**CHORDOMA**

ALTERNATIVE NAMES: Chordoma is also referred to as a “malignant tumor”

**DEFINITION / DESCRIPTION**

Chordoma is a rare malignant (cancerous) bone tumor that forms in your spine or the base of your skull. It’s a type of sarcoma.

Chordomas can occur at any point along your spine:

* About 35% develop in the base of your spine (sacrum).
* About 35% develop where your spine meets your skull (skull base). These are called clival chordomas because the bone in the skull base that’s most often involved is the clivus.
* About 30% develop in the vertebrae of your mobile spine — most commonly the second cervical vertebrae (in your neck) followed by your lumbar spine and then thoracic spine.

Chordomas typically grow slowly, but they can be difficult to treat due to how they invade nearby nervous system tissue.

They also tend to recur (come back) after treatment — usually in the same place. Chordomas spread to other parts of your body (metastasize) in 30% to 40% of cases.

If an advanced chordoma does metastasize, it most commonly spreads to your:

* Lungs.
* Nearby lymph nodes.
* Other bones.
* Liver.
* Skin.

***Types of chordomas***

The World Health Organization (WHO) recognizes three distinct types of chordoma based on what the cells look like under a microscope (their histology):

* Classic/conventional chordoma: This is the most common type (80% to 90% of all cases). It’s made up of a unique type of cell that looks “bubbly.” Chondroid chordoma is a variant of this type. It makes up 5% to 15% of all chordoma cases. Chondroid chordoma often forms in the base of your skull.
* Dedifferentiated chordoma: This is a rare type of chordoma (less than 5% of cases) that appears as a mix of abnormal cells. It’s more aggressive, faster growing and more likely to metastasize than conventional chordoma.
* Poorly differentiated chordoma: This type is very rare. There have been fewer than 60 cases recorded in medical literature. Poorly differentiated chordoma is characterized by the deletion of a gene called *SMARCB1*, or *INI1*. These chordomas most commonly affect children and young adults.

**SIGNS / SYMPTOMS**

As a chordoma grows, it puts pressure on nearby areas of your spinal cord or brain. This pressure causes the symptoms of chordoma. Symptoms can also vary based on where the tumor is along your spine.

General chordoma symptoms include pain, weakness and/or numbness in your back, arms or legs.

Symptoms of a chordoma at the base of your skull may include:

* Double vision (diplopia).
* Blurry vision.
* Headaches.
* Facial numbness/pain.

Symptoms of a chordoma in your tailbone may include:

* A lump that you can feel through your skin.
* Issues with bladder or bowel function.
* Low back or tailbone pain.

**CAUSES**

Researchers don’t know exactly why chordomas form. But they think changes (mutations) in the *TBXT* gene are likely involved.

A few families have had multiple members who’ve developed a chordoma. Studies revealed that these people inherited a duplication of the *TBXT* gene. Researchers have also identified changes in the *TBXT* gene in people with chordoma who have no family history of the condition.

A chordoma develops from cells of the notochord. This is a structure that’s present in a developing embryo and is important for the future development of its spine. The notochord usually disappears by the time the fetus is eight weeks old. But in a small percentage of people, a few notochord cells can remain embedded in the bones of the spine or the base of the skull.

A change in the *TBXT* gene may trigger the growth of these cells, leading to a chordoma.

People with a genetic condition called tuberous sclerosis are at higher risk of developing chordoma. This condition causes a variety of medical issues, including epilepsy, developmental delay and tumors throughout your body. Tuberous sclerosis is caused by mutations in two genes: *TSC1* and *TSC2*.

**RISK FACTORS**

There are no known environmental, dietary, or lifestyle risk factors for chordoma. Additionally, chordoma does not appear to be triggered by pre-existing health conditions or medications, and it does not seem to run in families, although there are rare cases of more than one person in a family having chordoma. There are no known risk factors for chordoma.

**DIAGNOSIS METHODS**

Your healthcare provider will ask about your symptoms and medical history. They’ll likely perform a physical exam and a neurological exam.

If they suspect a tumor, they’ll order an imaging test, such as an X-ray, computed tomography (CT) scan or MRI scan.

Your provider will likely refer you to a bone cancer specialist for a second opinion and confirmation of the diagnosis. You may need additional imaging tests to better determine the location of the chordoma and see if it’s spread to other areas of your body.

The only way healthcare providers can definitively diagnose chordoma is with a biopsy — usually a needle biopsy. This involves taking a small sample of the tumor so a specialist can examine it under a microscope.

**TREATMENT OPTIONS**

The go-to treatment option for chordoma is surgery. Total surgical removal of the tumor (en bloc resection) has the best chance of prolonging survival. However, this is often difficult due to the location of the tumors. Specifically, this isn’t possible for chordomas in the base of your skull.

A chordoma in your spine can invade your spinal cord and nearby important nerves and arteries, which could cause lasting issues or death if they’re damaged during surgery. A chordoma at the base of your skull is often difficult to completely remove because it’s close to essential structures such as your brainstem, cranial nerves and spinal cord. Neurosurgeons aim to remove as much of the chordoma as they safely can.

Chordomas are generally resistant to radiation therapy and chemotherapy as primary treatments. But your healthcare team might recommend radiation therapy after surgery to lower the chance that the tumor will grow back.

Researchers are currently studying experimental therapies for chordomas, such as targeted therapy and immunotherapy. There may be clinical trials available that you can participate in.

**OUTLOOK / PROGNOSIS**

The prognosis (outlook) of chordoma varies depending on a few factors:

* The tumor’s location and how much of it can be surgically removed: Total removal of the tumor is associated with a better prognosis. Nonsurgical treatment only is associated with a worse prognosis.
* If it has spread (metastasized): Distant metastasis is associated with a decrease in survival rate.
* Your age at diagnosis: People over 60 years old generally have a decreased survival rate.
* If the tumor has dedifferentiation or not: Poorly differentiated chordoma has a worse prognosis than conventional chordoma.

Your healthcare team will be able to give you more accurate information about what you can expect. Don’t be afraid to ask them questions.

***Can chordoma be fatal?***

Yes, chordoma can cause death — typically due to tissue destruction in your spinal cord, brain or brainstem after it has recurred (come back).

A study of 357 people with chordoma revealed that the survival rates were:

* After three years: 80.5%.
* After five years: 68.4%.
* After 10 years: 39.2%.

It’s important to remember that these are just averages. Your healthcare team can provide more detailed information about survival rates based on your unique situation.

Chordoma is a low-grade notochordal tumor of the skull base, mobile spine, and sacrum that behaves malignantly and confers a poor prognosis despite indolent growth patterns.

This is a clinically and histologically unique malignant neoplasm, and numerous diagnostic considerations must be excluded to establish the correct diagnosis. Treatment options have largely been centered on surgical excision with marginal results; however, novel therapeutic options including targeted therapy and immunotherapy offer promise for improved outcomes.

Identification of molecular factors that are associated with survival contributes to better prognostication of patients with chordoma. Given the rarity of chordoma, often only univariate analyses can be performed. Robust multivariate analyses are scarcer but provide independently significant prognostic factors. At 10-year follow-up, the average survival rate is 50%, although individual prognosis varies substantially.

A study based on analysis of Surveillance, Epidemiology, and End Results (SEER) data found that (1) marital status was an independent prognostic indicator for adult patients with chordoma, (2) married status was conducive to patient survival, and (3) compared with married patients, widowed patients are at higher risk of death.

Despite the low-grade status of chordomas, they have a high recurrence rate and involve significant mortality. Five-year survival is approximately 50% overall but is improved to 65% with complete resection with negative

margins.

**PREVENTION TIPS**

There’s nothing you can do to prevent developing chordoma. Most cases happen randomly.

If you have a family history of chordoma or tuberous sclerosis, be sure to see your healthcare team regularly so they can monitor you for signs of chordoma. The earlier they can catch it, the better.

**POSSIBLE COMPLICATIONS**

Possible complications for chordoma include the tumor spreading to other parts of the body, such as the lungs, lymph nodes, liver, or other bones. These tumors are considered malignant and may metastasize, though they typically grow slowly. Even slow-growing chordomas can become aggressive and grow quite large locally, putting pressure on or invading into critical parts of the brain or spine, which may cause pain and nerve problems or even be life threatening. Complications can also include the cancer spreading to other parts of the body. Wound dehiscence, wound infections, and cerebrospinal fluid (CSF) leak are the most commonly cited complications of sacrectomy for chordoma, with as many as 1 in 4 patients requiring further surgery as a result. Additionally, chordomas can press on the spine, brain, and nerves as they grow, causing pain and nerve problems specific to the part of the brain or spinal cord where they are located.

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

Chordomas often come back (recur), even many years after treatment. Because of this, long-term follow-up with your healthcare team is important.

If you have any new or worsening symptoms, talk to your healthcare provider.

**DIFFERENTIAL DIAGNOSIS**

Chordoma has a broad differential diagnosis, which includes both benign and malignant entities. The differential diagnosis for chordoma includes metastatic carcinoma, myeloma, giant cell tumor, neurogenic tumors, aneurysmal bone cyst, chondrosarcoma, and tuberculosis of the spine.

Additionally, conventional chondrosarcoma is an important differential diagnostic consideration for skull-base chordoma, especially chondroid chordoma. The histology of this lesion closely simulates that of chordoma, but characteristic physaliphorous cells are not observed. Immunohistochemically, the cells are positive for S-100 and negative for cytokeratin (CK) and epithelial membrane antigen (EMA).

Chondrosarcomas may enter the radiographic and microscopic differential diagnosis of chordoma. Both chordoma and chondrosarcoma entrap bony trabeculae as they infiltrate the marrow, which may have a similar radiographic appearance to true peripheral ossification of the lobules of a cartilaginous neoplasm ("ring and arc" pattern). Chondroid chordomas by definition contain areas in which the matrix has the appearance of hyaline cartilage; however, areas of non chondroid chordoma are often present, pointing to the correct diagnosis. Additionally, chondrosarcomas are negative for epithelial markers (CKs and EMA) and brachyury and may contain mutations in IDH1 or IDH2 . These mutations are not seen in chordoma.

Myoepithelial tumors of the soft tissue (and less commonly bone) are usually positive for epithelial markers (CK8, CK18, and EMA) and S100 protein, negative for CK7 and CK20, often contain a myxoid matrix, and may have epithelioid cells with clear to bubbly cytoplasm. These features resulted in the older term parachordoma for myoepithelial tumors of soft tissue.

Unlike chordoma, myoepithelial tumors typically demonstrate architectural heterogeneity, with areas of solid and reticular growth, and they always lack brachyury expression, allowing for differentiation from chordoma.

Carter et al proposed atypical notochordal cell tumor (ANCT) terminology that could be applied to notochordal tumors when the criteria for either BNCT or chordoma are not met.

The authors showed that all 4 cases of ANCT investigated had imaging characteristics most consistent with BNCT, except for minimal cortical permeation, mild gadolinium enhancement, and soft tissue extension in 3 cases, with typical BNCT morphology.

The fourth case had typical BNCT imaging and histologic features, with the exception of a myxoid matrix.

The differential diagnosis of chordoma includes various benign and malignant entities. The clinical outcome for TSC patients ... in the distinction from chondrosarcoma · The differential diagnosis of chordoma includes various benign and malignant entities.

**RECENT GUIDELINES OR UPDATES**

***Guidelines Summary***

NCCN recommendations for treatment of chordoma are as follows:

* Enrollment in a clinical trial should be considered when available; in addition, when possible, patients should be referred to a tertiary care center with expertise in sarcoma, for treatment by a multidisciplinary team.
* Wide excision with or without radiation therapy should be provided for tumors of the sacrum and mobile spine.
* Intralesional excision with or without radiation therapy may be the best feasible treatment for resectable skull base tumors when wide excision is not possible; re-resection can be considered with positive surgical margins; postoperative radiation can improve local control.
* Adjuvant radiation therapy can be considered for large tumors or for positive surgical margins after resection.
* Radiation therapy is the primary treatment for unresectable tumors regardless of location.
* Dedifferentiated chordomas are treated according to soft tissue sarcoma management guidelines; chemotherapy can be provided when clinically indicated.
* For local recurrence, surgical excision should be performed with or without radiation therapy and/or chemotherapy.
* For metastatic disease, options include chemotherapy and/or surgical excision and/or radiation therapy and/or best supportive care.

**EPIDEMIOLOGY**

Chordoma is a rare tumor that occurs along the axial spine in children and in adults, with an incidence of approximately 350 cases per year in the United States and a reported annual worldwide incidence of 0.08 per 100,000 cases.

Chordomas typically affect those in the 40- to 60-year age group but have been reported in children and in the very elderly. Most believe males are more commonly affected than females, at an approximately 2:1 ratio, with an annual incidence of 1:1,000,000 for new diagnoses. Chordomas account for approximately 20% of primary spinal tumors and only 3% of all bone tumors.

The most common location is the sacrum/coccygeal region (50%), followed by the spheno-occipital region (35%) and the mobile spine (about 10-15%).

Less than 5% of chordomas occur in children. In a population-based study comparing pediatric versus adult skull base chordoma, Xu and colleagues reviewed data from the National Cancer Database from 2004 to 2015 on patients 18 years of age and older versus those younger than 18 years. They found that pediatric patients were likely to have larger tumor size (41.4 ± 15.7 mm vs 34.1 ± 15.8 mm; *P*< 0.01) and were universally treated at academic facilities. They found no difference in overall survival.

**DOCTOR-PAIENT CONVERSATIONS**

Doctor: “Thank you for coming in today. I’ve reviewed your MRI scans, and they show a mass located at the base of your skull. Based on the imaging and your symptoms, we suspect it is a chordoma. Have you heard of this before?”

Patient: “No, I haven’t. What exactly is a chordoma?”

Doctor: “A chordoma is a rare type of tumor that arises from remnants of the notochord, which is a structure present during early development. These tumors typically occur along the spine, especially at the base of the skull or in the lower spine.”

Patient: “Is it cancerous? How serious is it?”

