“That’s very common. We encourage open communication about your feelings. We have counselors and support groups that can help you cope. You can also bring family or friends to appointments for support and to help remember information.”

Doctor:  
“Do you have any questions or concerns right now?”

Patient:  
“I’m worried about how this will affect my daily life and work.”

Doctor:  
“That’s an important concern. We will discuss how treatment may impact your daily activities and plan accordingly. Our goal is to maintain your quality of life as much as possible. We’ll work closely with you every step of the way.”

REFERENCES

<https://www.cancer.gov/about-cancer/treatment/drugs/head-neck>

<https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2025/2025-cancer-facts-and-figures-acs.pdf>

[Head and Neck Cancers: Symptoms & Treatment](https://my.clevelandclinic.org/health/diseases/14458-head-and-neck-cancer#outlook-prognosis)

[Head and neck cancers - Diagnosis and treatment - Mayo Clinic](https://www.mayoclinic.org/diseases-conditions/head-and-neck-cancers/diagnosis-treatment/drc-20558359)

**Canker sore**

Canker sores — or aphthous ulcers — are small, shallow ulcers that occur in the lining of your mouth. A canker sore starts as a white or yellowish mouth sore with a red border. They’re usually very small (less than 1 millimeter) but may grow to 1/2 inch to 1 inch in diameter.

You can get canker sores on your tongue, gums, roof of your mouth, inside of your lip or under your tongue. They can be painful and often make eating and talking uncomfortable.

There are two types of canker sores:

* Simple canker sores: These may appear three or four times a year and last up to a week.
* Complex canker sores: These are less common and occur more often in the people who have previously had them.

#### **Are canker sores a STD?**

No. Canker sores aren’t herpes or any other type of sexually transmitted infection (STI). In fact, they’re not contagious at all. So, you can’t spread them through kissing or sexual contact.

#### **Canker sore vs. cold sore: Are they the same thing?**

Learn the differences between cold sores and canker sores.

No. Although these sores are often confused for each other, they’re not the same.

Cold sores — sometimes called fever blisters — are caused by herpes simplex virus type 1 (HSV-1) or type 2 (HSV-2). Because cold sores are caused by viruses, they’re highly contagious and can spread through close personal contact, such as kissing or oral sex. Cold sores are fluid-filled blisters, and they can appear in clusters on your mouth or genitals.

Canker sores, on the other hand, aren’t caused by an infection and aren’t contagious.

#### **Who gets canker sores?**

Anybody can develop canker sores. But they’re most common in teens and people in their 20s. Females are more likely than males to get canker sores. Experts believe this could be due to hormonal changes.

Canker sores are fairly common. Approximately 20% of the U.S. population has had a canker sore at least once in their lifetime.

## **Symptoms and Causes**

Common canker sore symptoms include:

* One or more painful sores inside of your mouth. These ulcers may form on your tongue, the inside of your lips, your inner cheeks or the roof of your mouth.
* Burning or tingling sensations.
* Small, round ulcers that are white, gray or yellow with a red border.

In severe cases, you may also experience:

* Fever.
* Physical sluggishness.
* Swollen lymph nodes.

### **What causes canker sores?**

Experts aren’t exactly sure why some people are more likely to get canker sores. But they’ve discovered many factors that can trigger the development of these ulcers, including:

* Stress.
* Injury to the inside of your mouth.
* Acidic foods, such as citrus fruits.
* Nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen.
* Dental appliances, such as braces or ill-fitting dentures.

Complex canker sores may develop in people with immune system conditions, including:

* Lupus.
* Behcet’s disease.
* Celiac disease.
* Ulcerative colitis.
* Crohn’s disease.
* AIDS.

Canker sores may also be linked to nutritional deficiencies in vitamin B-12, zinc, folic acid or iron.

### **Are canker sores contagious?**

No. Canker sores aren’t contagious because they’re not caused by an infection.

## **Diagnosis and Tests**

Your healthcare provider can diagnose canker sores during a physical exam. They might also recommend a blood test to see if you have a vitamin deficiency or another condition that’s causing the ulcers.

## **Management and Treatment**

Canker sore treatment may include over-the-counter or prescription products to ease your symptoms. Your healthcare provider may recommend one or more of these canker sore remedies:

* Topical anesthetics, such as benzocaine.
* Mouth rinses containing hydrogen peroxide, chlorhexidine or dexamethasone.
* Corticosteroid ointments, such as fluocinonide, beclomethasone or hydrocortisone hemisuccinate.

If you have canker sores caused by nutritional deficiencies, your healthcare provider may recommend certain vitamins or supplements.

For severe canker sores, your healthcare provider may recommend cauterization (burning the affected tissue). This can sterilize the area, reduce pain and speed up healing.

Topical corticosteroids (TCs) remain the mainstays of treatment. A spectrum of different TCs can be used. At best, TCs reduce painful symptoms but not the rate of ulcer recurrence. The commonly used preparations are as follows:

* Hydrocortisone hemisuccinate pellets (Corlan), 2.5 mg used four times daily
* Triamcinolone acetonide in carboxymethyl cellulose paste (Kenalog in Orabase)
* Betamethasone sodium phosphate as a 0.5-mg tablet dissolved in 15 mL of water to make a mouth rinse, used four times daily for 4 minutes each time

Hydrocortisone and triamcinolone preparations are popular because neither causes significant adrenal suppression; however, ulcers still recur.

Betamethasone, fluocinonide, fluocinolone, fluticasone, and clobetasol are more potent and effective than hydrocortisone and triamcinolone, but they carry the possibility of some adrenocortical suppression and a predisposition to candidiasis.

Other topical medications that can reduce discomfort include the NSAIDs diclofenac and amlexanox paste; the latter has been found to shorten the time it takes minor aphthae to heal. Swishing three or four times daily with so-called “magic mouthwash” (MMW) can also offer some pain relief.MMW can be obtained in several formulations, an example being as follows:

* One part viscous lidocaine 2%
* One part Maalox (do not substitute Kaopectate)
* One part diphenhydramine (12.5 mg per 5 mL)

Benzydamine hydrochloride mouthwash, though no more beneficial than a placebo, can produce transient pain relief. Chlorhexidine gluconate and bioadhesive (Gelclair) mouth rinses reduce the severity and pain of ulceration but not the frequency.

Topical tetracyclines may reduce the severity of ulceration, but they do not alter the recurrence rate. A doxycycline capsule of 100 mg in 10 mL of water administered as a mouth rinse for 3 minutes or tetracycline 500 mg plus nicotinamide 500 mg administered four times daily may provide relief and reduce ulcer duration. Avoid tetracyclines in children younger than 12 years who might ingest them and develop tooth staining.

For severe cases of RAS or those that are unresponsive to topical treatments, systemic medications such as oral corticosteroids (eg, prednisone) may be used. Additionally, drugs like colchicine, dapsone, or immunosuppressive agents may be considered for patients with recurrent or complicated RAS.

However, although a wide spectrum of agents has been suggested as beneficial against RAS, few studies have been performed to assess the efficacy of these drugs (or their adverse effects are significant). Thalidomide 50-100 mg daily is effective against severe RAS, although ulcers tend to recur within 3 weeks. Teratogenicity, neuropathy, and other adverse effects dissuade most physicians from its use.

Oral vitamin B-12 may significantly reduce or eliminate RAS recurrences. For example, a randomized, double-blind, placebo-controlled study by Volkov et al found that in patients taking 1000 μg of sublingual vitamin B-12 daily for 6 months, there was a significant decrease in the number of ulcers and level of pain, as well as in the duration of outbreaks, at 5 and 6 months no matter what the patients' initial B-12 blood levels had been. Moreover, during the sixth month of treatment, 74.1% of the patients taking B-12 achieved "no aphthous ulcers status," compared with 32.0% of patients in the control group.

Many medications that have been historically suggested for the treatment of RAS have not been studied sufficiently enough to allow consistent, evidence-based recommendations to be provided. A variety of treatments have been explored, including aloe vera, biologics, transfer factor, gamma-globulin, sodium cromoglycate lozenges, dapsone, colchicine, pentoxifylline, levamisole, azathioprine, prednisolone, azelastine, alpha-2 interferon, cyclosporine, deglycerinated liquorice, 5-aminosalicylic acid (5-ASA), prostaglandin E2 (PGE2), sucralfate, diclofenac, and aspirin, with various results reported in the literature.

### Laser therapy

A randomized, single-blind, placebo-controlled trial by Albrektson et al indicated that low-level laser therapy can relieve RAS pain. The study, which involved 40 patients with RAS, also found that patients who received laser treatment found it easier to eat, drink, and brush their teeth than did the placebo patients.

Similarly, a literature review by Khaleel Ahmed et al suggested that low-level laser therapy is superior to topical medications in reducing pain and lesion size in patients with RAS. Moreover, in one of the reports included in the review, diode laser treatment at 635 nm was found to reduce pain more quickly than did therapy at 450 or 808 nm.

A study by Hanna et al found good results from the use of a 980 nm laser on children and adolescents with RAS, with all patients reporting scores of 0 on the quantitative numeric pain intensity scale (NPIS) immediately after their second treatment session and at 3-day, 2-week, and 3-month follow-up after treatment was completed. Moreover, the investigators found the lesion surface to be more than 50% healed right after the second session. Laser therapy has shown promising effects in studies, particularly for symptom relief and recurrence prevention, yet these findings mainly pertain to small-scale or short-term trials. Indeed, more robust research is needed to firmly establish the efficacy and safety of many RAS treatments​

### **How long do canker sores last?**

Canker sore pain usually improves in a few days and the ulcers typically heal within two weeks, even without treatment. If you have a canker sore that lasts for more than two weeks, schedule an appointment with your healthcare provider.

## **Outlook / Prognosis**

If you develop a canker sore, there are several over-the-counter treatments that can manage your symptoms, including rinses and topical ointments.

If you have canker sores that are unusually large, or if your symptoms interfere with your daily life, schedule a visit with your healthcare provider.

## **Prevention**

There’s no surefire way to prevent canker sores. But there are several things you can do to reduce your risk:

* Steer clear of acidic, salty or spicy foods.
* Practice good oral hygiene. Brush twice a day with a soft-bristled toothbrush and floss once daily.
* Talk to your healthcare provider about potential nutritional deficiencies.

Try stress reduction techniques, such as mindfulness and meditation.

### **When should I see my healthcare provider?**

You should call your healthcare provider if you have canker sores that:

* Begin to spread.
* Are unusually large.
* Last longer than two weeks.
* Interfere with eating, drinking or other daily routines.
* Are accompanied by a high fever.

## **Diagnostic Considerations**

Mouth ulcers can arise from local causes, malignancy, drug adverse effects, and systemic conditions (particularly infections, blood disorders, gastrointestinal disorders, and skin diseases).

Conditions such as viral infections (eg, herpes simplex), autoimmune diseases (eg, lupus), systemic diseases (eg, celiac disease), and traumatic lesions should be considered in the differential diagnosis of RAS. A thorough patient history and clinical examination are essential to differentiate RAS from other pathologies.

Recurrent multiple ulcers are most typical of the following conditions (before making a diagnosis of RAS, potentially overlooked causes of oral ulcers must be considered):

* Hematinic deficiency (eg, iron, folate, vitamin B-12)
* Celiac disease
* Crohn disease
* Neumann bipolar aphthosis
* Behçet syndrome
* Sweet syndrome
* HIV infection, neutropenia, and other immunodeficiencies
* Periodic fever, aphthous stomatitis, pharyngitis, and cervical adenitis (PFAPA) syndrome in children

## **Epidemiology**

### Frequency

*United States*

RAS affects 5-66% of the population. Approximately 1% of children from higher socioeconomic groups in developed countries have RAS; however, 40% of selected groups of children can have a history of RAS, with ulceration beginning before age 5 years and with the frequency of affected patients increasing with age. Multiple factors such as the specific population evaluated, diagnostic criteria, and environmental factors affect the prevalence of RAS.

### Mortality/morbidity

Most patients with RAS are otherwise healthy. However, a study by Wiriyakijja et al of 120 patients with RAS indicated that the condition is associated with psychological distress. Using the Hospital Anxiety and Depression Scale (HADS) and the 10-item Perceived Stress Scale (PSS-10), the investigators reported the prevalence of anxiety, depression, distress, and moderate-to-high perceived stress in the cohort to be 42.5%, 18.33%, 28.33%, and 71.67%, respectively. The study found the psychological symptoms to be linked to ethnicity, alcohol consumption, disease comorbidities, clinical type of RAS, ulcer size, pain, and RAS disease activity.

### Race

RAS has been reported in all races

### Sex

A slight female predominance exists.

### Age

RAS normally first arises in childhood or adolescence, predominantly between the ages of 10 and 19 years, with the frequency decreasing in subsequent years. The chance of children with RAS-positive parents presenting with RAS is high, up to 90%, while the chance of presentation in children with RAS-negative parents is just 20%. It is interesting to note that the prevalence of presentation has been found to be five times greater in children with high socioeconomic status

## **1. Genetic Polymorphisms Associated with RAS**

* Proinflammatory Cytokine Genes:  
  Variants in genes encoding cytokines such as TNF-α, IL-1α, IL-1β, IL-6, IL-10, and IL-12 have been studied extensively.
  + For example, polymorphisms in TNF-α (-1031 T>C, -308 G>A) are associated with increased risk of RAS and Behçet’s syndrome, suggesting a heightened inflammatory response.
  + IL-1β gene variants (+3954 C>T, -511 G) have also been linked to RAS susceptibility, indicating their role in immune regulation.
  + Some studies show conflicting results for IL-6 and IL-10 polymorphisms, highlighting complex genetic influences.
* Serotonin Transporter Gene (5-HTTLPR):
  + A polymorphism in the serotonin transporter gene promoter region (S allele) is more frequent in RAS patients. This may relate to stress and psychosomatic factors influencing disease severity.
* Endothelial Nitric Oxide Synthase (eNOS) Gene:
  + Certain eNOS gene variants have been implicated in Behçet’s syndrome but show inconsistent association with RAS, suggesting different genetic backgrounds.
* Human Leukocyte Antigen (HLA) Alleles:
  + Specific HLA types may influence immune response severity and predisposition to RAS, though findings vary by population.

## 2. Genome-Wide Association Studies (GWAS)

* A large GWAS involving over 460,000 participants identified 97 genetic variants associated with increased risk of non-specific mouth ulcers, including RAS.
* The lead variant near the IL12A gene (rs76830965) showed a strong protective effect (odds ratio 0.72), implicating T-cell regulation in the disease pathogenesis.
* These findings highlight the role of immune system genes in ulcer development.

## 3. Immune System and T-cell Regulation

* Functional analyses support the idea that Th1-type cellular immune response and T-cell regulation are key mechanisms in RAS development.
* This immune profile is shared with other autoimmune and inflammatory diseases such as Crohn’s disease and celiac disease.

### **What questions should I ask my healthcare provider?**

## 1. Is my mouth ulcer a canker sore?

A canker sore is a small, painful, round or oval ulcer inside the mouth with a white or yellow center and a red border. They usually appear on the inner cheeks, lips, tongue, soft palate, or base of the gums. If your ulcer matches this description and is painful but not contagious, it is likely a canker sore. Unlike cold sores, canker sores do not occur on the lips or outside the mouth and are not caused by a virus.

## 2. What could have caused it?

Canker sores can be triggered by several factors including:

* Minor mouth injuries (biting, dental work, brushing too hard)
* Emotional stress
* Hormonal changes
* Nutritional deficiencies (especially iron, folic acid, vitamin B12)
* Food allergies or sensitivities
* Immune system problems
* Genetic predisposition (family history)  
  In many cases, the exact cause is unknown.

## 3. Will you need to run tests?

Usually, canker sores are diagnosed by physical examination alone. However, if your sores are unusually large, persistent (lasting more than 2 weeks), recurrent, or accompanied by other symptoms like fever or swollen lymph nodes, your healthcare provider may order blood tests to check for nutritional deficiencies or other underlying conditions. In rare cases, swabs or biopsies may be needed to rule out infections or other diseases.

## 4. What are my treatment options?

Most canker sores heal on their own within 1 to 2 weeks. Treatment focuses on relieving pain and speeding healing:

* Over-the-counter topical ointments or gels
* Mouth rinses with antiseptic or numbing agents
* Prescription corticosteroid gels or rinses for severe cases
* Vitamin supplements if deficiencies are found
* In rare severe cases, cauterization (burning the sore) may be recommended by your doctor.

## 5. How can I manage my symptoms at home?

* Avoid spicy, acidic, or rough-textured foods that irritate the sore
* Use over-the-counter pain relievers or topical numbing gels
* Maintain good oral hygiene with gentle brushing
* Rinse your mouth with saltwater or baking soda solution
* Stay hydrated and avoid tobacco or alcohol
* Manage stress through relaxation techniques.

## 6. How long until my canker sore goes away?

Minor canker sores usually heal within 7 to 14 days without scarring. Larger or major canker sores may take up to 4 weeks or longer and can sometimes leave scars. Herpetiform canker sores (small clustered ulcers) may also take several weeks to heal.

## 7. Are there ways to reduce my risk for canker sores in the future?

* Avoid known triggers such as certain foods (acidic, spicy), mouth trauma, and harsh oral hygiene products
* Manage stress effectively
* Maintain a balanced diet rich in vitamins and minerals
* Treat any underlying nutritional deficiencies
* Avoid smoking and alcohol
* If you have frequent or severe outbreaks, discuss with your healthcare provider about preventive treatments

REFERENCES

[Canker Sore (Aphthous Ulcer): What It Is, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/10945-canker-sores#overview)

<https://emedicine.medscape.com/article/867080-treatment>

<https://my.clevelandclinic.org/health/diseases/10945-canker-sores>

**Carotid body tumor**

A carotid body tumor is a mass that grows in the blood vessels near the large arteries in either side of your neck (carotid arteries). These arteries carry blood from your heart to your head and brain.

A carotid body tumor is also called a carotid body paraganglioma or a carotid body chemodectoma.

#### **Are carotid body tumors benign?**

Most carotid body tumors are benign (not cancer). Some studies estimate that less than 10% of carotid body tumors are malignant (cancerous).

Anyone can get a carotid body tumor. The condition seems to be more common in females than males, and usually happens in people older than 20.

Carotid body tumors are rare, occurring in about 1 in 30,000 people.

Carotid body tumors are often painless, but your healthcare provider may want to remove the tumor because it can become large and affect the blood vessels in your neck or cause other symptoms.

## **Symptoms and Causes**

A carotid body tumor may not cause any symptoms, but as the mass grows, it may press on nearby nerves and blood vessels. You might feel a lump on your neck. Other carotid body tumor symptoms can include:

* Hoarseness.
* Numbness in your tongue.
* Sore throat.
* Swallowing problems (dysphagia).

### **What causes carotid body tumors?**

Researchers don’t know exactly why carotid body tumors happen, but they’re more common in people with oxygen deprivation (hypoxia). About 90% of cases happen sporadically, meaning it can affect anyone regardless of family history. About 10% of cases are familial, meaning there’s a genetic component and it can run in families.

## **Diagnosis and Tests**

Your healthcare provider begins with a physical examination of your head and neck. If they find signs of a carotid body tumor, they may order additional tests to confirm the condition.

Healthcare providers use imaging tests to diagnose carotid body tumors, including:

* CT scan.
* Magnetic resonance angiography (MRA).
* MRI.
* Ultrasound.

## **Management and Treatment**

Your healthcare provider will talk with you about your symptoms. They may recommend that you have:

* Surgery to remove the tumor.
* Radiation therapy.
* Transcatheter embolization to stop blood flow to the tumor, which you may have before surgery to help shrink the tumor.

When providers surgically remove large carotid body tumors, a hole may remain in your carotid artery. A surgeon may use a patch or graft to close the hole and restore your artery during the surgery.

### **Complications of carotid body tumor treatment**

Many people who have treatment for a carotid body tumor don’t have complications. But carotid body tumor treatment can involve many blood vessels. After treatment, some people may have:

* Difficulty swallowing (dysphagia).
* Injury to their cranial nerves.
* Problems with healing at the surgical incision site.
* Stroke.

### **RECOVERY TIME**

Recovery time after surgery for a carotid body tumor is typically three to four weeks. Follow your healthcare provider’s instructions for incision care. Talk to your provider about how to take care of yourself as you recover.

## **Outlook / Prognosis**

Your healthcare provider will talk with you about your symptoms and recommend treatment based on the tumor’s size. If your provider recommends observing the tumor (watchful waiting), let them know right away if you develop new symptoms.

If you have surgery to remove a carotid body tumor, you typically don’t need further treatment.

## **Prevention**

There’s no way to prevent or reduce your risk of carotid body tumor. If you have a biological family history of carotid body tumors, talk with your healthcare provider about your risk.

### **When should I see my healthcare provider if I have a carotid body tumor?**

Contact your healthcare provider right away if you notice any new symptoms. They’ll talk with you about treatment options that may be right for you.

## **Epidemiology**

### Frequency

Parasympathetic paragangliomas are rare, with a prevalence of 1-2 per 100,000 population.Carotid body tumors (CBTs) constitute about 50-60% of head and neck paragangliomas.

Carotid body tumors (CBTs) can occur in children; however, carotid body tumors (CBTs) are considered to be a disease of middle age. The mean age of onset is reported to be 45 years.Paragangliomas are inherited in 10-50% of cases. Age of onset in the hereditary group is typically younger, in the second to fourth decade.

A retrospective study by Davila et al suggested that carotid body tumors also tend to appear at a younger age in patients with succinate dehydrogenase mutations (see Pathophysiology). In the study, of 183 patients with carotid body tumors, 18 patients underwent succinate dehydrogenase testing, with 17 found to be positive for mutations. The positive patients were diagnosed with tumors at a mean age of 38.0 years, compared with 50.3 years for patients without known mutations.

About 5% of carotid body tumors (CBTs) are bilateral and 5-10% are malignant, but these rates are much higher in patients with inherited disease.Familial tumors are found to be 5.8 times more common among patients who have carotid body tumors as compared with patients who have paragangliomas at other sites.

Interestingly, the male-to-female ratio differs in patients dwelling at high altitudes above 2,000 meters (1:8.3) than those patients dwelling at sea level (1:1.0-1.4).

## **Staging**

Shamblin describes 3 different types or stages of carotid body tumors. Type I consists of a small tumor that is easily dissected from the adjacent vessels in a periadventitial plane. Type II tumors are larger and more adherent and partially surround the vessel. Type III tumors are large and completely surround the carotid bifurcation.As described, types II and III tumors are more likely to require carotid resection.

**Differential Diagnoses**

* Carotid Artery Aneurysm or Pseudoaneurysm: These involve an abnormal dilation or outpouching of the carotid artery, which can be caused by trauma or connective tissue disorders . Imaging will show a change in the vessel's caliber, and ultrasound may reveal a "yin-yang" sign or swirling blood within the sac .
* Glomus Vagale Tumor (Vagal Paraganglioma): These tumors also arise from paraganglia but originate from the vagus nerve. While similar to CBTs in appearance, they tend to displace the carotid artery anteriorly, whereas CBTs typically splay the carotid bifurcation .
* Schwannoma: These are benign nerve sheath tumors that can arise from cranial nerves, including the vagus nerve (vagal schwannoma) or sympathetic chain (cervical sympathetic chain schwannoma) . On imaging, schwannomas are well-encapsulated and tend to displace both the carotid artery and jugular vein together, rather than splaying them .
* Neck Hematoma/Thrombus: A collection of blood in the neck tissues, which can appear as a high-density mass on non-enhanced CT . Hematomas do not enhance with contrast, unlike hypervascular CBTs .
* Hypervascular Lymphadenopathy: Enlarged lymph nodes that exhibit increased blood flow, which can sometimes be confused with CBTs .
* Carotid Body Hyperplasia: An increase in the size of the carotid body due to chronic hypoxia, often seen in individuals living at high altitudes .
* Carotid Bulb Ectasia: A non-pathological widening of the carotid bulb

**Doctor-patient conversation about a carotid body tumor (CBT)**

Doctor:  
“Hello [Patient’s Name]. We have reviewed your imaging and clinical findings, and it appears you have a carotid body tumor. This is a rare, usually benign tumor that arises from a small group of cells located at the bifurcation of your carotid artery in your neck.”

Patient:  
“A tumor? Is it cancerous? Should I be worried?”

Doctor:  
“Most carotid body tumors are benign, meaning they are not cancerous. However, they can grow slowly and press on nearby nerves or blood vessels, which can cause symptoms like a lump in your neck, difficulty swallowing, or changes in your voice. A very small percentage can be malignant, but that is uncommon.”

Patient:  
“What caused this tumor? Is it something I did?”

Doctor:  
“The exact cause is not always clear. Some cases are linked to genetic factors or conditions that cause low oxygen levels in the blood over a long time, such as living at high altitudes. Sometimes, these tumors run in families due to inherited gene mutations. It’s not caused by anything you did.”

Patient:  
“What are the treatment options? Do I need surgery?”

Doctor:  
“The main treatment is surgical removal of the tumor. Surgery is generally recommended because the tumor tends to grow over time and can affect important structures in your neck. Before surgery, we may perform a procedure called embolization to reduce the tumor’s blood supply, which helps decrease bleeding during surgery. In some cases, if surgery is too risky or the tumor is not growing, we might consider careful observation or radiation therapy.”

Patient:  
“What are the risks of surgery? Will I have complications?”

Doctor:  
“Because the tumor is close to important nerves and blood vessels, surgery carries risks such as injury to cranial nerves, which can lead to difficulties with swallowing, voice changes, or shoulder movement. There is also a small risk of stroke or bleeding. However, with experienced surgeons and careful planning, these risks are minimized. We will monitor you closely during and after surgery.”

Patient:  
“How long will recovery take? Will I be able to return to normal activities?”

Doctor:  
“Recovery times vary, but most patients can return to normal activities within a few weeks to a couple of months. Some temporary nerve symptoms may improve over time. We will provide you with support and rehabilitation if needed.”

Patient:  
“Will I need any tests before surgery?”

Doctor:  
“Yes. We will do blood and urine tests to check if the tumor is secreting any hormones, as some carotid body tumors can produce substances that affect your heart rate or blood pressure. Imaging studies like CT or MRI help us understand the tumor’s size and relationship to blood vessels. Sometimes, we do angiography or embolization before surgery.”

Patient:  
“Is there anything I should watch for or do now?”

Doctor:  
“Watch for any new symptoms like worsening neck swelling, difficulty swallowing, voice changes, or dizziness. Keep all your appointments, and we’ll guide you through the process step by step. Avoid any trauma to your neck, and maintain a healthy lifestyle to support your recovery.”

Patient:  
“Thank you, doctor. This helps me understand what to expect.”

Doctor:  
“You’re welcome. We’ll work closely together to ensure the best outcome for you. Please feel free to ask any questions at any time.”

REFERENCES

[Carotid Body Tumor: Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/16848-carotid-body-tumors)

<https://emedicine.medscape.com/article/1575155-workup#c8>

### **Cavernous sinus thrombosis**

Cavernous sinus thrombosis is a rare, potentially life-threatening blood clot in your cavernous sinuses. Your cavernous sinuses are located behind your eyes, beneath your brain. Multiple veins, including a major one called the jugular vein, run through your cavernous sinuses. They help drain the blood from your brain and face. If a blood clot forms in one of these veins (often in response to an infection), the clot can restrict blood flow from your brain.

Cavernous sinus thrombosis can cause long-term damage to your brain, eyes and nerves. Without prompt treatment, it may result in death.

Cavernous sinus thrombosis is so rare that it’s difficult to predict how many cases happen yearly. Cases have declined substantially in the modern era, thanks to the widespread availability of antibiotics. Antibiotics can cure infections that may have otherwise caused a blood clot.

## **Symptoms and Causes**

One of the earliest symptoms of cavernous sinus thrombosis is a severe headache that gets worse even with pain medicine. The pain may feel sharp immediately or worsen over several days. The pain may feel especially pronounced around or behind one or both eyes.

Symptoms are related to pressure build-up in your cavernous sinuses and can worsen rapidly. Signs to look for include:

* Severe, sharp headache.
* Bulging or swelling around one and then both eyes.
* Droopy eyelids.
* Pain when you try to move one or both eyes.
* Inability to move one or both eyes.
* Blurred vision.
* Seeing double.
* Facial numbness.
* Fever.
* Seizures.

Untreated cavernous thrombosis worsens until symptoms progress to confusion and sleepiness. A coma and death often follow. It’s crucial to receive treatment before the condition reaches this point.

### **How quickly does cavernous sinus thrombosis occur?**

Cavernous sinus thrombosis may show up five to 10 days after having an untreated infection in your face or skull. The first sign of a clot is usually a headache. Symptoms related to your eyes (bulging, swelling) may happen shortly after the headache or gradually develop.

### **What causes cavernous sinus thrombosis?**

Cavernous sinus thrombosis is most often a complication of a bacterial infection in your face or skull. The blood in your cavernous sinus veins clots to prevent the infection from spreading. Instead of stopping the spread, however, the clot traps the infection. It prevents blood from flowing away from your brain. The blood creates pressure in your cavernous sinuses, causing common symptoms like headache and eye pain.

Infectious causes include:

* Sinus infection (sinusitis).
* Boils.
* Dental abscesses.
* Ear infections.

In up to 70% of cases, *Staphylococcus aureus* bacteria cause the infection. Other types of bacteria and some fungi may also cause infections that lead to cavernous thrombosis. There are also a few documented cases of cavernous sinus thrombosis related to COVID-19 infection.

Rarely, the clot forms in response to a head injury instead of an infection.

## **Diagnosis and Tests**

Diagnosis can be tricky, as cavernous sinus thrombosis shares symptoms with more common conditions, like an eye infection or a migraine.

Still, your healthcare provider may suspect cavernous sinus thrombosis based on your symptoms, especially if you currently have or recently had a sinus infection.

Your diagnosis may include any of the following tests or procedures:

* Imaging. MRI and CT scans allow your provider to identify clots in your cavernous sinuses. An MRI with venogram (MRV) is the most sensitive imaging procedure for this diagnosis. During an MRV, your provider will insert a contrast dye into your vein to make it easier to see blood flow during the MRI.
* Bacteria culture test. Your provider may check your blood or other body fluids (for example, sinus fluid) for signs of bacteria or other pathogens that are causing your infection.
* Spinal tap (lumbar puncture). A lumbar puncture can show if the infection has spread to your brain, as with meningitis. Meningitis is a complication of cavernous sinus thrombosis. During the procedure, your provider inserts a needle into your low back to collect a sample of spinal fluid. The fluid is tested for bacteria and other signs of infection.

Because cavernous sinus thrombosis is a potentially life-threatening condition that can progress quickly, your provider may begin treatment before confirming your diagnosis.

## **Management and Treatment**

Cavernous sinus thrombosis requires immediate treatment. You’ll likely be admitted into an intensive care unit (ICU) so your provider can monitor you closely. Treatments include:

* Antibiotics. Your provider will begin antibiotic treatment through an IV to clear the infection that’s causing the clot. Treatment is time-sensitive, so you’ll likely receive antibiotics before diagnostic tests confirm what pathogen (bacteria, fungus, etc.) is causing your infection. To be safe, you’ll receive broad-spectrum antibiotics that can kill various bacteria — especially *S. aureus.* Treatment may continue in the hospital for several weeks.
* Anticoagulants. You may need medicines that thin your blood, like heparin, to dismantle the clot and prevent new clots from forming. You may need to take anticoagulants several months after your initial treatment.
* Corticosteroids. Your provider may prescribe steroids to reduce the inflammation causing pressure in your sinuses. If so, you’ll receive them after antibiotic treatment.
* Sinus surgery. You may need surgery to drain any fluid build-up related to your infection and blood clot.