Doctor: “Chordomas are considered malignant tumors because they can grow aggressively and invade nearby tissues, but they tend to grow slowly. They are locally aggressive but rarely spread to distant parts of the body. Treatment can be challenging due to their location.”

Patient: “What symptoms should I expect?”

Doctor: “Symptoms depend on the tumor’s location. At the base of the skull, common symptoms include headaches, difficulty swallowing, hoarseness, or numbness in the face. You mentioned you’ve had some of these symptoms, correct?”

Patient: “Yes, I’ve had headaches and some numbness around my jaw.”

Doctor: “That fits with the tumor’s location. The next step is to confirm the diagnosis with a biopsy, which involves taking a small tissue sample from the tumor.”

Patient: “What treatments are available?”

Doctor: “The primary treatment is surgical removal of the tumor, aiming to remove as much as possible while preserving function. Because chordomas are difficult to completely remove, radiation therapy, especially proton beam therapy, is often used after surgery to reduce the risk of recurrence.”

Patient: “What are the risks of surgery?”

Doctor: “Given the tumor’s location near critical nerves and blood vessels, surgery carries risks such as nerve damage, which could affect swallowing, speech, or facial movement. We will work with a specialized surgical team to minimize these risks.”

Patient: “What is the prognosis?”

Doctor: “With aggressive treatment, many patients live for years, but chordomas have a tendency to recur, so long-term follow-up is essential.”

**Frequently Asked Additional Common Questions**

***Question 1: “What kind of cancer is chordoma?”***

Answer: “Chordoma is a type of bone cancer. More specifically, it’s a type of sarcoma, which is a broad group of cancers that begin in your bones and your soft (connective) tissues.”

***Question 2: “Can chordoma be non cancerous?”***

Answer: “No. All subtypes of chordoma are considered malignant (cancerous).”

***Question 3: “Who do chordomas affect?”***

Answer: “Chordomas can develop in anyone at any age, but they’re most likely to occur in adults aged 50 to 80. About 5% of cases affect children.

Men are approximately 1.5 times as likely to have a chordoma as women.”

***Question 4: “How common are chordomas?”***

Answer: “Chordomas are rare. They affect about 1 person for every 1 million people per year. That means that about 300 people receive a chordoma diagnosis each year in the United States.

About 1% to 4% of all primary bone tumors are chordomas.”

*REFERENCES:*

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<https://www.chordomafoundation.org/latest-updates/first-clinical-practice-guidelines-developed-for-chordoma/>

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**SMELL & TASTE (CHEMOSENSORY) DISORDERS**

*ALTERNATIVE NAMES:* Smell and taste disorders are also referred to as “chemosensory disorders”. These conditions can involve a loss or distortion of the sense of smell and/or taste.

Specific types of these disorders include “anosmia”, which is the complete inability to detect odors, and “parosmia”, which is a change in the normal perception of odors.

“Phantosmia” refers to the sensation of an odor that isn't there. Additionally, taste disorders can include “hypogeusia”, which is a reduced ability to taste, and “ageusia”, which is the complete loss of taste.

Other terms used to describe these conditions include “dysgeusia”, which is a condition where a foul, salty, rancid, or metallic taste sensation persists in the mouth.

**DEFINITION / DESCRIPTION**

Chemosensory disorders cause a loss or distortion of the sense of smell and/or taste. The ability to smell and taste start when molecules of substances stimulate sensory cells high inside the nose (olfactory nerve cells) or food and beverage stimulate the taste buds of the mouth or throat (gustatory nerve cells). The stimulated sensory cells transmit messages to the brain to identify as a particular taste or smell.

Smell and taste disorders can be the result of a number of health issues, including:

* Head injuries
* Hormonal changes (e.g. thyroid disorders)
* Illnesses, such as a cold, the flu or a sinus infection
* Nasal polyps
* Radiation treatment for cancer
* Smoking or using drugs like cocaine
* Surgery of the ear, nose or throat
* Other medications (e.g. blood pressure medicine)

**CAUSES**

Smell and taste disorders, also known as chemosensory disorders, can have various causes. Common causes include:

* nasal and sinus diseases,
* upper respiratory infections,
* head trauma, and
* certain medications.
* Infections of the upper respiratory tract,
* exposure to toxic substances, and
* iatrogenic causes such as certain medications can also contribute to taste disorders.

Additionally,

* age-related changes,
* hormonal disturbances,
* dental problems, and
* exposure to certain chemicals can play a role.

Other factors include illnesses such as

* colds,
* the flu, or
* sinus infections, as well as
* hormonal changes like thyroid disorders.

Furthermore, the use of certain medications, such as

* thyroid medicines,
* captopril,
* griseofulvin,
* lithium,
* penicillamine,
* procarbazine,
* rifampin,
* vinblastine, and
* vincristine can affect taste.

It is also noted that about 5% of people exhibit functional anosmia, which is largely caused by age, with 25% of people over 50 years old having an impaired sense of smell.

**RISK FACTORS**

The risk factors for smell and taste (chemosensory) disorders include various conditions and factors.

According to the 2011–2012 US National Health and Nutrition Examination Survey (NHANES), the strongest independent risk factor for smell alteration was sinonasal symptoms (odds ratio [OR] = 2.06; 95% confidence interval [CI]: 1.63–2.61), followed by heavy drinking, loss of consciousness from head injury, family income ≤110% poverty threshold, and xerostomia.

Other risk factors include age, with prevalence rates increasing progressively with age, highest in those aged 80+ years (smell, 32%; taste, 27%). Additionally, underlying health issues such as:

* respiratory infections,
* nervous system disorders,
* hormonal changes,
* illnesses like colds or sinus infections, and
* certain medications can contribute to these disorders.
* Exposure to toxic chemicals, including cigarette smoke, can also be a risk factor.

Furthermore, the ability to smell appears to be a measure of overall health, with smell becoming worse the more medicines are taken.

**SIGNS / SYMPTOMS**

When chemosensory disorders are present, symptoms might include:

* Changes in taste or smell — Normally pleasant smells or tastes can become unpleasant, or things don’t taste as they should.
* Inability or reduced ability to taste or smell — It’s rare for people to be completely unable to smell or taste, but it’s not uncommon to have a weakened ability.
* Smelling phantom odors — Also known as an olfactory hallucination, sufferers of this condition smell odors that aren’t there.
* Phantom taste perception – A constant unpleasant taste, even when not eating.

**DIAGNOSIS METHODS**

In addition to a complete medical history and physical examination, diagnostic procedures may include:

* Measuring the lowest concentration 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 directly applied to specific areas of the tongue

**TREATMENT OPTIONS**

Treatment for smell and taste disorders depend on the underlying condition, so treatment may include:

* **Managing health conditions** — Smell and taste may return when underlying health issues, such as respiratory infections or nervous system disorders are addressed.
* **Medication management** — Some medications can alter the senses of taste or smell, so stopping or changing the dosage of these medications may help. Patients should not stop taking prescribed medications without first talking with their doctor.
* Smoking cessation— Toxic chemical exposure accounts for up to 5 percent of all olfactory disorders, and toxic chemicals include cigarette smoke.
* **Smell retraining** — Repeated short-term exposure to odors for 3-6 months may improve/recover the sense of smell.
* **Surgery** — Removing polyps or other obstructions may stop chemosensory process interference.

**PREVENTION TIPS**

Smell and taste disorders, also known as chemosensory disorders, can be prevented or managed through various strategies. These include managing underlying health conditions, medication management, smoking cessation, and smell retraining.

For instance, addressing respiratory infections or nervous system disorders can help restore the senses of smell and taste. Medications that alter these senses may need to be adjusted under medical supervision. Smoking cessation is also recommended, as toxic chemical exposure, including cigarette smoke, accounts for up to 5% of all olfactory disorders.

Additionally, smell retraining, which involves repeated short-term exposure to odors for 3-6 months, may improve or recover the sense of smell.

Preventive measures also involve understanding the causes of these disorders.

For example, exposure to certain chemicals, radiation therapy for head or neck cancer, and hormonal disturbances can lead to chemosensory issues. It is important to be aware of these risk factors and take appropriate precautions. Furthermore, maintaining good dental health and avoiding medications that may affect taste and smell can also contribute to prevention.

In summary, prevention tips for smell and taste disorders include managing underlying health conditions, adjusting medications, quitting smoking, practicing smell retraining, and being cautious about exposure to harmful chemicals and radiation.

**POSSIBLE COMPLICATIONS**

Smell and taste (chemosensory) disorders can lead to various complications, affecting both physical health and quality of life. These disorders can result in nutritional deficiencies due to altered food preferences, leading to weight loss and malnutrition. They can also weaken the immune system and exacerbate existing medical conditions.

Additionally, the loss or distortion of smell and taste can significantly impact a person's quality of life, making everyday activities such as eating and social interactions challenging.

Complications may include the inability or reduced ability to taste or smell, where normally pleasant smells or tastes can become unpleasant, or things don't taste as they should. In some cases, individuals may experience parosmia, a condition where odors are perceived differently, often as unpleasant.

This can lead to a decreased enjoyment of food and may contribute to eating disorders or changes in eating habits, such as increased consumption of sugar and salt to compensate for diminished senses.

Moreover, smell and taste disorders can be indicative of underlying health issues, such as respiratory infections, nervous system disorders, hormonal imbalances, dental problems, exposure to certain chemicals, medications, or radiation therapy for head or neck cancer.

In some cases, these disorders may be associated with autoimmune diseases like Sjögren's syndrome, where changes in the structure of exocrine glands and their dysfunction can lead to chemosensory disorders.

In summary, the possible complications of smell and taste (chemosensory) disorders include nutritional deficiencies, weakened immune system, decreased quality of life, altered eating habits, and potential indicators of underlying health conditions. It is important to address these disorders to prevent further complications and improve overall health and well-being.

**OUTLOOK / PROGNOSIS**

The outlook or prognosis for smell and taste (chemosensory) disorders varies depending on the underlying cause and individual factors. For instance, post-infectious olfactory disorders have a better prognosis compared to post-traumatic anosmia, with about 60% of cases showing improvement.

Factors that favor remission include high residual smell ability, female gender, youthful age, non-smoking status, initial parosmia, absence of left-right differences in smell function, and large amplitudes of chemosensory evoked potentials to trigeminal stimuli.

Age-related and congenital smell disorders generally cannot be treated successfully. However, for some individuals, symptoms may improve over time, especially if the underlying condition is addressed. For example, managing health conditions such as respiratory infections or nervous system disorders can lead to the return of smell and taste.

In cases of post-COVID-19 persistent smell and taste disorders, the prognosis can vary. Some patients may experience recovery within weeks or months, while others may have persistent issues. The detailed mechanisms for these persistent disorders are still under study.

Overall, the prognosis for smell and taste disorders is influenced by various factors, and treatment often focuses on addressing the underlying cause.

**DIFFERENTIAL DIAGNOSIS**

## 1. Infectious Causes

* Viral upper respiratory infections (common cold, flu, COVID-19) often cause temporary anosmia or dysgeusia.
* Chronic sinusitis or nasal polyps causing obstruction or inflammation of olfactory pathways.

## 2. Neurological Disorders

* Neurodegenerative diseases such as Parkinson’s disease, Alzheimer’s disease, and multiple sclerosis.
* Head trauma causing damage to olfactory nerves or central processing centers.
* Tumors involving the olfactory bulb or brain regions related to smell and taste.
* Primary Sjögren’s syndrome and other autoimmune diseases affecting sensory nerves.

## 3. Structural and Mechanical Causes

* Nasal or sinus surgery complications.
* Obstruction by tumors, polyps, or foreign bodies in the nasal cavity.
* Congenital anosmia or hypogeusia.

## 4. Toxic and Medication-Induced Causes

* Smoking and substance abuse (e.g., cocaine).
* Side effects of medications such as antihypertensives, antibiotics, chemotherapy agents.

## 5. Metabolic and Endocrine Disorders

* Thyroid dysfunction.
* Nutritional deficiencies (e.g., zinc deficiency).

## 6. Psychogenic and Functional Disorders

* Malingering or somatoform disorders.
* Phantom smells (phantosmia) or distorted smells (parosmia) often linked to neurological or psychiatric conditions.

## 7. Age-Related Decline

* Normal aging leads to reduced olfactory and gustatory sensitivity.

**EPIDEMIOLOGY**

***Epidemiology of Chemosensory Disorders***

* Prevalence in the general population:
  + Self-reported olfactory disorders affect about 1.4% of U.S. adults, but objective testing reveals much higher rates, especially in older adults, with prevalence increasing with age.
  + Studies show that many people are unaware of their smell impairment, indicating underreporting in self-assessments.
* Age and gender:
  + Olfactory impairment is more common in older adults, with sensitivity of self-report decreasing with age. Women tend to report chemosensory changes more accurately than men.
  + Prevalence rises significantly after age 60 and is associated with cognitive decline risk.
* Impact of COVID-19:
  + The COVID-19 pandemic dramatically increased the prevalence of chemosensory disorders. During the Omicron variant wave, around 69% of patients reported smell disorders, 68% taste disorders, and 31% chemesthesis (chemical sensation) disorders.
  + Mixed chemosensory dysfunction (involving smell, taste, and chemesthesis) was reported by over 80% of post-COVID patients in some studies.
  + Recovery rates vary, but persistent symptoms remain in a minority (~7% with persistent symptoms).
* Other factors influencing prevalence:
  + Smoking, sex, age, and COVID-19-related symptoms like fatigue and dyspnea are associated with higher rates of chemosensory dysfunction.
  + Prevalence varies by population, assessment methods, and underlying causes.

**DIFFERENTIAL DIAGNOSIS**

Smell and taste disorders, also known as chemosensory disorders, can have a variety of causes and require a differential diagnosis to identify the underlying condition. Common causes include age-related changes, infections, medications, and structural issues in the nasal or oral cavity.

In terms of differential diagnosis, it is important to consider both olfactory and gustatory dysfunction. For example, hyposmia refers to a reduced ability to smell, while hypogeusia refers to a reduced ability to taste sweet, sour, bitter, or salty things. Additionally, there are cases where odors, tastes, or flavors may be misread or distorted, leading to unpleasant experiences with normally pleasant tastes or smells.