## **Outlook / Prognosis**

Before antibiotics, cavernous sinus thrombosis nearly always resulted in death. Now, more than 70% of people with cavernous sinus thrombosis survive.

Still, many people experience complications. For instance, just under 20% of people who survive cavernous sinus thrombosis have vision problems and nerve damage. Other complications include:

* Frequent headaches.
* Vision loss in one or both eyes.
* Seizures.
* Meningitis.
* Sepsis.

Having cavernous sinus thrombosis may lead to other dangerous clots, like clots in your legs (deep vein thrombosis), lungs (pulmonary embolism) or brain (stroke).

Speak with your provider about the likelihood your condition will lead to complications. Ask about the warning signs so you can prevent complications whenever possible.

## **Differential Diagnoses**

* Orbital Cellulitis
* Periorbital Infections
* Tolosa-Hunt Syndrome
* Rhinocerebral Mucormycosis

The differential diagnosis includes other causes of cavernous sinus syndrome and painful ophthalmoplegia.

Cavernous sinus syndrome can also be caused by local compression of the cavernous sinus from noninfectious and non-thrombotic lesions, 30% of which are tumors:

* Carotid cavernous fistula, with enhanced CT or MRI showing proptosis, enlarged superior ophthalmic vein, “dirty” appearance of retro-orbital fat, and enlarged extraocular muscles.
* Lytic bone lesions near the sphenoid sinus or sella turcica, tumors (such as metastatic cancer, meningioma, schwannoma, plexiform neurofibroma, pituitary adenoma, chordoma, chondrosarcoma, melanocytoma or nasopharyngeal carcinoma, the most common primary malignant tumor), or a cavernous hemangioma
* Meningioma
* Sino-orbital aspergillosis
* Superior orbital fissure syndrome
* Tolosa-Hunt syndrome, involving a retro-orbital granulomatous pseudotumor into the cavernous sinus, manifesting as retro-orbital pain, ophthalmoplegia, cranial nerve palsy, and clinical response to systemic steroids.

Other causes of painful ophthalmoplegia include:

* Orbital apex syndrome (inflammation of the posterior orbit, including the superior orbital fissure through which cranial nerves III, IV, V, and VI and the superior ophthalmic vein traverse, as well as the optic canal involving the ophthalmic artery and optic nerve and characterized by less edema and proptosis but more vision loss than cavernous sinus thrombosis)
* Orbital cellulitis
* Sarcoidosis
* Syphilis
* Tuberculosis

## **Epidemiology**

CST is rare. The overall incidence of both septic and aseptic cases is estimated to be between 0.2 and 1.6 per 100,000 persons.

CST can occur at any age but typically affects children and adolescents.

## **Living With**

Seek care immediately if you experience the following symptoms:

* Sharp headache that doesn’t improve with headache medicine.
* Headache that worsens when you lie on your back or bend down.
* Eye pain or swelling that affects one eye or both.
* Feeling sick, weak or drowsy.
* Shortness of breath.
* Fever.

### **What questions should I ask my doctor?**

## 1. What treatments will I need?

* Hospitalization: Treatment requires admission, often to an intensive care unit for close monitoring.
* Antibiotics: High-dose intravenous antibiotics started immediately, often before infection confirmation, typically continued for 3 to 4 weeks to fully clear infection.
* Anticoagulants: Heparin or other blood thinners are commonly given to help dissolve the clot and prevent new clots. Some patients continue anticoagulation for months after discharge.
* Corticosteroids: Sometimes used to reduce inflammation and swelling.
* Surgical drainage: If the infection source (e.g., sinusitis or abscess) is identified, drainage may be necessary to remove pus and control infection.

## 2. How long will I need treatment?

* Antibiotic therapy typically lasts 3 to 4 weeks, sometimes longer depending on clinical response.
* Anticoagulation may continue for several months (3 to 12 months) depending on individual risk factors and clot resolution.
* Full recovery can take several weeks to months, and prolonged hospitalization may be required initially.

## 3. What’s the likelihood I’ll experience complications related to the clot? Are they preventable?

* Complications can include vision loss, cranial nerve damage, stroke, neurological deficits, and in severe cases, death.
* Early diagnosis and aggressive treatment significantly reduce complication risks.
* Use of anticoagulation and surgical drainage when indicated helps prevent clot extension and further damage.
* Despite treatment, some patients may still experience lasting neurological effects, but these are less common with prompt care.

## 4. What adjustments will I need to make to my lifestyle in response to complications?

* If neurological or vision impairments occur, you may need rehabilitation services such as physical therapy, occupational therapy, or vision support.
* Activities may need to be modified based on residual deficits (e.g., balance problems, weakness).
* Regular follow-up with neurology, ophthalmology, and rehabilitation specialists will be important.
* Avoiding infections and promptly treating any facial or sinus infections can help prevent recurrence.

## 5. Will I need additional medications or therapies to address the complications?

* Depending on complications, you might require:
  + Anticonvulsants if seizures develop.
  + Vision therapy or corrective aids for eye problems.
  + Physical and occupational therapy for motor or cognitive deficits.
  + Long-term anticoagulation if clotting risk persists.
  + Psychological support or counseling if cognitive or emotional challenges arise.

## 6. What’s the likelihood that I’ll have this condition again?

* Recurrence of CST is rare but possible, especially if underlying risk factors persist (e.g., chronic infections, clotting disorders).
* Long-term anticoagulation may be recommended in patients with clotting disorders or recurrent thrombosis.
* Preventing and promptly treating infections in the face and sinuses is key to reducing recurrence risk.

**Doctor-patient conversation about cavernous sinus thrombosis (CST)**

Doctor:  
“Hello [Patient’s Name]. Based on your symptoms and imaging, you have a condition called cavernous sinus thrombosis. This means there is a blood clot in a large vein called the cavernous sinus, located at the base of your brain. It’s a serious condition that usually happens because of an infection in your face, sinuses, or nearby areas.”

Patient:  
“That sounds scary. How did this happen to me? Is it dangerous?”

Doctor:  
“It can be life-threatening if not treated promptly, but with early and aggressive treatment, many people recover well. The clot forms as your body tries to contain an infection, but unfortunately, it blocks blood flow and causes pressure buildup. This leads to symptoms like severe headache, eye pain, swelling around the eyes, and sometimes difficulty moving your eyes or changes in vision.”

Patient:  
“What kind of treatment will I need? Will I have to stay in the hospital?”

Doctor:  
“Yes, you will need to be treated in the hospital, often in an intensive care unit so we can monitor you closely. The main treatment is high-dose intravenous antibiotics to fight the infection. We start these as soon as possible, even before we know exactly which bacteria are causing the problem. Treatment usually lasts several weeks.”

Patient:  
“Are there other medicines I’ll need?”

Doctor:  
“You may also receive blood thinners like heparin to help dissolve the clot and prevent new clots from forming. Sometimes corticosteroids are given to reduce inflammation and swelling around the affected area. If the infection started from an abscess or sinus infection, surgery might be needed to drain the pus.”

Patient:  
“What are the risks or side effects of these treatments?”

Doctor:  
“Antibiotics can cause side effects like nausea, diarrhea, or skin rash, but these are usually manageable. Blood thinners carry a small risk of bleeding, so we carefully weigh the benefits and risks before using them. Surgery has its own risks, but it’s important if there’s a source of infection that needs to be removed.”

Patient:  
“How long will it take to get better? Will I have lasting problems?”

Doctor:  
“Recovery can take weeks to months. Some symptoms improve quickly, but full recovery may be slow. Unfortunately, some people may have lasting effects like vision problems or nerve damage, but we will do everything possible to prevent these. You will have regular follow-ups with specialists to monitor your progress.”

Patient:  
“What should I watch for while I’m recovering?”

Doctor:  
“Watch for worsening headache, vision changes, new weakness, confusion, or fever. If any of these happen, seek medical help immediately. Also, keep all your appointments and follow the treatment plan closely.”

Patient:  
“Thank you, doctor. This helps me understand what’s going on and what to expect.”

Doctor:  
“You’re welcome. We’re here to support you through this. Please ask any questions at any time.”

REFERENCES

[Cavernous Sinus Thrombosis: Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/23520-cavernous-sinus-thrombosis#overview)

<https://www.nhs.uk/conditions/cavernous-sinus-thrombosis/>

<https://emedicine.medscape.com/article/791704-overview#a6>

<https://www.ncbi.nlm.nih.gov/books/NBK448177/#article-19035.s9>

### **cholesteatoma**

A cholesteatoma is a growth behind your eardrum (tympanic membrane). It develops when dead skin cells gather behind your eardrum to form a lump or cyst that may look like a pearl. You can be born with a cholesteatoma, but it usually happens because you have a retracted eardrum or a ruptured eardrum.

Without treatment, cholesteatomas may become infected or grow large enough to damage your hearing and facial nerve. Surgery to remove the growth is the only way to treat a cholesteatoma.

## **Symptoms and Causes**

Symptoms vary depending on whether you’re born with a cholesteatoma (congenital cholesteatoma) or develop one over time (acquired cholesteatoma). Congenital cholesteatomas may not cause symptoms until they get larger. Your child’s pediatrician could find a congenital cholesteatoma in their ear while doing a physical examination. But both congenital and acquired forms of the condition may cause the following symptoms:

* A smelly discharge that may look like pus flowing from your ear or your child’s ear.
* Pressure or a feeling of fullness in your ear.
* Dizziness.
* Recurrent ear infections

Sometimes, the condition can cause hearing loss or tinnitus.

### **What is the main cause of a cholesteatoma?**

One of the main causes is a retracted eardrum. This is when there’s an imbalance between the air inside and outside of your ear. This causes your middle ear to pull in your eardrum. When that happens, you may develop a cyst or pocket that fills up with skin cells and becomes a cholesteatoma.

Chronic ear infections (acute otitis media) or ruptured eardrums can also lead to cholesteatomas. Rarely, children are born with the condition.

## **Diagnosis and Tests**

A healthcare provider will ask about your symptoms and medical history, including whether you have a history of ear infections. They’ll examine your ears with an otoscope, a device that lets them look at your eardrum.

If they suspect you have a cholesteatoma, they’ll refer you to an ear, nose and throat specialist (otolaryngologist). Your otolaryngologist may do the following tests:

* Computed tomography (CT) scan to see if the condition is damaging your ossicles (ear bones).
* Hearing tests including a tympanometry test.

## **Management and Treatment**

Treatments depend on the cause and symptoms, but surgeries like mastoidectomy and tympanoplasty are the only ways to remove a cholesteatoma.

## **Outlook / Prognosis**

If you’re like most people, surgery to remove a cholesteatoma will take care of your symptoms. But cholesteatomas can come back. Your otolaryngologist may recommend that you have regular checkups. Checkups may include:

* Ear exams and hearing tests to check for signs of new cholesteatoma.
* Ear washing (debridement) to remove skin cells and other tissue build-up.

## **Prevention**

You can’t prevent congenital cholesteatomas, but there are things you can do to reduce your risk that you’ll develop one:

* Protect your ears from chronic infections or activities that could rupture your eardrum.
* Talk to a healthcare provider if you have recurring ear infections.

### **When should I see my otolaryngologist?**

Contact your otolaryngologist if you have symptoms after surgery like:

* Bleeding or discharge from your ear.
* Ear pain.
* Fever of 104 degrees Fahrenheit (38 degrees Celsius).

You should also contact your otolaryngologist if you have symptoms like ear drainage that could mean you’re developing a new cholesteatoma.

## **Diagnostic Considerations**

The diagnosis may be in doubt in individuals with small epitympanic retractions observed during physical examination. Computed tomography (CT) scanning may help to distinguish between shallow retractions without soft tissue extension into the epitympanic space and an extensive soft tissue mass with bony erosion.

CT scanning can also be helpful in individuals who previously had otologic surgery. In this group of patients, a white mass behind the tympanic membrane (shown below) may represent tympanosclerosis, cartilage grafting, or recurrent cholesteatoma. CT scanning may frequently help to resolve such questions. Diffusion-weighted magnetic resonance imaging (MRI) may also be helpful in these circumstances.

Other otologic conditions that should be considered include:

* Middle ear osteoma
* Granulomatous disease (eg, granulomatosis with polyangiitis [Wegener granulomatosis], histiocytosis X)
* Mycobacterial infection
* Primary auricular and/or temporal bone malignancy

## 

## **Differential Diagnoses**

* Acute Otitis Media
* Chronic Suppurative Otitis Media
* Malignant Otitis Externa
* Otitis Media With Effusion
* Cholesterol Granuloma
  + Presents as a cystic lesion with high signal on T1 and T2 MRI sequences.
  + Unlike cholesteatoma, it shows *high* signal on ADC maps (diffusion imaging).
  + Often associated with a history of chronic otitis media or surgery.
  + Otoscopically, the tympanic membrane may appear bluish.
* Inflammation / Otitis Media
  + Middle ear inflammation or effusion can mimic cholesteatoma on imaging but usually lacks bony erosion.
  + Clinical presentation differs with acute infection signs.
* Cerumen (Earwax) Impaction
  + Located in the external auditory canal, shows similar imaging characteristics but can be differentiated by location and clinical exam.
* Abscess Formation in Middle Ear
  + May show similar imaging findings but is usually associated with systemic infection signs and different clinical presentation.
* Tympanosclerosis
  + Fibrotic scarring and calcification of the tympanic membrane, often after grommet insertion.
  + Appears as white plaques and can mimic cholesteatoma but lacks expansile soft tissue mass and bony erosion.
* Osteonecrosis of External Auditory Canal
  + Bone death in the canal, often in immunocompromised patients, may mimic cholesteatoma.
* Paragangliomas (Glomus Tumors)
  + Vascular tumors presenting as pulsatile masses behind the tympanic membrane.
  + Different imaging features with strong contrast enhancement and no bony erosion.
* Schwannomas of Facial Nerve or Geniculate Ganglion
  + Present as enhancing masses along the facial nerve canal with characteristic imaging findings.
* Facial Nerve Hemangioma
  + Shows “honeycomb” ossifying pattern on CT and strong enhancement on MRI.
* Keratosis Obturans
  + Bilateral keratin plugs in enlarged external auditory canals, usually without bony erosion.
* Necrotizing (Malignant) External Otitis
  + Severe infection in elderly or diabetic patients with extensive bony erosion and soft tissue inflammation.
* Squamous Cell Carcinoma of External Auditory Canal
  + Malignant tumor that can mimic cholesteatoma clinically and radiologically.

**Cholesteatoma Procedures and Timelines**

## 1. Types of Surgical Procedures

* Canal Wall Down Mastoidectomy (CWD)
  + Most common for medium to large cholesteatomas.
  + Involves removing the posterior ear canal wall and creating an open mastoid cavity.
  + Allows good access for complete removal but requires regular cleaning of the mastoid cavity postoperatively.
  + Water precautions are necessary to prevent infections.
  + Surgery duration: typically 1–3 hours.
  + Hospital stay: often same-day discharge or overnight stay.
* Canal Wall Up Mastoidectomy (CWU)
  + Used for smaller cholesteatomas with well-developed mastoid anatomy.
  + Preserves the ear canal wall, avoiding an open cavity.
  + Lower risk of postoperative cavity care but higher risk of disease recurrence.
  + Surgery duration: 1–3 hours.
  + May require second-look surgery to check for residual disease.
* Endaural Mastoidectomy (Atticotomy)
  + For small cholesteatomas limited to the attic (upper middle ear).
  + Performed through the ear canal with minimal external incisions.
  + Shorter surgery and recovery time.
* Tympanoplasty
  + Often performed alongside mastoidectomy to repair the eardrum and hearing bones.
  + Uses grafts (cartilage or fascia) to close perforations and reconstruct ossicles if damaged.

## 2. Procedure Details

* Surgery is performed under general anesthesia.
* Incisions are made behind or in front of the ear, sometimes combined with an incision in the ear canal.
* Bone removal around the cholesteatoma allows visualization and complete excision.
* Reconstruction of middle ear structures may be performed during the same surgery or in a staged approach.
* Surgery duration is usually 2 to 3 hours, depending on extent.

## 3. Postoperative Care and Follow-up

* Patients may be discharged the same day or after an overnight stay.
* Some discomfort, dizziness, ear numbness, and taste disturbance (due to chorda tympani nerve involvement) are common but usually temporary.
* Hearing may improve or worsen depending on disease extent and reconstruction success.
* Regular follow-up with clinical exams and imaging (CT or MRI) is essential to detect residual or recurrent cholesteatoma.
* Cleaning of the mastoid cavity (if CWD performed) is required every 6–12 months.

## 4. Timelines

| **Phase** | **Typical Duration** |
| --- | --- |
| Preoperative preparation | Days to weeks (includes imaging and hearing tests) |
| Surgery | 1–3 hours |
| Hospital stay | Same day to 1 night |
| Initial recovery | 1–2 weeks (pain, dizziness, wound healing) |
| Hearing improvement/stabilization | Weeks to months |
| Follow-up imaging | Usually at 6 months to 1 year post-op |
| Long-term monitoring | Lifelong, especially if CWD surgery performed |

## 5. Outcomes

* Surgical success rates are high (~90%+) with appropriate technique.
* Residual cholesteatoma occurs in about 6–10% of cases, often requiring second-look surgery.
* Hearing preservation is possible, especially with CWU and reconstruction.
* Recurrence is more common in children and with CWU procedures.

**Doctor-patient conversation about cholesteatoma**,

Doctor:  
“Hello [Patient’s Name]. After reviewing your symptoms and imaging, you have a condition called a cholesteatoma. This is an abnormal growth of skin cells in your middle ear or mastoid that can cause chronic ear infections and damage to the surrounding structures.”

Patient:  
“What exactly is a cholesteatoma? Is it cancer?”

Doctor:  
“No, it’s not cancer. It’s a benign but locally aggressive growth made up of skin cells that shouldn’t be inside the middle ear. Over time, it can erode bone and cause hearing loss, infections, and other complications if left untreated.”

Patient:  
“What caused it? Can it be prevented?”

Doctor:  
Cholesteatomas often develop because of repeated ear infections or problems with the eustachian tube, which affects ventilation of the middle ear. Sometimes, they can be congenital (present from birth). Preventing chronic ear infections and treating them promptly can reduce the risk, but once a cholesteatoma forms, it usually requires surgical removal.

Patient:  
“What are my treatment options?”

Doctor:  
The main treatment is surgery to remove the cholesteatoma and prevent further damage. There are two main surgical approaches:

* Open technique (canal wall down mastoidectomy): This removes part of the ear canal wall to create an open cavity, which makes it easier to remove the disease completely but requires ongoing cleaning.
* Closed technique (canal wall up mastoidectomy): This preserves the ear canal wall and has better cosmetic and hearing outcomes but has a higher chance of recurrence and may require a second surgery later.

We will choose the best approach based on the size and location of your cholesteatoma.

Patient:  
“What happens during surgery? How long will recovery take?”

Doctor:  
Surgery is done under general anesthesia and usually takes a couple of hours. We make an incision behind your ear and carefully remove the cholesteatoma and any damaged bone. Sometimes, we also reconstruct the hearing bones if possible.

Most patients stay in the hospital for a day or two. Recovery takes a few weeks, and you may have some discomfort, dizziness, or taste changes temporarily. Follow-up visits are important to monitor healing and check for recurrence.

Patient:  
“Are there any risks or complications?”

Doctor:  
As with any surgery, there are risks like infection, bleeding, or damage to nearby nerves, which could affect your facial movement or hearing. However, these are uncommon with experienced surgeons. The biggest challenge is that cholesteatomas can recur, so careful follow-up is essential.

Patient:  
“Will I need any medications after surgery?”

Doctor:  
You’ll likely need ear drops to keep the ear clean and prevent infection. Sometimes, topical steroids are used if there is excessive inflammation. Pain medications will be given as needed during recovery.

Patient:  
“Can the cholesteatoma come back?”

Doctor:  
Yes, recurrence can happen, especially with the closed surgical technique. That’s why we do regular follow-ups and sometimes imaging like MRI to detect any residual or recurrent disease early. If needed, a second surgery can be planned.

Patient:  
“What can I do to help prevent problems in the future?”

Doctor:  
Keep your ears dry and avoid inserting anything into the ear canal. Treat any ear infections promptly. Attend all your follow-up appointments so we can monitor your ear health closely.

REFERENCES

<https://www.health.harvard.edu/a_to_z/chronic-otitis-media-cholesteatoma-and-mastoiditis-a-to-z>

<https://emedicine.medscape.com/article/860080-differential>

[Cholesteatoma: Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/21535-cholesteatoma#overview)

### **choanal atresia**

Choanal atresia (pronounced “ko-UH-nul uh-TREE-zhuh”) is a congenital condition where your baby is born with tissue blocking their nasal airway. The blockage may consist of bone or a combination of bone and soft tissue. Choanal atresia can affect one or both sides of your baby’s nose.

Blockages or narrowing (choanal stenosis) in your child’s nasal passages may make it harder for them to breathe. But how serious the issue is (and how soon they’ll need treatment) depends on the extent of the blockage and whether it blocks one or both nasal passages.

#### **Types of choanal atresia**

The two types of choanal atresia are:

* Unilateral choanal atresia. Most infants with chronic atresia have a nasal blockage in just one side of their nose. As they can learn to breathe through one nasal passage, symptoms may not show up until later in childhood or even adulthood.
* Bilateral choanal atresia. Newborns with blockages in both nasal passages need life-saving emergency care to help them breathe. This is because infants breathe almost entirely through their noses. (Typically, babies only breathe through their mouths if they’re crying.) Your provider can insert a small tube into your baby’s windpipe immediately so they can get air. Once your baby is stable, your provider can perform surgery to permanently correct the problem.

Choanal atresia occurs in about 1 out of every 7,000 live births. More than 60% of diagnoses are unilateral choanal atresia. The condition is about twice as likely to affect girls.

## **Symptoms and Causes**

Healthcare providers often recognize symptoms of bilateral choanal atresia at birth. Babies with choanal atresia affecting both sides of their nose have trouble breathing unless they’re crying. Their skin and lips may look blue (cyanosis), and they may be unable to breathe. If this happens, your provider will resuscitate your baby immediately.

Babies that have a blockage in one side of their nose (unilateral choanal atresia) usually have milder symptoms that may not show up until you take them home. They may not show up until childhood. Symptoms include:

* A newborn whose chest sinks in unless they’re crying.
* A newborn that’s fussy during feedings (mouth breathing is especially difficult for an infant trying to nurse).
* Runny or stuffy noses that only affect one side (one-sided nasal drainage that doesn’t stop is the most common sign of choanal atresia).
* Long-lasting sinus infections (chronic sinusitis).

### **What causes choanal atresia?**

The exact cause of choanal atresia is unknown. Most medical experts believe it happens when the piece of tissue that separates the mouth and nose during fetal development stays intact after a baby is born.

#### **Conditions associated with choanal atresia**

About half of the babies with choanal atresia are born with inherited syndromes and genetic disorders associated with other developmental abnormalities. Medical experts don’t know why. Associated conditions include:

* CHARGE syndrome. (About 60% of babies born with bilateral choanal atresia have CHARGE syndrome.)
* Treacher Collins syndrome.
* Crouzon syndrome.
* Pfeiffer syndrome.
* Antley-Bixler syndrome.
* Marshall-Smith syndrome.
* Schinzel-Giedion syndrome.

### **Complications of this condition**

Over time, untreated choanal atresia can cause long-term effects related to fluid build-up in the blocked nasal passage. For example, your child may get frequent ear infections. Eventually, damage to their ear can lead to hearing loss. This is more common if your child also has CHARGE syndrome.

They may struggle to get enough air while eating and aspirate (food goes down their windpipe instead of their esophagus).

Your healthcare provider can provide treatment sooner rather than later if they’re concerned about these risks.

## **Diagnosis and Tests**

Healthcare providers usually diagnose newborns with bilateral choanal atresia while they’re still in the hospital. A provider may hold up a laryngeal mirror (the tiny mirror your dentist uses) to your baby’s nose to see if they’re breathing enough air to fog it up.

If they suspect your baby has choanal atresia, they may perform tests, including:

* CT (computed tomography) scan. This imaging test creates detailed 3D images that can show structural abnormalities or blockages in your baby’s nasal passages.
* Nasal endoscopy. Your provider will insert a thin tube with a small camera (endoscope) into your baby’s nose to get a better look at their nasal structures.

Your baby’s provider will ensure they’re getting the breathing support they need throughout these tests so there aren’t any risks.

## **Management and Treatment**

Surgery is the only long-term treatment for choanal atresia. If your baby is born with blockages in both nasal passages, they’ll need surgery as soon as possible. In some cases, infants with blockages on one side learn to breathe through their mouths, delaying the need for immediate surgery. In that case, you can work to manage symptoms at home.

But eventually, babies and children need choanal atresia repair to improve their health and quality of life. Endoscopic choanal atresia repair is the most common approach.

#### **Surgery**

During choanal atresia repair, the surgeon creates a hole through the bone or tissue that’s blocking your baby’s airway. This can be achieved through the nose (transnasal) or roof of the mouth (transpalatal). In some cases, they may place a stent (a small tube) inside your baby’s nasal passage to keep the airway open during healing. Your baby’s surgeon will remove the stent a few months after placement.

Surgeons perform choanal atresia repair in an operating room while your baby is under general anesthesia.

#### **Management**

If your baby has unilateral choanal atresia, you and your child’s provider may decide to wait on surgery until they’re older. This is fine, as long as your baby doesn’t have severe breathing problems or difficulty eating. In the meantime, ask your provider how to properly manage choanal atresia symptoms. For example, you may need to flush their nasal passages with saline to keep the tissues clean and healthy.

## **Outlook / Prognosis**

Your healthcare provider will discuss all treatment options with you in detail if your baby is born with choanal atresia. With unilateral choanal atresia, they’ll let you know when it’s safe to wait on surgery and when delaying poses risks.

Treatment for choanal atresia is usually successful. Most babies make a full recovery after surgery.

### **When should I call my healthcare provider?**

Schedule a visit with a healthcare provider any time you notice changes in the way your baby or child is breathing or eating. Sometimes, choanal atresia symptoms don’t surface until later — especially in mild unilateral cases. It’s important to get them checked.

## Epidemiology

### Frequency

The average rate of choanal atresia is 0.82 cases per 10,000 individuals. Unilateral atresia occurs more frequently on the right side. The ratio of unilateral to bilateral cases is 2:1. A slightly increased risk exists in twins. Maternal age or parity does not increase the frequency of occurrence. Chromosomal anomalies are found in 6% of infants with choanal atresia. Five percent of patients have monogenic syndromes or conditions.

### Race

Choanal atresia occurs with equal frequency in people of all races.

### Sex

Studies report significantly more females than males affected by choanal atresia. A report by Michalski et al, using data from the National Birth Defects Prevention Study (1997-2009), indicated that the female-to-male ratio for infants with choanal atresia is 2.2

D**ifferential diagnosis** of choanal atresia includes the following:

* Antrochoanal polyp
* Chordoma
* Deviated nasal septum
* Dislocated nasal septum
* Hematoma
* Isolated piriform aperture stenosis
* Nasal dermoid
* Nasolacrimal duct cyst
* Turbinate hypertrophy
* Tumor
* Encephalocele

A thorough evaluation of these potential conditions helps guide appropriate treatment strategies.

**Doctor-patient conversation about choanal atresia**

Doctor:  
“Hello [Patient’s Name]. After reviewing your symptoms and tests, it looks like you have a condition called choanal atresia. This means that the back part of one or both of your nasal passages is blocked, either by bone or tissue, which makes it hard for air to pass through your nose.”

Patient:  
“Is this something I was born with? How does it affect me?”

Doctor:  
“Yes, choanal atresia is a congenital condition, meaning it’s present from birth. If both sides are blocked (bilateral), newborns usually have trouble breathing right after birth because babies primarily breathe through their noses. If only one side is blocked (unilateral), symptoms might be milder, like persistent nasal congestion or difficulty breathing through one nostril, and may not be noticed until later in childhood.”

Patient:  
“What causes it? Can it be fixed?”

Doctor:  
It happens because during fetal development, the nasal cavity doesn’t fully open to the throat as it should. The blockage can be made of bone, soft tissue, or both. The good news is that it can be treated, usually with surgery to open the blocked nasal passage and restore normal airflow.

Patient:  
“What kind of surgery is needed? How soon would it be done?”

Doctor:  
The surgery is typically done through the nose using an endoscope, which allows us to remove the blockage with minimal incisions. For babies with bilateral choanal atresia, surgery is often urgent to help them breathe better. For unilateral cases, surgery may be planned electively depending on symptoms. Sometimes, a small tube or stent is placed temporarily after surgery to keep the airway open.

Patient:  
“What should I expect after surgery? Will there be complications?”

Doctor:  
After surgery, there may be some nasal swelling and discharge for a few weeks. Regular follow-up is important to monitor healing and ensure the nasal passage stays open. Sometimes, restenosis (re-blockage) can occur, requiring additional procedures. Most patients do very well and have significant improvement in breathing.

Patient:  
“Is there anything I should do to prepare or avoid before surgery?”

Doctor:  
We’ll do some imaging like a CT scan to understand the anatomy before surgery. If your child has any infections, we’ll treat those first. Avoiding nasal trauma and keeping the nose clean after surgery helps with healing.

Patient:  
“Can this condition be part of other syndromes or problems?”

Doctor:  
Yes, sometimes choanal atresia is associated with other congenital anomalies or syndromes, so we may evaluate those as well to ensure comprehensive care.

### **What questions should I ask my healthcare provider?**

## 1. Does my baby have blockages in one nasal passage or both?

This is determined by clinical examination and imaging.

* Bilateral choanal atresia means both nasal passages are blocked, causing severe breathing difficulties right after birth. Babies with this often struggle to breathe unless they cry, which opens the airway.
* Unilateral choanal atresia means only one nasal passage is blocked. Symptoms may be milder or appear later, such as noisy breathing, persistent nasal discharge, or difficulty breathing through one nostril.  
  Doctors use nasal endoscopy and CT scans to confirm which side(s) are blocked.

## 2. Is my child’s condition associated with another syndrome like CHARGE?

Yes. Choanal atresia is frequently associated with congenital syndromes, especially CHARGE syndrome, where over half of children have choanal atresia, often bilateral. Other syndromes linked include Treacher Collins, Crouzon, Tessier syndrome, and coloboma-related conditions. Because of this, your child may be evaluated for other anomalies to provide comprehensive care.

## 3. When will they need surgery?

* For bilateral choanal atresia, surgery is usually urgent or emergent because the baby cannot breathe effectively through the nose. Immediate airway management, sometimes including intubation, is needed before surgery.
* For unilateral choanal atresia, surgery is often planned electively when symptoms become apparent or cause feeding and breathing difficulties.  
  The timing depends on symptom severity and overall health.