When evaluating a patient with chemosensory complaints, a systematic approach is necessary. This includes obtaining a detailed history and clearly defining the symptoms. It is also crucial to assess the sense of smell and the quality and intensity of taste. The evaluation of taste disorders measures detection or recognition thresholds, and the tests are extremely variable.

The differential diagnosis for smell and taste disorders also involves considering the possibility of underlying health issues such as respiratory infections, nervous system disorders, hormonal changes, and illnesses like a cold, the flu, or a sinus infection. Furthermore, certain medications can contribute to these disorders, including blood pressure medicine.

In some cases, the loss of smell may be mistaken for a loss of taste, but true gustatory disorders are rare. Up to 80% of a meal's flavor is a result of olfactory input, which means that patients frequently interpret a loss of smell as a loss of taste. Therefore, it is essential to differentiate between olfactory and gustatory dysfunction.

Other factors that can contribute to smell and taste disorders include smoking, which accounts for up to 5 percent of all olfactory disorders, and toxic chemical exposure. Treatment options may include smoking cessation, smell retraining, and surgery to remove polyps or other obstructions.

In conclusion, the differential diagnosis for smell and taste (chemosensory) disorders involves a comprehensive evaluation of the patient's symptoms, medical history, and potential underlying causes. This includes considering both olfactory and gustatory dysfunction, as well as other factors such as age, medications, and structural issues in the nasal or oral cavity.

**RECENT GUIDELINES OR UPDATES**

Recent guidelines and updates for smell and taste (chemosensory) disorders highlight the importance of clinical assessment, research advancements, and patient engagement. Over 12% of the US population is estimated to experience taste or smell dysfunction, yet long-term, effective treatments have been largely elusive.

The "Identifying Treatments for Taste and Smell Disorders" conference, held in 2018, brought together scientists, clinicians, and patients to identify gaps in understanding and next steps for research.

Key recommendations included increasing awareness and research capacity, developing and enhancing clinical measures of taste and smell, and supporting new avenues of research into cellular and therapeutic approaches, such as stem cells and gene therapy.

Clinical assessment of patients with chemosensory complaints includes testing of gustatory and olfactory ability, with olfactory function assessment being essential to establish the degree of chemosensory loss and confirm the patient's complaint of olfactory loss.

The conference emphasized the need for expanding our understanding of specific responses of chemosensory cells and developing valuable assays to identify and document cell development, regeneration, and function.

Recent progress has been made toward developing methods for quantifying chemosensory dysfunction and establishing definitions of impairment and improvement.

However, many basic questions about taste and smell disorders remain unanswered, such as how to consistently regrow human olfactory neurons or taste receptor cells after injury.

The field continues to explore new diagnostic tests and treatment methods, with a focus on preventing the effects of aging on taste and smell, understanding associations between taste disorders and changes in diet and food preferences, and improving treatment methods and rehabilitation strategies.

**DOCTOR PATIENT CONVERSATION**

Doctor: "You’ve mentioned changes in your sense of smell and taste, which we call chemosensory disorders. These can range from a reduced ability to smell or taste, to distortions or even phantom sensations."

Patient: "Is this serious? What causes these problems?"

Doctor: "Your sense of smell and taste play important roles in your safety and quality of life — for example, detecting smoke, spoiled food, or gas leaks. Chemosensory disorders can be caused by many things, including viral infections like colds or COVID-19, nasal problems such as polyps or sinus infections, neurological conditions like Parkinson’s or multiple sclerosis, head injuries, certain medications, or even aging."

Patient: "How do you test for this? Can it be treated?"

Doctor: "We can perform specific tests to objectively measure your smell and taste function. For smell, we use identification tests where you try to recognize different odors. For taste, we assess your ability to detect sweet, salty, sour, bitter, and umami. Treatment depends on the cause — for example, if nasal inflammation is present, treating that may help. Some viral-related losses improve over time, but others may persist. Research is ongoing to find better therapies."

Patient: "I feel like my life is affected — food doesn’t taste good anymore, and I worry about safety."

Doctor: "That’s a common and very real concern. Loss or distortion of smell and taste can affect appetite, nutrition, and emotional well-being. We can discuss coping strategies, such as enhancing food texture and aroma, using smoke detectors, and ensuring safe food handling. Also, support groups and counseling can help."

Patient: "Do doctors usually know about these disorders? I feel like it’s not taken seriously."

Doctor: "Unfortunately, chemosensory disorders are often under-recognized in medical training, so many healthcare providers may not fully understand their impact. But awareness is growing, and we’re working to improve education and research to better diagnose and manage these conditions."

Patient: "What should I do if my symptoms change or get worse?"

Doctor: "Keep track of your symptoms and let us know if you notice new changes, such as complete loss of smell, distorted smells, or if you develop other neurological symptoms. Regular follow-up helps us monitor your condition and adjust care as needed."

*REFERENCES:*

[**https://www.europeanreview.org/wp/wp-content/uploads/2593-2604.pdf**](https://www.europeanreview.org/wp/wp-content/uploads/2593-2604.pdf)

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**DACRYOCYSTITIS**

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

* Lacrimal sac infection
* Lacrimal sac inflammation
* Dacryocystic infection
* Lacrimal sac dacryocystitis
* Nasolacrimal duct infection (when involving the duct as well)
* Acute dacryocystitis (for sudden onset infection)
* Chronic dacryocystitis (for long-standing inflammation)

**DEFINITION / DESCRIPTION**

Dacryocystitis (pronounced “dak-ree-oh-sis-ty-tus”) is the medical term for the inflammation and infection of your tear sac. The sac is also called the lacrimal sac and leads to your tear duct (nasolacrimal duct). These are all parts of your tear system.

When the system works the way it’s supposed to, your tears will flow from your eyes into the duct and through to your nasal passages.

Dacryocystitis happens because the pathway is blocked. The blockages can be found in the sac, in the passages that the tears use to move or in the nasolacrimal duct. When it can’t move, the fluid containing the tears can become stagnant and infected.

***Acute and chronic dacryocystitis***

There are two kinds of dacryocystitis — acute and chronic. In general, the difference is one of time. Acute dacryocystitis comes on suddenly and resolves quickly, generally under three months. Chronic dacryocystitis lasts for a long period of time.

Another difference is that chronic dacryocystitis is more often linked to systemic (whole body) and autoimmune conditions. These include granulomatosis with polyangiitis, sarcoidosis and lupus (also called systemic lupus erythematosus). People who have chronic dacryocystitis may also have chronic conjunctivitis (pink eye).

The types of pathogens (harmful agents, like bacteria or viruses) may differ between the two types.

***Are there other types of dacryocystitis?***

In addition to chronic and acute dacryocystitis, the condition can be congenital (present at birth) or acquired.

Congenital dacryocystitis happens mostly because amniotic fluid doesn’t completely leave the tear system after a baby is born. Neonatal dacryocystitis happens when this fluid becomes infected.

Acquired dacryocystitis happens because of other factors that may include broken bones, surgeries, tumors or using certain medicines.

About 6% of babies born have congenital nasolacrimal duct obstruction (NLDO). Dacryocystitis happens in about 1 in 3,884 live births. It’s more common in females than in males because their passageways are narrower.

**SIGNS / SYMPTOMS**

Signs and symptoms of dacryocystitis can include:

* Eye pain.
* Swelling around your eye.
* Redness or skin darkening.
* An abscess or sore that may have discharge (pus) in the inner corner of your eyelids.
* Fever.

Signs and symptoms of chronic dacryocystitis may be less severe than those of acute dacryocystitis. With the chronic form, you may have watery eyes and no fever.

**CAUSES**

A blockage in your tear duct causes dacryocystitis. These blockages disrupt the flow of tears from your eyes into your nasal cavity.

A membrane that blocks the duct causes the blockage in newborns. In children and older people, blockages can be caused by many things.

Factors that lead to acquired dacryocystitis include:

* Getting older. Dacryocystitis often happens in adults over 40 years of age.
* Trauma, like that from broken bones or surgeries on your nose.
* Other medical conditions like those involving your immune system or other types of inflammations or infections like sinusitis.
* Having an unusual nasal structure.
* Tumors.
* Certain drugs. These include the blood pressure medication timolol, the glaucoma drugs dorzolamide and pilocarpine, the antiviral trifluridine and cancer treatments such as fluorouracil, docetaxel or radioactive iodine.
* Retained punctal plugs.

***Is dacryocystitis contagious?***

Even though dacryocystitis may involve an infection, you’re not likely to be contagious.

**DIAGNOSIS METHODS**

Your healthcare provider may have an idea about your condition by the way your eyes look, if your nose is affected and the answers you give to questions about your medical history.

Testing may include:

* Doing an eye exam.
* Pressing the swollen area and finding that discharge comes out through the punctum in your eye (the hole at the corner where tears collect).
* Taking a sample of any discharge to culture in the lab to find out which germ is causing the infection.
* Taking a blood sample to check the level of white blood cells. (Higher counts can mean you have an infection.) Your provider may also use blood tests to find the underlying cause of the eye condition.
* Using a yellow dye placed in your eye to see if it follows that natural pattern of tears. If it takes a long time to disappear, you may have a blockage. If the dye appears on a swab in your nose, you may have a partial blockage.
* Imaging tests to help discover underlying causes of dacryocystitis.

Extra testing may be especially necessary if you’ve had blood in your tears (hemolacria) or troubles with your vision.

**TREATMENT OPTIONS**

If you have acute dacryocystitis caused by bacteria, your provider will prescribe oral or intravenous (IV, or in the vein) antibiotics. They might also suggest antibiotic ointment or drops.

Using warm compresses can relieve some of the symptoms. You might also try gently massaging the area. You should feel better a few days after starting antibiotics.

These antibiotics can treat tear duct infections:

* Amoxicillin-clavulanate.
* Cephalexin.
* Ciprofloxacin.
* Clindamycin.
* Trimethoprim-Sulfamethoxazole.

Babies with neonatal dacryocystitis who have recurrent episodes will likely outgrow the condition in about a year.

Your provider may suggest surgery called dacryocystorhinostomy (DCR) after you take the antibiotics if you have acute dacryocystitis. DCR is the primary way that providers treat chronic dacryocystitis. The DCR surgery creates a new pathway for your tears.

Treatment of acute dacryocystitis includes conservative measures such as warm compresses and Crigler massage. For uncomplicated cases, oral antibiotics should be considered. Coverage should be aimed at gram-positive organisms, particularly antistaphylococcal agents. In complicated cases or toxic patients, intravenous antibiotics should be administered. Empiric antibiotics should include gram-positive and gram-negative coverage. Lacrimal probing is discouraged in the acute phase. For recurrent infections, referral to ophthalmology for surgical evaluation is advised.

Chronic dacryocystitis is almost always managed surgically. Probing is accepted as first-line management in chronic cases and can be done in the outpatient setting. Inevitably, patients will progress to further surgical options to treat the condition. Balloon dacryoplasty, nasolacrimal intubation, and nasolacrimal stenting have all been attempted with variable first-time success rates. If these therapies fail, evaluation for percutaneous dacryocystorhinostomy (DCR) or endonasal dacryocystorhinostomy (EN-DCR) is then pursued.

Treatment of congenital dacryocystitis includes conservative measures first. Crigler massage should be taught to parents or caregivers to perform at home. Topical antibiotics can be considered for acute flares. About 90% of congenital dacryocystitis will resolve by 6 months to 1 year of age with conservative measures. If conservative measures fail, a referral is made to ophthalmology for nasolacrimal probing. Nasolacrimal probing is successful in more than 70% of cases. Balloon dacryoplasty, nasolacrimal intubation, or nasolacrimal stenting can be pursued if symptoms recur. If these measures fail, then DCR or EN-DCR will serve as the definitive treatment.

**POSSIBLE COMPLICATIONS**

There are some complications that can result from DCR, including:

* Excessive bleeding.
* Infection.
* Sinusitis.
* Injuries to parts of your eyes or nose.

Dacryocystitis can extend from the lacrimal sac to the surrounding orbital tissues. This can lead to preseptal cellulitis, orbital cellulitis, and orbital abscess. Orbital cellulitis can lead to optic nerve compression and vision loss. Early administration of systemic antibiotics is the best way to prevent these complications.

**OUTLOOK / PROGNOSIS**

Some episodes of dacryocystitis will resolve, but you should always check with your healthcare provider or your child’s provider if you have any of the symptoms of dacryocystitis.

Untreated dacryocystitis can lead to an open sore and possible vision issues if it’s not treated.

In general, the prognosis for dacryocystitis is good. Simple probing techniques are highly successful. DCR has been reported to be more than 93% to 97% successful.In congenital cases, approximately 90% will resolve with conservative measures alone by the age of 1.

The outlook for most patients with simple obstruction is good, but for those with complex obstruction, the outcomes are guarded and can interfere with vision and lifestyle.

**PREVENTION TIPS**

There’s nothing you can do to prevent most forms of dacryocystitis. However, you can try to avoid infections by practicing good hand washing methods and keeping your hands away from your eyes. You can also take care to avoid being in crowds or around people who are sick.

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

Always contact a healthcare provider if you have any of the signs or symptoms of dacryocystitis or if your child has any of these symptoms.

**DIFFERENTIAL DIAGNOSIS**

Differential diagnoses to consider include the following:

* Preseptal, or periorbital, cellulitis
* Orbital cellulitis
* Sebaceous cyst
* Frontal, ethmoid, or maxillary sinusitis
* Neoplasm
* Ectropion of the lower eyelid
* Dacryoadenitis
* Acute Complications of Sarcoidosis
* Adult Blepharitis
* Alacrima
* Bacterial Conjunctivitis (Pink Eye)
* Basal Cell Carcinoma
* Canaliculitis / Actinomycosis
* Chalazion
* Congenital Anomalies of the Nasolacrimal Duct
* Conjunctival Melanoma
* Dermoid Cyst
* Encephalocele
* Episcleritis
* Headache, Children
* Neonatal Conjunctivitis (Ophthalmia Neonatorum)
* Nasolacrimal Duct Obstruction and Epiphora
* Orbital Cellulitis
* Preseptal Cellulitis
* Primary Congenital Glaucoma
* Red Eye Evaluation
* Squamous Cell Carcinoma, Eyelid

**RECENT GUIDELINES OR UPDATES**

Dacryocystitis is an inflammatory condition of the lacrimal sac, typically caused by obstruction of the nasolacrimal duct. Recent guidelines and updates highlight the importance of appropriate antibiotic therapy, surgical intervention when necessary, and the role of microbiological analysis in guiding treatment.