## 4. What surgical approach do you recommend?

The most common surgical approach is endoscopic transnasal repair, where the blockage is removed through the nose using a small camera and instruments. This minimally invasive technique reduces recovery time and avoids external incisions. Sometimes a small stent or tube is placed temporarily to keep the airway open during healing. The exact approach depends on the type and extent of blockage and your child’s anatomy.

## 5. How will we know the surgery was successful?

Success is determined by:

* Improved nasal airflow and breathing without distress.
* Resolution of symptoms like noisy breathing and feeding difficulties.
* Follow-up nasal endoscopy and imaging (CT or nasal endoscopy) to confirm the nasal passage remains open and free of restenosis (re-blockage).
* Long-term monitoring is important because restenosis can occur and may require additional treatment

REFERENCES

[Choanal Atresia: Symptoms, Definition & Repair](https://my.clevelandclinic.org/health/diseases/21865-choanal-atresia#overview)

<https://www.ncbi.nlm.nih.gov/books/NBK507724/#article-19441.s9>

<https://emedicine.medscape.com/article/872409-overview#a6>

### **Chronic sinusitis**

Chronic sinusitis is long-lasting swelling or infection in your sinuses. Unlike acute sinusitis, which typically goes away within 10 days, chronic sinusitis may last 12 weeks or more. Healthcare providers can help cure it, but you may need several different kinds of treatment to make it go away for good.

## **Symptoms and Causes**

If you have chronic sinusitis, you may feel:

* Tenderness or pressure, particularly around your nose, eyes and forehead.
* Thick yellow or green mucus from your nose or postnasal drip (mucus that builds up and drips down the back of your throat).
* Stuffy nose.
* Toothache.
* Headache, particularly a headache that makes your face hurt.
* Cough.
* Tiredness.
* Ear pain.
* Loss of the senses of taste (ageusia) and smell (anosmia).
* Bad breath (halitosis).

### **Causes of chronic sinusitis**

Your sinuses are a series of connected hollow spaces behind your cheekbones, forehead and nose. Air that comes in through your nose moves through your sinuses on its way to your lungs.

Your sinuses are lined with tissue. They also make mucus that keeps the inside of your nose moist and takes care of debris that air might move into your nose, like bacteria, viruses and dust-carrying allergens. In chronic sinusitis, your sinus tissues swell, sometimes trapping mucus so it can’t flow from your nose as it should. (You have several sinuses, and swelling may affect one or more of them.)

Chronic sinusitis may happen because you have:

* Conditions that block your airways, like asthma, allergies or cystic fibrosis.
* Tooth infection.
* Weak immune system, which makes you more vulnerable to infections that cause chronic sinusitis.
* Polyps (growths) in your nose.

#### **Risk factors for chronic sinusitis**

If you have asthma or allergies, you’re more likely to develop chronic sinusitis because your airways are more likely to become inflamed or irritated, making your sinus tissue swell.

### **Complications of this condition**

Untreated chronic sinusitis may cause infections that spread from your sinuses into your eyes, bones, brain or spine.

## **Diagnosis and Tests**

If sinus infection symptoms last 12 weeks or more, healthcare providers may determine that you have chronic sinusitis. They may do the following tests:

* Examine the inside of your nose with an endoscope, a tool that lets them look inside your nose and sinuses. They may also remove tissue that medical pathologists examine under a microscope.
* CT scan or MRI to look for polyps or see if you have a deviated septum.
* Biopsy, in case your provider suspects your issue is caused by something other than chronic sinusitis or acute fungal infection. Providers rarely do biopsies to diagnose chronic sinusitis.

## **Management and Treatment**

Chronic sinusitis treatment focuses on controlling or easing inflammation. That’s because most chronic sinusitis happens when something irritates your sinuses. But treatments may vary depending on your situation. Your provider may prescribe:

* Nasal saline irrigation.
* Nasal steroid sprays.
* Surgery to fix a deviated septum, remove nasal polyps, open up your sinuses or remove fungal balls (clumps of fungal infection that block sinuses.
* Balloon sinuplasty, a procedure that opens your sinus cavities.

## **Outlook / Prognosis**

Yes, it can, depending on the cause. For example, if nasal polyps cause chronic sinusitis, removing the polyps could cure the condition.

## **Prevention**

You may be able to prevent infections and chronic sinusitis if you:

* Get treatment for conditions that may cause chronic sinusitis, like asthma and allergies.
* Avoid allergens such as animal dander, dust, pollen, smoke and mold that make your sinuses swell.
* If you smoke, try to stop. If you don’t smoke, avoid secondhand smoke.
* Avoid infections by washing your hands thoroughly with soap and water.
* Rinse your nasal passages with saline solution, either purchased or with a neti pot.
* Use a humidifier to keep nasal tissues moist.

### **When should I see my healthcare provider?**

If you’ve had sinusitis symptoms for weeks, it’s time to contact a healthcare provider. Sinusitis symptoms include thick green or yellow mucus from your nose, or it hurts when you put gentle pressure on your nose, forehead or around your eyes.

#### **Is there anything I can do at home to feel better?**

* Take a shower. The warm steam may help ease sinus pressure. Don’t have time for a shower? Wring out a washcloth soaked in warm water and drape it over your face.
* Drink up. Drinking water and clear liquids may help thin the mucus clogging your nose.
* Get extra rest. Chronic sinusitis can affect your sleep. If you can, build a nap into your daily schedule. If an infection is the chronic sinusitis cause, extra rest may help you recover.

## **Common Questions**

### **What’s the difference between chronic sinusitis and recurrent sinusitis?**

Chronic sinusitis is different from recurrent sinusitis because chronic sinusitis symptoms don’t go away for long periods of time. In recurrent sinusitis, you have four or more bouts of sinusitis in one year, but you also have symptom-free periods in between.

## **Diagnostic Considerations**

Problems to be considered include the following:

* Temporomandibular joint syndrome
* Asthma
* Other chronic rhinitis
* Nasal and sinus cavity tumors
* Facial pain and headache attributable to other causes
* Nasal polyp
* Dental infection
* Periodontal abscess
* Antral-choanal polyp
* Inverting papilloma
* Aspirin/nonsteroidal anti-inflammatory drug sensitivity
* Chronic headache of other etiology

## 

## **Differential Diagnoses**

* Acute Sinusitis
* Allergic Fungal Sinusitis
* Allergic Rhinitis
* Benign Tumors of the Skull Base
* Chronic Sinusitis
* Fever of Unknown Origin (FUO)
* Foreign Bodies of the Airway
* Fungal Sinusitis
* Gastroesophageal Reflux Disease
* Juvenile Nasopharyngeal Angiofibroma
* Malignant Nasopharyngeal Tumors
* Malignant Tumors of the Nasal Cavity
* Malignant Tumors of the Sinuses
* Medical Treatment for Acute Sinusitis
* Olfaction disorders
* Pain due to other causes (migraine, tension headaches, and cluster headaches, and facial pain syndromes)
* Pharmacotherapy for Nonallergic Rhinitis
* Rhinocerebral Mucormycosis
* Sinonasal Manifestations of Cystic Fibrosis
* Turbinate Dysfunction

## **Epidemiology**

Chronic sinusitis is one of the more prevalent chronic illnesses in the United States, affecting persons of all age groups. The overall prevalence of CRS in the United States is 146 per 1000 population. For unknown reasons, the incidence of this disease appears to be increasing yearly. This results in a conservative estimate of 18-22 million physician visits in the United States each year and a direct treatment cost of $3.4-5 billion annually.Chronic sinusitis is the fifth most common disease treated with antibiotics. Up to 64% of patients with AIDS develop chronic sinusitis.

### International prevalence

Chronic sinusitis is a common disease worldwide, particularly in places with high levels of atmospheric pollution. In the Northern Hemisphere, damp temperate climates along with higher concentrations of pollens are associated with a higher prevalence of chronic sinusitis.

### Rhinosinusitis in children

Rhinosinusitis is more common in the pediatric population because this term includes both acute and chronic infection and both viral and bacterial disease. This is likely secondary to an increased frequency of exposure to upper respiratory tract infections in the pediatric population.

**TREATMENT DRUG INFORMATION AND THEIR SIDE EFFECTS**

| **Drug Treatment** | **Purpose** | **Common Side Effects** |
| --- | --- | --- |
| Nasal corticosteroids  (e.g., fluticasone, mometasone) | Reduce inflammation and swelling in nasal passages | Nasal irritation, dryness, nosebleeds, rare systemic steroid effects with long-term use |
| Oral corticosteroids  (short courses) | Used for severe or refractory inflammation | Increased blood sugar, mood changes, insomnia, increased infection risk, osteoporosis with prolonged use |
| Nasal saline irrigation | Thins mucus, clears allergens and irritants | Nasal irritation or discomfort, rarely nosebleeds |
| Antibiotics  (prolonged courses, 3-4 weeks) | Treat bacterial infections when confirmed or highly suspected | Gastrointestinal upset, antibiotic resistance, allergic reactions |
| Decongestants  (oral or nasal, e.g., pseudoephedrine, oxymetazoline) | Provide short-term relief of nasal congestion | Nasal rebound congestion if nasal sprays used >3-7 days, increased blood pressure, insomnia, nervousness with oral forms |
| Antihistamines  (e.g., loratadine, cetirizine) | Used if allergy contributes to sinusitis | Drowsiness (especially first-generation), dry mouth, headache |
| Biologic therapies  (e.g., dupilumab, omalizumab, mepolizumab) | For chronic sinusitis with nasal polyps and severe inflammation | Injection site reactions, headache, possible increased risk of infections |

DOCTOR PATIENT CONVERSATION

Doctor: "You’ve been experiencing sinus symptoms for quite a while now, more than 12 weeks, which suggests chronic sinusitis. This means your sinuses are persistently inflamed, causing congestion, pressure, and nasal discharge."

Patient: "I’ve had this off and on for months. Last time I had antibiotics and they helped. Do I need antibiotics again?"

Doctor: "I understand that antibiotics helped before, but most chronic sinusitis cases are caused by ongoing inflammation rather than an active bacterial infection. Antibiotics are usually reserved for when we strongly suspect a bacterial infection or if symptoms worsen or don’t improve. Overusing antibiotics can lead to side effects like diarrhea or yeast infections and can contribute to antibiotic resistance."

Patient: "So what can I do to feel better now?"

Doctor: "There are several things that can help. Nasal saline rinses, like using a neti pot, can clear mucus and reduce congestion. Nasal corticosteroid sprays help reduce inflammation, but they need to be used regularly for at least 8 to 12 weeks to see the full benefit. Over-the-counter decongestants can provide short-term relief but should not be used for more than a few days."

Patient: "What if these treatments don’t work?"

Doctor: "If your symptoms persist despite medical treatment, we may refer you to an ear, nose, and throat specialist. They might perform further tests like a nasal endoscopy or a CT scan to look for underlying causes such as nasal polyps or structural issues. In some cases, surgery can help improve sinus drainage and relieve symptoms."

Patient: "Will my symptoms ever completely go away?"

Doctor: "Many people experience significant improvement with treatment, but chronic sinusitis can wax and wane. Managing triggers like allergies or asthma, avoiding smoking, and maintaining good nasal hygiene helps. We’ll work together to find the best approach for you."

Patient: "How will I know if it’s getting worse?"

Doctor: "If you develop a high fever, severe facial pain, swelling, or if your symptoms suddenly worsen instead of gradually improving, you should contact me immediately. Otherwise, expect gradual improvement over the next several days to weeks."

REFERENCES

[Chronic Sinusitis: Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/17700-chronic-sinusitis#overview)

<https://www.ncbi.nlm.nih.gov/books/NBK441934/#article-29061.s10>

<https://emedicine.medscape.com/article/232791-overview#a7>

**Chronic acid reflux**

### Acid reflux

Your stomach contents are supposed to travel only one way: down. When acid from inside your stomach flows backward — meaning, up — into your esophagus and throat, it’s called acid reflux.

When acid creeps into places it doesn’t belong, you’re bound to feel it. Acid irritates and inflames the tissues inside your esophagus, which runs from your stomach up through your chest to your throat.

Almost everyone has experienced an occasional episode of acid reflux. It might feel like indigestion — burning stomach pain after eating — or heartburn — burning chest pain close to your sternum.

Occasional acid reflux is uncomfortable, but it’s not a disease. But some people have reflux all the time. Chronic acid reflux can really affect your quality of life, and it can also do real damage to your tissues.

**What’s the difference between GERD and stomach ulcers?**

#### What is GERD?

GERD stands for gastroesophageal reflux disease. Depending on where you live, it may be spelled GORD for gastro-oesophageal reflux disease. However you spell it, GERD is chronic acid reflux in your esophagus. Acid reflux is considered chronic when you’ve had it at least twice a week for several weeks.

Temporary conditions can cause temporary acid reflux. But GERD is a constant, mechanical problem. It means that the mechanisms that are supposed to keep acid out of your esophagus aren’t working right.

Occasional, uncomplicated gastroesophageal reflux (GER) and gastroesophageal reflux disease (GERD) are both common. GERD is estimated to affect about 20% of adults and 10% of children in the U.S.

## **Symptoms and Causes**

Symptoms of acid reflux and GERD may include:

* Backwash. You might notice acid, food or liquids backwashing from your stomach into your throat after eating. This is also called regurgitation. You might notice the sour taste of the acid.
* A burning feeling. Acid literally burns the tissues in your esophagus. If it feels like it’s in your chest, it’s called heartburn. If it feels closer to your stomach, you might call it acid indigestion.
* Noncardiac chest pain. Some people feel pain in their esophagus that doesn’t feel like burning. Esophagus pain triggers the same nerves as heart-related pain does, so it might feel like that.
* Nausea. Acid overflow or backwash may make you feel queasy or make you lose your appetite. Although you may have eaten a while ago, it may feel like there’s still more food to digest.
* Sore throat. If acid rises into your throat, it can make it sore. It might feel like there’s a lump in your throat, or like it’s hard to swallow. Reflux into your throat often happens at night.
* Asthma symptoms. GERD can trigger asthma-like symptoms, like chronic coughing, wheezing and shortness of breath. If acid particles get into your airways, it can make them contract.

GERD symptoms may be worse:

* At night or while lying down.
* After a large or fatty meal.
* After bending over.
* After smoking or drinking alcohol.

#### Do babies get GERD?

It’s normal for babies to spit up (regurgitate). There might be some acid in it, but usually not enough to really bother them. GERD is a more severe condition that causes distress or complications with feeding.

Babies are more likely to have GERD if they’re born prematurely or with a condition that affects their esophagus. A pediatrician might check for GERD if your baby seems to be struggling in some way.

Symptoms of GERD in babies (or small children) may include:

* Excessive fussiness.
* Difficulty sleeping.
* Refusing to feed.
* Small vomiting episodes.
* Wheezing or hoarseness.
* Bad breath.

### **What causes acid reflux?**

For acid to get into your esophagus, it needs to get past the valve at the bottom of your esophagus that usually keeps things from coming back up. This valve is called your lower esophageal sphincter (LES).

Your LES is a circular muscle that opens when you swallow and then closes again to keep substances in your stomach. It also opens a little to let gas bubbles out when you’re burping or have hiccups.

Acid reflux happens when your LES weakens or relaxes enough to let acid pass. Some temporary things can relax your LES, like lying down after a large meal. But if you have GERD, it means your LES is relaxing often.

Many things can contribute to weakening your LES, either temporarily or permanently. Sometimes acid reflux turns into chronic GERD when these factors overlap or persist for a long time.

Common causes of acid reflux and GERD include:

* Hiatal hernia. A hiatal hernia happens when the top of your stomach pushes up through the hole in your diaphragm where your esophagus passes through. It squeezes in next to your esophagus, compressing them both and trapping acid. It also moves your LES above your diaphragm, where it loses some of its muscular support. Hiatal hernias are very common, especially as you get older. They usually occur gradually, and they can gradually worsen.
* Pregnancy. Pregnancy is a common cause of temporary acid reflux. The pressure and volume in your abdomen can push, stretch and weaken the muscles in your diaphragm that support your LES. Pregnancy hormones may also encourage your LES to relax. Pregnancy brings high levels of the hormone relaxin, which relaxes your muscles so they can stretch to make room for the fetus. It also brings high levels of estrogen and progesterone, which may also relax your LES.
* Obesity. Obesity increases the pressure and volume in your abdomen, which affects your LES similarly to how pregnancy does. Obesity also tends to last longer than pregnancy, which can weaken the muscles more permanently. It’s a common contributing factor to developing a hiatal hernia. Since fat tissue secretes estrogen, having more of it also raises your estrogen levels.
* Smoking. Tobacco smoke relaxes your LES, whether you’re the one smoking or you’re exposed to second-hand smoke. Smoking also triggers coughing, which opens your LES. Smoking and chronic coughing can weaken your diaphragm muscles and contribute to developing a hiatal hernia. Smoking also slows down your digestion and causes your stomach to produce more acid.

**Other possible causes of GERD include:**

Birth defects. Congenital defects like esophageal atresia and hernias can affect your LES.

Connective tissue diseases. Diseases like scleroderma may affect your esophagus muscles.

Prior surgery. Surgery in your chest or upper abdomen may have injured your esophagus.

Medications. Certain medications can have a relaxing effect on your LES, including:

* Benzodiazepines, a type of sedative.
* Calcium channel blockers, which treat high blood pressure.
* Tricyclic antidepressants, which treat depression and pain.
* NSAIDs (nonsteroidal anti-inflammatory drugs) like aspirin and ibuprofen.
* Theophylline, a common asthma medication.
* Hormone therapy (HT) medications for menopause.

#### **Can foods cause acid reflux**

Foods and drinks probably aren’t enough to cause acid reflux alone, but they can contribute to it. Chocolate, coffee, alcohol, mint, garlic and onions may have a relaxing effect on your LES in higher doses.

Fatty foods increase stomach acid and take longer to digest, so there’s more opportunity for acid to escape. If you have a heavier meal for dinner, it might not have time to digest before you lie down.

### **Complications of chronic acid reflux (GERD)**

Stomach acid is powerful stuff, built to break down the food you eat for digestion. Your stomach has a tough inner lining to protect it from its own acid. But your other organs don’t have this protection.

Acid reflux mostly affects your esophagus, though sometimes it can get into your windpipe or even your airways. A little acid may just feel momentarily uncomfortable. But a lot of acid will injure these organs.

Possible complications include:

* Esophagitis. Esophagitis is inflammation in the lining of your esophagus. Chronic esophagitis can cause chronic pain and complications, like ulcers in your esophagus. After a long time, it can cause tissue changes like scarring or intestinal metaplasia, a precancerous condition.
* Barrett’s esophagus. Barret’s esophagus is the name for intestinal metaplasia of your esophagus. It means that the tissues lining your esophagus change to look like intestinal lining. This change happens after long exposure to acid and inflammation. It’s a risk factor for esophageal cancer.
* Esophageal stricture. Your esophagus may also develop scar tissue to protect it from chronic inflammation and injury. Scar tissue can cause your esophagus to narrow. This is called stricture. Esophageal strictures can make it hard to swallow, which can make it hard to eat and drink.
* Laryngopharyngeal reflux. Some people with GERD also develop LPR, which is reflux that travels into your throat. Acid might sneak up into your throat while you sleep. It can cause swelling, hoarseness and vocal cord growths, and you can also aspirate acid particles into your airways.
* Asthma. Acid in your airways may aggravate existing asthma or cause asthma-like symptoms in people without any preexisting respiratory conditions. Tiny acid particles may irritate your bronchial tubes and cause them to contract, causing coughing and breathing difficulties.

## **Diagnosis and Tests**

A gastroenterologist will evaluate your esophagus to diagnose GERD. Tests may include:

* Esophagram. An esophagram is a type of X-ray exam. It takes moving X-rays (fluoroscopy) of your esophagus while you swallow. For the test, you swallow a chalky liquid called barium.
* Upper endoscopy. An upper endoscopy involves looking inside your esophagus with a camera. The camera is on the end of a thin tube that passes through your mouth while you’re asleep under light sedation.
* Esophageal pH test. This test measures the acid content inside your esophagus through a small wireless receiver. Your provider places the receiver in your esophagus during an endoscopy.
* Esophageal manometry. This test measures the muscle activity in your esophagus, using pressure sensors embedded in a nasogastric tube. It can confirm if your LES or other muscles aren’t working right.

## **Management and Treatment**

Some people find they can reduce acid reflux with lifestyle adjustments, like changing their eating habits, reducing alcohol and tobacco and losing weight. Healthcare providers encourage this approach.

But if you have chronic acid reflux or GERD, they also recommend medicines to reduce your stomach acid, so reflux is less damaging. These medicines are easily available and highly effective for GERD.

#### Medicine

Over-the-counter (OTC) medicines for acid reflux include:

* Antacids. Antacids (like Tums® and Rolaids®) neutralize your stomach acid so that when reflux happens, it isn’t as corrosive to your esophagus. They work well for occasional acid reflux, but they can have side effects if you take them too often, so they aren’t a good long-term solution.
* Alginates. Alginates are naturally occurring sugars derived from seaweed. They help block acid reflux by floating on top of the acid, creating a physical barrier between the acid and your esophagus. You can get alginates by themselves, and you can also get antacids with alginates.

Prescription medications for GERD include:

* Histamine receptor antagonists (H2 blockers). H2 blockers reduce stomach acid by blocking the chemical that tells your body to produce it (histamine). You can take them more frequently than antacids, but they don’t always work long-term. Your body can adapt to their effects.
* Proton pump inhibitors (PPIs). PPIs are stronger acid blockers that also promote healing. Your provider may prescribe them as a first-line treatment if your GERD is relatively severe or you have signs of tissue damage in your esophagus. They’re 90% effective in reducing acid reflux.
* Baclofen. Baclofen is a muscle relaxant, often prescribed to reduce muscle spasms. It can also help reduce the frequency of LES relaxation events, which reduces the frequency of acid reflux. Baclofen isn’t a first-line treatment for acid reflux, but it may be a part of your treatment plan.

#### **How do you get rid of acid reflux? Is there a cure?**

While medicine can reduce the symptoms and the effects of GERD, it doesn’t stop it from happening. A severe case of GERD may continue to cause complications despite medication, even if you can’t feel it.

When this is the case, you need a more definitive treatment for acid reflux. This usually means a procedure to tighten your LES. These are minor, outpatient procedures, and they’re very effective.

#### Surgery

Surgery for GERD includes:

* Nissen fundoplication. Fundoplication is the most common surgery for GERD. When possible, it’s done as a laparoscopic surgery, which means smaller incisions and less recovery time. A surgeon wraps the top of your stomach around your lower esophagus and secures it with stitches to tighten the junction between them. This is also the procedure to fix a hiatal hernia.
* LINX device. A newer procedure implants a device called LINX during surgery. The LINX device is a ring of tiny magnets that help keep the junction between the stomach and esophagus closed.

## **Outlook / Prognosis**

So many things contribute to acid reflux that it can be hard to tell what’s causing yours. Sometimes, simple lifestyle changes can make it go away. But some causes, like a hiatal hernia, may get worse.

If you have mild acid reflux, you can often manage it at home. If you have moderate to severe acid reflux, you might need a prescription to manage it. Medicine works for most people, but not all.

Whether your acid reflux bothers you a lot or a little, it’s a good idea to discuss it with a healthcare provider. They can assess whether it’s causing you complications that you may be unaware of.

If you have severe GERD or it causes complications that medicine can’t help, you might need surgery. But surgery is usually minor and effective. It’s worth treating GERD to prevent its complications.

## **Living With**

To help manage acid reflux at home, try:

* Eating smaller meals. Larger meals expand your stomach and put pressure on your LES. Smaller meals digest faster and don’t stimulate your stomach to produce so much acid.
* Eating dinner earlier. Gravity plays a role in keeping acid down, so it’s a good idea to eat several hours before reclining in the living room or going to bed
* Sleeping on your left side. This positions your lower esophageal sphincter in an air pocket above your stomach contents. Lying on your back or your right side submerges the valve.
* Reducing abdominal pressure. Wear loose-fitting clothes or consider losing weight if you have overweight/obesity. This can help in the short term and the long term.
* Quitting smoking and drinking. Both tobacco and alcohol weaken your LES. They also affect your stomach, making it more acidic and slowing your digestion time.
* Over-the-counter medications. Antacids and alginates are good to have on hand, especially if you know you’re eating a rich or acidic meal that might trigger more stomach acid.

#### What to do during an acid reflux attack?

If it’s happening right now, try:

* Standing up. Gravity is on your side.
* Taking a sip of water. Don’t drink a lot, but small sips may help wash the acid down.
* Loosening your waistband. Take off your belt or change your pants if it helps.
* Taking an antacid. If you don’t have one, Pepto Bismol® might work.

#### **When should I see my healthcare provider about acid reflux?**

If you have acid reflux frequently, talk to a healthcare provider. It’s important to find out how it’s affecting your body. GERD isn’t just an inconvenience — it can do real harm. It’s also very treatable**.**

## **Diagnostic Considerations**

Gastroesophageal reflux may be classified into three categories, as follows:

* Physiologic (or functional) gastroesophageal reflux: These patients have no underlying predisposing factors or conditions; growth and development are normal; and pharmacologic treatment is typically not necessary, though it may be needed to relieve symptoms if lifestyle changes are unsuccessful.
* Pathologic gastroesophageal reflux or GERD: Patients frequently experience complications noted above, requiring careful evaluation and treatment
* Secondary gastroesophageal reflux: This refers to a case in which an underlying condition may predispose to gastroesophageal reflux, with examples including asthma (a condition that may also be, in part, caused by or exacerbated by reflux) and gastric outlet obstruction

The diagnosis of GERD in patients with atypical symptoms can be difficult. When patients present with atypical complaints, the diagnosis of GERD must be kept in mind. Patients with recurrent aspiration can have asthma, history of pneumonias, and progressive pulmonary fibrosis. Additionally, hoarseness can be present due to chronic laryngeal irritation. Chest pain is another presenting symptom that can be difficult to evaluate. In these patients, excluding cardiac etiology is important prior to labeling the pain as noncardiac chest pain secondary to GERD.

The clinical presentation of GERD in pregnant women is similar to that for the general population. Heartburn and regurgitation are the cardinal symptoms. The diagnostic evaluation consists of a thorough history and physical examination.

## **Differential Diagnoses**

* Achalasia
* Acute Gastritis
* Antral Web Cholelithiasis
* Chronic Gastritis
* Coronary Artery Atherosclerosis
* Esophageal Cancer
* Esophageal Motility Disorders
* Esophageal Spasm
* Esophagitis
* Gallstones (Cholelithiasis)
* Helicobacter Pylori Infection
* Hiatal Hernia
* Intestinal Malrotation
* Intestinal Motility Disorders
* Irritable Bowel Syndrome (IBS)
* Peptic Ulcer Disease

## **Epidemiology**

Western dietary habits have made GERD a common disease. The prevalence of GERD in Western populations is estimated to be 10-20%, whereas it is about 2.5-17.0% in Asian populations.

Richter and associates reported that 25%-40% of Americans experience symptomatic GERD at some point. [19] Approximately 7%-10% of Americans experience symptoms of GERD on a daily basis. Because many individuals control their symptoms with over-the-counter (OTC) medications and without consulting a medical professional, the actual number of individuals with GERD is probably higher.

No sexual predilection exists: GERD is as common in men as in women. However, the male-to-female incidence ratio for esophagitis is 2:1-3:1. The male-to-female incidence ratio for Barrett esophagus is 10:1. White males are at a greater risk for Barrett esophagus and adenocarcinoma than other populations.

GERD occurs in all age groups. The prevalence of GERD increases in people older than 40 years.

**DOCTOR PATIENT CONVERSATION**

Doctor: "Can you tell me when you usually experience your acid reflux symptoms? Is it after meals, at night, or with certain foods or drinks?"

Patient: "Mostly after dinner, especially if I eat a large or fatty meal. Sometimes it wakes me up at night."

Doctor: "That’s important to note. How often do you get these symptoms? Would you say it’s more than twice a week?"

Patient: "Yes, it happens almost every day now."

Doctor: "And how severe is the burning sensation or regurgitation? Does it interfere with your sleep or daily activities?"

Patient: "The burning can be quite uncomfortable, and sometimes I have trouble sleeping because of it."

Doctor: "Have you noticed any other symptoms like a bitter taste in your mouth, hoarseness, frequent coughing, or difficulty swallowing?"

Patient: "Yes, I do have a bitter taste sometimes and my voice gets hoarse occasionally."

Doctor: "Have you tried any treatments so far? For example, over-the-counter antacids, lifestyle changes, or prescription medications?"

Patient: "I’ve tried antacids, but they only help a little. I stopped eating spicy foods and tried to avoid lying down right after eating."

Doctor: "Those are good steps. Chronic acid reflux can cause inflammation and damage if untreated, so it’s important to manage it properly. We might consider starting you on a proton pump inhibitor to reduce stomach acid and discuss further lifestyle adjustments like weight management, avoiding caffeine and alcohol, and not eating close to bedtime."

Patient: "Are there any serious complications I should worry about?"

Doctor: "If acid reflux is frequent and untreated, it can lead to complications like esophageal inflammation, strictures, or rarely, increased risk of esophageal cancer. That’s why we want to control your symptoms and may do further tests if needed."

Patient: "What else can I do to help with symptoms?"

Doctor: "Chewing food thoroughly, eating smaller meals, elevating the head of your bed, and stress reduction techniques can all help. We’ll tailor a plan that works best for you."

REFERENCES

<https://www.ncbi.nlm.nih.gov/books/NBK554462/>

<https://emedicine.medscape.com/article/176595-guidelines>

[**Acid Reflux & GERD: Symptoms, What It Is, Causes, Treatment**](https://my.clevelandclinic.org/health/diseases/17019-acid-reflux-gerd#overview)

Cerebrospinal fluid (CSF) otorrhea

### **cerebrospinal fluid (CSF) leak**

A cerebrospinal fluid leak is when the fluid surrounding your brain and spinal cord leaks out from where it’s supposed to be. If the leak is large enough, it can cause severe symptoms that make it hard or even impossible to go about your life as usual.

#### **Cerebrospinal fluid**

Your brain and spinal cord have a surrounding protective layer of cerebrospinal fluid (CSF). CSF contains nutrients that your brain can use. The CSF layer also supports and cushions your brain and spinal cord from sudden movements.

The effect is similar to putting a grape inside a jar. If the jar is empty and you give it a good shake, you’ll bruise or damage the grape. That’s what would happen to your brain if you had no CSF. But if you fill the jar with water and then shake it, the water slows down how fast the grape moves and cushions it, preventing damage.

Spontaneous CSF leaks are more likely in people over 30 (the average age to have them is 42). Females are also much more likely to develop spontaneous CSF leaks.

Having a CSF leak causes a drop in fluid pressure inside your head. That causes a condition known as intracranial hypotension (“intracranial” means “inside your skull” and “hypotension” means “lower than normal pressure”). Intracranial hypotension is a rare condition, and about 5 people out of every 100,000 have it.

However, it's very likely that CSF leaks happen more often than that number suggests. Experts don't know exactly how common CSF leaks are because they're difficult to diagnose. It's also common for healthcare providers to misdiagnose a CSF leak as another condition, like migraine, sinus infections or allergies.

There's less fluid to surround, support and cushion your brain when you have a CSF leak. If the leak is small, it might not cause noticeable effects, or you might notice symptoms and mistake them for something else.