For acute dacryocystitis, treatment with oral antibiotics such as amoxicillin-clavulanate is appropriate. Cultures of the lacrimal fluid may be helpful in identifying the causative organisms, and empirical antibiotic therapy should be initiated immediately, especially in cases of suspected MRSA infection. In severe cases, hospitalization with intravenous (IV) antibiotics may be required, and surgical exploration and drainage should be performed for focal collections of pus.

In the context of first-onset dacryocystitis, a retrospective study found that the majority of patients had no further episodes of dacryocystitis, but some experienced recurrent and complicated infections requiring surgery. The choice of antibiotics can be influenced by patient allergies, the spectrum of bacterial pathogens in the geographical region, and differences in guidelines between clinics.

A study conducted in South Australia provided updated findings on the microbiological profile of acute dacryocystitis, highlighting the importance of identifying specific microorganisms and their antibiotic susceptibility to guide empirical antibiotic choices. The most common pathogens isolated were Staphylococcus aureus, Streptococcus species, and Escherichia coli, among others.

For chronic dacryocystitis, surgical intervention is often necessary, particularly if the condition is caused by a partial or intermittent nasolacrimal duct obstruction. Topical steroid drops may also be beneficial in some cases. The treatment of choice for a lacrimal sac mucocele, even if asymptomatic, is a dacryocystorhinostomy.

In summary, recent guidelines emphasize the importance of individualized treatment approaches, considering the patient's specific condition, the causative organisms, and the need for surgical intervention when necessary.

**EPIDEMIOLOGY**

Dacryocystitis has a bimodal distribution, with most cases occurring just after birth in congenital cases or in adults older than 40. Congenital dacryocystitis occurs in roughly 1 in 3884 live births. Dacrocystitis is found more often in adults of the white race, with females comprising nearly 75% of all cases.[[5]](https://www.ncbi.nlm.nih.gov/books/NBK470565/#)

Serious morbidity and mortality are low with dacryocystitis. However, in congenital dacryocystitis, morbidity and mortality can be significant if not treated promptly and appropriately.

**PREDEFINED FREQUENTLY ASKED QUESTION**

Here is an expert-validated predefined Q&A set addressing common patient queries about dacryocystitis based on current clinical insights:

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

***Answer: “***Dacryocystitis is an infection or inflammation of the tear (lacrimal) sac, usually caused by a blockage in the tear (nasolacrimal) duct, leading to tear drainage obstruction and subsequent infection.***”***

***Question 2: “What is the difference between dacryoadenitis and dacryocystitis?”***

***Answer: “***These conditions are similar but the inflammation/infection occurs in different locations. The sickness centers in the tear duct in dacryocystitis. The sickness centers in the lacrimal gland in dacryoadenitis.***”***

***Question 3: “What are the common symptoms of dacryocystitis?”***

***Answer: “***

* Pain, redness, and swelling near the inner corner of the eye (over the tear sac)
* Persistent eye discharge or tearing
* Tenderness and sometimes fever in acute cases
* Possible formation of an abscess if untreated***”***

***Question 4: “When should I see a doctor for dacryocystitis?”***

***Answer: “***You should consult an eye specialist promptly if you experience persistent eye discharge, pain, redness, or swelling near the tear duct. Early diagnosis is crucial to prevent complications.***”***

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

***Answer: “***Diagnosis is based on clinical symptoms and physical examination by an eye specialist. Additional tests may include:

* Lacrimal syringing to assess tear duct blockage
* Imaging studies (ultrasound or CT scan) to evaluate the extent of infection
* Culture of discharge to identify causative bacteria***”***

***Question 6: “What causes dacryocystitis?”***

***Answer: “***The primary cause is obstruction of the nasolacrimal duct, which leads to tear stagnation and bacterial infection. It can occur in newborns (congenital) or adults due to various reasons like infection, inflammation, or trauma.***”***

***Question 7: “How is acute dacryocystitis treated?”***

***Answer: “***

* Antibiotics: Oral or intravenous antibiotics targeting the infection (e.g., Amoxicillin-clavulanate, Cephalexin, Ciprofloxacin)
* Antibiotic eye drops or ointments for local infection control
* Warm compresses to reduce swelling and discomfort
* In severe cases, hospitalization and IV antibiotics may be necessary***”***

***Question 8: “What about chronic dacryocystitis?”***

***Answer: “***Chronic dacryocystitis often requires surgical intervention to bypass the blocked tear duct, most commonly by dacryocystorhinostomy (DCR). This surgery creates a new drainage pathway to prevent recurrent infections.***”***

***Question 9: “Can dacryocystitis resolve on its own?”***

***Answer: “***Mild cases may improve with home care such as warm compresses and antibiotics, but professional evaluation is essential to avoid complications. Untreated infection can worsen and cause serious issues.***”***

***Question 10: “Is dacryocystitis contagious?”***

***Answer: “***The condition itself is not contagious, but the bacteria causing the infection can spread through contact with infected eye secretions. Good hygiene practices help prevent transmission.***”***

***Question 11: “How long does recovery take?”***

***Answer: “***With proper treatment, most acute cases improve within 1 to 2 weeks. Chronic cases or those requiring surgery may have a longer recovery period.***”***

***Question 12: “Can dacryocystitis affect vision?”***

***Answer: “***Typically, dacryocystitis does not directly impair vision. However, severe infections or complications like abscess formation can cause temporary vision disturbances and require urgent care.***”***

***Question 13: “How can I prevent dacryocystitis?”***

***Answer: “***While many cases cannot be fully prevented, you can reduce risk by:

* Practicing good hand hygiene
* Avoiding touching or rubbing eyes with unclean hands
* Promptly treating any eye infections or inflammations***”***

**DOCTOR-PATIENT CONVERSATIONS**

Patient: "Doctor, I have pain and swelling near the corner of my eye, and it's been tearing a lot. It started suddenly and now the area is red and tender."

Doctor: "It sounds like you have an infection of the tear sac called acute dacryocystitis. This usually happens because the tear duct is blocked, causing bacteria to infect the sac."

Patient: "Is this serious? What should I do?"

Doctor: "It can be serious if untreated, but we will start you on oral antibiotics that cover common bacteria. Warm compresses can help reduce swelling. If the infection worsens or you develop fever or spreading redness, you should come back immediately. Sometimes, if an abscess forms, surgery to drain it may be necessary."

Patient: "I've had watery eyes and some swelling near my nose for months. Sometimes it gets worse with redness and discharge."

Doctor: "This sounds like chronic dacryocystitis, which is a low-grade infection or inflammation of the tear sac due to a blocked tear duct. It often causes recurrent symptoms."

Patient: "What can be done about it?"

Doctor: "Initially, we can try warm compresses and massage over the tear sac to improve drainage. If infections recur, we may prescribe antibiotic eye drops. Ultimately, surgery called dacryocystorhinostomy (DCR) may be needed to create a new tear drainage pathway."

Parent: "My baby has swelling near the inner corner of the eye and is tearing a lot. There’s some redness too."

Doctor: "This is likely congenital nasolacrimal duct obstruction causing dacryocystitis. We usually start with gentle massage over the tear sac and warm compresses. Antibiotics may be prescribed if infection is present."

Parent: "Will it get better on its own?"

Doctor: "Most cases resolve by one year of age. If not, lacrimal probing can be done to open the blocked duct."

Clinical notes:

* Infant with swelling, redness, and tearing at the lacrimal sac
* Conservative treatment with Crigler massage and antibiotics for infection
* Monitoring for resolution or need for probing

***REFERENCES:***

[Dacryocystitis (Tear Duct Infection): Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/24419-dacryocystitis#overview)

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**DEVIATED (NASAL) SEPTUM**

ALTERNATIVE NAMES: An alternative name for a deviated (nasal) septum is "Deviated nasal septum (DNS)".

**DEFINITION / DESCRIPTION**

A deviated septum is when the bone and cartilage that divides your nasal cavity is off-center. Your nasal septum separates the right and left sides of your nasal cavity. It’s why you have two nostrils.

Up to 80% of the general population has nasal septum deviation. Some people don’t even realize they have a deviated septum because they don’t have symptoms. But for some, a deviated septum can cause breathing concerns, headaches and other issues.

**SIGNS / SYMPTOMS**

People with a severely deviated septum may notice a change in the shape of their nose.

Other deviated septum symptoms may include:

* Difficulty breathing out of one or both nostrils.
* Headaches.
* Facial pain.
* Nasal congestion.
* Noisy breathing (stridor).
* Nosebleeds.
* Chronic sinusitis (inflammation of your sinuses).
* Snoring.
* Sleep apnea.

***How to tell if you have a deviated septum***

Lean your head back and look into a mirror. (You can also take a picture of the underside of your nose.) If your nostrils are uneven, or if they’re two different sizes, you might have a deviated septum.

You might also be able to tell by taking the deviated septum self-test:

1. Using your finger, hold one of your nostrils closed.
2. Breathe in and notice the airflow. Be mindful about how easy or difficult it is to breathe through that nostril.
3. Now, hold your other nostril closed and repeat the exercise.
4. If you have difficulty breathing through one or both nostrils, you could have a deviated septum.

This test can be a helpful self-test tool. But the only surefire way to know if you have a deviated septum is to get a diagnosis from a healthcare provider.

**RISK FACTORS**

A deviated nasal septum occurs when the wall between the nasal passages is displaced, potentially causing breathing difficulties and other symptoms. Several risk factors have been identified for the development of a deviated septum. These include both congenital and acquired factors.

Congenital factors refer to deviations that are present at birth. Some individuals are born with a slightly uneven nasal septum, which is considered a normal anatomical variation found in the majority of the population.

However, more severe deviations may require treatment.

Acquired factors include injuries or trauma to the nose, such as from contact sports, car accidents, or physical altercations. These events can cause the septum to shift out of position, leading to a deviated septum. Additionally, developmental factors may play a role, as certain types of deviations are more common in older age groups.

In summary, the risk factors for a deviated nasal septum include congenital variations, injuries or trauma to the nose, and developmental influences.

**CAUSES**

An injury, like a broken nose, can cause a deviated septum. Other causes include:

* Playing contact sports.
* Car accidents.
* Falls.
* Fights and other physical altercations.

Some people are born with nasal septum deviation. For example, difficult births or connective tissue disease can cause it.

A deviated septum can also be a result of normal development. As your nose grows, your septum also grows and can sometimes lean toward one side. This is the most common deviated septum cause.

**POSSIBLE COMPLICATIONS**

Minor nasal septum deviation may not cause any complications at all. But if you have a severely deviated septum, you may develop complications, including:

* Chronic sinus issues.
* Sleep apnea.
* Snoring or loud breathing during sleep.
* Nasal congestion.
* Nosebleeds.
* Dry mouth (xerostomia).

A badly deviated septum that blocks the nose can lead to complications such as:

* **Dry mouth.** This is from breathing through the mouth.
* **Disturbed sleep.** This is from not being able to breathe well through the nose at night.
* **Repeated nosebleeds.** Air passing through the nostrils can dry out the surface of the nasal septum.

**DIAGNOSIS METHODS**

A healthcare provider will examine your nose using a nasal speculum. This handheld instrument gently spreads your nostrils open so your provider can see the inside of your nose. They’ll look at your septum to see if it affects the size of your nasal passages.

Your provider will also ask about your symptoms. They may ask questions like:

* What symptoms do you have?
* How long have you experienced these symptoms?
* Do you have difficulty breathing?
* Do you have disrupted sleep?
* Do you snore during sleep?
* Do you have a history of sinus issues or nasal congestion?

**TREATMENT OPTIONS**

It depends on the severity of your condition. Most people don’t need deviated septum treatment because they have little to no symptoms. You can treat mild symptoms with medication. But if a deviated nasal septum keeps you from breathing properly, you might need surgery.

***Medications***

Mild septal deviation may cause occasional symptoms. You can treat these symptoms with over-the-counter (OTC) medications, including:

* Nasal decongestants. (You shouldn’t use nasal decongestant sprays for more than three days in a row. It could cause rebound congestion.)
* Nasal steroid sprays.
* Antihistamines.

***Septoplasty***

The most common deviated septum treatment is septoplasty. If you have breathing problems, frequent sinus infections or other bothersome symptoms, a septoplasty may be an option for you.

During a septoplasty, a surgeon reshapes your septum. This may involve adding or removing bone and cartilage.

Typically, septoplasty is an outpatient procedure. It takes between 30 and 90 minutes to complete.

**OUTLOOK / PROGNOSIS**

In many cases, having a deviated septum doesn’t affect your quality of life. If you have mild symptoms, then you may be able to manage them with over-the-counter medications.

Severe cases may require surgery. If you have difficulty breathing, chronic nosebleeds or persistent nasal congestion, ask your healthcare provider if surgery is an option.

**PREVENTION TIPS**

Some people are born with a deviated septum. Others may develop a deviated septum during development in childhood. You can’t prevent nasal septum deviation in these cases.

If you don’t already have a deviated septum, there are ways to reduce your risk:

* Wear protective gear (like a midface mask and helmet) when playing contact sports.
* Always wear your seatbelt.

**POSSIBLE COMPLICATIONS**

A deviated septum can lead to several possible complications, especially in severe cases. These include chronic sinus issues, sleep apnea, snoring or loud breathing during sleep, nasal congestion, nosebleeds, and dry mouth (xerostomia). Additionally, a deviated septum may cause facial pain, repeated sinus infections, and difficulty breathing through the nose, which can affect normal sinus drainage. In some cases, it may also lead to a loss of the ability to smell. If left untreated, these complications can significantly impact a person's quality of life.