If the leak is large enough to cause intracranial hypotension, your brain will sink downward in your skull, putting too much pressure on its lower sections. That can disrupt how those parts of your brain work, causing symptoms ranging from minor and barely noticeable to severe and unbearable.

## **Symptoms and Causes**

When CSF leaks are small enough that they don’t noticeably affect your brain, you may not notice any symptoms or might mistake the symptoms for something else. When a CSF leak is large enough that it causes intracranial hypotension, you’ll have symptoms related to pressure on the lower areas of your brain.

The most common symptom of intracranial hypotension from a CSF leak is a postural headache, which means a headache that changes depending on your posture. A postural headache with a CSF leak worsens when you sit up or stand and improves when you lie down.

#### **Symptoms that depend on CSF leak location**

Some possible symptoms of CSF leak depend on the location of the leak. Two likely places that CSF can leak into are your sinuses or your nose. In either case, you’ll have a runny nose (rhinorrhea) with thin, clear fluid. CSF coming out of your nose has two key differences from nasal mucus:

* If you wipe your nose with a handkerchief, drying nasal mucus will cause the cloth to stiffen, but CSF won’t.
* The runny nose may happen under certain circumstances, such as when you bend over to pick something up or tie your shoes.

Another place where leaking CSF can cause symptoms is your ears. Clear fluid coming out of your ears (otorrhea) is a symptom of a CSF leak. However, it's less likely to happen because for the fluid to leak out, you'd also have to have a hole or tear in your tympanic membrane (also known as your eardrum).

#### **Other possible symptoms that happen with or because of a CSF leak**

* Loss of sense of smell (anosmia). This usually happens with a CSF leak due to an injury to your face.
* Blurred or double vision (diplopia). This can happen when downward pressure on your brain causes problems with the ocular nerves, which connect to your eyes.
* Changes in hearing or hearing loss. This happens for similar reasons as double vision, with position changes putting strain or stress on the nerves connected to your ears.
* Pulsatile tinnitus. This is being able to hear your own pulse without using some kind of medical instrument or other means.
* Seizures. These are most likely to happen with large CSF leaks or those that cause severe intracranial hypotension.
* Neck pain and stiffness.
* Loss of appetite.
* Headaches, which can sometimes be severe or even unbearable.
* Dizziness or vertigo.
* Nausea and vomiting.
* Photophobia (light sensitivity).
* Balance and gait problems.

### **What causes a CSF leak?**

Experts estimate that about 90% of CSF leaks happen because of injuries. The remaining 10% happen spontaneously or for unknown reasons.

Many injuries can cause CSF leaks. These include:

* Injuries to your face, head, neck or spine. A common example of this is injuries from car crashes. The most likely injuries involve your nose, sinuses, ears, temples or the base (bottom) of your skull. Twisting or severe whiplash can also cause tears that leak CSF fluid near your spinal cord.
* Penetrating injuries (like puncture or stab wounds, gunshot wounds).
* Injuries from brain surgery.
* Injuries from ear, nose and throat medical procedures.
* Injuries from medical procedures on or around your spine, such as epidural anesthesia and spinal taps (lumbar punctures).

#### **Non-injury causes**

In about 10% of cases, CSF leaks happen for unknown reasons. However, experts have connected this problem to a few other medical conditions. Whether or not they cause CSF leaks is not yet known, but they do happen often enough that researchers are now looking to see if there is a cause-effect relationship.

* Connective tissue disorders that could cause a weakness in the layers of tissue that should contain the CSF (examples include Marfan syndrome and Ehlers-Danlos syndrome).
* Intracranial hypertension (high pressure inside your skull), which can cause tears in the surrounding tissue, creating a leak.
* Pseudotumor cerebri (false brain tumors).
* Obesity (especially class II or class III obesity).
* Structural defects in how your nose, sinuses or other parts of your skull formed (either that you had when you were born or that developed or happened at some point in your life).

CSF leak is not contagious. You can’t give it to or get it from others.

## **Diagnosis and Tests**

A healthcare provider can diagnose a CSF leak using a physical examination, along with gathering information about your symptoms, and asking questions about your medical history and circumstances. It’s also very likely that they’ll use certain kinds of lab tests and diagnostic imaging scans to confirm or rule out a CSF leak.

The combination of tests and methods they use depends on the suspected location of the leak, and whether or not you have any injuries (past or present) that could play a role.

There are several possible tests for CSF leaks. Most of them are imaging tests, which offer healthcare providers a way to look inside your head and back to locate possible leaks or damage that could contribute to them.

If you have CSF leak symptoms specific to your nose or face (especially a runny nose), your provider will likely want to test that fluid. The most likely lab test to help is a beta-2 transferrin test. This test looks for tau, a protein found in CSF but not in nasal mucus. Another possible test is a glucose test, as CSF has about the same amount of glucose as your blood, while nasal mucus has little-to-no glucose.

The most likely imaging and diagnostic tests include:

* Computerized tomography (CT) scans.
* Magnetic resonance imaging (MRI) scans.
* Digital subtraction angiography.
* Myelography.
* Cisternography.
* Lumbar puncture (spinal tap).\*

\**This is usually not a first-line test for CSF leak.*

## **Management and Treatment**

In many cases, healthcare providers recommend no direct treatments for CSF leaks. That's because time and rest are all it takes for many injury-related CSF leaks to heal on their own.

In cases where a CSF might not or definitely won’t heal on its own, there are many different treatments and methods that can help. In most cases, it's possible to repair or seal the leak, stopping it from worsening or causing symptoms.

Chronic conditions, especially connective-tissue disorders like Marfan syndrome or Ehlers-Danlos syndrome, aren't curable. When this condition isn’t treatable or repairable directly or is the result of another condition, healthcare providers will try to treat your symptoms.

### **medications or treatments used**

The treatments you receive depend most on what caused the CSF leak and its location. Medications, surgeries and other non-surgical procedures can often help. Your healthcare provider is the best person to tell you about the medications they recommend and why they feel those will help in your specific case.

#### **Conservative treatment**

Conservative treatment is a non-direct way of treating CSF leaks. This treatment calls for a person to lie down and rest for a period of time. They'll also need to stay hydrated, and medications to treat inflammation and pain are common. Caffeine and salt may also be part of the treatment guidelines in cases where a leak causes low CSF pressure. If conservative treatment doesn’t work after one to two weeks, your provider will likely recommend moving to direct treatments.

#### **Surgery and related procedures**

Surgery is a common method to repair CSF leaks. The surgery can either directly close a leak or help reconstruct a damaged area when the leak is from a significant injury. Some surgeries may go through your skull to access a leak, while others might try to repair a leak through your nose or mouth. The location, cause and severity of the leak are often key factors in deciding the type of surgical procedure.

#### **Blood patch injections**

The most likely treatment for CSF leaks that don’t involve surgery is a procedure known as a blood patch. During this procedure, a healthcare provider inserts a needle into the lumbar section of your lower back. Once it’s in position, they’ll slowly inject some of your own blood into the CSF surrounding your spinal cord and the injected blood “patches” the leak. In some cases, more than one blood patch is necessary, but most people who need more than one will still feel some improvement after the first.

#### **Medications**

Several medications can help with a CSF leak. Some lower the pressure inside your skull, while others treat severe symptoms like pain. Antibiotics are also possible because bacteria that reach your brain through your CSF can lead to dangerous infections like meningitis and encephalitis.

#### **Complications or side effects of the treatment**

The possible complications and side effects from treatment depend on the location and severity of your CSF leak, what caused it, and what treatments you received. Your healthcare provider can explain the possible complications and side effects in your case and what you can do to limit or avoid these.

### **How to manage symptoms**

A CSF leak isn't something you can diagnose or treat on your own. If you suspect you have this condition, you should talk to a healthcare provider as soon as possible. That's because this condition has symptoms that are possible with severe conditions that need immediate medical attention.

**RECOVERY TIMELINE**

The time to recover and start feeling better depends on treatment. Many people will feel some relief just by lying down and resting. But other people might need days or even weeks to recover.

## **Outlook / Prognosis**

CSF leaks are sometimes tricky to diagnose, but the overall outlook for this condition is good. While the symptoms can be unpleasant, severe or disruptive, this condition is usually treatable. The overwhelming majority of people who have CSF leaks will either recover when the leak heals or with treatments or surgeries.

CSF leaks can last days, weeks or even months, depending on the size of the leak and why it happened. Treatment can also greatly shorten how long you feel the effects of a CSF leak. Your healthcare provider is the best person to tell you more about how long this condition will affect you and what you can do to help yourself.

Overall, the outlook for CSF leaks is very good. About 98% of people with CSF leaks will recover from them, no matter the cause.

## **Prevention**

CSF leak happens unpredictably, so it’s not preventable. However, you can try to reduce the risk of it happening by protecting yourself from conditions or circumstances that might cause a leak. However, that only works with causes related to injuries.

The most important thing you can do to avoid an injury-related CSF leak is to wear safety equipment. Face, head, neck and back injuries can cause the kind of damage that makes a CSF leak possible. Whether you're on the job or on your own time, using safety gear and equipment can help you avoid this possibility.

## **Living With**

If you have a CSF leak, you should follow your healthcare provider's guidelines on how to care for yourself. They're the best source of information for what you can and should do. They can also tell you what problem signs or warning indications to watch for and avoid.

### **When should I see my healthcare provider or seek medical care?**

You should talk to or see a healthcare provider if you think you have a CSF leak. While this condition doesn't usually cause severe or life-threatening complications, it shares symptoms with urgent and dangerous conditions.

If you know you have a CSF leak, your healthcare provider will schedule follow-up visits to monitor you as you recover. You should also see them if you notice symptoms getting worse or causing new disruptions in your daily life.

If you have a CSF leak, you should go to the ER if you have a sudden, severe headache, muscle weakness or trouble standing up. You should also see them if you notice any tingling or numbness anywhere on your body, especially in your hands, feet, legs and arms. Those can be a sign of injury to your spinal cord, which can lead to permanent paralysis.

You should also get emergency medical attention if you have stroke-like symptoms. These include:

* Weakness, numbness or paralysis on one side of your body.
* Slurred or garbled speech.
* Droop on one side of your face or vision loss in one eye.
* Trouble swallowing.
* Confusion, irritability or agitation.
* Trouble focusing, thinking or remembering.
* Sudden severe headache, especially if it interferes with your usual activities

**DIFFERENTIAL DIAGNOSIS**

The presentation of clear rhinorrhea and/or a headache is common in many conditions.Those that should be specifically considered are:

* Allergic rhinitis
* Benign intracranial hypotension
* Carotid or vertebral artery dissection
* Infectious etiologies such as the common cold
* Meningitis
* Posttraumatic headache
* Spontaneous intracranial hypotension
* Subarachnoid hemorrhage
* Vasomotor rhinitis
* Sinus disease
* Spinal disease
* Migraine
* Brain tumor

**EPIDEMIOLOGY**

According to Ommaya et al., 80 % of CSF leak is due to nonsurgical trauma, 16 % is iatrogenic, and 4 % is spontaneous. It is known that spontaneous spinal CSF leaks are more common in female adults than in children. The average patient age at the presentation for various types of spontaneous CSF leaks ranges from 33 years (+/-10) to 52.4 years (+/-13.1). Its most common location is at the upper thoracic level (T1 - T6), followed by the lower thoracic level (T7 - T12), and being the lumbar and cervical spine levels the less common regions.

Nearly 2.8 million people in the United States sustained a head injury that resulted in an emergency department visit, hospitalization, or death between 2007 and 2013. Skull base fractures occur in approximately 4% of these injuries, accounting for 21% of all skull fractures. Male patients are predominant (78%), and the mean age was 49.The widely cited incidence of CSF leaks resulting from skull base fractures has been reported in the literature as 10 to 30%. Still, recently the retrospective study from the Harward group reviewed the incidence of CSF leaks among 4,944 patients with cranial facial fractures and reported a lower incidence of 4%.

A cerebrospinal fluid leak is also a known complication of post-trauma surgical procedures, endoscopic endonasal skull base surgery, operations involving the lumbosacral spine, as well as diagnostic or therapeutic lumbar puncture. The CSF leak incidence after primary spine surgery varies from 5.5% to 9% and 13.2% to 21% for second-look surgeries. Non-identified intraoperative durotomies occurred in 6.8% of cases, and the incidence of CSF leaks was less frequent in minimally invasive surgeries (4.7%) compared to 9.0% of open cases, according to Wong et al. A recent literature review on CSF leaks in the endoscopic endonasal approach for tumor resection showed an overall postoperative rate of 10.1%. It also suggests that the material and closure technique can influence that rate

**GENOMIC DATA**

* TGFBR2 gene mutations, linked to Loeys-Dietz syndrome and some connective tissue disorders, were investigated in patients with spontaneous spinal CSF leaks but no mutations were found, indicating TGFBR2 is unlikely a major factor in these leaks.
* A broader spectrum of connective tissue abnormalities has been identified in patients with spontaneous CSF leaks, including features of Marfan syndrome, Ehlers-Danlos syndrome (EDS), and other unclassified connective tissue disorders. In many cases, spontaneous CSF leak was the first clinical manifestation of these genetic conditions.
* Although patients with spontaneous CSF leaks often display minor Marfan-like features (tall stature, joint hypermobility, arachnodactyly), they typically do not harbor mutations in the Marfan syndrome gene (FBN1), but may have defects in microfibrils or extracellular matrix components related to fibrillin.
* Mutations affecting collagen and proteoglycans in the extracellular matrix, as seen in hypermobile Ehlers-Danlos syndrome, are thought to weaken the dura mater and predispose to spontaneous CSF leaks.
* Other genetic disorders associated with increased risk of CSF leaks due to connective tissue fragility include polycystic kidney disease and neurofibromatosis

**DOCTOR PATIENT CONVERSATION**

Doctor: "You mentioned you’ve been having headaches that get worse when you stand up and improve when you lie down. Have you noticed any clear fluid leaking from your nose or ears?"

Patient: "Yes, actually, sometimes I get a clear, watery drip from my nose, especially when I lean forward."

Doctor: "That’s an important symptom. It could be a sign of a cerebrospinal fluid leak, which means that the fluid cushioning your brain and spinal cord is leaking out through a small tear or hole."

Patient: "How does that happen? I haven’t had any recent head injury."

Doctor: "CSF leaks can happen after trauma or surgery, but sometimes they occur spontaneously, especially if there’s increased pressure inside your skull or if the membranes around your brain are weak. Women who have had epidurals or lumbar punctures can also develop leaks."

Patient: "Is it dangerous?"

Doctor: "Yes, it can be serious. The fluid protects your brain, and if it leaks out, you can get headaches and be at risk for infections like meningitis. That’s why we need to confirm the diagnosis and find exactly where the leak is."

Patient: "How do you find the leak?"

Doctor: "We start with imaging tests like an MRI with contrast to look for signs of brain sagging or fluid collections. We may also test the fluid from your nose or ear for a protein called beta-2 transferrin, which is specific to CSF."

Patient: "What treatments are available?"

Doctor: "Sometimes the leak heals on its own with rest and avoiding activities that increase pressure, but often we need to do an epidural blood patch to seal the leak or, in some cases, surgery to repair the tear. Early treatment improves outcomes."

Patient: "What should I do now?"

Doctor: "I’ll arrange the necessary tests to confirm the diagnosis. Meanwhile, try to avoid heavy lifting or straining, and keep your head elevated when resting. We’ll work together to manage your symptoms and plan the best treatment."

REFERENCES

[Cerebrospinal Fluid (CSF) Leak: Symptoms & Treatment](https://my.clevelandclinic.org/health/diseases/16854-cerebrospinal-fluid-csf-leak#overview)

[**https://www.mayoclinic.org/diseases-conditions/csf-leak/symptoms-causes/syc-20522246**](https://www.mayoclinic.org/diseases-conditions/csf-leak/symptoms-causes/syc-20522246)

[**https://www.ncbi.nlm.nih.gov/books/NBK538157/#article-19199.s9**](https://www.ncbi.nlm.nih.gov/books/NBK538157/#article-19199.s9)

### **Cleft lip and cleft palate**

A cleft lip and cleft palate are openings in a baby’s upper lip or roof of their mouth (palate). They’re congenital abnormalities (birth defects) that form while a fetus develops in the uterus. Cleft lips and cleft palates happen when tissues of the upper lip and roof of the mouth don’t join together properly during fetal development. Surgery can repair a cleft lip and/or cleft palate.

#### **cleft lip**

Our lips form between weeks four and seven of fetal development. Tissues from each side of the head join together at the center of the face to make the lips and mouth. A cleft lip happens when the tissues that make the lips don’t join completely.

As a result, an opening or gap forms between the two sides of the upper lip. The cleft can range from a small indentation to a large gap that reaches the nose. This separation can include the gums or the palate (roof of the mouth).

#### **cleft palate**

The roof of your mouth (palate) forms between six and nine weeks of pregnancy. A cleft palate is a split or opening in the roof of your mouth that forms during fetal development. A cleft palate can include the hard palate (the bony front portion of the roof of the mouth) and/or the soft palate (the soft back portion of the roof of the mouth).

Cleft lip and cleft palate can occur on one or both sides of the mouth. Because the lip and the palate develop separately, it’s possible to have a:

* Cleft lip without a cleft palate.
* Cleft palate without a cleft lip.
* Both a cleft lip and cleft palate (most common).

Cleft lip and cleft palate are common congenital disorders in the U.S.

According to the U.S. Centers for Disease Control and Prevention:

* About 1 in every 1,600 babies is born with both cleft lip and cleft palate.
* About 1 in every 2,800 babies is born with cleft lip without cleft palate.
* About 1 in every 1,700 babies is born with cleft palate.

Cleft lip (either with or without a cleft palate) is more common in male babies. Cleft palate (without a cleft lip) is more common in female babies.

## **Symptoms and Causes**

In most cases, there’s no known cause of cleft lip or cleft palate, and parents can’t prevent it. Most scientists believe a combination of genetic (inherited) and environmental (related to the natural world) factors cause clefts. There seems to be a greater chance of a newborn having a cleft if a sibling, parent or other relative has one.

#### **Risk factors**

You may have a greater chance of having a baby with cleft lip/cleft palate if you take certain medications during pregnancy, including:

* Antiseizure medications.
* Acne treatment medications containing Accutane®.
* Methotrexate, a drug commonly used for treating cancer, arthritis and psoriasis.

Other factors (related to the birthing mother) that can contribute to the development of a cleft include:

* Folic acid deficiency.
* Having obesity.
* Smoking or tobacco use during pregnancy.
* Having substance use disorder.
* Exposure to certain viruses or chemicals during pregnancy.

#### **Is cleft lip/cleft palate genetic?**

Some studies suggest cleft lips and cleft palates have a genetic component. If you or your partner were born with a cleft lip or palate, your chance of having a baby with a cleft is around 2% to 8%. If you’ve already had a child with a cleft lip or palate, your chances of having another child with the condition are slightly higher.

### **complications of this condition**

Babies born with a cleft lip or cleft palate may have difficulties eating (both from the breast and a bottle). They may also have trouble speaking, and they often have fluid behind their eardrum that can affect their hearing. Some also have issues with their teeth.

## **Diagnosis and Tests**

Prenatal ultrasound can diagnose most clefts of the lip because these clefts cause physical changes in the fetus’s face. Isolated cleft palate (with no cleft lip present) is harder to detect this way. Only 7% of these appear on a prenatal ultrasound.

If an ultrasound doesn’t detect a cleft before birth, a physical exam of the mouth, nose and palate can diagnose cleft lip or cleft palate after birth.

In some cases, your provider may recommend amniocentesis to check for associated genetic conditions. Amniocentesis is a procedure to remove amniotic fluid from the amniotic sac.

### **Can you detect cleft lip before birth?**

Most healthcare providers detect cleft lip at your 20-week ultrasound (anatomy scan), which occurs between 18 and 22 weeks of pregnancy. Providers may discover it as early as 12 weeks. It’s more challenging to detect cleft palates on an ultrasound.

## **Management and Treatment**

Treatment for cleft lip and cleft palate begins at birth. Surgical treatment begins as early as 3 months and can last until the teen years.

Surgery treats cleft lip and/or cleft palate. The exact details of treatment depend on the extent of the cleft, your child’s age and other special needs or health conditions. Your child will have surgery at a hospital, under general anesthesia, so they’ll be asleep during the procedure.

#### **Cleft lip repair**

A cleft lip repair may require one or two surgeries. The first surgery usually occurs when your baby is between 3 and 6 months old. This surgery closes their lip. The second surgery, if necessary, is usually done when your child is 6 months old.

Several techniques can improve the outcomes of cleft lip and palate repairs when used appropriately before surgery. They’re noninvasive and can dramatically change the shape of your baby’s lip, nose and mouth. For example:

* A lip-taping regimen can narrow the gap in your child’s cleft lip.
* A nasal elevator helps form your baby’s nose into a more natural shape.
* A nasal-alveolar molding (NAM) device can help mold the lip tissues into a more favorable position to prepare for surgical lip repair.

#### **Cleft palate repair**

Cleft palate surgery usually occurs when your baby is 12 months old. It creates a working palate and reduces the chances that fluid will develop in your baby’s middle ears. To prevent fluid buildup, children with cleft palate usually need special tubes placed in their eardrums to help drain fluid. Their healthcare providers will check their hearing once a year.

Up to 40% of children with a cleft palate will need further surgeries to help improve their speech. A speech pathologist will assess your child’s speech between the ages of 4 and 5. They may use a nasopharyngeal scope to check the movement of their palate and throat. If your child needs surgery to improve their speech, it usually occurs around age 5.

Children with a cleft involving the gum line may also need a bone graft when they’re between the ages of 6 and 10. This procedure fills in the upper gum line so that it can support permanent teeth and stabilize the upper jaw. Once the permanent teeth grow in, a child will often need braces to straighten their teeth and a palate expander to widen their palate.

Your child may need additional surgeries to:

* Improve the appearance of their lip and nose.
* Close openings between their mouth and nose.
* Improve their breathing.
* Stabilize and straighten their jaw.

Possible risks of surgery include bleeding, infection and damage to nerves, tissues or other structures. Cleft lip and cleft palate surgery is usually successful, and risks are low. Cleft lip surgery leaves a small pink scar that should become less noticeable as your child grows.

Children often need treatment beyond surgery for cleft lip or palate. Some other treatments their healthcare providers may recommend are speech therapy and orthodontic treatment.

### **Who treats children who have cleft lip and palate?**

Because of the number of oral health and medical problems associated with a cleft lip or cleft palate, it takes a team of healthcare providers working together to develop a comprehensive care plan. Your child’s treatment usually begins in infancy and often continues through their early adulthood.

Members of their healthcare team may include:

* A pediatric plastic surgeon.
* A pediatrician.
* An otolaryngologist.
* Lactation support providers to help with feeding early in life.
* An orthodontist to straighten and reposition teeth.
* A dentist or pediatric dentist to perform routine dental care.
* A prosthodontist to make artificial teeth and dental appliances.
* Speech-language pathologists (SLPs) to assess speech problems.
* An audiologist to check and monitor hearing.
* A social worker/psychologist to support the family and note any adjustment problems.
* Genetic counselors to help parents and adult patients understand the chances of having future children with a cleft palate or cleft lip.

## **Outlook / Prognosis**

Treatment may take many years and require several surgeries. But most children affected by these conditions have a normal childhood. Treatment helps improve speech and feeding issues. Some people may be self-conscious about the shape of their lips or scarring. Talk to your child’s healthcare providers about how you can offer support over the years.

## **Prevention**

You can’t prevent your baby from having a cleft lip/cleft palate. However, you may be able to lower the risk by not using cigarettes, alcohol and certain medications during pregnancy. Talk to your healthcare provider to learn more.

## **Living With**

It’s possible to breastfeed your baby if they have cleft lip and/or cleft palate. But you’ll need support from trained healthcare providers. Breastfeeding success depends on many factors, including:

* The type, size and location of the cleft.
* The breastfeeding position you use.
* Whether or not your baby has an associated syndrome (which may have other features that affect your baby’s ability to breastfeed).
* The lactation education and support you receive.

Babies use suction to latch onto the breast and remove milk. Cleft lip and/or cleft palate can interfere with your baby’s ability to use suction in this way.

Research shows that some babies who only have cleft lip can create enough suction to breastfeed successfully. Babies with small clefts affecting only their soft palate may also create the necessary suction.

However, creating suction is typically harder for babies:

* Who have cleft lip and palate.
* Who have larger clefts affecting their soft and/or hard palate.

These babies may struggle to create suction because there’s not enough separation between the inside of their nose and the inside of their mouth.

If your baby can’t suction well, the effort of trying can make them very tired. They may also experience nasal regurgitation or reflux. Some babies can’t remove enough milk, and this can lead to problems with nutrition and growth.

#### **Support for breastfeeding your baby with cleft lip or palate**

The first thing to know is that you’re not alone. Many families are in your shoes and wondering how they’ll manage breastfeeding or alternative options.

Thankfully, lactation support providers — including lactation consultants and breastfeeding medicine specialists — are prepared to help you find ways to breastfeed your baby. These providers can also help you if breastfeeding isn’t possible. Set up an appointment as early as you can, even while you’re still pregnant, to begin learning how to care for your baby and what you can expect.

A lactation support provider can help you:

* Identify if breastfeeding is possible.
* Manage your milk supply.
* Learn how to express (remove) milk by hand or with a breast pump.
* Find the best breastfeeding positions for you and your baby.
* Make sure your baby is properly hydrated.
* Keep an eye on your baby’s weight gain and growth.
* Manage supplemental feedings (formula or donor breast milk substitutes), if needed.
* Help you and your baby with breastfeeding after cleft lip/cleft palate surgery.

#### **Support when breastfeeding isn’t possible**

It’s important to know that despite everyone’s best efforts, it may not be possible to feed your baby directly from your breast. This might be the case even after surgical repair. However, your lactation support provider can still help you find other ways to feed and bond with your baby.

For example, your provider can help you with breast milk feeding. This involves removing breast milk (by hand or pump) and giving it to your baby with a spoon, cup, bottle or syringe. Some bottles are specially designed for babies who need a little extra help with suckling. Your provider will guide you on which bottles to choose.

Breast milk feeding allows your baby to get the important nutrition that your milk provides. Breast milk may also lower your baby’s risk of getting ear infections, which are common among babies with cleft lip/cleft palate.

Your provider might also encourage you to hold your baby to your chest and try breastfeeding, even if your baby can’t remove enough milk for nourishment. Doing so may help you keep your milk supply. It’s also an important way to soothe and bond with your baby.

### **What dental care will my child need?**

Generally, children with clefts have the same dental needs as other children. However, children with cleft lip and palate may also have missing, misshapen or poorly positioned teeth. Some recommendations include:

* Early dental care: Your child needs good nutrition, proper teeth cleaning and fluoride treatment to have healthy teeth. Clean your child’s teeth with a small, soft-bristled children’s toothbrush as soon as teeth appear. If this toothbrush doesn’t clean your child’s teeth well enough because of the different shape of their mouth and teeth, a dentist may recommend swabbing your child’s teeth with a soft sponge that contains mouthwash. Be sure to ask how often you should take your child for dental appointments.
* Orthodontic care: After permanent teeth appear, an orthodontist can further evaluate your child’s short- and long-term dental needs. Most children with a cleft palate will require palatal expansion around age 6 or 7. After all the permanent teeth erupt, an orthodontist can align the teeth with braces. Your child will also need orthodontic care in preparation for jaw surgery (orthognathic surgery).
* Prosthodontic care: A prosthodontist may make a dental bridge to replace missing teeth, or special appliances called “speech bulbs” or “palatal lifts” to help close the nose from the mouth to improve speech. The prosthodontist coordinates treatment with the oral or plastic surgeon and the speech pathologist.

## **Common Questions**

### **What problems are associated with cleft lip and cleft palate?**

Problems with eating, hearing and speech are common in children with clefts. Children may also have issues with their teeth or self-esteem.

#### **Eating problems**

With a separation or opening in the palate, food and liquids can pass from your child’s mouth back through their nose. Some babies have difficulty breastfeeding or taking a bottle because they can’t create enough suction.

#### **Hearing loss**

Children with cleft palate are more prone to fluid buildup in their middle ears (glue ear). If left untreated, this causes hearing loss.

#### **Speech problems**

Children with cleft palate may have trouble speaking. Their voices may not carry well, and their speech may be difficult to understand. Not all children have these problems, and surgery may solve them.

#### **Dental problems**

Children with clefts are prone to dental problems like cavities and missing, malformed or displaced teeth.

They may be more prone to defects of the alveolar ridge, the bony upper gum that contains the teeth. A defect in the alveolus can:

* Displace, tip or rotate permanent teeth.
* Prevent permanent teeth from appearing.
* Prevent the alveolar ridge from forming.
* Cause premature loss of erupting canine and incisor teeth.

#### **Emotional or social problems**

Children with clefts may be self-conscious or embarrassed about their appearance, even at a young age. This can cause emotional, social or behavioral problems at school and lead to issues with their confidence.

## **Epidemiology**

Reported data on the frequency of orofacial clefts have varied according to the investigator and the country.In general, all typical orofacial cleft types combined occur in White populations with a frequency of 1 per 500-550 live births. Although the total combined frequency of CL, CLP, and CP is often used in statistics, combining the two etiologically different groups (ie, CL/P and CP alone) represents a misclassification bias similar to that of combining clefts with other congenital malformations.

The sex ratio in patients with clefts varies. In Whites, cleft lip and cleft lip and palate occur significantly more often in males, and cleft palate occurs significantly more often in females. In CL/P, the sex ratio correlates with the severity and laterality of the cleft. A large study of 8952 orofacial clefts in Whites found the male-to-female sex ratio to be 1.5-1.59:1 for CL, 1.98-2.07:1 for CLP, and 0.72-0.74:1 for CP.

The prevalence of clefts varies considerably in different racial groups.The lowest rate is for Black individuals. A high prevalence of CL/P was found for the Japanese population, and the highest prevalence was found for the North American Indigenous populations.

In contrast, no remarkable variation among races was found in isolated CP.In particular, its prevalence did not significantly vary between Black and White infants or between infants of Japanese and European origin in Hawaii. Leck considered that such findings may reflect a higher etiologic heterogeneity of CP than of CL/P. Methods of ascertainment and classification criteria undoubtedly influence prevalence figures.

In a large population-based study of 4433 children born with orofacial cleft (ascertained from 2,509,881 California births), the birth prevalence of nonsyndromic CL/P was 0.77 per 1000 births (CL, 0.29/1000; CP, 0.48/1000), and the prevalence of nonsyndromic CP was 0.31 per 1000 births

In that study, the risk of CL/P was slightly lower among the offspring of non-US-born Chinese women compared to US-born Chinese women and slightly higher among non-US-born Filipinos relative to their US-born counterparts. For CP, lower prevalences were observed among Blacks and Hispanics than among Whites. The risk of CP was higher among non-US-born Filipinos compared to US-born Filipinos. These prevalence variations may reflect differences in both environmental and genetic factors affecting risk for development of orofacial cleft.

In a study that addressed the prevalence of birth defects in the United States for the period 2010-2014, Mai et al provided the following estimates for the total population: CL/P, 10.25/10,000; CLP, 6.67/10,000; CL, 3.51/10,000; and CP, 5.91/10,000. In a subsequent study that addressed the prevalence of birth defects in the United States for the period 2016-2020, Stallings et al provided the following estimates for the total population: CL/P, 9.94/10,000; CLP, 6.54/10,00; CL, 3.41/10,000; and CP, 6.26/10,000.

Indicators of lower socioeconomic status have been associated with an increased incidence of orofacial clefts; the specific indicators involved with CL/P appear to differ from those involved with CP alone.

### Risk of recurrence

Genetic factors (ie, genes participating in the etiology of nonsyndromic orofacial clefts) are passed to the next generation, thus creating an increased risk for such anomaly in offspring. The risk of recurrence also differs with respect to proportion of genetic and nongenetic factors. In CL/P, the hypothetical four-threshold model closely corresponds with differences in the risk of recurrence.

From a clinical point of view, the following two factors are most important in evaluating the risk of recurrence for CL/P:

* Sex of the individuals (ie, patient and individual at risk)
* Severity of the effect in the patient (eg, unilateral vs bilateral)

The lowest recurrence risk for CL/P is for the subcategory of male patients with unilateral cleft (see Table 3 below) and, within this category, for sisters of males with a unilateral cleft and for daughters of fathers with a unilateral CL/P (see the image below). The highest risk of recurrence of CL/P is for the subcategory of female patients affected with a bilateral CL/P.

**DIFFERENTIAL DIAGNOSIS**

Cleft palate is often a straightforward diagnosis, though differentiation between incomplete cleft palate, bifid uvula, and submucous cleft palate is crucial. Identifying and excluding syndromes of which cleft palate can be a feature is also essential, including:

* CHARGE syndrome
* Stickler syndrome
* 22q11 deletion syndromes
* Pierre Robin sequence
* Various chromosomal deletions or duplications

**Treatment protocol currently used in most cleft treatment centers**:

* Newborn - Diagnostic examination, general counseling of parents, feeding instructions, palatal obturator (if necessary); genetic evaluation and specification of diagnosis; empiric risk of recurrence of cleft calculated; recommendation of a protocol for the prevention of a cleft recurrence in the family
* Age 3 months - Repair of CL (and placement of ventilation tubes)
* Age 6 months - Presurgical orthodontics, if necessary; first speech evaluation
* Age 9 months - Speech therapy begins
* Age 9-12 months - Repair of CP (placement of ventilation tubes if not done at the time of CL repair)
* Age 1-7 years - Orthodontic treatment
* Age 7-8 years - Alveolar bone graft
* Older than 8 years - Orthodontic treatment continues

**DOCTOR PATIENT CONVERSATION**

Doctor: "Your baby has a cleft lip and palate, which means there is a split or gap in the upper lip and the roof of the mouth. This happens because the tissues didn’t fully join together during early pregnancy."

Parent: "What causes this? Did I do something wrong?"

Doctor: "Cleft lip and palate are usually caused by a combination of genetic and environmental factors. It’s not your fault. Sometimes family history plays a role, and sometimes factors like certain medications or vitamin deficiencies during pregnancy can contribute."

Parent: "What problems will my baby have?"

Doctor: "Babies with clefts may have difficulty feeding at first because the gap affects the seal needed for sucking. They might also have issues with speech development and ear infections as they grow. But the good news is that we have very effective treatments."

Parent: "What kind of treatments are available?"

Doctor: "Treatment involves surgery to close the cleft lip, usually within the first few months of life, and surgery for the palate a bit later. Sometimes multiple surgeries are needed as your child grows. Along with surgery, your child will likely need support from speech therapists, dentists, and sometimes hearing specialists."

Parent: "Will my baby have normal speech and appearance?"

Doctor: "With proper treatment and therapy, most children develop normal speech and appearance. Our team includes plastic surgeons, speech pathologists, and other specialists who will work closely with you to support your child’s development."

Parent: "Is this a lifelong condition?"

Doctor: "The cleft itself can be repaired, but your child may need ongoing care through childhood and sometimes into adulthood to address dental, speech, or hearing issues. We’ll guide you every step of the way."

Parent: "What should I do now?"

Doctor: "We’ll set up appointments with our multidisciplinary cleft team to plan your baby’s care. Meanwhile, we’ll help with feeding techniques to ensure your baby is getting enough nutrition."

REFERENCES

[Cleft Lip & Cleft Palate: Causes & Treatment](https://my.clevelandclinic.org/health/diseases/10947-cleft-lip-cleft-palate#overview)

<https://www.ncbi.nlm.nih.gov/books/NBK563128/#article-19600.s9>

<https://emedicine.medscape.com/article/995535-treatment>

**Common cold (upper respiratory infection)**

An upper respiratory infection (URI) is a [viral](https://my.clevelandclinic.org/health/diseases/24473-viral-infection) or bacterial illness in the upper part of your respiratory system. This includes your nose, sinuses and throat.

A runny nose, sore throat, headache and other cold-like symptoms might come to mind when you think of an upper respiratory infection. And it’s true — common colds and other viruses are usually to blame for URIs. But some URIs, like strep throat or some cases of sinusitis, are bacterial infections. Still others, like the viruses responsible for the flu, COVID-19 and RSV, can cause both upper and lower respiratory infections.

## **Symptoms and Causes**

Symptoms of upper respiratory infections depend on the cause and what part of your body is affected. Infections can lead to swelling in parts of your respiratory tract, causing conditions like pharyngitis, laryngitis and epiglottitis, which can have different symptoms.

Symptoms of upper respiratory infections can include:

* Fever
* Sore throat
* Cough
* Runny or stuffy nose
* Sneezing
* Hoarse voice or loss of voice
* Fatigue
* Facial pain
* Wheezing
* Swollen lymph nodes

### **What causes upper respiratory tract infections?**

Viruses cause most upper respiratory infections. But bacteria and even fungi can cause them, too. Specific causes can include:

* Common cold viruses
* Influenza A and B virus (the flu)
* SARS-CoV-2 virus (COVID-19)
* Respiratory syncytial virus (RSV)
* Varicella-zoster virus
* Herpes simplex virus
* Streptococcus bacteria, like group A strep and *Streptococcus pneumoniae*
* *Haemophilus influenza* bacteria
* *Moraxella catarrhalis* bacteria
* *Aspergillus,* mucormycetes and other types of fungi

#### **Are upper respiratory infections contagious?**

Yes, the viruses and bacteria that cause upper respiratory infections are contagious (spread from person to person). They can spread through:

* Respiratory droplets, when someone coughs, sneezes or talks
* Sharing eating or drinking utensils (like forks, spoons, cups or water bottles)
* Contact with objects or surfaces with germs on them (think doorknobs, light switches, phones or toys)

Fungi that cause upper respiratory infections aren’t contagious.

### **Complications of upper respiratory tract infections**

Upper respiratory infections like colds rarely lead to complications. But URIs can sometimes cause inflammation in your lungs, leading to [pneumonia](https://my.clevelandclinic.org/health/diseases/4471-pneumonia). Additionally, if bacterial or fungal infections are left untreated, they can travel to other parts of your body and cause:

* Meningitis
* Rheumatic fever
* Scarlet fever
* Sepsis
* Organ damage

You might be at higher risk for complications from a URI if you have certain health conditions or a compromised immune system, or if you’re older than 65. Newborns are also at higher risk for severe illness.

## **Diagnosis and Tests**

Healthcare providers usually diagnose upper respiratory infections based on your symptoms and nasal swab or throat culture. If your symptoms are mild and your tests are negative for infections like the flu or strep throat, you might have one of hundreds of common cold viruses, which providers don’t often test for.

## **Management and Treatment**

Treatment for upper respiratory infections depends on the cause. There aren’t any specific treatments for most viral URIs, like colds. Providers treat bacterial infections, like strep throat, with antibiotics**.**

## **Outlook / Prognosis**

Most viral URIs have to run their course and go away on their own. They usually last one to two weeks. You can ease your symptoms by drinking plenty of water and taking over-the-counter medications.

If you have a bacterial infection, your symptoms should start to improve a day or two after starting antibiotics. Don’t stop taking antibiotics even if you feel better — make sure you take the entire course as prescribed.

Upper respiratory infections caused by viruses are usually most contagious in the first few days of symptoms, and sometimes, a day or two before they start. But you could still be contagious even when you start to feel better, especially if you still have symptoms. Strep throat can be contagious for weeks if left untreated.

### **When should I see my healthcare provider?**

Contact a healthcare provider if your symptoms:

* Are severe
* Last longer than two weeks
* Come back frequently

Long-lasting or frequent symptoms could be signs of a bacterial infection, fungal infection or other health condition. Talk to your healthcare provider if you have a compromised immune system or other health condition that might put you at higher risk for severe illness if you get an URI.

Go to the emergency room if you experience signs of severe illness, including:

* High fever (over 103 degrees Fahrenheit/40 degrees Celsius)
* Difficulty breathing
* Chest pain
* Noisy breathing, like wheezing or stridor
* Dizziness
* Retractions, when your skin between your ribs pulls in when you breathe
* Confusion or other mental changes

## **Prevention**

You can reduce your risk of getting or spreading upper respiratory infections by:

* Getting all recommended vaccinations
* Washing your hands frequently
* Disinfecting surfaces
* Not sharing food, utensils or cups
* Wearing a mask if you must be around people when you’re sick

## **Common Questions**

### **Do you need antibiotics for an upper respiratory infection?**

Most of the time, no. Antibiotics don’t work on viruses, the cause of most URIs. You only need antibiotics if your provider diagnoses you with a bacterial infection, like strep throat.

## **Differential Diagnoses**

* Allergic Rhinitis
* Asthma
* Community-Acquired Pneumonia (CAP)
* Immunoglobulin A Deficiency
* Epstein-Barr Virus (EBV) Infectious Mononucleosis (Mono)
* Obstructive Sleep Apnea (OSA)
* Otitis Media
* Pediatric Retropharyngeal Abscess
* Reflux Laryngitis
* Tuberculosis (TB)

## 

## **Epidemiology**

URIs are the most common infectious illness in the general population and are the leading cause of missed days at work or school. They represent the most frequent acute diagnosis in the office setting.

### Nasopharyngitis

The incidence of the common cold varies by age. Rates are highest in children younger than 5 years. Children who attend school or day care are a large reservoir for URIs, and they transfer infection to the adults who care for them. In the first year after starting at a new school or day care, children experience more infections, as do their family members. Children have about 3-8 viral respiratory illnesses per year, adolescents and adults have approximately 2-4 colds annually, and people older than 60 years have fewer than 1 cold per year.

### Pharyngitis

Acute pharyngitis accounts for 1% of all ambulatory office visits. [15] The incidence of viral and bacterial pharyngitis peaks in children aged 4-7 years.

### Rhinosinusitis

Sinusitis is common in persons with viral URIs. Transient changes in the paranasal sinuses are noted on computed tomography (CT) scans in more than 80% of patients with uncomplicated viral URIs.However, bacterial rhinosinusitis occurs as a complication in only about 2% of persons with viral URIs.

### Epiglottitis

The occurrence of epiglottitis has decreased dramatically in the United States and other developed nations since the introduction of Hib vaccine. According to the Centers for Disease Control and Prevention (CDC), the rate of Hib infections decreased from 0.1 per 100,000 population in 1997 to 0.02 per 100,000 population in 2018. Among children younger than age 5 years in 2018, the rate of invasive *H. influenzae* disease was 0.08 per 100,000 population and 38 cases of invasive disease due to Hib were reported in the US. African American, Alaska Native and Native American children have increased risk for serious Hib disease compared to children of other racial and/or ethnic groups.

A Swedish study documented that the Hib vaccination program was associated with a decrease in the overall annual incidence of acute epiglottitis from 4.5 cases to 0.98 cases per 100,000 population; the incidence decreased in children and adults. However, the annual incidence of pneumococcal epiglottitis in adults increased from 0.1 to 0.28 cases per 100,000 population over the same period.

### Laryngitis and laryngotracheitis

Croup, or laryngotracheobronchitis, may affect people of any age but usually occurs in children aged 6 months to 6 years. The peak incidence is in the second year of life. Thereafter, the enlarging caliber of the airway reduces the severity of the manifestations of subglottic inflammation.

Vaccination has dramatically reduced rates of pertussis. However, the incidence of whooping cough in the United States has increased steadily since 2007, reaching a peak of 48,277 reported cases in 2012 before leveling off at 18,975 cases in 2019 prior to the start of the COVID-19 pandemic. During the pandemic cases dropped dramatically but have since begun to increase again. Incidence rates of pertussis are highest in infants below age 1 year; adolescents and adults accounted for approximately 66% of the 2,116 cases of pertussis reported in the United States in 2021.

Worldwide, pertussis has an estimated incidence of 48.5 million cases and causes nearly 295,000 deaths per year. In low-income countries, the case-fatality rate among infants may be as high as 4%.

Although pertussis is a nationally notifiable disease in the United States, many cases likely go undiagnosed and unreported. On the other hand, challenges in laboratory diagnosis and overreliance on polymerase chain reaction (PCR) assays have resulted in reports of respiratory illness outbreaks mistakenly attributed to pertussis.

### Occurrence rate of selected pathogens

Group A streptococcal bacteria cause approximately 5-15% of all pharyngitis infections,accounting for several million cases of streptococcal pharyngitis each year. This infection is rarely diagnosed in children younger than 2 years.

Influenza affects on average, about 8 percent of the U.S. population each season, with a range of between 3 percent and 11 percent.Early presentations include symptoms of URI.

EBV infection affects as many as 95% of American adults by age 35-40 years. Childhood EBV infection is indistinguishable from other transient childhood infections. Approximately 35-50% of adolescents and young adults who contract EBV infection have mononucleosis.

Diphtheria rates fell dramatically in the United States after the advent of diphtheria vaccine. Since 1980, the prevalence of diphtheria has been approximately 0.001 case per 100,000 population. The last U.S. case of confirmed respiratory diphtheria was in 1997. A small number of cutaneous cases associated with international travel have been reported since then.However, diphtheria remains endemic in developing countries.

### Seasonality

Although URIs may occur year round, in the United States most colds occur during fall and winter. Beginning in late August or early September, rates of colds increase over several weeks and remain elevated until March or April.Epidemics and mini-epidemics are most common during cold months, with a peak incidence from late winter to early spring.

Cold weather results in more time spent indoors (eg, at work, home, school) and close exposure to others who may be infected. Humidity may also affect the prevalence of colds, because most viral URI agents thrive in the low humidity that is characteristic of winter months. Low indoor air moisture may increase friability of the nasal mucosa, increasing a person's susceptibility to infection.

Laryngotracheobronchitis, or croup, occurs in fall and winter. Seasonality does not affect rates of epiglottitis.

The figure below illustrates the peak incidences of various agents by season. Rhinoviruses, which account for a substantial percentage of URIs, are most active in spring, summer, and early autumn. Coronaviral URIs manifest primarily in the winter and early spring. Enteroviral URIs are most noticeable in summer and early fall, when other URI pathogens are at a nadir. Adenoviral respiratory infections can occur throughout the year but are most common in the late winter, spring, and early summer.

Seasonal influenza typically lasts from November until March. Some PIVs have a biennial pattern. The patterns for human PIV types 1-4 are as follows:

* Human PIV type 1: Currently produces autumnal outbreaks in the United States during odd-numbered years; the leading cause of croup in children.
* Human PIV type 2: May cause annual or biennial fall outbreaks and is more common during the years when HPIV-1 is low.
* Human PIV type 3: Peak activity is during the spring and early summer months; however, the virus may be isolated throughout the year.
* Human PIV type 4 ((subtypes 4a and 4b): Seasonal patterns are not as well characterized, but appear to occur in fall and winter each year.

Human metapneumovirus (hMPV) infection may also occur year round, although the infection rates peak between December and February.

### Race- and sex-related demographics

No notable racial difference is observed with URIs. However, African American, Alaska Native and Native American children have increased risk for serious Hib disease than children of other racial and/or ethnic groups.

Sexual disparities among URIs are as follows:

* Rhinitis: Hormonal changes during the middle of the menstrual cycle and during pregnancy may produce hyperemia of the nasal and sinus mucosa and increase nasal secretions; URI may be superimposed over these baseline changes and may increase the intensity of symptoms in some women
* Nasopharyngitis: The common cold occurs frequently in women, especially those aged 20-30 years; this frequency may represent increased exposure to small children, who represent a large reservoir for URIs, but hormonal effects on the nasal mucosa may also play a role
* Epiglottitis: A male predominance is reported, with a male-to-female ratio of approximately 3:2
* Laryngotracheobronchitis, or croup: More common in boys than in girls, with a male-to-female ratio of approximately 3:2

### Age-related demographics

The incidence of the common cold varies by age. Rates are highest in children younger than 5 years. Children have approximately 3-8 viral respiratory illnesses per year, while adolescents and adults have approximately 2-4 colds a year, and people older than 60 years have fewer than 1 cold per year.

The age-related occurrence of other infections is as follows:

* Viral and bacterial pharyngitis: Peaks in children aged 4-7 years.
* Epiglottitis: Typically occurs in children aged 2-7 years and has a peak incidence in those aged 3 years
* Laryngotracheobronchitis (croup): As previously stated, it may affect people of any age but usually occurs in children aged 6 months to 6 years; the peak incidence is in the second year of life

| **Drug Class** | **Common Drugs/Examples** | **Purpose** | **Common Side Effects** |
| --- | --- | --- | --- |
| **Nasal decongestants** | **Pseudoephedrine (oral), Oxymetazoline (nasal spray)** | **Reduce nasal congestion by vasoconstriction** | **Nasal irritation, rebound congestion (nasal sprays if used >3-5 days), increased blood pressure, insomnia, nervousness (oral)** |
| **Analgesics/Antipyretics** | **Acetaminophen, Ibuprofen** | **Relieve fever, headache, and body aches** | **Acetaminophen: liver toxicity (overdose); Ibuprofen: GI upset, kidney effects, allergic reactions** |
| **Cough suppressants** | **Dextromethorphan** | **Reduce cough reflex** | **Drowsiness, dizziness, nausea** |
| **Expectorants** | **Guaifenesin** | **Thin mucus to ease expectoration** | **Nausea, vomiting (rare)** |
| **Antihistamines** | **Diphenhydramine, Loratadine** | **Reduce allergic symptoms like sneezing** | **Sedation (first-generation), dry mouth, dizziness** |
| **Antibiotics** | **Amoxicillin, Amoxicillin/clavulanate, Azithromycin, Cephalexin** | **Treat bacterial infections (e.g., strep throat)** | **Allergic reactions, GI upset, antibiotic resistance risk, yeast infections** |
| **Corticosteroids (nasal sprays)** | **Fluticasone, Mometasone** | **Reduce nasal inflammation in allergic or chronic rhinitis** | **Nasal irritation, dryness, nosebleeds** |

Additional notes:

* Antibiotics are not recommended for most viral URIs as they do not improve symptoms and contribute to resistance; they are used when bacterial infection is confirmed or highly suspected (e.g., streptococcal pharyngitis).
* Nasal decongestant sprays should be limited to a few days to avoid rebound congestion.
* Symptomatic treatments like analgesics and cough medicines help improve comfort but do not shorten illness duration.
* Patients with asthma, COPD, or immunosuppression may require closer monitoring and tailored treatment.
* Hydration, rest, and supportive care remain essential.

This treatment approach aligns with guidelines emphasizing symptom management for viral URIs and judicious antibiotic use for bacterial infections.

**DOCTOR PATIENT CONVERSATION**

Doctor: "I’ve examined you, and your ears look good, your lungs sound clear, and your throat is a bit red but nothing concerning like strep throat or pneumonia. So, what you have is a pretty bad cold, or what we call an upper respiratory infection."

Patient: "So, is it serious? Do I need antibiotics?"

Doctor: "This type of infection is caused by a virus, so antibiotics won’t help because they only work against bacteria. These infections usually get better on their own within one to two weeks."

Patient: "What can I do to feel better?"

Doctor: "You can take over-the-counter medicines like acetaminophen or ibuprofen to reduce fever and ease aches. Drinking plenty of fluids and resting will also help your body fight the virus. Raising your head while sleeping can reduce nasal drainage and coughing."

Patient: "How long will it take to get better?"

Doctor: "Most people start feeling better within a week, but some symptoms like cough or congestion can last a bit longer. If your symptoms get worse or you develop a high fever, difficulty breathing, or severe pain, you should come back immediately."

Patient: "Am I contagious? Should I stay away from others?"

Doctor: "You’re most contagious in the first few days of symptoms, but you can still spread the virus even as you start feeling better. It’s a good idea to cover your mouth when coughing, wash your hands frequently, and avoid close contact with others, especially those at higher risk."

Patient: "When should I come back to see you?"

Doctor: "If your symptoms don’t improve after 10 days, or if you get worse at any point, please come back. Also, if you have underlying health issues or a weakened immune system, check in sooner."

**REFERENCES**

[**Upper Respiratory Infection: Causes, Symptoms & Treatment**](https://my.clevelandclinic.org/health/diseases/4022-upper-respiratory-infection#whats-an-upper-respiratory-tract-infection)

[**https://emedicine.medscape.com/article/302460-workup**](https://emedicine.medscape.com/article/302460-workup)

**Craniopharyngioma**

Craniopharyngioma is a rare type of noncancerous brain tumor.

Craniopharyngioma begins as a growth of cells near the brain's pituitary gland. The pituitary gland makes hormones that control many body functions. As a craniopharyngioma slowly grows, it can affect the pituitary gland and other nearby structures in the brain.

Craniopharyngioma can happen at any age, but it occurs most often in children and older adults. Symptoms include changes in vision over time, fatigue, headaches and urinating more often. Children with craniopharyngioma may grow slowly and may be smaller than expected.

**Causes**

It's not clear what causes craniopharyngioma. Craniopharyngioma begins as a growth of cells near the brain's pituitary gland. The pituitary gland makes hormones that control many body functions.

Craniopharyngioma happens when cells develop changes in their DNA. A cell's DNA holds the instructions that tell the cell what to do. In healthy cells, the DNA gives instructions to grow and multiply at a set rate. The instructions tell the cells to die at a set time. In tumor cells, the DNA changes give different instructions. The changes tell the tumor cells to grow and multiply quickly. Tumor cells can keep living when healthy cells die. This causes too many cells.

**Risk factors**

Healthcare professionals haven't found many risk factors for craniopharyngioma. This tumor can happen at any age. But it's more common in children and older adults.

**Symptoms**

Signs and symptoms of craniopharyngioma may include:

* Headaches.
* Vision changes.
* Nausea and vomiting.
* Increased urination.
* Sleepiness.
* Memory troubles.
* Loss of balance.
* Trouble walking.
* Changes in personality or behavior.
* Weight gain and slowed growth in children.

### **When to see a doctor**

Make an appointment with a doctor or other healthcare professional if you have any symptoms that worry you.

## **Diagnosis**

Diagnosing a craniopharyngioma usually starts with a medical history review and a discussion of symptoms. Tests used to diagnose a craniopharyngioma include:

* **Neurological exam.** During this exam, a healthcare professional tests vision, hearing, balance, coordination, reflexes, and growth and development. This can help show which part of the brain might be affected by the tumor.
* **Blood tests.** Blood tests may reveal changes in hormone levels that show a tumor is affecting the pituitary gland.
* **Imaging tests.** Imaging tests capture pictures of the brain. The pictures can show the size and location of the tumor. Imaging tests include X-rays, CTs and MRIs. In certain situations, other tests might be needed.

**Treatment**

Craniopharyngioma treatment often starts with surgery. When possible, surgeons remove all of the tumor. Sometimes the craniopharyngioma can't be removed completely. Surgeons may remove as much of the craniopharyngioma as is safe.

Radiation therapy may be used after surgery to treat any tumor cells that remain. Using surgery and radiation together often provides good tumor control. This approach also helps lower the risk of complications after surgery.

Other treatments, such as chemotherapy and targeted therapy, might be options in certain situations.

### **Surgery**

Most people with craniopharyngioma have surgery to remove all or most of the tumor. What type of surgery you have depends on the location and size of the tumor.

* **Open craniopharyngioma surgery.** Also called a craniotomy, this operation involves opening the skull to access the tumor.
* **Minimally invasive craniopharyngioma surgery.** Also called a transsphenoidal procedure, this operation uses special surgical tools inserted through the nose. The tools go through a natural passage to get to the tumor. This approach minimizes the effect on the brain.

When possible, surgeons remove the entire tumor. However, there are often many delicate and important structures nearby. This means that surgeons sometimes can't remove the entire tumor. To ensure a good quality of life after the operation, surgeons remove as much of the tumor as possible. Other treatments may be used after surgery.

Surgeons do the operation in a way that avoids hurting nearby structures during the operation. Surgeons take care to reduce the risk of vision problems. They work to minimize damage to the hypothalamus. The hypothalamus helps with many functions, including controlling appetite and alertness.

Surgery is sometimes used to relieve a fluid backup on the brain, called hydrocephalus. A tube can be placed to drain the fluid. Often the tube is temporary. Sometimes a permanent tube is needed. A permanent tube, called a shunt, can drain the brain fluid to the abdomen.

### **Radiation therapy**

Radiation therapy uses powerful energy beams to control tumor cells. The energy can come from X-rays, protons or other sources.

Radiation therapy is often used after surgery to treat any tumor cells that are left.

Types of radiation therapy for craniopharyngioma include:

* **External beam radiation therapy.** During external beam radiation therapy, you lie on a table while a machine moves around you. The machine directs radiation to precise points on your body.  
  Specialized external beam radiation technology allows your healthcare team to carefully shape and aim the radiation beam. This helps to deliver treatment to the tumor cells and reduces the chances of hurting healthy tissue. These technologies include proton beam therapy and intensity-modulated radiation therapy, also called IMRT.
* **Stereotactic radiosurgery.** Stereotactic radiosurgery is an intense form of radiation treatment. It aims many beams of radiation from many angles at the tumor. Stereotactic radiosurgery treatment is typically completed in one or a few treatments.
* **Brachytherapy.** Brachytherapy involves placing radioactive material directly into the tumor where it can radiate the tumor from the inside.

### **Chemotherapy**

Chemotherapy uses medicines to kill tumor cells. Chemotherapy can be injected directly into the tumor so that the treatment reaches the target cells. This makes it less likely to damage nearby healthy tissue.

### **Treatment for papillary craniopharyngioma**

Targeted therapy medicines might be a treatment option for one type of craniopharyngioma called papillary craniopharyngioma. This type isn't common. In adults, about one out of every three craniopharyngiomas is the papillary type.

Targeted therapy uses medicines that attack specific chemicals in the tumor cells. By blocking these chemicals, targeted treatments can cause tumor cells to die.

Nearly all papillary craniopharyngioma cells contain a change in their DNA called the BRAF gene. Targeted therapy aimed at this change may be a treatment option. Lab testing can show whether your craniopharyngioma contains papillary cells. Tests also can tell whether those cells have the BRAF gene change.

## **Outlook / Prognosis**

Many people live for years after treatment. But these tumors often come back (recur). Overall, as many as 17% of tumors that are completely removed during surgery come back. That number increases to 25% to 63% for partially removed tumors. Most craniopharyngiomas that return will do so within three years after surgery.

## **Prevention**

These tumors can’t be prevented. These tumors develop due to changes in your or your child’s cells that happened while your or your child’s body was being formed.

## **Living With**

### **Some healthcare providers consider a craniopharyngioma a chronic condition that needs long-term care and monitoring; here’s why:**

* You or your child may need additional surgery to remove a recurring tumor.
* If the tumor or surgery caused problems with your or your child’s pituitary or hypothalamus, you or your child may need hormone replacement therapy.
* Many children who have tumor-related obesity, called hypothalamic obesity, have an increased risk for other health problems. If your child has hypothalamic obesity, you may need support and guidance so you can help your child make good food choices and get regular exercise.

### **What questions should I ask my/my child’s healthcare provider?**

## 1. I’ve never heard of this tumor. Can you explain what it is?

Craniopharyngiomas are rare, benign (noncancerous), slow-growing tumors that develop near the brain’s pituitary gland and hypothalamus. They arise from cells involved in pituitary development and can press on nearby structures such as the optic nerves, pituitary gland, and hypothalamus.

## 2. Can this tumor cause me/my child to have more serious medical problems?

Yes. Because of their location, craniopharyngiomas can cause:

* Headaches and vision problems (like blurred or double vision, loss of peripheral vision) due to pressure on the optic nerves.
* Endocrine dysfunction from pituitary gland compression, leading to hormone deficiencies such as growth hormone deficiency, delayed puberty, thyroid problems, adrenal insufficiency, and diabetes insipidus (excessive thirst and urination).
* Hypothalamic dysfunction, affecting appetite, weight regulation (often causing obesity), sleep, mood, and behavior.
* Neurological symptoms like balance problems, memory difficulties, and personality changes.

## 3. Why do I/does my child have this tumor?

The exact cause is unknown. Researchers believe craniopharyngiomas develop from embryonic cells that normally form the pituitary gland but transform abnormally and grow into a tumor. There is no clear genetic or environmental cause identified.

## 4. What are the treatment options?

Treatment usually involves:

* Surgery to remove as much of the tumor as safely possible, either through the nose (endoscopic) or via craniotomy (opening the skull).
* Radiation therapy after surgery if the tumor cannot be completely removed or if it recurs.
* Lifelong hormone replacement therapy to manage pituitary hormone deficiencies caused by the tumor or treatment.
* Supportive care including vision monitoring and management of hypothalamic symptoms.

## 5. What are the chances treatment will be successful?

Surgery and radiation can control tumor growth and relieve symptoms, but craniopharyngiomas tend to be challenging because they are close to critical brain structures. Complete removal is often difficult, and tumors may recur. With current treatments, many patients achieve good control, but long-term follow-up is essential.

## 6. Will treatment make my or my child’s symptoms go away?

Treatment can improve or stabilize symptoms like headaches and vision problems. However, some symptoms, especially hormonal deficiencies and hypothalamic dysfunction, may persist and require ongoing management. Growth delays in children and behavioral changes may improve but often need long-term support.

## 7. What are treatment possible short-term and long-term side effects?

* Short-term: Surgical risks include infection, bleeding, neurological deficits, and damage to nearby brain structures. Radiation may cause fatigue and inflammation.
* Long-term: Hormonal deficiencies requiring lifelong replacement, obesity due to hypothalamic damage, vision loss if optic nerves are affected, cognitive or behavioral changes, and risk of tumor recurrence.

## 8. What happens if the tumor comes back?

If the tumor recurs, further surgery or radiation may be needed. Ongoing monitoring with MRI scans and hormone testing is important to detect recurrence early. Managing recurrent tumors can be more complex, but multidisciplinary care helps optimize outcomes.

If you or your child have a craniopharyngioma, working closely with a specialized neurosurgeon, endocrinologist, and other specialists is key to managing this lifelong condition effectively.