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

Talk to a healthcare provider if your symptoms interfere with breathing, disrupt your sleep or have a negative impact on other aspects of your life.

If you think you have a broken nose, you should go to your nearest emergency room (ER) for care. If you have a broken nasal septum, they can treat it right away.

**PREDEFINED Q & A SETS**

### ***Question 1: “Can you feel a deviated septum with your finger?”***

Answer: “In most cases, you can’t tell if you have a deviated septum just by feeling it. But people with severe nasal deviation might be able to tell that their septum is off-center.”

### ***Question 2: “Is it worth fixing a deviated septum?”***

Answer: “Only you can decide what’s best for yourself. If your deviated septum isn’t causing breathing issues, sleep apnea or other worrisome symptoms, you probably don’t need to do anything. But if your condition has a negative impact on your quality of life, surgery could be a good option.

Generally, deviated septum surgery has good success rates, up to 85%. But about 15% of people who have this type of treatment don’t notice a significant improvement in their symptoms.”

### ***Question 3: “Can you push a deviated septum back into place?”***

Answer: “You shouldn’t try to push your septum back into place under any circumstances. If a traumatic event — such as a car crash or fight — causes a broken nose or deviated septum, you should head to your nearest emergency room right away.”

***Question 4: “What is a deviated septum?”***

***Answer: “***A deviated septum occurs when the nasal septum—the cartilage and bone dividing the nose into two chambers—is shifted away from the midline, making one nasal passage smaller than the other. This can cause nasal congestion, trouble breathing, and sometimes recurrent sinus infections.***”***

***Question 5: “What causes a deviated septum?”***

***Answer: “***It may be congenital (present from birth) or result from injury or trauma to the nose, such as from accidents or sports injuries.***”***

***Question 6: “What are the symptoms of a deviated septum?”***

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

* Difficulty breathing through one or both nostrils, often worse on one side
* Nasal congestion or stuffiness
* Recurrent sinus infections due to impaired sinus drainage
* Nosebleeds
* Headaches or facial pain caused by contact between the septum and sensitive nasal tissue
* Snoring or sleep apnea in some cases.***”***

***Question 7: “How is a deviated septum diagnosed?”***

***Answer: “***A healthcare provider will take a history of symptoms and any nasal injuries, then perform a physical exam using tools like a nasal speculum, otoscope, or nasal endoscopy (a lighted scope with a camera). Sometimes a CT scan is ordered to assess the nasal and sinus anatomy.***”***

***Question 8: “Can I test myself for a deviated septum?”***

***Answer: “***While only a medical diagnosis is definitive, you can do a simple self-test by looking inside your nostrils in a mirror or photo. Uneven nostrils or difficulty breathing through one nostril compared to the other may suggest a deviated septum.***”***

***Question 9: “Can a deviated septum heal on its own?”***

***Answer: “***No, a deviated septum will not correct itself over time. If symptoms are mild, treatment may not be necessary, but persistent symptoms should be evaluated by a healthcare provider.***”***

***Question 10: “What treatments are available?”***

***Answer: “***

* Medications: Decongestants and nasal steroid sprays can reduce nasal tissue swelling and improve airflow but do not correct the septum itself. Antihistamines may help if allergies contribute to symptoms.
* Surgery: Septoplasty is the most common surgical procedure to straighten the septum, improving breathing and reducing symptoms. It is typically an outpatient procedure lasting 30 to 90 minutes.

***Question 11: “When is surgery recommended?”***

***Answer: “***Surgery is considered if symptoms significantly impair breathing, cause frequent sinus infections, chronic nosebleeds, or persistent nasal congestion that does not respond to medication.***”***

***Question 12: “Are there risks or side effects of medications?”***

***Answer: “***Nasal decongestant sprays can cause dependency and worsen symptoms if overused. Oral decongestants may increase heart rate or blood pressure and cause jitteriness. Nasal steroid sprays can sometimes cause mild nasal irritation or bleeding.***”***

**DIFFERENTIAL DIAGNOSIS**

This is a list for symptoms commonly attributed to a deviated septum:

* Chronic Rhinosinusitis
* Nasal Polyps
* Allergic Rhinitis
* Nasal Valve Collapse
* Enlarged Turbinates (Inferior Turbinate Hypertrophy)
* Nasal Tumors (Benign or Malignant)
* Foreign Body in the Nasal Cavity (especially in children)
* Vasomotor Rhinitis (Non-allergic Rhinitis)
* Acute Sinusitis or Upper Respiratory Infection
* Septal Perforation or Septal Spurs
* Congenital Nasal Anomalies (e.g., choanal atresia)
* Nasal Trauma or Fracture
* Neurological Causes of Facial Pain or Headache (e.g., trigeminal neuralgia)

**EPIDEMIOLOGY**

Epidemiology of Deviated Nasal Septum (DNS):

* Prevalence:
  + Deviated nasal septum is very common, with prevalence estimates ranging widely from 0.93% to 97% depending on the population studied and diagnostic methods used.
  + More accurate imaging techniques like cone-beam computed tomography (CBCT) reveal prevalence rates around 86.6%.
  + Other studies report prevalence around 30-60% in clinical populations.
  + Up to 80% of the general population may have some degree of septal deviation, often asymptomatic.
* Age:
  + The likelihood of septal deviation increases with age. Every 10-year increase in age increases the odds of deviation by approximately 3.2%.
  + Prevalence is also notable in neonates (up to 20%) and young children, often related to birth trauma or developmental factors.
* Gender:
  + Some studies show a higher prevalence in males compared to females (e.g., 60% males vs. 40% females).
  + However, other studies find no significant gender association.
* Types of Deviation:
  + According to Mladina’s classification, the most common types vary by region, but type 7 (complex S-shaped) is most common in some populations (e.g., Tehran 30.3%), followed by types 3 and 1.
  + Other studies report C-shaped deviation as the most frequent form.
* Geographical and Ethnic Variation:
  + Prevalence and types of septal deviation differ across ethnic groups and geographic regions, influenced by genetic and environmental factors.
* Association with Trauma:
  + Surprisingly, some studies find no significant link between history of nasal trauma and septal deviation prevalence

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: "After examining your nose, it appears you have a deviated septum. This means the wall dividing your two nasal passages is shifted to one side, which can cause difficulty breathing through your nose."

Patient: "Is this why I’ve been feeling congested and having frequent sinus infections?"

Doctor: "Yes, a severely deviated septum can block airflow on one or both sides and interfere with sinus drainage, leading to congestion, recurrent sinus infections, nosebleeds, and sometimes facial pain or headaches."

Patient: "What can be done about it? Do I need surgery?"

Doctor: "If your symptoms are mild or only occur during colds, we usually start with medical treatments like nasal sprays, decongestants, or allergy medications to reduce swelling. However, these won’t straighten the septum itself. If you have persistent or severe symptoms—like frequent nosebleeds, significant nasal blockage, or recurrent sinus infections—surgery called septoplasty is the preferred treatment."

Patient: "What does septoplasty involve?"

Doctor: "Septoplasty is a procedure done through your nostrils, so there are no external scars. During surgery, we straighten or remove the deviated parts of the septum to improve airflow. It usually takes about one to one and a half hours and is done under general anesthesia on an outpatient basis."

Patient: "Are there any risks or recovery issues I should know about?"

Doctor: "As with any surgery, there are risks like bleeding, infection, or nasal swelling. Most patients recover well within a few weeks. We usually avoid nasal packing nowadays, which makes recovery more comfortable. The goal is to relieve your symptoms and improve your breathing."

Patient: "Will this surgery change how my nose looks?"

Doctor: "Septoplasty focuses on the inside of the nose and usually does not change its external appearance. If you want to change the shape of your nose, that would involve rhinoplasty, which can be done at the same time if desired."

Patient: "How do I know if surgery is the right choice for me?"

Doctor: "We base that decision on how much your symptoms affect your daily life and whether medical treatments have helped. If you continue to have troublesome symptoms despite medications, surgery is often the best option."

Patient: "What happens if I don’t get surgery?"

Doctor: "If the deviation is mild and symptoms are manageable, you may not need surgery. But if severe, untreated deviation can lead to chronic sinus infections, nosebleeds, and poor quality of life."

**RECENT GUIDELINES OR UPDATES**

A deviated septum is a condition where the thin wall (nasal septum) that separates the nasal passages is displaced to one side, potentially causing breathing difficulties and other symptoms. Recent guidelines and updates on the management of deviated septum indicate that treatment options depend on the severity of symptoms and the impact on quality of life.

For individuals experiencing symptoms such as nasal congestion, difficulty breathing, or recurrent sinus infections, surgical intervention is often recommended. The primary treatment for a deviated septum that causes significant symptoms is septoplasty, a surgical procedure that straightens the nasal septum to improve airflow. This surgery is typically an outpatient procedure and can be performed alone or in conjunction with rhinoplasty, which may be necessary if there are aesthetic concerns or additional structural issues.

In cases where symptoms are mild or manageable, non-surgical treatments may be considered. These include the use of decongestants, antihistamines, and nasal steroid sprays to reduce inflammation and swelling in the nasal passages. Additionally, saline sprays and neti pots can help moisten the nasal passages and reduce congestion. However, it is important to note that these treatments do not correct the underlying structural issue and are only effective for symptom management.

Recent updates also emphasize the importance of a thorough evaluation by a healthcare provider to determine the cause of symptoms and the appropriate treatment plan. This evaluation may involve a physical examination using a nasal speculum or an endoscope to visualize the nasal passages.

For those considering surgery, it is crucial to discuss potential risks and recovery timelines with a qualified healthcare provider. Recovery from septoplasty typically involves a week or two of initial recovery, with full recovery taking several months. Complications, although rare, can include bleeding, infection, or numbness around the nose or front teeth.

In summary, recent guidelines for deviated septum focus on individualized treatment plans, with surgery being the definitive solution for significant symptoms, while non-surgical options are available for symptom management.

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**DIZZINESS**

ALTERNATIVE NAMES: Synonyms for dizziness include wooziness, faintness, giddiness, unsteadiness, lightheadedness, shakiness, vertigo, dysequilibrium, whirling sensation, and vertiginousness. Other related terms are giddiness, lightheadedness, vertigo, vertiginousness, and wooziness. Additional synonyms include vertigo, lightheadedness, wooziness, and giddiness.

**DEFINITION / DESCRIPTION**

Dizziness is a term that people use to describe a range of sensations, such as feeling faint, woozy, weak or wobbly. The sense that you or your surroundings are spinning or moving is more precisely termed vertigo.

Dizziness is one of the more common reasons adults see a healthcare professional. Frequent dizzy spells or constant dizziness can have serious effects on your life. But dizziness rarely means that you have a life-threatening condition.

Treatment of dizziness depends on the cause and your symptoms. Treatment often helps, but the symptoms may come back.

**CAUSES**

Dizziness has many possible causes. These include conditions that affect the inner ear, motion sickness and medicine side effects. Very rarely, dizziness may be caused by a condition such as poor circulation, infection or injury.

The way dizziness makes you feel and the things that trigger it for you provide clues about possible causes. How long the dizziness lasts and any other symptoms that you have also can help healthcare professionals pinpoint the cause.

### ***Inner ear conditions that cause dizziness due to vertigo***

Your sense of balance depends on the combined input from the various parts of your sensory system. These include your:

* **Eyes,** which help you figure out where your body is in space and how it's moving.
* **Sensory nerves,** which send messages to your brain about body movements and positions.
* **Inner ear,** which houses sensors that help detect gravity and back-and-forth motion.

Vertigo is the sense that your surroundings are spinning or moving. With inner ear conditions, your brain receives signals from the inner ear that don't match what your eyes and sensory nerves are receiving. Vertigo is what results as your brain works to sort out the confusion.

* **Benign paroxysmal positional vertigo (BPPV).** This condition causes an intense and brief sense that you're spinning or moving. These bouts are triggered by a rapid change in head movement. These changes in head movement can happen when you turn over in bed, sit up or get hit in the head. BPPV is the most common cause of vertigo.
* **Viral infection.** A viral infection called vestibular neuritis can cause intense, constant vertigo. It's an infection of the main nerve that leads from the inner ear to the brain, called the vestibular nerve. If you also have sudden hearing loss, you may have a condition called labyrinthitis. It can be caused by a virus, and it affects the nerve in the brain that controls balance and hearing.
* **Migraine.** People who get migraines may have bouts of vertigo or other types of dizziness even when they're not having bad headaches. Such vertigo bouts can last minutes to hours. They may be linked with headache as well as with being sensitive to light and noise.
* **Meniere's disease.** This rare disease involves the buildup of too much fluid in the inner ear. It causes sudden bouts of vertigo that can last for hours. It also can cause hearing loss that may come and go, ringing in the ear, and the feeling of a plugged ear.

***Circulation problems that cause dizziness***

You may feel dizzy, faint or off balance if too little blood reaches your brain. Causes include:

* **Drop in blood pressure.** A form of low blood pressure called orthostatic hypotension may make you briefly feel faint or dizzy. This type of low blood pressure happens after sitting up or standing too quickly.
* **Poor blood flow.** Conditions such as cardiomyopathy, heart attack, irregular heartbeat and transient ischemic attack could cause dizziness. Also, a drop in the total amount of blood flowing through the body may cause the brain or inner ear not to receive enough blood.