**DIFFERENTIAL DIAGNOSIS**

* Arachnoid cyst
* Brain tumor
* Epidermoid tumor
* Langerhan cell histiocytosis
* Leptomeningeal cancer
* Meningitis
* Migraine
* Multiple sclerosis
* Optic gliomas
* Pituitary adenoma
* Pseudotumor cerebri
* Rathke’s cleft cyst

**EPIDEMIOLOGY**

Craniopharyngioma has an incidence of 0.5 to 2 cases per million persons per year. Craniopharyngiomas can be recognized at any age. It is generally considered a pediatric disease accounting for 1.2 to 4% of all intracranial tumors; however, approximately half of the craniopharyngiomas are diagnosed in adults. It has a classical bimodal age distribution, with an increased incidence rate in 5 to 14 years and 50 to 74 years of age. There is no statistical difference in the incidence based on gender, race, and geographical location. Familial cases of craniopharyngioma have been reported only in 2 families.

Craniopharyngioma has a very high recurrence rate of approximately 50%. It also has high survival rates (83% to 96% five-year survival and 65% to 100% 10-year survival) but also carries similar rates of morbidity, with almost all patients developing some sequelae.

**DOCTOR PATIENT CONVERSATION**

Doctor: "You or your child has been diagnosed with a craniopharyngioma. This is a rare, benign tumor that grows near the pituitary gland and hypothalamus, important areas in the brain that control hormones and vision."

Patient/Parent: "I’ve never heard of this tumor before. What exactly is it?"

Doctor: "Craniopharyngiomas develop from cells near the pituitary stalk. Although they are not cancerous, they can cause symptoms like headaches, vision problems, and hormonal imbalances because of pressure on nearby structures. For example, vision loss can happen if the tumor presses on the optic nerves, and hormone deficiencies can occur if the pituitary gland is affected."

Patient/Parent: "Why did this happen? Is it something I or my child did?"

Doctor: "The exact cause isn’t fully understood. These tumors arise from developmental cells that didn’t form normally during early brain development. It’s not caused by anything you did during pregnancy or afterward."

Patient/Parent: "What are the treatment options?"

Doctor: "The main treatment is surgery to remove as much of the tumor as safely possible. Nowadays, many tumors can be removed through minimally invasive approaches, such as through the nose or a small incision near the eyebrow, which reduces recovery time. Sometimes, if the tumor can’t be fully removed or if it comes back, radiation therapy is used to control growth. Because the tumor and treatment can affect hormone production, hormone replacement therapy is often needed long-term."

Patient/Parent: "Will the treatment cure the tumor and fix the symptoms?"

Doctor: "Treatment can control or remove the tumor and often improves symptoms like headaches and vision problems. However, some hormone deficiencies or hypothalamic issues may persist and require ongoing management. Because of the tumor’s location, complete removal can be challenging, and there is a risk of recurrence, so regular follow-up is important."

Patient/Parent: "What are the risks or side effects of treatment?"

Doctor: "Surgery carries risks like infection, bleeding, or damage to nearby brain structures, which can affect vision or hormone function. Radiation can cause fatigue and, rarely, long-term effects on brain tissue. Hormone replacement therapy has its own management considerations but is essential for quality of life."

Patient/Parent: "What if the tumor comes back?"

Doctor: "If the tumor recurs, we may consider additional surgery or radiation. Advances in treatment and close monitoring help us manage recurrences effectively. You will be followed by a multidisciplinary team including neurosurgeons, endocrinologists, and ophthalmologists to provide comprehensive care."

REFERENCES

<https://emedicine.medscape.com/article/1157758-clinical>

<https://www.cancer.gov/types/brain/patient/child-cranio-treatment-pdq>

<https://www.hopkinsmedicine.org/health/conditions-and-diseases/craniopharyngioma>

[Craniopharyngioma: Definition, Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/22989-craniopharyngioma#outlook-prognosis)

[Craniopharyngioma - Diagnosis and treatment - Mayo Clinic](https://www.mayoclinic.org/diseases-conditions/craniopharyngioma/diagnosis-treatment/drc-20581537)

### 

### **Croup**

Croup (laryngotracheobronchitis) is a respiratory infection that affects young children. Viral infections are the most common cause of the condition. Croup causes swelling of your child’s voice box (larynx) and windpipe (trachea). This swelling causes the airway below their vocal cords to narrow, which makes their breathing noisy and difficult.

Croup in babies is most common, along with children younger than 3 years old. As children get older, croup isn’t seen as often. This is because their windpipes get larger and swelling is less likely to get in the way of their breathing.

Croup causes a distinctive cough that may sound similar to the call of a seal. The condition is usually mild but symptoms can become severe and life-threatening.

#### **RSV vs. croup — what’s the difference?**

RSV (respiratory syncytial virus) and croup are both respiratory illnesses that can affect babies and young children. RSV is a viral infection that can affect both children and adults. It causes coughing, sneezing and other cold-like symptoms.

While RSV is its own illness, the respiratory syncytial virus is also one of the viruses that can lead to croup.

#### **Whooping cough vs. croup — what’s the difference?**

Whooping cough (pertussis) and croup are both respiratory infections that can affect babies and children. Both conditions cause a distinctive cough, although the sound of whooping cough is a more high-pitched gasping or “whooping” noise.

Whooping cough is a bacterial infection whereas a viral infection usually causes croup. Therefore, no vaccines can prevent croup and antibiotics can’t treat it. (Antibiotics can’t kill viruses.) There’s a vaccine to prevent whooping cough, but it doesn’t go away quickly on its own as croup usually does.

Croup affects about 3% of U.S. children every year. The condition accounts for 7% of all hospitalizations in children younger than 5 years old. It’s more common in males. Healthcare providers define about 85% of croup cases as mild. They consider less than 1% of cases severe.

## **Symptoms and Causes**

The croup cough sounds like a harsh “barking” sound. This is the most common symptom of croup. Your child may also have stridor, which is a raspy, vibrating sound that occurs when your child is breathing in.

Croup is typically mild and lasts less than one week, but symptoms can get more severe. Symptoms normally start slowly and may begin with a runny or stuffy nose. Over the next 12 to 48 hours, symptoms can worsen and the barking cough may start. Symptoms are usually worse at night.

Other mild croup symptoms include:

* Hoarseness.
* Fever.
* Rash.
* Eye redness (conjunctivitis).
* Swollen lymph nodes.

Symptoms of moderate to severe croup may include:

* Difficulty breathing.
* Restlessness or nervousness.
* Retractions (sucking in the skin around your child’s ribs and the top of their breastbone).
* Cyanosis (blue-tinged skin).

### **What causes croup?**

The most common cause of croup is a viral infection. Croup viruses include parainfluenza, influenza, respiratory syncytial virus (RSV), measles and adenovirus. Viral croup causes your child’s upper airways to swell, making it difficult for them to breathe. However, these viruses are common and most children with viral infections don’t develop croup. Rarely, bacteria can complicate the viral infection and make it more difficult to breathe.

#### **Is croup contagious?**

Yes, croup is highly contagious because the viruses that lead to the condition are easily spreadable.

#### **How do you get croup?**

The viruses that cause croup spread easily through the air. When someone with a viral or bacterial infection that can cause croup sneezes or coughs, they send respiratory droplets containing croup-causing germs into the air. When your child breathes in these droplets, they can catch an illness that’ll cause croup. Your child can also get croup by touching objects contaminated by germs that can cause croup.

#### **How long is croup contagious?**

Your child is contagious for three days after their symptoms first appeared or until their fever is gone. You should keep your child home from school until 24 hours have passed without a fever and without using fever-reducing medication.

### **Complications of croup**

Most cases of croup are mild and you can treat them at home. Complications of croup are rare. Less than 5% of children with croup need in-hospital care. Your child’s condition may lead to hospitalization if they:

* Need oxygen therapy to keep their oxygen levels within a safe range.
* Have severe dehydration that requires IV (intravenous, or through your vein) fluids.
* Need multiple doses of inhaled breathing treatments to provide relief.
* Have severe symptoms despite initial treatment.

## **Diagnosis and Tests**

You can usually tell if your child has a croup based on their signs and symptoms. The most common symptoms are a barking cough and stridor. This condition is especially widespread in the fall and winter months. If your child’s condition is severe, a healthcare provider may order X-rays and laboratory tests, but this is rare.

## **Management and Treatment**

Croup treatment depends on the severity of your child’s condition and the risk of it rapidly worsening. If your child has a history of respiratory problems or was born prematurely, that may also affect the treatment approach.

#### **Mild croup**

You can usually treat mild croup at home. Home treatment includes using a cool mist humidifier to help soothe dry and irritated airways. You can also sit with your child in a bathroom filled with steam generated from hot water running in the shower. (Don’t sit in the shower or let your child near the hot water.) If your child’s condition doesn’t improve with mist treatment, you should contact their healthcare provider.

Other croup home remedies include:

* Letting your child breathe cool air at night by opening a door or window.
* Treating your child’s fever with an over-the-counter (OTC) medication such as acetaminophen (Tylenol®) or ibuprofen (Advil®).
* Treating your child’s cough with warm, clear fluids to help loosen the mucus on their vocal cords.
* Avoiding smoking in your home, as smoke can worsen your child’s cough.
* Keeping your child’s head elevated with an extra pillow. (Don’t use pillows with infants younger than 12 months old.)

You may wish to sleep in the same room as your child so you’re there if they start to have trouble breathing.

#### **Moderate to severe croup**

For moderate to severe croup, you should take your child to the nearest urgent care center or emergency room (ER). Severe croup can be life-threatening, and you shouldn’t delay taking your child in. Treatment for moderate to severe croup will vary based on your child’s symptoms. Croup treatments may include:

* Humidified air or oxygen.
* IV fluids for dehydration.
* Monitoring of [v](https://my.clevelandclinic.org/health/articles/10881-vital-signs)ital signs, including oxygen levels, breathing and heart rate.
* Croup medication, including steroids (glucocorticoids) and nebulized breathing treatments (epinephrine).
* Placement of a breathing tube (mechanical ventilation). This is rare.

#### **Specific croup medication**

If you take your child to their provider’s office or the emergency room, their provider will give them a glucocorticoid and a nebulized breathing treatment (epinephrine).

##### **Glucocorticoids**

Glucocorticoids are a type of steroid that decreases the swelling of your child’s voice box (larynx), typically within six hours of the first dose. For a child with mild croup, glucocorticoids may reduce the need for a repeat visit to their provider’s office or the emergency room.

The glucocorticoids healthcare providers use most often are dexamethasone and prednisolone. Your child will usually only need one dose taken by mouth (orally). If your child is vomiting or can’t keep the medicine down, their provider can also give dexamethasone intravenously (IV) or through an intramuscular (IM) injection.

##### **Nebulized breathing treatment (epinephrine)**

Your child will receive epinephrine as an inhaled mist (nebulizer). This also reduces the swelling in your child’s airways and usually starts working within 10 minutes. Epinephrine works for two hours or less, and your child may receive this treatment every 15 to 20 minutes for severe symptoms.

#### **Complications/side effects of the treatment**

Serious side effects of epinephrine are rare. However, side effects could include a rapid heartbeat (tachycardia). A healthcare provider will monitor your child for three to four hours after their last dose to ensure symptoms of airway blockage don’t return.

#### **How soon after treatment will my child feel better?**

Glucocorticoids usually start working within six hours of the first dose. Epinephrine typically begins working faster than glucocorticoids.

## **Outlook / Prognosis**

Croup can be mild, moderate or severe, depending on how difficult it is for your child to pull air into their lungs. The size (diameter) of their windpipe and the amount of narrowing due to the swelling determine the severity of your child’s condition. In addition, your child’s condition may become more severe if they become upset.

#### **Mild croup**

A child with mild croup may have a barking cough and stridor. Symptoms can worsen throughout your child’s illness, especially during the evening hours. So it’s important to keep an eye on their breathing, but you can usually treat their condition at home.

#### **Moderate croup**

A child with moderate croup may have stridor along with retractions (sucking in the skin around their ribs and the top of their breastbone). They may also be slightly agitated or disoriented and may have moderate trouble breathing. You should take your child to see a healthcare provider for treatment.

#### **Severe croup**

A child with severe croup has stridor and retractions. They may also be agitated, anxious or fatigued. Cyanosis (blue-tinged skin) is common. Severe croup is a life-threatening condition. Take your child to the emergency room immediately.

#### **How long does croup last?**

Symptoms of croup usually clear up in most children within two days. However, symptoms can persist for up to one week.

#### **When can my child go back to school?**

Croup is very contagious. Your child should stay home from school until after their fever is gone.

## **Prevention**

Croup can spread by physical contact or through the air. To help prevent its spread:

* Wash and dry your hands thoroughly after caring for your child.
* Wash toys between each use.
* Encourage your child to cover their mouth and nose when coughing and sneezing.
* Keep your child home from school or daycare when they’re ill or if outbreaks occur.
* Throw used tissues away.

### **When should I take my child to see their healthcare provider?**

You should call your child’s healthcare provider if:

* Your child has a fever that lasts for more than three days.
* Your child has symptoms of mild croup that last for more than one week.
* You have questions or are concerned about your child’s condition.

If your child develops symptoms of severe or worsening croup, seek immediate medical attention. These symptoms include:

* Difficulty breathing.
* Blue-tinged skin (cyanosis).
* Severe coughing spells.
* Drooling or difficulty swallowing.
* Inability to cry or speak due to trouble taking a breath.
* A noisy, high-pitched whistling sound while breathing.
* Sucking in the skin around your child’s ribs and the top of their breastbone (retractions).

## **Common Questions**

### **Why does my child keep getting croup?**

If your child keeps getting croup, it may be a sign they have a narrowing in their airway and that they’re at a higher likelihood to be affected by the infection. Your child may have been born with the narrowing or it may have developed after birth. If croup returns (recurs) repeatedly, your child’s provider may refer them to a specialist such as an otolaryngologist (ear, nose and throat doctor) or a pulmonologist (breathing and lung disease doctor).

### **Can adults get a croup?**

Adults can get croup, but it’s rare. The reason babies and young children get croup is because their windpipes (tracheas) are narrower and not fully developed. As children get older, their windpipes get larger and fully develop, so any swelling is less likely to affect breathing. Adults have larger airways, so croup doesn’t typically affect them. When adults do get croup, their symptoms are usually worse and they may need more aggressive treatment.

**DIFFERENTIAL DIAGNOSIS**

The differential diagnosis of croup includes other causes of stridor and respiratory distress, such as bacterial tracheitis, epiglottitis, foreign body aspiration, hemangioma, peritonsillar abscess, neoplasm, retropharyngeal abscess, and smoke inhalation. Rarely, neurological causes can cause stridor that mimics croup. In a report, 3 children presented with stridor and were treated for croup but were eventually found to have a neurological cause of stridor.

**Acute Epiglottitis**

Acute epiglottitis is rare due to vaccination against *Haemophilus influenzae* type B. The patient does not have a barking cough but has anxiety out of proportion to the degree of respiratory distress. Symptom onset is generally rapid; the child appears febrile and ill-appearing. Affected children prefer to sit upright in a tripod position, and cough is rare. The thumb sign due to a swollen epiglottis may be noted on a radiograph. A cough is highly sensitive and specific for croup, whereas drooling may indicate bacterial epiglottitis. Other symptoms include acute onset of dysphagia, odynophagia, high fever, and a muffled voice.

Distinguishing croup from epiglottitis is essential because patients with the latter may deteriorate rapidly. If acute epiglottitis is suspected, it is imperative to keep the child calm and avoid asking them to open their mouth wide, as this could precipitate fatal airway obstruction. An emergent ear, nose, and throat (ENT) consultation for airway evaluation in the operating room is essential for suspected epiglottitis. The *Haemophilus influenzae* vaccine, licensed in 1985, decreased cases of epiglottitis, but with the current rates of vaccine refusals, acute epiglottitis cases are likely to occur. All patients with epiglottitis should be admitted to the intensive care unit for close monitoring.

**Bacterial Tracheitis**

Bacterial tracheitis is also called bacterial croup. An exudative bacterial infection invades tracheal soft tissue and occurs as a primary infection or secondary to viral croup. In secondary bacterial infection, mild viral croup symptoms worsen, and patients exhibit high fevers, a toxic appearance, and severe respiratory distress. Radiographs may show nonspecific edema and irregularities of the tracheal wall.

**Deep Neck Space Abscesses**

Patients with peritonsillar, parapharyngeal, or retropharyngeal abscesses typically lack symptoms of croup, such as barking cough and stridor. Children may present with drooling, fever, difficulty swallowing, neck stiffness, enlargement of cervical lymph nodes, and a toxic appearance. With deep neck space abscesses, cellulitis of the cervical prevertebral tissues may occur. Children with a retropharyngeal abscess typically have fever, drooling, dysphagia, and odynophagia but also complain of neck pain with a bulging posterior pharyngeal wall on neck radiography. Children with a peritonsillar abscess often complain of a sore throat, fever, and a classic hot potato voice.

**Foreign Body**

A previously healthy child presents with a sudden onset of choking and upper airway obstruction symptoms. A foreign body lodged in the larynx causes hoarseness and stridor. A large foreign body in the upper esophagus can pressurize the extra-thoracic trachea, resulting in a barking cough and inspiratory stridor. Late onset of stridor can occur due to the ingestion of a nonobstructive erosive foreign body, such as a button battery.

**Allergic Reaction or Acute Angioneurotic Edema**

Patients present with a sudden onset of symptoms such as swollen lips and tongue without preceding respiratory symptoms or fever. The associated symptoms include urticarial rash, difficulty swallowing, and inspiratory stridor. Patients may have a history of allergies and a history of similar episodes in the past.

**Congenital and Acquired Anomalies**

Congenital and acquired anomalies and upper airway injury can cause stridor.Anatomic abnormalities include laryngeal webs, papillomas, laryngomalacia, subglottic stenosis, hemangiomas, bronchogenic cysts, and vocal cord paralysis. Most patients present with stridor as a chronic symptom without other upper respiratory symptoms or fever.

## **Diagnostic Considerations**

Although croup is considered the most common cause of stridor and respiratory distress in the pediatric population, diagnostic differentials should be considered, dependent on clinical history and presenting symptoms, and include the following:

* Spasmodic croup (recurrent croup, afebrile)
* Retropharyngeal abscess
* Subglottic stenosis
* Angioedema
* Allergic reaction
* Tracheomalacia
* Laryngeal web
* Laryngeal papillomatosis
* Laryngeal hemangioma
* Subglottic hemangioma
* Vocal cord paralysis
* Uvulitis
* Innominate artery compression
* Right aortic arch vascular ring
* Double aortic arch
* Aberrant subclavian artery
* Pulmonary artery sling
* Gastroesophageal reflux (diagnostic consideration for recurrent croup)
* Rarer etiologies in the pediatric population:
  + Laryngeal tuberculosis, neoplasm (compressing trachea), sarcoidosis, Wegener granulomatosis

**EPIDEMIOLOGY**

The majority of patients with croup, more than 85%, exhibit mild symptoms, and severe croup is rare, fewer than 1%. In the United States, croup accounts annually for approximately 7% of pediatric hospitalizations, with fewer than 3% of admitted cases requiring intubation, and contributes to up to 15% of emergency department visits among children younger than 5.

Croup typically affects children between the ages of 6 months and 3 years, but can occur as early as 3 months and up to 15 years. The annual incidence is approximately 532 cases per 100,000 individuals, affecting 3% of children younger than 5 globally. Croup rarely occurs in adults. PIV is responsible for more than two-thirds of croup infections. Croup is more common in boys than in girls, with a 1.5:1 ratio, and shows no preference for any race. Croup is more prevalent in resource-limited countries, likely due to a higher proportion of children younger than 6 and suboptimal nutritional status.

## Additional notes:

* Dexamethasone is recommended for all severities of croup because it improves symptoms within hours and reduces hospital admissions and return visits. Oral administration is preferred for ease and less distress, but IM or IV routes are used if vomiting or severe distress prevent oral intake.
* Nebulized epinephrine is reserved for moderate to severe croup with stridor at rest or respiratory distress. It acts quickly but has a short duration, so children require observation for at least 2 hours after administration to monitor for symptom recurrence.
* Repeated doses of dexamethasone are generally not required, but may be considered in severe or atypical cases under specialist advice.
* Budesonide nebulized is an alternative steroid but is more expensive and not routinely used.
* Antibiotics are not indicated unless there is suspicion of bacterial superinfection (e.g., bacterial tracheitis).
* Hospitalization may be needed for severe cases requiring oxygen, repeated epinephrine, or airway support.

**DOCTOR PATIENT CONVERSATION**

Doctor: "Your child has croup, which is a common viral infection that causes swelling around the voice box and windpipe. This swelling leads to the characteristic barking cough and sometimes noisy breathing called stridor."

Parent: "Is it serious? What caused this?"

Doctor: "Croup is usually caused by a virus, most often parainfluenza virus. It tends to affect young children and is generally mild, but it can sometimes cause breathing difficulties, especially at night."

Parent: "What can we do to help my child?"

Doctor: "The main treatment is a medicine called dexamethasone, a steroid that reduces the swelling in the airway. It usually works within a few hours and helps your child breathe more easily. We may also use a nebulized medicine called epinephrine if your child is having more severe breathing difficulty."

Parent: "Are there any side effects from these medicines?"

Doctor: "Dexamethasone is usually well tolerated; some children may have mild upset stomach or feel a bit restless. Epinephrine can cause a faster heartbeat or jitteriness, but these effects are temporary and we monitor your child closely when it’s given."

Parent: "Will my child need to stay in the hospital?"

Doctor: "Most children with mild to moderate croup can be treated at home after a single dose of dexamethasone. If your child has severe symptoms like difficulty breathing at rest or persistent stridor, we may keep them in the hospital for observation and additional treatment."

Parent: "What should I watch for at home?"

Doctor: "Keep your child calm and comfortable, as crying can worsen the airway swelling. Make sure they drink fluids and rest. If you notice worsening difficulty breathing, bluish lips, or if your child becomes very sleepy or unresponsive, seek emergency care immediately."

Parent: "How long will it take to get better?"

Doctor: "Symptoms usually improve within a few days, but the cough can last up to a week or more. Follow-up with your pediatrician if symptoms don’t improve or if you have any concerns."

REFERENCES

<https://www.aafp.org/pubs/afp/issues/2018/0501/p575.html>

<https://www.mayoclinic.org/diseases-conditions/croup/diagnosis-treatment/drc-20350354>

<https://emedicine.medscape.com/article/962972-treatment>

[Croup: Causes, Symptoms & Treatment](https://my.clevelandclinic.org/health/diseases/8277-croup#overview)

<https://www.ncbi.nlm.nih.gov/books/NBK431070/#article-20142.s9>

### **conductive hearing loss**

Conductive hearing loss occurs when sounds can’t reach your inner ear. Several things can cause it, including ear infections, blockages and structural issues. As a result, louder sounds might be muffled, and you may not be able to hear softer sounds at all. Other names for this condition include conductive hearing impairment or conduction deafness.

Conductive hearing loss is the most common cause of hearing loss in young children. In one study, researchers found that 19% of schoolchildren from kindergarten to grade 6 had some type of hearing loss. Among these cases, 93% were due to conductive hearing impairment.

Though conductive hearing loss is most common in children, adults can get it, too. It can be temporary or permanent and range from mild to severe. In most cases, treatment can correct it.

#### **Types of conductive hearing loss**

There are two types of conductive hearing impairment:

* Unilateral conductive hearing loss: Affects one ear.
* Bilateral conductive hearing loss: Affects both ears.

## **Symptoms and Causes**

Conductive hearing loss symptoms can include:

* Balance issues (due to problems with the vestibular system in your inner ear)
* Ear pain
* Ear pressure
* Ear popping or ringing
* Muffled hearing in one or both ears
* Noticing that your own voice sounds louder

### **What causes conductive hearing loss?**

Conductive hearing loss happens when sound can’t reach your cochlea. Your cochlea is the part of your inner ear responsible for hearing.

There are many reasons — both simple and complex — why sounds might not reach your inner ear. Conductive hearing loss causes include:

* Blockages from stuck objects
* Ear infections (especially chronic ones)
* Ear tumors, cysts or other growths like cholesteatoma
* Earwax buildup
* Eustachian tube dysfunction
* Fluid in your middle ear from colds
* Otosclerosis (abnormal bone growth in your ear)
* Ruptured eardrum

Among children, the most common causes of conductive hearing loss include chronic ear infections and foreign objects in the ear canal.

In adults, conductive hearing loss is usually a result of an ear injury or health condition.

#### **Risk factors**

Some things increase your risk for conductive hearing loss. The following conditions could cause permanent hearing impairment if left untreated:

* Ear abnormalities. Microtia, atresia (missing or underdeveloped ear canal) and other ear abnormalities can result in conductive hearing loss.
* Chronic ear infections. Fluid buildup in your middle ear that doesn’t go away can increase your risk for conductive hearing loss.
* Structural damage. An ear injury or otosclerosis can cause damage to your ossicles (three tiny bones in your ear that help you hear).

## **Diagnosis and Tests**

A healthcare provider (usually an otolaryngologist) will do a physical examination. During this visit, they’ll ask about your symptoms and medical history. They might ask you questions like:

* When did you first start to lose your hearing?
* Was it sudden or gradual?
* Is one side worse than the other?
* Do you have a history of ear infections?
* Do you have any ear pain, pressure or ringing in the ears?
* Do any of your biological family members have hearing loss?

Your healthcare provider will look at the outside of your ear and feel around the area. They’ll use a lighted instrument called an otoscope to view the inside of your ear, looking for any blockages or structural abnormalities.

After a physical exam, an otolaryngologist or audiologist will need to run some hearing tests, which may include:

* Acoustic reflex test: Measures the tightness of a small muscle in your middle ear (stapedial muscle) in response to loud sounds.
* Bone conduction test: Sends sound directly to your inner ear and helps determine which type of hearing loss you have.
* Otoacoustic emissions (OAEs): Measures sound-related vibrations from your inner ear and can show whether you have a blockage.
* Pure-tone audiometry: Determines the quietest sounds you can hear at different pitches.
* Speech audiometry: Tests your word recognition and records the softest speech you can repeat.
* Tuning fork exams: Determine whether you have conductive or sensorineural hearing loss. (Examples include the Rinne test and Weber’s test).
* Tympanometry: Shows how well your eardrum moves in response to sounds.

In addition to hearing tests, your healthcare provider may need to do a:

* Cranial nerve exam
* Head and neck exam
* MRI (magnetic resonance imaging) or CT scan (computed tomography scan)

## **Management and Treatment**

The treatment that’s right for you depends on what caused your hearing loss. Depending on your situation, conductive hearing loss treatments might include:

* Active surveillance. Your healthcare provider may start with “watchful waiting.” That means they’ll monitor your hearing loss over a period of time. If hearing loss worsens, they’ll design a treatment plan.
* Hearing aids. Hearing aids and other assistive listening devices can amplify and change sounds so you can hear them better.
* Medications. You might need medication if an infection or similar condition caused conductive hearing loss. Your provider can prescribe these in ear drops or pill form.
* Surgery. If a cyst, tumor or another type of growth keeps sound from reaching your inner ear, a surgeon may need to remove the growth. Surgery can also repair damaged ossicles (the tiny bones inside your ear).

## **Outlook / Prognosis**

The outlook is generally good with treatment. Medication, hearing aids or surgery can improve or correct most cases of conductive hearing loss.

## **Prevention**

You can’t always prevent conductive hearing loss, especially when abnormal bone growth or a structural issue inside your ear causes it. But you can reduce your risk by following these guidelines:

* Don’t stick anything in your ear canal, including cotton swabs.
* If you get an ear infection, treat it promptly.
* See your healthcare provider for regular hearing tests.

### **When should I see my healthcare provider?**

Tell your healthcare provider right away if you have:

* Hearing loss that gets worse
* Sudden hearing loss (especially in one ear)
* Symptoms in addition to hearing loss, like ear pain, headaches, numbness or weakness

#### **What questions should I ask my doctor?**

## 1. What type of treatment do I need?

**Treatment depends on the cause of your conductive hearing loss. Common options include:**

* **Medications such as antibiotics or antifungals if an infection is causing the problem.**
* **Surgery to correct structural issues like eardrum perforations, abnormal bone growth (otosclerosis), or malformations of the ear canal or middle ear bones.**
* **Hearing aids (behind-the-ear, in-the-ear, or bone-anchored devices) to amplify sounds when surgery is not possible or not fully effective.**
* **Sometimes, watchful waiting with regular monitoring is appropriate if the condition is stable or improving.**

## 2. What results can I expect from treatment?

**Most cases of conductive hearing loss improve significantly with appropriate treatment. Surgery or medication can often restore hearing or greatly reduce hearing difficulties. Hearing aids can effectively improve hearing and communication when surgery isn’t an option. Early diagnosis and treatment improve outcomes and reduce the risk of permanent hearing impairment.**

## 3. How often will I need follow-up visits?

**Follow-up frequency varies depending on your treatment plan and condition severity. Typically, you’ll have:**

* **Regular hearing tests to monitor your hearing levels.**
* **Periodic ear examinations to check for infections or changes in ear structure.**
* **Follow-ups after surgery to assess healing and hearing improvement.  
  Your healthcare provider will tailor the schedule to your specific needs.**

## 4. Could my hearing eventually get worse?

**If untreated, some causes of conductive hearing loss can worsen over time, potentially leading to permanent hearing damage. Conditions like chronic ear infections or progressive bone growth disorders can cause gradual hearing decline. Timely treatment and monitoring help prevent deterioration.**

**DIFFERENTIAL DIAGNOSIS**

The differential diagnosis for conductive hearing loss is extensive. A thorough history and examination, together with pure tone audiometry, will point towards the underlying cause. It is essential to confirm that the hearing loss is conductive rather than sensorineural, guiding subsequent investigations and management.

* Defect in the pinna, external auditory canal, tympanic membrane, and ossicles
* Aural atresia
* External canal obstruction
* Tympanic membrane perforation
* Acute otitis media
* Otitis media with effusion
* Nasopharyngeal tumor
* Cholesteatoma
* Otosclerosis
* Ossicle discontinuity after head trauma

**EPIDEMIOLOGY**

Conductive hearing loss is common in younger patients due to conditions such as otitis media with effusion. A study on primary school children found the prevalence of hearing loss to be 15%, with 88.9% of those being conductive. Another study with preschool children in a South African community showed that 19% had hearing loss, with 65% of those being conductive. They found that 9% of children had impacted cerumen, causing a hearing loss in 19% of them. In a Canadian study in school children from kindergarten to grade 6, hearing loss was found in 19%, with 93% of those being conductive. They found perforations of the tympanic membrane in 37% if unilateral loss and 46% in the bilateral loss.

In low-middle income countries, hearing loss secondary to otitis media can be as high as 26%. Otosclerosis prevalence in the white population is 0.04% to 1% but increases to 5% in Asians, and is associated with bilateral hearing loss in up to 80% of cases.In the elderly population, hearing loss is mostly attributed to presbycusis, which is sensorineural.

**DOCTOR PATIENT CONVERSATION**

Doctor: "I understand you've been having some trouble hearing, like needing to turn up the TV volume or asking people to repeat themselves. After examining your ears and doing some hearing tests, it looks like you have conductive hearing loss."

Patient: "What exactly does that mean?"

Doctor: "Conductive hearing loss happens when sound waves can't travel properly through your outer or middle ear to the inner ear. This can be due to things like earwax buildup, fluid behind the eardrum, infections, or problems with the small bones in the middle ear."

Patient: "Is this permanent? Can it be fixed?"