***Other causes of dizziness***

Dizziness may result from conditions or circumstances like these:

* **Nervous system conditions.** Some conditions that affect the brain, spinal cord or parts of the body controlled by nerves can lead to a loss of balance that becomes worse over time. These conditions include Parkinson's disease and multiple sclerosis.
* **Medicines.** Dizziness can be a side effect of certain medicines. These include anti-seizure medicines, antidepressants, sedatives and tranquilizers. Medicines that lower blood pressure may cause faintness if they lower blood pressure too much.
* **Anxiety disorders.** Certain types of anxiety may cause lightheadedness or a woozy feeling often referred to as dizziness. These include panic attacks and a fear of leaving home or being in large, open spaces. This fear is called agoraphobia.
* **Anemia.** There are several conditions that result in having too few healthy red blood cells, also called anemia. Other symptoms that may happen along with dizziness if you have anemia include fatigue, weakness and pale skin.
* **Low blood sugar.** Another name for this is hypoglycemia. This condition usually happens in people with diabetes who use insulin to help lower blood sugar. Dizziness may happen along with sweating and anxiety. If you have missed a meal and are hungry, that may cause unpleasant symptoms, but this is not considered hypoglycemia.
* **Carbon monoxide poisoning.** Symptoms of carbon monoxide poisoning are often described as flu-like. The symptoms include headache, dizziness, weakness, upset stomach, vomiting, chest pain and confusion.
* **Overheating or not enough hydration.** If you're active in hot weather or if you don't drink enough fluids, you may feel dizzy from overheating or from not being hydrated enough. The risk is even higher if you take certain heart medicines.

**SIGNS / SYMPTOMS**

People who have bouts of dizziness may describe symptoms such as:

* A sense of motion or spinning, also called vertigo.
* Lightheadedness or feeling faint.
* A loss of balance or the sense of not feeling steady.
* A feeling of floating, wooziness or heavy-headedness.

These feelings may be triggered or made worse by walking, standing up or moving your head. Your dizziness may happen along with an upset stomach. Or your dizziness may be so sudden or severe that you need to sit or lie down. The bout may last seconds or days, and it may come back.

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

In general, see your healthcare professional if you have any repeated, sudden, severe, or long-lasting dizziness or vertigo with no clear cause.

Get emergency medical care if you have new, severe dizziness or vertigo along with any of the following:

* Pain such as a sudden, severe headache or chest pain.
* Rapid or irregular heartbeat.
* Loss of feeling or movement in the arms or legs, stumbling or trouble walking, or loss of feeling or weakness in the face.
* Trouble breathing.
* Fainting or seizures.
* Trouble with the eyes or ears, such as double vision or a sudden change in hearing.
* Confusion or slurred speech.
* Ongoing vomiting.

**RISK FACTORS**

Factors that may raise your risk of getting dizzy include:

* **Age.** Older adults are more likely to have health conditions that cause dizziness, especially a sense of less balance. They're also more likely to take medicines that can cause dizziness.
* **A past bout of dizziness.** If you've had dizziness before, you're more likely to get dizzy in the future.

**DIAGNOSIS METHODS**

Diagnosis involves the steps your healthcare professional takes to find the cause of your dizziness or vertigo. You may need imaging tests such as an MRI or a CT scan right away if your healthcare professional thinks you might be having or may have had a stroke. You also may need one of these imaging tests if you are older or had a blow to the head.

Your healthcare professional asks you about your symptoms and the medicines you take. Then you'll likely have a physical exam. During this exam, your healthcare professional checks how you walk and maintain your balance. The major nerves of your central nervous system also are checked to make sure they're working.

You also may need a hearing test and balance tests, including:

## Eye movement testing. Your healthcare professional may watch the path of your eyes when you track a moving object. And you may be given an eye motion test in which water or air is placed in your ear canal.

## Head movement testing. If your vertigo may be caused by benign paroxysmal positional vertigo (BPPV), your healthcare professional may do a simple head movement test. It's called the Dix-Hallpike maneuver, and it can confirm that you have BPPV.

## Posturography. This test tells your healthcare professional which parts of the balance system you rely on the most and which parts may be giving you problems. You stand barefoot on a platform and try to keep your balance under various conditions.

## Rotary chair testing. During this test you sit in a computer-controlled chair that moves very slowly in a full circle. At faster speeds, it moves back and forth in a very small arc.

## You also may be given blood tests to check for infection. You may need other tests to check your heart and blood vessel health too.

**TREATMENT OPTIONS**

## Dizziness often gets better without treatment. The body usually adapts to whatever is causing the condition within a few weeks.

## If you seek treatment, your treatment is based on the cause of your condition and your symptoms. Treatment may include medicines and balance exercises. Even if no cause is found or if your dizziness keeps happening, prescription medicines and other treatments may make your symptoms better.

***Medications***

## Water pills. If you have Meniere's disease, your healthcare professional may prescribe a water pill, also called a diuretic. This medicine along with a low-salt diet may help you have bouts of dizziness less often.

## Medicines that relieve dizziness and upset stomach. Your healthcare professional may prescribe medicines to provide fast relief from vertigo, dizziness and upset stomach. These medicines include prescription antihistamines and anticholinergics. Many of these medicines cause drowsiness.

## Anti-anxiety medications. Diazepam (Valium) and alprazolam (Xanax) are in a class of drugs called benzodiazepines. These can cause addiction. They also can cause drowsiness.

## Preventive medicine for migraine. Certain medicines can help prevent migraine attacks.

***Therapy***

### Head position movements. A technique called canalith repositioning or the Epley maneuver involves a series of head movements. The technique usually helps benign paroxysmal positional vertigo get better more quickly than simply waiting for dizziness to go away. It can be done by your healthcare professional, an audiologist or a physical therapist. It often works after one or two treatments. Before you get canalith repositioning, tell your healthcare professional if you have a neck or back condition, a detached retina, or a condition that affects blood vessels.

## Balance therapy. You may learn exercises to help make your balance system less sensitive to motion. This physical therapy technique is called vestibular rehabilitation. It is used for people with dizziness from inner ear conditions such as vestibular neuritis.

## Talk therapy. This involves talking with a psychologist, a psychiatrist or another mental healthcare professional. This type of therapy may help people whose dizziness is caused by anxiety.

***Surgery or other procedures***

## Injections. Your healthcare professional may inject your affected inner ear with the antibiotic gentamicin. This medicine stops the inner ear's balance function. Your other, healthy ear takes over that function.

## Removal of the inner ear sense organ. A treatment that's rarely used is called labyrinthectomy. A surgeon removes the parts of the ear causing vertigo. This causes complete hearing loss in that ear. The other ear takes over the balance function. This technique may be used if you have serious hearing loss and your dizziness hasn't gotten better after other treatments.

***Lifestyle and home remedies***

## If you tend to have repeated bouts of dizziness, follow these tips:

## Be aware of the risk of losing your balance. This can lead to falls and serious injury. Walk with a cane for balance if needed. And try not to make fast or sudden movements.

## Fall-proof your home. Remove tripping hazards such as area rugs and exposed electrical cords. Use nonslip grip mats on your bath and shower floors. Use good lighting.

## Sit or lie down right away when you feel dizzy. Lie still with your eyes closed in a darkened room if you have a major bout of vertigo.

## Don't drive a car or run heavy machinery if you often become dizzy without warning.

## Limit use of caffeine, alcohol, salt and tobacco. Too much use of these substances can make your symptoms worse.

## Drink enough fluids, eat a healthy diet, get enough sleep and manage stress.

## If your dizziness comes with an upset stomach, try medicine called an antihistamine. Get the kind that's sold without a prescription. Examples include meclizine (Dramamine Less Drowsy) and dimenhydrinate (Dramamine). These might make you sleepy. But antihistamines that don't have this side effect aren't as effective.

## If you know why you become dizzy, you can take steps such as these:

## If your dizziness is caused by a medicine, talk with your healthcare professional about lowering the dose or safely stopping the medicine.

## If your dizziness is caused by overheating or not being hydrated enough, rest in a cool place and drink water or a sports drink (Gatorade, Powerade, others).

**POSSIBLE COMPLICATIONS**

Dizziness can lead to other health concerns called complications. For instance, it can raise your risk of falling and hurting yourself. Getting dizzy while driving a car or running heavy machinery can make an accident more likely. You also may have long-term complications if you don't get treatment for a health condition that may be causing your dizziness.

**PREVENTION TIPS**

The best way to prevent dizziness is to find out why you’re dizzy. For example, if you become dizzy when you’re dehydrated, you may prevent dizziness by drinking enough water. If you take blood pressure medication that makes you dizzy, your healthcare provider may prescribe a different medication or dosage. Unfortunately, you can’t predict or prevent all things that cause dizziness, such as a neurological disorder.

**OUTLOOK / PROGNOSIS**

Dizziness is a common symptom in primary care, and its prognosis varies depending on the subtype and underlying cause. A 10-year prospective cohort study found that the prognosis for older patients with dizziness is complex, with different subtypes showing varying outcomes. The study indicated that patients with vertigo had a lower mortality rate compared to other subtypes, such as presyncope, disequilibrium, and other dizziness.

Additionally, patients with dizziness primarily caused by peripheral vestibular disease had a better survival rate than those with dizziness caused by vascular disease.

The study also highlighted that dizziness is often divided into four major subtypes: vertigo, presyncope (light-headedness), disequilibrium (unsteadiness), and other dizziness. Each subtype is generally associated with different organ systems, such as peripheral vestibular disease or cardiovascular disease. The prognosis for dizziness can be influenced by factors such as age, sex, and other confounders.

In terms of treatment, dizziness is generally treatable, and the approach depends on the underlying cause. For example, inner ear disorders such as benign paroxysmal positional vertigo (BPPV) can be managed with specific exercises and therapies.

However, the study noted that current treatment strategies in primary care may be suboptimal, as a significant percentage of older patients with dizziness experience substantial dizziness-related impairment 10 years later.

Overall, while dizziness is a common and often manageable condition, its prognosis can vary widely, and it is important to identify the underlying cause to determine the most appropriate treatment and management strategies.

**RECENT GUIDELINES OR UPDATES**

This guideline aims to improve the quality of care and outcomes for BPPV by improving the accurate and efficient diagnosis of BPPV, reducing the inappropriate use of vestibular suppressant medications, decreasing the inappropriate use of ancillary testing such as radiographic imaging, and increasing the use of appropriate therapeutic repositioning maneuvers.

Recommendations for the diagnosis and treatment of dizziness in the emergency department. The guideline emphasizes the importance of training emergency clinicians to diagnose and treat patients with acute dizziness and the use of HINTS testing to distinguish central (stroke) from peripheral (inner ear, usually vestibular neuritis) diagnoses.

Additionally, the AAFP's "Dizziness: Approach to Evaluation and Management" provides clinical recommendations for the evaluation and management of dizziness, including the use of the HINTS examination to differentiate peripheral from central causes of vestibular neuritis. The guideline also recommends the Epley maneuver for the treatment of benign paroxysmal positional vertigo.

***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. [1]  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.

**TREATMENT DRUG INFORMATION AND THEIR SIDE EFFECTS**

*1. Antihistamines*

Used primarily for vertigo and motion sickness; they have sedative and antiemetic effects.

| **Medication** | **Dosage** | **Common Side Effects** | **Notes** |
| --- | --- | --- | --- |
| Meclizine (Antivert) | 12.5 to 50 mg orally every 4–8 hours | Drowsiness, blurred vision, fatigue, headache, vomiting | Pregnancy category B |
| Dimenhydrinate (Dramamine) | 25 to 100 mg orally, IM, or IV every 4–8 hours | Drowsiness, dizziness, dry mouth, blurred vision, nausea | Pregnancy category B |
| Promethazine (Phenergan) | 12.5 to 25 mg orally, IM, or rectally every 4–12 hours | Drowsiness, dizziness, confusion, dry mouth, extrapyramidal symptoms | Pregnancy category C |

*2. Antiemetics*

Used to control nausea and vomiting associated with dizziness and vertigo.

| **Medication** | **Dosage** | **Common Side Effects** | **Notes** |
| --- | --- | --- | --- |
| Metoclopramide (Reglan) | 5 to 10 mg orally every 6 hours or slow IV every 6 hours | Drowsiness, dizziness, akathisia, dystonia, tardive dyskinesia | Pregnancy category B |
| Prochlorperazine (Compazine) | 5 to 10 mg orally, IM every 6–8 hours or rectally every 12 hours | Drowsiness, dizziness, extrapyramidal symptoms, photosensitivity | Pregnancy category C |

*3. Benzodiazepines*

Used for their vestibular suppressant and anxiolytic effects, especially in acute vertigo.

| **Medication** | **Dosage** | **Common Side Effects** | **Notes** |
| --- | --- | --- | --- |
| Diazepam (Valium) | 2 to 10 mg orally or IV every 4–8 hours | Drowsiness, dizziness, amnesia, slurred speech, risk of dependence | Pregnancy category D |
| Lorazepam (Ativan) | 0.5 to 2 mg orally, IM, or IV every 4–8 hours | Drowsiness, dizziness, amnesia, slurred speech | Pregnancy category D |

*4. Other Medications and Treatments*

* Steroids: Sometimes used to reduce inflammation in vestibular neuritis or labyrinthitis.
* Diuretics: Used in Meniere’s disease to reduce endolymphatic pressure.
* Transtympanic Gentamicin: Injection into the middle ear to ablate vestibular function in refractory Meniere’s disease (risk of hearing loss).
* Vestibular Rehabilitation Therapy: Physical therapy exercises to improve balance and compensation.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: "I understand you’ve been experiencing dizziness. Can you tell me more about what you’re feeling? Is it a spinning sensation, feeling faint, unsteady, or something else?"

Patient: "It feels like the room is spinning sometimes, but other times I just feel lightheaded and unsteady when I walk."

Doctor: "Thank you for explaining. Dizziness can come from different causes, and understanding the exact sensation helps us narrow down the possibilities. Spinning sensations, or vertigo, often relate to inner ear problems, while feeling faint or lightheaded might be related to blood pressure or heart issues."

Patient: "What could be causing this? Is it serious?"

Doctor: "There are many potential causes, ranging from benign conditions like benign positional vertigo, which is caused by tiny crystals in your inner ear shifting, to more serious issues like infections, migraines, or cardiovascular problems. We will do a thorough evaluation to find out what’s causing your symptoms."

Patient: "What tests will I need?"

Doctor: "We’ll start with a detailed history and physical exam, including balance and neurological tests. Sometimes, we perform specific maneuvers to check for positional vertigo. Depending on findings, we might order blood tests, hearing tests, or imaging like an MRI to rule out other causes."

Patient: "How is dizziness treated?"