Doctor: "Many causes of conductive hearing loss are temporary and treatable. For example, if it's due to earwax or an infection, we can treat that and your hearing should improve. Sometimes surgery is needed if there are structural issues. If the hearing loss is permanent, hearing aids or bone-conduction devices can help you hear better."

Patient: "What kind of treatment would I need?"

Doctor: "That depends on the cause. We might start with removing any earwax or treating infections. If surgery is needed, we’ll discuss the options carefully. If hearing aids are appropriate, we can refer you to an audiologist who will fit you with the right device."

Patient: "Will my hearing get worse over time?"

Doctor: "It depends on the underlying cause. Some conditions can worsen if left untreated, but with proper care and follow-up, we can often prevent further hearing loss. Regular check-ups will help us monitor your hearing."

Patient: "How often will I need to come back?"

Doctor: "Initially, we’ll see you more frequently to monitor treatment response. Once your hearing stabilizes, follow-ups might be yearly or as needed. Your audiologist will also be involved in ongoing care."

Patient: "Are there any risks or side effects with treatments?"

Doctor: "Treatments like earwax removal or medications are usually safe. Surgery carries some risks, which we’ll explain if it’s needed. Hearing aids have minimal risks but require adjustment to get used to."

Patient: "Is there anything I can do to protect my hearing?"

Doctor: "Yes, avoid exposure to loud noises, use ear protection when needed, and keep your ears dry and clean. If you notice any changes in your hearing, come in promptly."

REFERENCES

<https://stanfordhealthcare.org/medical-conditions/ear-nose-and-throat/conductive-hearing-loss/treatments.html>

[Conductive Hearing Loss: Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/conductive-hearing-loss#overview)

<https://www.ncbi.nlm.nih.gov/books/NBK563267/#article-19834.s8>

**Congenital neck anomalies**

Congenital head and neck masses are lumps (cysts) in the neck, face, scalp or ear that are present at birth. Many of these should be removed to prevent infection. The most common congenital head and neck masses are dermoid cysts, branchial cleft cysts and thyroglossal duct cysts.

**Dermoid cysts** are usually found on the scalp, face or neck. Dermoid cysts need to be removed because they can grow larger or become infected.

**Branchial cleft cysts** develop in the neck of young children. Branchial cleft cysts are surgically removed to prevent infection.

**Thyroglossal duct cysts** are lumps in the middle of the neck near the Adam’s apple or under the chin. Removal is typically required to prevent infection.

## **Symptoms**

Symptoms include lumps or bumps anywhere on the scalp, neck and head.

## **Diagnosis**

* Physical exam
* Ultrasound
* CT scan or other imaging
* Biopsy or removal

## Treatment

Many lesions are removed with surgery.

## When to Call for Help

Call your pediatrician if you notice any of the above symptoms in your child.

**DIFFERENTIAL DIAGNOSIS**

## 1. Branchial Cleft Anomalies

* Branchial cleft cysts, sinuses, and fistulae
  + Arise from incomplete obliteration of branchial clefts or pouches during embryogenesis.
  + Present as lateral neck masses, often near the anterior border of the sternocleidomastoid muscle.
  + May become infected or drain intermittently.
  + Classified by the cleft of origin (first, second, third, or fourth).
  + Diagnosis aided by imaging (ultrasound, CT, MRI) and sometimes direct laryngoscopy.

## 2. Thyroglossal Duct Cyst (TGDC)

* The most common midline congenital neck mass.
* Results from persistence of the thyroglossal duct tract.
* Typically presents as a painless, midline neck swelling that moves with swallowing or tongue protrusion.
* Diagnosis mainly clinical, supported by ultrasound; CT/MRI if complicated.

## 3. Lymphangioma (Cystic Hygroma)

* Benign lymphatic malformations, often multiloculated cystic masses.
* Commonly located in the posterior triangle of the neck.
* Can cause airway or feeding difficulties if large.
* Diagnosed by ultrasound and MRI.

## 4. Dermoid and Epidermoid Cysts

* Midline or paramedian cystic masses containing skin elements.
* Usually painless and slow-growing.

## 5. Congenital Torticollis

* Head tilt due to sternocleidomastoid muscle fibrosis or injury during birth.
* May be associated with a palpable mass in the SCM muscle.

## 6. Vascular Lesions

* Hemangiomas: benign vascular tumors appearing shortly after birth, often proliferative then involuting.
* Other vascular malformations (venous, capillary, or mixed).

## 7. Solid Tumors and Rare Neoplasms

* Teratomas, neuroblastomas, thymic cysts, and other rare congenital tumors.

## 8. Other Congenital Anomalies

* Thymic cysts, laryngoceles, plunging ranulas, and ectopic thyroid tissue (e.g., lingual thyroid).

**Procedures and Timeline for Congenital Neck Anomalies**

## 1. Initial Evaluation and Diagnosis

* History and Physical Exam: Identify mass characteristics, location, symptoms (infection, drainage, swelling).
* Imaging: Ultrasound is first-line to characterize cystic vs solid lesions. CT or MRI may be used for complex or extensive lesions.
* Additional Tests: Rarely, genetic testing if syndromic features are present.

## 2. Medical Management (if applicable)

* For some vascular lesions like hemangiomas, high-dose steroids or other medical therapies may be started during the first year of life (proliferative phase).
* Infected cysts may require antibiotics and sometimes incision and drainage before definitive surgery.

## 3. Surgical Treatment

* Thyroglossal Duct Cyst (TGDC):
  + The standard procedure is the Sistrunk operation, which involves removal of the cyst, sinus tract, and the central portion of the hyoid bone.
  + Surgery is ideally performed after infection is controlled to reduce recurrence risk.
  + Recurrence rates are low (3-5%) with complete excision but higher if infection or prior drainage occurred.
* Branchial Cleft Anomalies (BCA):
  + Complete surgical excision of the entire tract or cyst is required to prevent recurrence.
  + Timing is debated: some recommend early surgery to prevent infection; others suggest waiting until age 2-3 years.
  + Most surgeries are outpatient and last 1-2 hours.
  + Recurrence rates vary but can be up to 22% if excision is incomplete.
* Dermoid Cysts and Other Cysts:
  + Surgical excision is curative.
* Congenital Torticollis:
  + Managed initially with physical therapy (passive stretching exercises).
  + Botulinum toxin injections or surgery may be considered for refractory cases.
* Lymphangiomas:
  + May require staged surgical excision or sclerotherapy depending on size and location.

## 4. Postoperative Care and Follow-Up

* Patients are monitored for wound healing, signs of infection, and recurrence.
* Follow-up visits typically occur within weeks after surgery, then periodically based on clinical course.
* Recurrence or complications may require repeat surgery.

## 5. Timeline Summary

| **Stage** | **Typical Timing** | **Notes** |
| --- | --- | --- |
| Initial diagnosis | At presentation | Imaging and clinical evaluation |
| Medical management (if needed) | Weeks to months | Steroids for hemangiomas; antibiotics for infection |
| Surgery for TGDC | Usually after infection resolves; often before age 5 | Sistrunk procedure; outpatient |
| Surgery for BCA | Often between 2-5 years; earlier if recurrent infection | Outpatient; 1-2 hours duration |
| Surgery for dermoid cysts | When diagnosed, often in early childhood | Complete excision curative |
| Physical therapy for torticollis | From birth or diagnosis | May last several months; surgery if refractory |
| Follow-up | Weeks post-op, then as needed | Monitor for recurrence or complications |

**Epidemiology of Congenital Neck Anomalies**

* Congenital neck anomalies are a subset of head and neck congenital anomalies, which account for approximately 5.5% of all congenital anomalies reported in some neonatal hospital studies.
* The overall prevalence of multiple congenital anomalies (MCA), which often include respiratory and ear, face, and neck anomalies, ranges from about 15 to 26 per 10,000 births in European and other populations. Respiratory and ear/neck anomalies are among the most common types to occur with other anomalies, present in about one-third of MCA cases.
* Studies show variation in prevalence by region and population, with some reports indicating congenital anomalies (including neck anomalies) ranging from roughly 100 to 370 per 10,000 births depending on geographic and demographic factors.
* Male newborns may have a slightly higher frequency of head and neck anomalies compared to females in some populations.
* Prenatal detection rates of multiple congenital anomalies, including neck anomalies, have improved over time with the introduction of nationwide screening programs, increasing from about 26% to over 50% detection before birth.
* Congenital neck anomalies are often part of broader syndromic presentations or multiple anomalies, but isolated cases also occur.
* Risk factors influencing prevalence include parental age (higher paternal age associated with increased anomalies), genetic factors, and possibly environmental exposures, although specific causes for many congenital neck anomalies remain unknown

**DOCTOR PATIENT CONVERSATION**

Doctor: "You or your child has a congenital neck anomaly, which means there is an abnormality in the neck present from birth. These can take different forms like cysts, sinuses, or lumps, and are usually caused by how the neck structures developed before birth."

Patient/Parent: "What kind of abnormalities are these? Are they dangerous?"

Doctor: "The most common types are branchial cleft anomalies, thyroglossal duct cysts, lymphangiomas, and dermoid cysts. Most of these are benign, meaning they are not cancerous. However, they can sometimes cause problems like infections, swelling, or discomfort, and may affect neck movement or appearance."

Patient/Parent: "How do these happen?"

Doctor: "During early development in the womb, the neck forms from several structures called branchial arches. Sometimes these don’t fuse properly or some embryonic tissue remains, leading to these anomalies. For example, a branchial cleft cyst forms when tissue that should disappear during development remains and forms a cyst or tract."

Patient/Parent: "What symptoms should I watch for?"

Doctor: "Usually, these anomalies appear as lumps or swelling in the neck. They may be painless but can become red, tender, or drain fluid if infected. Some, like a thyroglossal duct cyst, move when the tongue moves or when swallowing."

Patient/Parent: "What treatment options are there?"

Doctor: "Treatment often involves surgical removal to prevent infections or other complications. For example, branchial cleft cysts and thyroglossal duct cysts are usually removed surgically once diagnosed. Lymphangiomas may sometimes be treated with special injections to shrink them before surgery."

Patient/Parent: "Is surgery safe? When should it be done?"

Doctor: "Surgery is generally safe and done under general anesthesia. We usually plan surgery when the child is healthy, often before the second year of life, but timing depends on the size, symptoms, and risk of infection. Early surgery can prevent complications like neck contractures or recurrent infections."

Patient/Parent: "Will this affect my child long-term?"

Doctor: "Most children do very well after treatment with no lasting problems. If left untreated, some anomalies can cause repeated infections or restrict neck movement, so timely management is important."

Patient/Parent: "Do we need any special tests?"

Doctor: "We’ll usually start with an ultrasound to understand the nature of the mass. Sometimes CT or MRI scans are needed to see the extent and relation to nearby structures. If there’s any concern about other anomalies, we might do additional evaluations."

Patient/Parent: "Is this hereditary? Could future children have the same problem?"

Doctor: "Most congenital neck anomalies are sporadic and not inherited, but if there is a family history or other birth defects, we might consider genetic counseling."

REFERENCES

[Congenital Head and Neck Masses | Johns Hopkins Medicine](https://www.hopkinsmedicine.org/health/conditions-and-diseases/congenital-head-and-neck-masses)

<https://emedicine.medscape.com/article/837477-overview>

**Cricopharyngeal Muscle dysfunction**

Cricopharyngeal (*CRY-coe-fare-en-gee-uhl*) spasms are throat spasms. Your cricopharyngeal muscle — sometimes called the cricopharyngeus or upper esophageal sphincter (UES) — sits at the top part of your esophagus (food pipe). This muscle contracts to open and close your esophagus, allowing food and liquid to pass through. In people with cricopharyngeal spasm, this muscle contracts too much and/or too tightly. When this happens, you can still swallow but your throat feels uncomfortable.

Cricopharyngeal spasms can affect people of all ages, even children. They may be related to other issues, like acid reflux, inflammatory diseases or neurological conditions.

**Other names for cricopharyngeal spasms include cricopharyngeal achalasia and cricopharyngeal dysfunction**.

## **Symptoms and Causes**

Cricopharyngeal spasm symptoms can range from mild to severe. They may include:

* Choking or strangling sensations
* Feeling like there’s a lump in your throat that you can’t clear
* Pressure on the area just below your Adam’s apple

These symptoms usually go away when you’re eating or drinking. They can also worsen when you’re stressed. Even though many people with cricopharyngeal spasm feel restriction in their throats, they can still swallow normally.

### **What causes cricopharyngeal spasms?**

Cricopharyngeal spasms occur when your upper esophageal sphincter tightens more than it should. They’re more common in people with:

* Acid reflux or GERD
* Anxiety disorders
* Inflammation
* Neurological conditions (like stroke, myositis and muscular dystrophy)
* Stress

### **Complications of cricopharyngeal spasms**

Leaving cricopharyngeal spasms untreated for a long time can cause something called Zenker’s diverticulum (a type of esophageal diverticulum). The condition causes a pouch in the back of your throat where food and saliva collect, making it harder to swallow.

## **Diagnosis and Tests**

Your healthcare provider will do a physical examination and ask about your symptoms. They’ll also review your health history to see if you have any conditions that could contribute to cricopharyngeal spasm.

If your provider thinks you might have cricopharyngeal spasms, they’ll do an upper endoscopy. During this outpatient procedure, they’ll insert a thin tube with a tiny camera down your throat. This allows them to see your esophagus in greater detail.

They might run additional tests, which could include:

* Esophageal manometry test. This test shows how the muscles in your esophagus operate when you swallow.
* Barium swallow test. Your provider will ask you to drink a barium liquid that coats your digestive tract. Then, they’ll take X-rays to examine your esophagus.

## **Management and Treatment**

Management depends on the cause and severity of your symptoms. Cricopharyngeal spasm treatments include:

* Acid reflux medications. If cricopharyngeal spasm is related to acid reflux, GERD or similar conditions, your healthcare provider may prescribe medications like H2 blockers or proton pump inhibitors.
* Botox injections. This temporarily weakens the affected muscles, helping them relax.
* Counseling. If stress is a contributing factor, counseling can help. Managing your anxiety can reduce — and in some cases eliminate — cricopharyngeal spasm symptoms.
* Muscle relaxants. These prescription medications can help calm stress that triggers cricopharyngeal spasms.
* Physical therapy. Exercises for cricopharyngeal spasms can help ease your symptoms. A physical therapist can show you how to relax the affected muscles.

Rarely, some people need surgery. During this procedure, your surgeon makes incisions (cuts) in your cricopharyngeal muscle. This keeps it from contracting too much.

**Treatment of Cricopharyngeal Spasm: Drugs and Side Effects**

Cricopharyngeal spasm involves involuntary contraction of the cricopharyngeus muscle (upper esophageal sphincter), causing throat tightness, globus sensation, and sometimes swallowing difficulties. Treatment depends on severity, underlying causes (e.g., reflux, anxiety), and symptom duration.

## 1. Muscle Relaxants

* Benzodiazepines:
  + Examples: *Diazepam (Valium), Clonazepam (Rivotril), Lorazepam (Ativan)*
  + Use: Relax throat muscles and reduce spasm-related anxiety.
  + Side Effects: Drowsiness, dizziness, fatigue, potential dependence with long-term use, impaired coordination.
  + Notes: Typically prescribed short-term due to addiction risk.
* Over-the-counter muscle relaxants:
  + May provide mild symptom relief.
  + Side effects vary by product; generally mild but can include sedation or gastrointestinal upset.

## 2. Antispasmodic Agents

* Nifedipine (a calcium channel blocker):
  + Use: Reduces esophageal spasms by relaxing smooth muscle.
  + Side Effects: Low blood pressure, dizziness, headache, flushing, swelling of ankles.
  + Notes: Dose limited by blood pressure tolerance.

## 3. Antidepressants

* Selective Serotonin Reuptake Inhibitors (SSRIs):
  + Example: *Escitalopram*
  + Use: Addresses anxiety and possible serotonin-related dysfunction contributing to spasms.
  + Side Effects: Nausea, headache, insomnia, sexual dysfunction. Effects take 4–6 weeks to appear.
* Tricyclic Antidepressants:
  + Example: *Amitriptyline, Nortriptyline*
  + Use: May reduce esophageal pain and muscle spasm.
  + Side Effects: Dry mouth, drowsiness, constipation, weight gain, dizziness.

## 4. Acid Reflux Medications

* Proton Pump Inhibitors (PPIs) and H2 Blockers:
  + Use: Treat underlying GERD that may trigger or worsen spasms.
  + Side Effects: Headache, diarrhea, abdominal pain, long-term use linked to nutrient malabsorption.

## 5. Botulinum Toxin (Botox) Injections

* Temporarily paralyzes the cricopharyngeus muscle to relieve spasms.
* Effects last about 3–4 months; repeat injections may be needed.
* Side Effects: Temporary swallowing difficulties, local pain or bruising at injection site.

## 6. Other Treatments

* Physical Therapy: Neck stretching and relaxation exercises.
* Psychological Counseling: Stress reduction techniques, mindfulness, and anxiety management.
* Surgery (rare): Cricopharyngeal myotomy or balloon dilation for refractory cases.

#### **Managing cricopharyngeal spasm symptoms at home**

In addition to medical treatments, there are also ways to get relief from cricopharyngeal spasm symptoms on your own:

* Drink warm beverages to help relax your throat muscles.
* Eat smaller meals throughout the day. This helps your throat muscles stay relaxed for longer.
* Gently massage your neck and throat.
* Keep track of factors that make your symptoms worse, then avoid them.
* Practice mindfulness, meditation or other relaxation techniques.
* Take supplements to reduce cricopharyngeal spasms. Magnesium may be particularly helpful.

## **Outlook / Prognosis**

Most of the time, cricopharyngeal spasms go away on their own. You may experience flare-ups during times of stress, but learning to manage your symptoms can help improve your quality of life.

#### **How long cricopharyngeal spasms last**

In most cases, people with cricopharyngeal spasms notice improvement in about three weeks. But everyone is unique, and this timeline can vary.

Sometimes, just being aware of the issue can help. Once you have a diagnosis to explain your symptoms, you might become less anxious and experience symptoms less often.

## **Prevention**

You can’t always prevent cricopharyngeal spasms. But treating the underlying cause — like acid reflux, neurological issues or inflammatory conditions — can help reduce your risk. Additionally, managing stress can be key in easing your symptoms.

### **When should I see my healthcare provider?**

If you’ve had symptoms lasting longer than three weeks, call your healthcare provider. They may run some tests to rule out other, more serious conditions.

## **Common Questions**

### **What’s the difference between cricopharyngeal spasms and esophageal spasms?**

Cricopharyngeal spasms and esophageal spasms both affect your esophagus. Some symptoms overlap, but there are key differences:

|  | **Cricopharyngeal spasm** | **Esophageal spasm** |
| --- | --- | --- |
| What part of your body does it affect? | Upper esophageal sphincter (UES) | Lower esophageal sphincter (LES) |
| What does it impact? | The way food moves from your mouth to your esophagus | The way food moves from your esophagus to your stomach |
| What are the common symptoms? | Chest pain; difficulty swallowing; regurgitation; a sensation that something is stuck in your throat | Throat pain or tightness; difficulty swallowing; regurgitation; a sensation that something is stuck in your throat |

## **DIFFERENTIAL DIAGNOSIS**

## 1. Pharyngeal Muscle Spasms (Non-cricopharyngeal)

## Spasms of other pharyngeal muscles can cause similar globus sensations, with tension felt around the thyroid cartilage rather than the cricoid cartilage.

## These may coexist with cricopharyngeal spasms.

## 2. Cricopharyngeal Muscle Dysfunction / Achalasia

## A failure of the cricopharyngeus muscle to relax properly during swallowing, causing dysphagia and food sticking.

## Unlike spasms, this is a functional obstruction often diagnosed with manometry or videofluoroscopy.

## 3. Zenker’s Diverticulum

## A pouch forming above the cricopharyngeus muscle due to increased pressure from dysfunction, causing regurgitation, halitosis, and dysphagia.

## 4. Gastroesophageal Reflux Disease (GERD) and Laryngopharyngeal Reflux (LPR)

## Acid reflux can cause inflammation and trigger cricopharyngeal spasms or mimic throat tightness.

## 5. Neurological Disorders

## Conditions like muscular dystrophy, myositis, amyotrophic lateral sclerosis (ALS), or other neurogenic causes can involve cricopharyngeal dysfunction or spasms.

## 6. Psychogenic or Anxiety-related Disorders

## Stress and anxiety can precipitate or worsen cricopharyngeal spasms and globus sensation.

## Symptoms may fluctuate with stress levels and improve with relaxation or eating.

## 7. Structural Lesions or Inflammation

## Tumors, infections, or scarring in the hypopharynx or upper esophagus can cause symptoms mimicking spasms.

## 8. Sensory Neuropathic Throat Clearing

## A condition with throat irritation and frequent clearing, distinct from muscle spasm but can coexist.

## 

## **Epidemiology**

### Frequency

The exact incidence of cervical dysphagia caused by cricopharyngeal dysfunction is unknown. The lack of epidemiologic data results from the significant controversy regarding the diagnostic criteria required for proper use of the term cricopharyngeal dysfunction (ie, achalasia); some authors base the diagnosis solely on symptoms, while others hinge the diagnosis on highly specialized radiologic and invasive probe studies. Although the exact incidence of cricopharyngeal dysfunction is unknown, the literature reports cricopharyngeal achalasia as the primary cause of or as a contributor to dysphagia in 5-25% of patients being evaluated for clinical symptoms of dysphagia.

**DOCTOR PATIENT CONVERSATION**

Doctor: "You’re experiencing a sensation of tightness or a lump in your throat, which we call a cricopharyngeal spasm. This happens when the muscle at the top of your esophagus, called the cricopharyngeus muscle, contracts too much and doesn’t relax fully between swallows."

Patient: "Is this dangerous? What causes it?"

Doctor: "It’s not dangerous, but it can be uncomfortable and worrying. Causes include stress, anxiety, acid reflux, or sometimes it happens without a clear reason. The muscle still relaxes normally when you swallow, so it doesn’t usually block food, but the constant tightness causes that choking or lump sensation."

Patient: "What can I do to get better?"

Doctor: "Many people improve over a few weeks just by understanding the condition and managing stress. Simple changes like eating smaller, more frequent meals and drinking warm liquids can help relax the muscle. Relaxation techniques, breathing exercises, and sometimes physical therapy for neck muscles are beneficial."

Patient: "Are there medicines that can help?"

Doctor: "Yes, if symptoms persist, we might try muscle relaxants like diazepam to ease the spasm temporarily. If reflux is contributing, acid reflux medications can help. In rare cases, Botox injections into the muscle or surgery to cut the muscle may be considered, but most people don’t need these."

Patient: "How long will it take to feel better?"

Doctor: "Symptoms often improve within about three weeks, but it varies. Knowing the diagnosis often reduces anxiety, which itself helps lessen the spasms."

Patient: "What should I do if symptoms get worse?"

Doctor: "If you develop trouble swallowing, choking on food, or breathing difficulties, seek immediate medical attention. Otherwise, keep in touch with me if symptoms persist or if you have concerns."

REFERENCES

[Cricopharyngeal Spasms: Symptoms & Treatment](https://my.clevelandclinic.org/health/diseases/21735-cricopharyngeal-spasm#what-is-a-cricopharyngeal-spasm)

[**https://emedicine.medscape.com/article/836966-overview#a7**](https://emedicine.medscape.com/article/836966-overview#a7)

**Cystic hygroma**

A cystic hygroma is a fluid-filled sac (cyst) that forms most often on your baby’s neck due to a malformation or blockage of the lymphatic system. The lymphatic system is a group of tissues and organs that move lymph fluid (a watery fluid full of white blood cells) through your bloodstream and circulatory system to remove waste and toxins.

Cystic hygromas can appear during pregnancy on an ultrasound or after your baby is born as a bump or bulge under their skin. If the hygroma appears during pregnancy, there is a risk of miscarriage or stillbirth.

A cystic hygroma could affect any baby since it may be the result of a genetic change that affects how the lymphatic system forms during fetal development. Cystic hygromas can occur on their own or among children diagnosed with a genetic condition like Down syndrome, Turner syndrome or Noonan syndrome.

Cystic hygromas could also form in adults after physical trauma or a respiratory infection.

Cystic hygromas are rare and account for only 6% of all non-cancerous (benign) tumors during early childhood. Adult cystic hygromas are extremely rare.

## **Symptoms and Causes**

Symptoms of a cystic hygroma vary based on the size and location of the fluid-filled sac (cyst). Symptoms could include:

* A bulge under the skin.
* Skin over the cyst has a blue tint.
* The cyst is soft.
* The cyst most often appears on the neck, but it can form anywhere on the body.
* Size ranges from a grape to grapefruit and could increase in size as the baby grows.

Severe symptoms of a cystic hygroma include:

* Physically disfigure part of the body.
* Bone or organ damage.
* Feeding difficulties.
* Difficulty breathing (airway obstruction).
* Hemorrhage.
* Infection.

If a cystic hygroma is present during pregnancy, there is a risk of miscarriage or stillbirth due to complications from the cyst affecting how the fetus develops and grows. The cyst could create an excess amount of fluid in the fetus’ body (hydrops), which could cause early death.

### **What causes cystic hygroma?**

The exact cause of a cystic hygroma is unknown. The cyst forms as a result of damage to the lymphatic system during fetal development, or as a result of physical trauma or respiratory infection in cases that affect adults. Damage to the lymphatic system causes lymph fluid to collect under the skin instead of flowing through your bloodstream, causing a bulge or sac-like growth of fluid.

Studies suggest that cystic hygromas could be the result of environmental factors like smoking or drinking alcohol during pregnancy. Other studies suggest that genetic changes or mutations that affect the development of the lymphatic system cause cystic hygromas.

Often, cystic hygromas form on their own, but some form in combination with genetic conditions like Down syndrome, Turner syndrome or Noonan syndrome.

## **Diagnosis and Tests**

Diagnosis of a cystic hygroma occurs before your child reaches two years old. During pregnancy, a cystic hygroma diagnosis is possible with a routine prenatal ultrasound. A blood test to detect alpha-fetoprotein between 15 to 20 weeks helps confirm the diagnosis.

If prenatal tests suggest that your child has an abnormal number of chromosomes, your child may have a predisposition to cystic hygromas and your provider will carefully monitor the development of your fetus to make sure it is healthy.

After your baby is born, a physical examination of the cyst, along with an X-ray, ultrasound or an MRI will help your provider confirm the diagnosis and offer a treatment plan unique to your child’s condition.

## **Management and Treatment**

Treatment is unique for each child diagnosed with a cystic hygroma. Your provider’s goal to treat the cyst is to remove it, if possible. Treatment options could include:

* Surgery to remove the cyst.
* Draining fluid from the cyst (percutaneous drainage).
* Rerouting the cyst’s fluid through the body (sclerotherapy).
* Removing the cyst with a laser (laser therapy).
* Shrink the size of the cyst (radiofrequency ablation).

In some cases, no treatment is necessary because the cyst could go away on its own. In other cases, the cyst could return after treatment if there is damage to the lymphatic system. The success of treatment varies and is most often positive if your surgeon can remove all of the excess and abnormal tissue from the cyst.

#### **Are there complications of the treatment?**

There is a possibility of scarring after surgical treatment, which is dependent on the size and location of the cyst. There are treatment options that are less invasive than traditional surgery, which produce less scarring like laser therapy.

Treat your child’s cyst like a wound, especially if your child is healing from surgery. There is a risk of infection with any treatment, so monitor the cystic hygroma and make sure it isn’t leaking clear or yellow pus, changing color or size or is warm or tender to the touch. Contact your provider if you suspect your child has an infection.

## **Outlook / Prognosis**

The prognosis is dependent on when your provider diagnoses the cystic hygroma, whether the cyst is the result of an underlying condition and the location and size of the cyst.

Surgery to remove the cyst leads to a good prognosis if your surgeon can safely remove excess tissue within the cyst. If your surgeon is unable to safely remove the excess tissue surrounding the cyst, there is a 15% chance that the cyst could return.

Early diagnosis and treatment lead to the best outcome and reduce your child’s risk of developing complications from the cyst, like organ damage and cosmetic abnormalities.

There is an increased risk of miscarriage and stillbirth in cystic hygroma cases that form in combination with chromosome abnormalities like Down syndrome. Your healthcare provider will monitor the progress of your developing fetus to make sure it is healthy during your pregnancy.

## **Prevention**

It's difficult to prevent cystic hygroma since the cause is unknown. Take steps to make sure your developing child is healthy by:

* Getting a genetic test in consultation with your health provider before you become pregnant to understand your risk of having a child with a genetic condition.
* Not smoking or drinking alcohol during pregnancy.
* Attending regular checkups during your pregnancy to monitor the health of your developing fetus.
* Eating a well-balanced diet and staying healthy.

### **When should I see my healthcare provider?**

Visit your healthcare provider if you notice your child’s cyst:

* Size increases.
* Changes color.
* Leaks a yellow or clear fluid.
* Is red, tender or warm to the touch.
* Causes pain and discomfort.
* Prevents your child from eating.

If your child has trouble breathing, call 911 or visit the emergency room immediately.

## **Diagnostic Considerations**

Other problems to be considered include the following:

* Thyroglossal duct cyst
* Thyroid goiter
* Soft-tissue tumors (rhabdomyosarcoma, lipoma, etc)
* Neck abscess

## **Differential Diagnoses**

* Branchial Cleft Cyst
* Mucocele and Ranula
* Pediatric Teratomas and Other Germ Cell Tumors

## 1. Branchial Cleft Cyst

* Typically a unilocular cystic mass located along the anterior border of the sternocleidomastoid muscle (lateral neck).
* Usually non-septated and does not transilluminate.
* Does not extend as diffusely as cystic hygromas.

## 2. Thyroglossal Duct Cyst

* Midline neck cyst that moves with swallowing or tongue protrusion.
* Located near or attached to the hyoid bone.
* Usually unilocular and non-septated.

## 3. Dermoid and Epidermoid Cysts

* Often midline or paramedian, slow-growing cystic masses containing skin elements.
* Usually unilocular and without internal septations.

## 4. Pediatric Teratomas and Other Germ Cell Tumors

* Solid or mixed cystic-solid masses, sometimes with calcifications.
* May present at birth or early childhood.

## 5. Mucocele and Ranula

* Cystic lesions of the floor of the mouth or oral cavity, related to salivary gland duct obstruction.

## 6. Lymphadenopathy (Reactive or Infective)

* Enlarged lymph nodes due to infection or inflammation can mimic cystic masses but usually have solid components and systemic signs.

## 7. Neoplastic Lesions (e.g., Lymphoma)

* Usually solid masses, may have cystic degeneration but generally present with systemic symptoms.

## 8. Occipital Encephalocele and Cervical Teratoma (Antenatal DDx)

* Detected on prenatal ultrasound as cystic or complex masses in the neck region.

## **Epidemiology**

The incidence of LM is estimated to be 1 per 6000-16,000 live births.

Most LMs (50-65%) are evident at birth, and 80-90% are present by age 2 years. Some authors believe that all LMs are present at birth, even though they may not have fully manifested at that time. LM can be visualized with abdominal ultrasonography (US) by 10 weeks' gestation, though transvaginal US provides superior detail. Fast-spin magnetic resonance imaging (MRI) can also be used to determine the extent of fetal LM. Elevated alpha-fetoprotein levels in amniocentesis fluid have been reported in pregnancies with LM.

The sex distribution is equal. Most series have reported no racial predominance, though a decreased incidence in African Americans has been described.

## **Key Genetic Findings**:

* Chromosomal Abnormalities:
  + The majority of fetal cystic hygroma cases are associated with chromosomal aneuploidies.
  + Common chromosomal abnormalities include:
    - Turner syndrome (45,X) — about 30-50% of cases
    - Down syndrome (Trisomy 21) — approximately 48% in some cohorts
    - Trisomy 18 and Trisomy 13 — less frequent but significant contributors
  + These aneuploidies are the primary genetic causes detected prenatally by karyotyping and chromosomal microarray (CMA) analysis.
* Genetic Syndromes:
  + About 40% of cystic hygroma cases are linked to genetic syndromes such as:
    - Noonan syndrome (usually autosomal dominant, often de novo mutations)
    - Multiple-pterygium syndrome
    - Fryns syndrome
    - Neu-Laxova syndrome
  + These syndromes involve mutations affecting lymphatic development and other organ systems.
* Gene Mutations and Inheritance Patterns:
  + Recent studies using next-generation sequencing (NGS) targeting vascular and lymphatic development genes have identified novel variants in genes such as KDR and KRIT1, though their significance requires further validation.
  + Cystic hygroma can manifest as a Mendelian inherited trait with autosomal dominant or recessive inheritance patterns, similar to hereditary lymphedema.
  + In autosomal recessive cases, both parents are usually healthy carriers, with a 25% chance of transmission to offspring

**STAGING**

A cystic hygroma is a macrocystic lymphangioma found in the neck.

Giguère et al proposed categorizing lymphangiomas on the basis of the size of the cystic component :

* Macrocystic - Cystic spaces ≥2 cm
* Microcystic - Cystic spaces < 2 cm
* Mixed lesions

De Serres et al proposed the following system for staging of LMs of the head and neck :

* Stage I - Unilateral infrahyoid (17% complication rate)
* Stage II - Unilateral suprahyoid (41% complication rate)
* Stage III - Unilateral and both infrahyoid and suprahyoid (67% complication rate)
* Stage IV - Bilateral suprahyoid (80% complication rate)
* Stage V - Bilateral infrahyoid and suprahyoid (100% complication rate)

### **What questions should I ask my doctor?**

## Does my child need surgery to remove their cyst?

Surgery is often recommended if the cystic hygroma causes symptoms like respiratory distress, recurrent infections, difficulty swallowing, bleeding, or significant cosmetic concerns. Complete surgical excision is considered the ideal treatment to remove the cyst and prevent complications. However, some cystic hygromas may be managed with less invasive treatments like sclerotherapy (injection of a medication to shrink the cyst). The decision depends on the cyst’s size, location, symptoms, and involvement of nearby structures.

## Did the cyst cause any organ, bone, or nerve damage?

Cystic hygromas are benign and usually do not cause damage to bones or organs directly. However, large or deep cysts can compress nearby vital structures such as nerves, blood vessels, the airway, or the esophagus, potentially causing symptoms like breathing difficulty or nerve dysfunction. During surgery, there is a risk of injury to important structures (facial nerve, carotid artery, jugular vein), especially if the cyst infiltrates deeply. Preoperative imaging helps assess any such involvement.

## What are the side effects of the treatment you suggest?

* Surgery: Risks include infection, bleeding, scarring, lymphatic fluid leakage from the wound, and possible injury to nearby nerves or vessels. There is also a risk of recurrence in about 15–20% of cases, especially if complete excision is difficult.
* Sclerotherapy: Possible side effects include allergic reactions to the injected agent, swelling, pain, and inflammation. It is less invasive but may require multiple sessions and sometimes surgery afterward.
* General anesthesia: Carries a very small risk but is generally safe with experienced pediatric anesthetists

**DOCTOR PATIENT CONVERSATION**

Doctor: "Your child has a cystic hygroma, which is a benign cystic mass made up of lymphatic fluid. It usually appears as a soft, painless swelling in the neck or head area. This happens because of a malformation in the lymphatic system present from birth."

Parent: "Is it dangerous? What problems can it cause?"

Doctor: "Most cystic hygromas are not dangerous by themselves, but depending on their size and location, they can press on important structures like the airway or esophagus. This can cause breathing difficulties or trouble swallowing. Sometimes, the cyst can get bigger over time or become infected, which we want to avoid."

Parent: "How do you know for sure it’s a cystic hygroma?"

Doctor: "We use ultrasound and sometimes MRI to look at the cyst’s size, location, and whether it involves nearby tissues. These imaging tests help us plan the best treatment."

Parent: "Will my child need surgery?"

Doctor: "If the cyst is large, growing, or causing symptoms like breathing or swallowing problems, surgery is usually recommended to remove it completely. For some smaller or less problematic cysts, we might try a treatment called sclerotherapy, where we inject a special medicine into the cyst to shrink it. Sometimes, both treatments are used together."

Parent: "What are the risks of surgery or other treatments?"

Doctor: "Surgery carries some risks like infection, bleeding, or injury to nearby nerves or blood vessels, but these are uncommon with experienced surgeons. There is also a chance the cyst could come back if it’s difficult to remove entirely. Sclerotherapy can cause swelling or irritation but is less invasive."

Parent: "Is there anything we should watch for at home?"

Doctor: "Yes. If you notice the cyst suddenly getting bigger, your child having trouble breathing or swallowing, redness, warmth, or pain around the cyst, or any fever, please seek medical care immediately."

Parent: "Can cystic hygroma be prevented? Will future children have it?"

Doctor: "Cystic hygroma is usually a random developmental issue. Sometimes it’s linked to genetic conditions like Turner syndrome, so if you’re planning more children, genetic counseling can be helpful. But most cases are isolated and not inherited."

Parent: "What’s the outlook for my child?"

Doctor: "With proper treatment and follow-up, most children do very well and lead normal lives. We’ll work closely with you to monitor and manage the cyst to ensure the best outcome."

REFERENCES

[Cystic Hygroma: Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/22492-cystic-hygroma#overview)

<https://www.ncbi.nlm.nih.gov/books/NBK560672/#article-20214.s10>

<https://emedicine.medscape.com/article/994055-workup#c7>

### **cystic fibrosis (CF)**

Cystic fibrosis (CF) is a genetic disease that causes sticky, thick mucus to build up in your organs, blocking and damaging them. Many people think of CF as a lung disease because it affects your lungs and airways, which can make it hard to breathe and cause frequent infections. But it’s called cystic fibrosis because it also causes cysts and scarring (fibrosis) in your pancreas. This damage, plus the thick mucus, can block ducts that release digestive enzymes, making it hard to get nutrients from your digestive tract. CF can also affect your liver, sinuses, intestines and sex organs.

The mucus that lines your organs and body cavities, such as your lungs and nose, is thin and watery. In people with CF, a change in a gene (genetic mutation) leads to low levels of certain proteins, or proteins that don’t work properly. Because of these faulty proteins, minerals that move water into your mucus (which thins it out) get trapped inside cells, leaving the mucus thick and sticky.

People with cystic fibrosis are born with it. It’s a lifelong illness that gets more severe over time. Most people with CF don’t live as long as people without it.

#### **Types of cystic fibrosis**

There are two types of cystic fibrosis:

* Classic cystic fibrosis often affects multiple organs. It’s usually diagnosed in the first few years of your life.
* Atypical cystic fibrosis is a milder form of the disease. It may only affect one organ or symptoms may come and go. It’s usually diagnosed in older children or adults.

## **Symptoms and Causes**

Cystic fibrosis symptoms include:

* Frequent lung infections (recurrent pneumonia or bronchitis).
* Loose or oily poop (stool).
* Trouble breathing.
* Frequent wheezing.
* Frequent sinus infections.
* A nagging cough.
* Slow growth.
* Failure to thrive (inability to gain weight despite having a good appetite and taking in enough calories).

#### **Atypical cystic fibrosis symptoms**

People with atypical cystic fibrosis may have some of the same symptoms as those with classic CF. Over time, you also might experience:

* Chronic sinusitis.
* Nasal polyps.
* Dehydration or heatstroke from abnormal electrolyte levels.
* Diarrhea.
* Pancreatitis.
* Unintended weight loss.

### **What causes cystic fibrosis?**

Changes to the *CFTR* gene — called variants or mutations — cause cystic fibrosis. *CFTR* makes a protein that works as an ion channel on the surface of a cell. Ion channels are like gates in a cell’s membrane that allow certain molecules to pass through.

*CFTR* usually makes a gate for chloride ions, a type of mineral with a negative electrical charge. Chloride moves out of the cell, taking water with it, which thins out mucus and makes it more slippery. In people with CF, gene mutations in *CFTR* prevent this from happening, so the mucus stays sticky and thick.

There are different categories (classes I to VI) of gene mutation in *CFTR* that depend on the effect they have. Some produce no proteins at all, some produce only small amounts of proteins, and some produce proteins that don’t work properly.

#### **Are you born with cystic fibrosis?**

Yes, cystic fibrosis is a genetic condition that you’re born with. People who have CF inherit two mutated *CFTR* genes, one from each biological parent (it’s inherited in an autosomal recessive manner).

Your parents don’t have to have cystic fibrosis for you to have CF. In fact, many families don’t have a family history of CF. Someone with just one copy of the gene variant is called a carrier. About 1 in 31 people in the U.S. are carriers who have no CF symptoms.

#### **Can adults get cystic fibrosis?**

You’re born with the mutation in the gene that causes cystic fibrosis. But with mild symptoms, or symptoms that come and go, some people may go undiagnosed until later in life, even as adults.

### **Complications of CF**

Complications of CF include:

* Infections. Thick mucus can trap bacteria in your lungs and airways that you can’t clear out. This can lead to frequent infections.
* Congenital bilateral absence of the vas deferens (CBAVD). In this condition, males don’t have the vas deferens (sperm ducts). They often need the help of fertility procedures if they want to have biological children.
* Diabetes. Damage to your pancreas can cause cystic fibrosis-related diabetes.
* Malnutrition. Thick mucus in your digestive tract and the lack of pancreatic enzymes to help you digest can put you at risk for malnutrition.
* Osteopenia and osteoporosis. The inability to absorb nutrients in your digestive tract can lead to conditions that make your bones too thin.
* Pregnancy complications. CF can affect your digestive tract and cause poor nutrition. This can increase your risk of pregnancy complications. Preterm (early) birth is the most common complication.

## **Diagnosis and Tests**

Healthcare providers often test for cystic fibrosis during a newborn screening. Providers perform this test with a few drops of blood from your baby’s heel. A lab looks in the blood sample for immunoreactive trypsinogen (IRT), a chemical made in your pancreas. People with CF have higher levels of IRT in their blood. Babies are often tested for IRT shortly after birth and a few weeks later.

Some conditions — like preterm delivery — can raise IRT levels. So, a positive IRT test alone doesn’t mean your baby has CF. If your baby has higher levels of IRT than expected, your healthcare provider will order additional tests to make a final diagnosis.

In about 5% of cases, the newborn screen doesn’t detect elevated IRT levels in someone with CF. Or you may have been born before routine CF screening was available. If you or your child has symptoms of CF, a provider will perform a sweat test and follow up with additional tests as needed.

#### **Tests for cystic fibrosis**

* Sweat test. The sweat test measures the amount of chloride in your body’s sweat. Chloride levels in sweat are higher in people who have CF. This is the most conclusive test for CF, but it may be normal in people with atypical CF.
* Genetic tests. A provider tests blood samples for changes in the genes that cause CF.
* Imaging. Providers use imaging, like sinus and chest X-rays, to support or confirm a CF diagnosis. Imaging alone can’t diagnose CF.
* Pulmonary function tests. These tests measure how well your lungs are working.
* Sputum culture. Your healthcare provider takes a sample of your sputum (mucus coughed up from your lungs) and tests it for bacteria. Certain bacteria, such as *Pseudomonas*, are most commonly found in people who have CF.
* Pancreatic biopsy. This can tell your provider if you have cysts or damage to your pancreas.
* Nasal potential difference (NPD). This test measures the small amount of electrical charge that’s usually present in the lining of your nose. The movement of ions creates this charge. People with CF don’t have as much ion movement because of the way CF affects their ion channels.
* Intestinal current measurement (ICM). A provider takes a sample of rectal tissue to perform this test. A lab uses the sample to measure how much chloride it secretes.

## **Management and Treatment**

There’s no cure for cystic fibrosis. You can manage the disease and its symptoms with the help of a cystic fibrosis specialist and other providers on your healthcare team. Management involves:

* Keeping your airways clear and open with breathing techniques and devices to loosen mucus.
* Medications that help correct issues with CFTR proteins (CFTR modulators).
* Medications that reduce specific symptoms.
* Ensuring you get enough of the right kinds of calories from food.
* Surgery.

#### **Airway clearance techniques**

You can help to keep your airways clear if you have cystic fibrosis in a number of ways:

* Coughing and breathing techniques. A physical therapist who specializes in CF can teach you techniques that open your airways and loosen mucus.
* Positive expiratory pressure (PEP). PEP devices fit in your mouth or with a mask on your face. They provide resistance so you have to work harder to breathe out, holding your airways open and forcing out mucus. Oscillating PEP devices (Flutter®, Acapella®, AerobikA®, RC-Cornet®) are specific types of PEP that also vibrate to loosen mucus.
* Airway clearance vests. An airway clearance vest, or high-frequency chest wall oscillation device, is an inflatable vest that attaches to a machine. The vest vibrates to loosen mucus.
* Postural drainage and percussion. This is a type of physical therapy where you move into certain positions so that your lungs can drain. Another person claps their hand on your chest and/or your back to help loosen the mucus. You might combine this with coughing techniques.

#### **CFTR modulators for cystic fibrosis**

CFTR modulators are medications that can help correct issues with proteins made by mutated *CFTR* genes and increase the amount of functioning proteins on your cells’ surfaces. They’re not a cure for CF. But for certain people, they’ve made dramatic improvements in symptoms and life expectancy. Despite this, some people with CF don’t qualify for or can’t tolerate modulator therapies.

CFTR modulators include:

* Kalydeco® (ivacaftor).
* Orkambi® (ivacaftor/lumacaftor).
* Symdeko® (ivacaftor/tezacaftor).
* Trikafta® (ivacaftor/tezacaftor/elexacaftor).

#### **Other medications for cystic fibrosis**

Your provider may also prescribe medications that reduce inflammation, treat infections or manage symptoms. These include:

* Antibiotics. Your provider might give you antibiotics to treat or prevent infections.
* Inhaled bronchodilators. Bronchodilators make breathing easier by opening and relaxing your airways.
* Inhaled hypertonic saline. The salt in saline solutions attracts water, which thins mucus and makes it easier to clear.
* Anti-inflammatory drugs. These medications reduce swelling. They include corticosteroids and nonsteroidal anti-inflammatory drugs (NSAIDS).
* Pancreatic enzymes. These help you digest food and get nutrients from it.
* Stool softeners. These can help with constipation and make it easier to poop.

#### **Cystic fibrosis diet**

If you have CF, your dietary needs are different from those of someone without CF. CF can prevent your pancreas from creating or secreting enzymes that help break down food. This means your intestines don’t fully absorb nutrients and fats from foods.

Your CF specialist or a registered dietitian may recommend a nutrition plan. It could include:

* Taking in extra calories each day. This might be up to twice as many calories as someone without CF.
* Eating foods that are high in fat. This is important in helping you get more fat-soluble vitamins.
* Maintaining a higher-than-typical weight starting in childhood. This can help you grow taller and have larger lungs, which can help with symptoms as you grow.
* Taking enzyme supplement capsules. Enzyme supplements help you digest foods.
* Increasing your salt intake. This helps to replace excess salt you lose when sweating. This is especially important during hot, humid weather and exercise. Ask your provider about the amount of salt you need each day.

#### **Surgeries for cystic fibrosis**

You may need surgery for cystic fibrosis or one of its complications. These might include:

* Surgery on your nose or sinuses.
* Bowel surgery to remove blockages.
* Lung transplant.
* Liver transplant.

## **Outlook / Prognosis**

Yes, cystic fibrosis can be life-threatening. Lung damage — from thick mucus and frequent lung infections — is the most common cause of death.

#### **Life expectancy of cystic fibrosis**

Experts predict the life expectancy of someone born with cystic fibrosis in the past few years is around 50 years old. Improvements in treatment in recent years have increased this from a few years ago, when life expectancy was between 30 and 40 years old.

People with atypical cystic fibrosis tend to have longer life expectancies than those with classic CF.

### **What can I expect if I have cystic fibrosis?**

There’s no cure for CF. You or your child will need lifelong treatments to manage it. This includes treating infections, maintaining nutrition and seeing a CF specialist frequently. But new treatment methods help children who have CF live well into adulthood and have a better quality of life.

Treatments work best when CF is diagnosed early, which is why newborn screening is so important. The addition of CFTR modulators at a young age may improve long-term health and increase life expectancy even more in the future.

## **Prevention**

Since you’re born with CF, there’s no way to prevent it. If you’re a carrier of a *CFTR* gene variant, you can ask your provider about prenatal genetic testing and the chances that your biological children would have CF.

### **How do I take care of myself?**

Taking care of yourself with CF includes developing a treatment plan with your healthcare team. You must follow this plan very closely to stay well, including:

* Strictly following your airway clearance regimen.
* Taking medications as prescribed.
* Attending regular office visits with your team of CF providers.

Get recommendations from your providers about a healthy eating plan and physical activities that are safe for you. Ask your provider if pulmonary rehabilitation is a good idea for you.

You can reduce your risk of infections by avoiding people who are sick, practicing good handwashing techniques, and getting any recommended vaccinations.

You can also take part in clinical trials, which test new treatments for CF. Ask your provider if any would be a good fit for you. Make sure you get all the information about the benefits and risks of clinical trials.

### **When should I see my healthcare provider?**

Keep all of your scheduled appointments with members of your healthcare team. Talk to your provider if you have any concerns about your treatment plan or symptoms you’re having. Ask them what to do if you have symptoms of an infection. You can also reach out to them if you need help with social or emotional issues.

Go to the emergency room if you have symptoms of severe illness, including:

* High fever (over 103 degrees Fahrenheit/40 degrees Celsius).
* Difficulty breathing.
* Not peeing or peeing very little.
* Pain in your chest or stomach (abdomen) that doesn’t go away.
* Dizziness.
* Confusion.
* Severe muscle pain or weakness.
* Seizures.
* Bluish skin, lips or nails (cyanosis, which can be a sign of low oxygen levels in your blood or tissues).
* Fever or cough that gets better or goes away but then get worse.

## **Common Questions**

### **Why can’t people with CF touch each other?**

Healthcare professionals usually recommend that people with cystic fibrosis aren’t in close contact with one another. This is because people with CF are more likely to get infections that other people fight off easily. They’re more likely to pass the germs on to others with CF (who also can’t fight them off easily). People with CF also should avoid anyone who’s sick.

## What are my treatment options?

## Medications: CFTR modulators (like Kalydeco, Orkambi, Trikafta) improve the function of the defective CFTR protein in eligible patients.

## Antibiotics: To treat and prevent lung infections (oral, inhaled, or intravenous).

## Mucus-thinning medicines: Such as hypertonic saline inhalation to help clear mucus.

## Bronchodilators: To open airways and ease breathing.

## Anti-inflammatory drugs: To reduce lung inflammation.

## Pancreatic enzyme supplements: Taken with meals to aid digestion and nutrient absorption.

## Other supportive meds: Acid reducers, stool softeners, vitamins, and treatments for CF-related diabetes or liver disease.

## Airway clearance therapies: Chest physiotherapy and devices to loosen mucus.

## Surgery: In some cases, lung transplant, sinus surgery, or feeding tube placement may be needed.

## Treatment is personalized and best managed at specialized CF centers.

## What’s a healthy eating plan I can follow?

## CF increases calorie and nutrient needs due to malabsorption and increased energy use.

## A high-calorie, high-protein, and high-fat diet is recommended.

## Take pancreatic enzymes with every meal and snack to help absorb fats and nutrients.

## Include plenty of fruits, vegetables, and whole grains for vitamins and fiber.

## Stay well-hydrated.

## Work with a CF dietitian to tailor your nutrition plan and monitor growth and weight.

## What can I do to manage my symptoms?

## Perform daily airway clearance techniques to loosen and remove mucus.

## Take prescribed medications consistently.

## Avoid exposure to respiratory infections by practicing good hygiene and avoiding sick contacts.

## Exercise regularly to improve lung function and overall health.

## Monitor symptoms closely and report any changes to your care team.

## Attend regular clinic visits for monitoring and adjustments in therapy.

## What signs of infection should I look out for?

## Increased cough or sputum production, especially if thicker or discolored.

## Fever or chills.

## Increased shortness of breath or wheezing.

## Fatigue or decreased exercise tolerance.

## Chest pain or discomfort.

## Loss of appetite or weight loss.

## Any sudden worsening of respiratory symptoms should prompt contacting your healthcare provider.

## When should I follow up with you?

## Regular visits are typically scheduled every 3 months or as recommended by your CF care team.

## Follow-up sooner if you develop new or worsening symptoms, signs of infection, or complications.

## Annual comprehensive assessments including lung function tests, imaging, and nutritional evaluation are standard.

## What symptoms should I go to the ER for?

## Severe difficulty breathing or shortness of breath at rest.

## Chest pain or tightness that does not improve.

## High fever not responding to medications.

## Persistent vomiting or inability to keep fluids down.

## Severe abdominal pain or signs of bowel obstruction.

## Sudden swelling or severe pain in limbs (possible blood clots).

## Any symptoms of respiratory distress or severe infection require urgent care.

## Should other family members get tested?

## CF is inherited in an autosomal recessive pattern.

## Parents and siblings may be carriers without symptoms.

## Genetic counseling and testing are recommended for family members, especially if planning children.

## Early diagnosis in relatives can allow prompt treatment and better outcomes.

## 

## **Differential Diagnoses**

* Acute Sinusitis
* Bronchiolitis
* Nutritional Considerations in Failure to Thrive
* Pediatric Aspergillosis
* Pediatric Asthma
* Pediatric Bronchiectasis
* Pediatric Celiac Disease (Sprue)
* Primary Ciliary Dyskinesia
* Short Stature

## **Epidemiology**

Cystic fibrosis is an autosomal-recessive disease. Its estimated heterozygote frequency in White people is up to 1 in 20. Each offspring of 2 heterozygote parents has a 25% chance of developing cystic fibrosis.

Cystic fibrosis is the most common lethal hereditary disease in the White population. In the United States, the prevalence is as follows:

* Whites of northern European origin - 1 case per 3200-3500 population
* Hispanics - 1 case per 9200-9500 population
* African Americans - 1 case per 15,000-17,000 population
* Asian Americans - 1 case per 31,000 population

The worldwide incidence varies from 1 per 377 live births in parts of England to 1 per 90,000 Asian live births in Hawaii. The higher frequency in Asian American or African American populations compared with native Asians or Africans reflects White admixture.

### Race demographics

The distribution of *CFTR* mutations varies according to the background of patients; for example, ΔF508 is the most common mutation found in the White population of northern European origin. Variability in clinical features between people of different races with same genotype has not been reported.

Clinical manifestations are similar in Black and White populations, except that a poorer nutritional status is observed in Black patients. Black patients with cystic fibrosis are younger at diagnosis and have poorer nutritional status and pulmonary function than White patients with cystic fibrosis. Whether this is genetic or due to socioeconomic factors is unclear; low socioeconomic status is associated with significantly worse pulmonary outcomes in patients with cystic fibrosis.

### Sex demographics

Compared with males, females with cystic fibrosis have greater deterioration of pulmonary function with increasing age and younger mean age at death. Although it has been suggested that the increase in hormone secretion with puberty in females may interfere with the defense mechanisms of the immune system, thereby promoting progressive pulmonary involvement, the immune system in patients with cystic fibrosis is fundamentally intact.

## **Genotyping**

Genotype testing is recommended for individuals with a positive family history and for couples planning a pregnancy. It is not necessarily indicated for the general population.

More than 1893 CF mutations have been identified.In the commercially available CF gene sequencing method, the entire coding region, splice junction sites, and promoter region of the *CFTR* gene are amplified from genomic DNA by polymerase chain reaction (PCR) and then subjected to nucleotide sequence analysis on an automated capillary DNA sequencer.

A finding of 2 *CFTR* mutations in association with clinical symptoms is diagnostic. This test can detect more than 98% of disease-causing mutations in Whites; the detection rate is lower in Black, Hispanic, and Asian populations. Therefore, failure to find 2 abnormal genes does not exclude the disease.

In 2013, the US Food and Drug Administration (FDA) approved 4 next-generation gene sequencing devices for clinical use in CF. Two of the devices are used to screen and diagnose CF by detecting DNA changes in the CF transmembrane conductance regulator (*CFTR*) gene: the Illumina MiSeqDx Cystic Fibrosis 139-Variant Assay, which checks specific points in the patient's *CFTR* gene sequence to detect known variants in the gene, and the Illumina MiSeqDx Cystic Fibrosis Clinical Sequencing Assay, which sequences a large portion of the *CFTR* gene to detect any difference in the *CFTR* gene compared with a reference *CFTR* gene.

The other 2 FDA-approved devices are the Illumina MiSeqDx instrument platform, which analyzes the genes, and the Illumina Universal Kit reagents, which isolate and create copies of the genes of interest from patient blood samples. These 2 devices comprise the first FDA-regulated test system that allows laboratories to develop and validate sequencing of any part of a patient’s genome.

**Cystic Fibrosis: Procedures and Their Timelines**.

## 1. Diagnostic Procedures

* Newborn Screening & Sweat Test: Usually done shortly after birth or when symptoms appear to confirm diagnosis.
* Genetic Testing: Performed early to identify CFTR mutations.
* Chest X-rays and Pulmonary Function Tests (PFTs): Baseline at diagnosis and repeated regularly (every 3–12 months) to monitor lung status.

## 2. Airway Clearance Techniques (Daily, Lifelong)

* Performed multiple times daily to loosen and remove thick mucus from lungs.
* Includes chest physiotherapy (clapping), positive expiratory pressure (PEP) devices, high-frequency chest wall oscillation (vest therapy), and breathing exercises.
* Initiated soon after diagnosis and continued lifelong.

## 3. Medications (Daily, Ongoing)

* CFTR Modulators: Target underlying protein dysfunction; started as early as diagnosis if eligible. Effects monitored regularly.
* Antibiotics: Used to treat acute infections (oral, inhaled, or intravenous) and sometimes as chronic suppressive therapy. Frequency varies with infection status.
* Mucus Thinners (e.g., hypertonic saline): Daily inhalation to improve mucus clearance.
* Bronchodilators: As needed to open airways.
* Anti-inflammatory agents: To reduce lung inflammation.
* Pancreatic Enzyme Replacement Therapy: Taken with every meal lifelong to aid digestion.
* Other supportive meds: Acid reducers, stool softeners, diabetes medications as needed.

## 4. Pulmonary Rehabilitation (Ongoing)

* Includes physical exercise, breathing techniques, education, and psychological support.
* Typically outpatient programs started after diagnosis and maintained lifelong.

## 5. Procedures for Complications

* Bronchoalveolar Lavage (BAL): Performed during bronchoscopy to collect samples or clear mucus; done as needed during infections or diagnostic workup.
* Sinus Surgery (Endoscopic Sinus Surgery): Recommended for chronic sinus infections or nasal polyps not responsive to medical therapy; timing individualized.
* Lung Transplant: Considered in advanced lung disease when medical management fails; timing depends on disease progression.

## 6. Supportive Therapies

* Oxygen Therapy: Initiated when oxygen levels are low, often in advanced disease stages.
* Ventilator Support and ECMO: Used in critical respiratory failure or during lung transplant procedures.

## Typical Timeline Summary

| **Procedure / Treatment** | **Timing / Frequency** | **Notes** |
| --- | --- | --- |
| Newborn screening & diagnosis | At birth or symptom onset | Early diagnosis improves outcomes |
| Airway clearance techniques | Multiple times daily, lifelong | Essential for lung health |
| Medications | Daily, lifelong | Adjusted based on symptoms and genetics |
| Pulmonary function tests & imaging | Every 3–12 months | Monitor lung status |
| Bronchoalveolar lavage | As needed during infections or diagnosis | Performed via bronchoscopy |
| Sinus surgery | When medical therapy fails | Individualized timing |
| Lung transplant | For end-stage lung disease | Timing based on severity and candidacy |
| Oxygen therapy | As needed | Advanced disease support |

**DOCTOR PATIENT CONVERSATION**

Doctor: "Your child has cystic fibrosis, which is a genetic condition that causes thick, sticky mucus to build up in the lungs, pancreas, and other organs. This mucus can make it harder to breathe and digest food properly."

Parent: "What does this mean for my child’s health and daily life?"

Doctor: "CF is a lifelong condition that requires daily treatments to help clear mucus from the lungs, fight infections, and support digestion. This often means spending about two to three hours a day on therapies like chest physiotherapy, inhaled medications, and enzyme supplements."

Parent: "That sounds like a lot. How do families manage this?"

Doctor: "It is a big commitment, and it can be challenging to fit these treatments around school, work, and family life. That’s why we work as a team with you and your child to find a routine that fits your lifestyle and to support you through it. Many patients live active lives with CF thanks to advances in care."

Parent: "What treatments will my child need?"

Doctor: "Treatment usually includes airway clearance techniques, inhaled medicines to open the airways and thin mucus, antibiotics to prevent or treat lung infections, and pancreatic enzyme supplements to help with digestion. We also monitor nutrition closely and provide vitamins."

Parent: "How often will we need to see the doctor?"

Doctor: "Regular check-ups are important, usually every few months, to monitor lung function, growth, and adjust treatments as needed. We also encourage you to contact us promptly if your child’s symptoms worsen."

Parent: "What about the future? How long can children with CF live?"

Doctor: "Thanks to new treatments and specialized care, many people with CF now live into their 40s and beyond. Our goal is to help your child have the best quality of life possible and to manage the disease proactively."

Parent: "Are there any challenges we should be prepared for?"

Doctor: "Yes, CF can affect many parts of the body and sometimes causes complications like lung infections or digestive issues. It’s also common for patients to experience emotional and social challenges, so support from healthcare teams, counselors, and patient communities is very helpful."

Parent: "Is there anything I can do to help my child?"

Doctor: "Your support is vital. Encouraging adherence to treatments, maintaining a healthy lifestyle, and keeping regular appointments make a big difference

REFERENCES

<https://www.rarediseaseadvisor.com/disease-info-pages/cystic-fibrosis-differential-diagnosis/>

<https://www.ncbi.nlm.nih.gov/books/NBK493206/#article-20211.s9>

<https://emedicine.medscape.com/article/1001602-medication>

[Cystic Fibrosis: Causes, Symptoms & Treatment](https://my.clevelandclinic.org/health/diseases/9358-cystic-fibrosis#overview)

<https://www.nhlbi.nih.gov/health/cystic-fibrosis/treatment>

<https://www.mayoclinic.org/diseases-conditions/cystic-fibrosis/diagnosis-treatment/drc-20353706>

<https://www.lung.org/lung-health-diseases/lung-disease-lookup/cystic-fibrosis/treating-and-managing>