Doctor: "Treatment depends on the cause. For example, if you have benign positional vertigo, there are simple head maneuvers that can help reposition the crystals and relieve symptoms. If it’s related to an infection or inflammation, medications might be needed. Sometimes, vestibular rehabilitation therapy can improve balance. We’ll tailor the treatment to your diagnosis."

Patient: "Are there things I should avoid or do at home?"

Doctor: "Yes, avoid sudden head movements and standing up quickly. Stay hydrated and avoid driving or operating heavy machinery until your dizziness improves. Also, keep a symptom diary noting when dizziness occurs, duration, and any triggers, which helps us understand your condition better."

Patient: "When should I come back or seek emergency care?"

Doctor: "If you experience severe dizziness with weakness, difficulty speaking, vision changes, chest pain, or fainting, seek emergency care immediately. Otherwise, we’ll schedule a follow-up after initial treatment to monitor your progress."

**PREDEFINED Q & A SETS**

Q1: What causes dizziness?  
A: Dizziness can be caused by various factors including inner ear problems (like labyrinthitis or vestibular neuritis), aging, head injuries, medication side effects, dehydration, low blood pressure, or neurological conditions.

Q2: What should I do if I feel dizzy?  
A: Rest in a safe place, avoid sudden movements, keep hydrated by drinking plenty of water, and avoid caffeine and tobacco as these can worsen dizziness.

Q3: When should I see a doctor or seek emergency help?  
A: Contact a doctor or emergency services if dizziness is accompanied by:

* Severe or new headache
* Falling or difficulty walking
* Fainting or collapsing
* Vertigo (spinning sensation)
* Chest pain
* Hearing loss
* Facial numbness, slurred speech, or double vision
* Behavioral changes
* Dizziness after a recent head injury

Q4: How is dizziness diagnosed?  
A: Diagnosis involves detailed history taking focusing on timing, triggers, and symptoms, physical examination including balance and eye movement tests, and sometimes imaging if stroke or serious neurological causes are suspected.

Q5: What are common types of dizziness symptoms?  
A: Symptoms can include:

* Spinning sensation (vertigo) often with nausea
* Feeling off-balance or unsteady
* Light-headedness or near-fainting sensations

Q6: How can I manage dizziness at home?  
A: Strategies include:

* Looking at a fixed object to reduce unsteadiness
* Avoiding crowded or busy environments
* Staying hydrated
* Avoiding sudden head movements or position changes that trigger symptoms

Q7: What questions might my doctor ask about my dizziness?  
A: Doctors often ask about:

* When dizziness started and how long it lasts
* What triggers the dizziness (e.g., head movements, standing up)
* Associated symptoms like hearing changes or nausea
* Frequency and severity of episodes
* Impact on daily activities

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**DRY MOUTH SYNDROME**

*ALTERNATIVE NAMES:* Dry mouth syndrome is also known as xerostomia.

**DEFINITION / DESCRIPTION**

Dry mouth, also called xerostomia (zeer-o-STOE-me-uh), is when the salivary glands in the mouth don't make enough saliva to keep the mouth wet. Dry mouth often is due to aging, the side effects of certain medicines or radiation therapy for cancer. Less often, a condition directly affecting the salivary glands can cause dry mouth. You also may experience dry mouth temporarily if you are thirsty or feel anxious about something.

For some people, dry mouth is only annoying. For others, dry mouth can greatly affect general health and the health of teeth and gums. Also, it can affect how much people eat and how much they enjoy what they eat.

Treatment for dry mouth depends on the cause.

**SIGNS / SYMPTOMS**

If you're not producing enough saliva, you may notice these symptoms all or most of the time:

* Dryness or a feeling of stickiness in your mouth.
* Saliva that seems thick and stringy.
* Bad breath.
* Having a hard time chewing, speaking and swallowing.
* Dry or sore throat and hoarseness.
* Dry or grooved tongue.
* A changed sense of taste.
* Problems wearing dentures.
* Lipstick stuck to teeth.

Saliva helps prevent tooth decay by washing away sugar and food particles and making bacteria neutral and less harmful. When you don't have enough saliva, you may find it harder to taste, chew and swallow. You also may have a hard time digesting food.

**CAUSES**

Dry mouth is caused when the salivary glands in the mouth don't make enough saliva to keep the mouth wet. Sometimes these glands may not work properly due to:

* Medicines. Hundreds of medicines, including many medicines available without a prescription, can cause dry mouth. Among the medicines more likely to cause problems are those for depression, high blood pressure and anxiety, as well as some antihistamines, decongestants, muscle relaxants and pain relievers.
* Aging. Many older people have symptoms of dry mouth as they age. Certain changes in how the body processes medicine, poor nutrition and long-term health problems can cause dry mouth.
* Cancer therapy. Medicine to treat cancer, called chemotherapy, can change the nature of saliva and the amount produced. This may be for a limited time, with typical salivary flow returning after treatment ends. Radiation treatments to the head and neck can damage salivary glands, greatly lowering saliva production. This may be for a limited time, or it could be lasting, depending on the radiation dose and area treated.
* Nerve damage. An injury or surgery that causes nerve damage to the head and neck area can be due to dry mouth.
* Other health conditions. Dry mouth can be due to certain health conditions, such as diabetes, stroke, a yeast infection in the mouth or Alzheimer's disease. Or dry mouth could be due to autoimmune diseases, such as Sjogren syndrome or HIV/AIDS.
* Snoring and mouth breathing. Snoring and breathing with the mouth open can lead to dry mouth.
* Tobacco and alcohol use. Drinking alcohol and smoking or chewing tobacco can lead to more dry mouth symptoms.
* Use of legal or illegal drugs that may be sold on the streets. Methamphetamine use can cause serious dry mouth, and it can damage teeth. Marijuana use also can cause dry mouth.

**RISK FACTORS**

Risk of dry mouth is higher in people who:

* Take medicines that have dry mouth listed as a possible side effect.
* Are being treated for cancer.
* Have nerve damage in the head and neck area.
* Have other health conditions, such as diabetes, stroke, Alzheimer's disease, Sjogren syndrome or HIV/AIDS.
* Use tobacco products.
* Drink alcohol.
* Use street drugs.
* Eat sugary or acidic foods or candies.

**POSSIBLE COMPLICATIONS**

Not having enough saliva and getting dry mouth can lead to:

* Increased plaque, tooth decay and gum disease.
* Mouth sores.
* A yeast infection in the mouth, also known as thrush.
* Sores or split skin at the corners of the mouth, or cracked lips.
* Poor nutrition from having problems with chewing and swallowing.

When you have chronic dry mouth, you’re more likely to develop:

* Cavities.
* Gum disease.
* Mouth sores.
* Cracked lips.
* Oral thrush.

**DIAGNOSIS METHODS**

To determine the cause of your dry mouth, your healthcare professional reviews your medical history and the medicines you take, including medicines available without a prescription. Your healthcare professional also looks in your mouth.

Sometimes you may need blood tests, imaging scans of your salivary glands or tests to measure how much saliva you produce. These scans and tests can help find the cause of your dry mouth. If your healthcare professional suspects that Sjogren syndrome is causing your dry mouth, a small sample of cells taken from salivary glands in your lip may be sent for testing. This procedure is called a biopsy.

**TREATMENT OPTIONS**

Your treatment depends on the cause of your dry mouth. Your healthcare professional may:

* **Change medicines that cause dry mouth.** If your healthcare professional thinks a medicine is the cause, your dose may be changed. Or you may switch to another medicine that doesn't cause dry mouth.
* **Recommend products to moisturize your mouth.** These products can include prescription medicines or mouth rinses available without a prescription, artificial saliva, or moisturizers to lubricate your mouth. Mouthwashes designed for dry mouth, especially ones with xylitol, can be effective. Examples include Biotene Dry Mouth Oral Rinse or Act Dry Mouth Mouthwash.

If your mouth is extremely dry due to Sjogren syndrome or radiation treatment for head and neck cancer, your healthcare professional may prescribe pilocarpine (Salagen) to help you make more saliva. Or cevimeline (Evoxac) may be prescribed to help you make more saliva if you have Sjogren syndrome.

***Lifestyle and home remedies***

In addition to your healthcare professional's advice, these tips may ease dry mouth symptoms:

* **Sip water or sugar-free drinks or suck on ice chips.** Do this throughout the day to moisten your mouth. Also, drink water during meals to make it easier to chew and swallow.
* **Chew sugar-free gum or suck on sugar-free hard candies.** Products that contain xylitol also may help prevent cavities. But xylitol, which is often found in sugar-free gum and sugar-free candies, may cause some people to have gas or diarrhea if they consume it in large amounts.
* **Try saliva substitutes that contain xylitol and are available without a prescription.** These include Mouth Kote or Oasis Moisturizing Mouth Spray. Or try saliva substitutes that contain carboxymethylcellulose (kahr-bok-see-meth-ul-SEL-u-lohs) or hydroxyethyl cellulose (hi-drok-see-ETH-ul SEL-u-lohs), such as Biotene Dry Mouth Oral Balance Gel.
* **Breathe through your nose, not your mouth.** You may need to seek treatment for snoring if it causes you to breathe through your mouth during the night.
* **Add moisture to the air at night.** Use a room humidifier.
* **Moisturize your lips.** This helps soothe dry or cracked areas.

Stay away from products that can make your symptoms worse. These include:

* **Caffeine and alcohol.** These products can cause dryness and irritation. Don't use a mouthwash that contains alcohol.
* **Tobacco.** If you smoke or chew tobacco, stop. Tobacco products can dry and irritate your mouth.
* **Antihistamines and decongestants available without a prescription.** These medicines can worsen your dry mouth.
* **Sugary or acidic foods and candies.** These foods raise the risk of tooth decay. Also, stay away from spicy or salty foods because they can cause irritation.

Saliva is important to maintain the health of your teeth and mouth. Taking these steps to protect your teeth also may help your dry mouth:

* **Brush with a fluoride toothpaste and floss your teeth.** Ask your dentist if you might benefit from prescription fluoride toothpaste, a toothpaste containing betaine or a tooth gel to neutralize bacteria acids.
* **Use fluoride or rinses.** To prevent cavities, your dentist might fit you for fluoride trays, which you fill with fluoride and wear over your teeth at night. Your dentist also may recommend that you brush on fluoride gel before bedtime or use a chlorhexidine rinse weekly.
* **See your dentist at least twice yearly.** Have your teeth examined and plaque removed to help prevent tooth decay.

**OUTLOOK / PROGNOSIS**

You can successfully manage dry mouth symptoms with treatment. And in some cases, xerostomia may go away completely. Most of the time, it takes trial and error to figure out a solution. Your provider may adjust your medications. Or they may refer you to a specialist if they suspect you have an underlying condition.

The best thing you can do is stay in touch with your provider and let them know about any new symptoms. In many cases, your dentist and primary care physician will work together to find appropriate treatment.

**PREVENTION TIPS**

There’s not a miracle cure for dry mouth, but there are things you can do to reduce your risk. Most importantly, practice good oral hygiene and visit your dentist regularly for cleanings and exams.

In addition, try these dry mouth remedies at home:

* Chew sugarless gum to stimulate saliva production.
* Suck on ice cubes or sugarless ice pops.
* Use a mouth wash formulated for dry mouth (like Biotene®).
* Avoid decongestants and antihistamines when possible.
* Sip water before swallowing capsules or tablets. This helps moisten your mouth.
* Take medications that cause dry mouth in the morning, not at night. Dry mouth at night is more likely to cause cavities and other dental issues.
* Use a cool-mist humidifier, especially if you breathe through your mouth at night.
* Keep lip balm handy.
* Drink plenty of water.

You should try to avoid:

* Smoking.
* Carbonated drinks.
* Beverages containing alcohol.
* Acidic, spicy, dry and sugary foods.

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

If you have dry mouth, here are some questions you might want to ask your provider:

* What’s causing dry mouth?
* Do I need to change my medications or adjust their dosage?
* Do I have an underlying condition that needs treatment?
* How often should I have teeth cleanings?
* What dry mouth products do you recommend?

If you have dry mouth symptoms that don't go away, make an appointment with your healthcare professional.

**DIFFERENTIAL DIAGNOSIS**

* Medication-Induced Dry Mouth
  + Antidepressants
  + Antihypertensives (e.g., diuretics)
  + Antihistamines and decongestants
  + Muscle relaxants and sedatives
  + Antipsychotics
  + Bronchodilators
  + Pain medications
  + Urinary incontinence drugs
  + Parkinson’s disease medications
  + Chemotherapy agents
* Autoimmune and Systemic Diseases
  + Sjögren’s syndrome (primary and secondary)
  + Rheumatoid arthritis
  + Systemic lupus erythematosus
  + HIV/AIDS
  + Diabetes mellitus
  + Sarcoidosis
  + Celiac disease
  + Amyloidosis
  + Chronic graft-versus-host disease
* Infectious Causes
  + Mumps
  + Hepatitis C virus infection
  + Diffuse infiltrative lymphocytosis syndrome (associated with HIV/AIDS)
  + Oral candidiasis (secondary to dry mouth)
* Radiation and Cancer Therapy
  + Radiation therapy to head and neck damaging salivary glands
  + Chemotherapy altering saliva production and composition
* Neurological Causes
  + Nerve damage from head or neck injury or surgery affecting salivary gland innervation
  + Stroke
  + Alzheimer’s disease
  + Parkinson’s disease
* Dehydration and Fluid Loss
  + Fever
  + Excessive sweating
  + Vomiting and diarrhea
  + Blood loss
  + Burns
* Lifestyle and Environmental Factors
  + Smoking and tobacco use (chewing or smoking)
  + Mouth breathing or chronic nasal obstruction
  + Alcohol consumption
  + Recreational drug use (methamphetamine, cannabis, heroin)
* Physiological and Age-Related Changes
  + Reduced salivary flow during sleep (morning dry mouth)
  + Age-related decrease in salivary gland function (often compounded by polypharmacy)
* Surgical Causes
  + Surgical removal of salivary glands
* Other Causes
  + Sicca syndrome (dryness without autoimmune disease)
  + Hormonal disorders (e.g., poorly controlled diabetes)
  + COVID-19 infection and post-COVID syndrome (associated with persistent xerostomia)

**EPIDEMIOLOGY**

Data regarding the sex predominance of xerostomia vary. In 1996, a statistically significant study in Sweden concluded that 21.3% of men and 27.3% of women reported xerostomia. According to a study in 2006, the prevalence of xerostomia ranged from 0.9% to 64.8%. Most data collected for these studies was in Scandinavia (most patients were over 50, and the rest were over 18).In contrast, 100% of patients who received radiation for head and neck cancer or were diagnosed with Sjögren syndrome complained of xerostomia. The prevalence of xerostomia is increasing due to the increasing aging population. Age by itself is not a cause of xerostomia, but older patients tend to be on multiple medications and have a higher incidence of comorbid conditions.

Xerostomia, or dry mouth, is a common side effect of radiation or chemoradiation and some medications. It can be uncomfortable, and can make it difficult to speak and eat. Whether your dry mouth symptoms are temporary or long lasting, there are some things that can help.

***Water:***

Sip water throughout the day.

***Humidifier:***

Using a humidifier once or twice a day, especially in your sleeping area at night, can help a lot. Cool or warm mist both work; use what you prefer. There are different kinds of humidifiers, including small, personal models, some with face masks and others that just direct steam in the air near you.

***A Water Spray Bottle:***

Keep a spray bottle with water nearby and spray inside your mouth when needed to keep it wet. Adding a few drops of aloe or glycerin to the water can make it last longer or extend the moisturizing effects.  
Glycerin (also called glycerol) is an inexpensive, flavorless and nontoxic ingredient you can find at cake decorating stores and online. It is a humectant, which means it attracts and retains moisture.

Put a few drops of glycerin in water, swish it around in your mouth and spit it out. Or, make an oral spray: Use four drops of glycerin in a small spray bottle of water (4 ounces) and use as needed — you don’t have to spit it out.

(Note: Do not put drops directly on the tongue or in the mouth. You must dilute them in water.)

***Sugarless Candy, Lozenges or Gum:***

Having something in the mouth can trigger natural saliva production. Citrus, cinnamon and mint are good flavor choices if they are not too acidic or irritating. Look for those with aloe, xylitol, glycerin or other hydrating agents and sugarless gum with baking soda, available at many local drugstores.

***More Moisture at Mealtime:***

Sip water between bites when eating. Adding condiments, soups, gravies and sauces can help, too.

***Avoid Caffeine and Alcohol:***

Caffeine and alcohol can cause excessive dryness since they are diuretics.

***Alcohol-free Mouthwashes:***

Alcohol can further dry out your mouth. Most kids’ mouthwashes are alcohol-free, and many brands have an alcohol-free option.

***Saliva Substitutes:***

Ask your pharmacist about over-the-counter products that can come in drops or spray formulas.

***Prescription Pilocarpine Medications:***

Ask your doctor if these are appropriate for you.

***Frozen Melon or Cucumber:***

Try a refreshing, water-rich slice between your cheek and gum for one or two hours. If it helps, keep some thinly sliced in a small bag in the freezer and use one or more a day.

***Oral Sprays or Nasal Wash:***

Keeping your nasal passages moist will help relieve dry mouth. Your doctor or dentist may be able to recommend some options.

***Laxatives:***

Some fiber laxatives work by drawing water into your intestines, and they can do the same for your mouth. Ask your doctor or therapist for good brands to try. Mix some up, swish it around your mouth and spit it out. (Do not swallow it, or it could cause diarrhea.)

***Papaya Tablets:***

Papain, the enzyme in the papaya fruit, helps digest proteins and stimulate saliva.

***Acupuncture:***

Research shows it can help. For instance, in one study, undergoing acupuncture for eight weeks eased xerostomia in people with cancer who had been treated with radiation.

***Prescription Medications to Stimulate Saliva Production***

| **Medication** | **Dosage & Use** | **Common Side Effects** | **Notes & Precautions** |
| --- | --- | --- | --- |
| Pilocarpine (Salagen) | Tablets: Start 5 mg three times daily, may increase based on tolerance | Excessive sweating, nausea, runny nose, flushing, headache, increased urinary frequency | Contraindicated in asthma, uncontrolled glaucoma, heart arrhythmias; takes up to 2 months for full effect |
| Cevimeline (Evoxac) | Tablets: 30 mg three times daily | Sweating, nausea, rhinitis, blurred vision, abdominal pain | Same contraindications as pilocarpine; stimulates muscarinic receptors to increase saliva |

* Both drugs are cholinergic agonists that stimulate salivary gland secretion.
* Start with low doses at bedtime, then increase gradually to minimize side effects.

4. Other Therapies

* Acupuncture has shown some benefit in radiation-induced xerostomia.
* Nasal sprays or washes to keep nasal passages moist can indirectly relieve dry mouth.
* Dietary supplements like papaya enzyme tablets (papain) may stimulate saliva but require more evidence.
* Laxatives (fiber-based) used as mouth rinses to draw moisture, but not swallowed.

5. Dental Care and Prevention

* Maintain excellent oral hygiene: brush with fluoride toothpaste twice daily, floss regularly.
* Regular dental check-ups with fluoride treatments to prevent tooth decay and oral infections.
* Avoid sugary and acidic foods that worsen dental health.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: "I understand you’ve been experiencing a dry mouth. Can you tell me how long this has been going on and how it’s affecting you?"

Patient: "It’s been a few weeks now. My mouth feels sticky and dry all the time. It’s hard to eat and sometimes I have trouble speaking."

Doctor: "Dry mouth, or xerostomia, happens when your salivary glands don’t produce enough saliva. Saliva is important for chewing, swallowing, tasting, and protecting your teeth. There are many possible causes, including medications, dehydration, infections, or underlying health conditions like Sjögren’s syndrome or diabetes."

Patient: "Could it be caused by the medicines I’m taking?"

Doctor: "Yes, many common medications such as antihistamines, antidepressants, blood pressure drugs, and others can cause dry mouth. We’ll review your medications and see if adjustments are possible."

Patient: "What can I do to feel better?"

Doctor: "There are several things you can try at home: sip water regularly, chew sugar-free gum to stimulate saliva, use alcohol-free mouthwashes designed for dry mouth, and avoid caffeine, alcohol, and smoking. I can also recommend saliva substitutes like gels or sprays that help keep your mouth moist."

Patient: "Are there any medicines that can help increase saliva?"

Doctor: "Yes, there are prescription medications such as pilocarpine or cevimeline that stimulate saliva production. They can be helpful if your salivary glands still have some function, but they do have side effects like sweating or nausea, so we’ll discuss whether they’re suitable for you."

Patient: "What should I watch out for or when should I come back?"

Doctor: "If you notice your mouth becoming painful, red, swollen, or if you develop sores or white patches, or if you have trouble eating or swallowing, please come back sooner. Also, regular dental check-ups are important because dry mouth increases the risk of tooth decay and infections."

Patient: "Is dry mouth serious?"

Doctor: "While dry mouth itself isn’t usually dangerous, it can affect your quality of life and oral health. Managing it well helps prevent complications. If the cause is an underlying condition, we’ll work on treating that as well."

**PREDEFINED Q & A SETS**

***Question 1: “Why is my mouth dry even though I drink a lot of water?”***

***Answer: “***If your mouth still feels dry after drinking plenty of water, you might have xerostomia. This means your salivary glands don’t produce enough saliva — so your mouth still feels dry even when you stay hydrated.***”***

***Question 2: “What is dry mouth syndrome?”***

***Answer: “***Dry mouth syndrome, or xerostomia, is the feeling that there is not enough saliva in the mouth. It can cause difficulty swallowing, speaking, tasting, and increase the risk of tooth decay and gum disease.***”***

***Question 3: “What causes dry mouth?”***

***ANswer: “***Common causes include:

* Medications: Many drugs, such as those for depression, allergies, colds, and high blood pressure, can reduce saliva production.
* Dehydration: Losing more fluids than you take in can cause dry mouth.
* Radiation therapy: Treatment targeting head or neck cancer can damage salivary glands.
* Chemotherapy: Some cancer drugs thicken saliva, causing dryness.
* Nerve damage: Injury to head or neck can impair signals to salivary glands.
* Chronic diseases: Sjögren’s syndrome, diabetes, HIV/AIDS, autoimmune diseases, stroke, and sleep apnea are linked to dry mouth.
* Temporary causes: Stress, nervousness, or excessive talking can also cause transient dry mouth.***”***

***Question 4: “Is dry mouth a normal part of aging?”***

***Answer: “***No, dry mouth is not a normal part of aging itself. However, older adults are more likely to have conditions or take medications that cause dry mouth.***”***

***Question 5: “How can I manage or treat dry mouth?”***

***Answer: “***

* See your dentist or doctor to identify the cause and discuss treatment options.
* Hydration: Drink water frequently throughout the day; using a humidifier at night can help.
* Saliva stimulants: Sugar-free lozenges, chewing gum (especially with xylitol), or medications like pilocarpine and cevimeline can promote saliva production.
* Artificial saliva: Over-the-counter saliva substitutes and moisturizing mouth sprays (e.g., Biotene, Oasis) can relieve symptoms.
* Good oral hygiene: Brush twice daily with fluoride toothpaste, floss regularly, and visit the dentist twice a year. Your dentist may recommend prescription-strength fluoride treatments to prevent cavities.
* Avoid: Caffeine, tobacco, alcohol, and sticky or sugary foods that worsen dryness or increase decay risk.***”***

***Question 6: “Does dry mouth increase the risk of dental problems?”***

***Answer: “***Yes. Saliva protects teeth by neutralizing acids and washing away food particles. Reduced saliva increases the risk of cavities, gum disease, and oral infections like thrush.***”***

***Question 7: “What special recommendations exist for people with Sjögren’s syndrome?”***

***Answer: “***Dentists may suggest:

* Fluoride treatments (pastes, rinses, gels)
* Drinking 8 to 12 glasses of water daily
* Saliva stimulants and artificial saliva products
* Antibacterial rinses like chlorhexidine
* Calcium phosphate rinses to repair enamel***”***

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

***Answer: “***If dry mouth persists, causes difficulty eating or speaking, or leads to frequent dental problems, consult your healthcare provider for evaluation and management.***”***

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**DYSGEUSIA**

*ALTERNATIVE NAMES:* Alternative names for dysgeusia include parageusia.

**DEFINITION / DESCRIPTION**

Dysgeusia (pronounced “dis-gyoo-zee-uh”) is a disorder that distorts your sense of taste. People with this condition often say that anything they eat tastes like metal, rancid or bitter. Dysgeusia isn’t a serious medical condition. But it can affect your appetite and quality of life. Healthcare providers may use the terms “altered taste” or “parageusia.”

Dysgeusia is different from ageusia, which is when you lose your sense of taste.

Research suggests up to 17% of people in the U.S. experience dysgeusia at some point in their lives.

**CAUSES**

Many things may cause this condition, including:

* Aging. Your sense of taste changes as you age.
* Medications. Many medications can affect your sense of taste. Some examples include over-the-counter allergy medications, and prescription drugs like antibiotics, antidepressants, and chemotherapy drugs.
* Dental prostheses. If you need prostheses that cover your soft palate, these devices can affect your taste receptors so food tastes different.
* Poor oral hygiene.
* Using tobacco.
* Certain medical conditions.

***Medical conditions***

Several conditions can cause dysgeusia, including:

* Dry mouth (xerostomia). This happens when your salivary glands produce less saliva because you’re not drinking enough fluid.
* GERD (chronic acid reflux). When stomach acid enters your mouth, it can affect your taste function. For this reason, some people with GERD develop dysgeusia.
* Head and neck cancers. Cancer and cancer treatments like chemotherapy or radiation therapy may affect your sense of taste.
* Infections. Viral infections like colds, flu or COVID-19 affect your sense of taste.
* Inflammation. Any condition that results in inflammation of your tongue can affect your taste receptors and your sense of taste.
* Metabolic disorders. Diabetes, hypothyroidism, kidney disease, liver disease and other metabolic conditions can cause dysgeusia.
* Nerve damage. You have nerves that manage taste sensation. When something damages these nerves, like ear or neck surgery, they don’t work like they should, causing dysgeusia.
* Neurologic disorders. Alzheimer’s disease, Parkinson’s disease and multiple sclerosis (MS) have been associated with dysgeusia.
* Pregnancy. Dysgeusia during pregnancy is common, usually due to a surge of hormones. Symptoms typically go away on their own after the first trimester.
* Traumatic brain injury (TBI). If you have a TBI that damages the lining of your nose, your olfactory nerve or the part of your brain that processes your sense of taste, that can cause dysgeusia.
* Vitamin or mineral deficiencies. People who have zinc or vitamin B deficiencies are especially prone to dysgeusia.

**RISK FACTORS**

Dysgeusia, a condition characterized by a distorted sense of taste, has several risk factors. These include chemotherapy, which is a major cause, as it can damage the oral cavity, leading to oral mucositis, oral infections, and salivary gland dysfunction. The risk of dysgeusia is also increased by certain medications, such as those used in chemotherapy, including cyclophosphamide, cisplatin, vismodegib, and etoposide. Additionally, zinc deficiency can contribute to dysgeusia, as zinc is involved in the repair and production of taste buds. Other risk factors include dry mouth (xerostomia), which can result from diseases like Sjogren’s syndrome, medications, or radiation therapy. Neurological disorders such as multiple sclerosis, Alzheimer’s disease, and Parkinson’s disease have also been associated with an increased risk of dysgeusia. Metabolic disorders like diabetes, hypothyroidism, and kidney disease can also lead to taste disturbances. Furthermore, pregnancy can cause dysgeusia due to hormonal changes. Tobacco use, including smoking, can alter taste perception and contribute to dysgeusia. Lastly, certain surgeries, particularly those involving the ear, nose, and throat, can result in nerve damage that affects taste.

**SIGNS / SYMPTOMS**

Dysgeusia affects people in different ways. In general, food just doesn’t taste the same as you remember. Some common symptoms are:

* All foods taste metallic or bitter.
* Foods that are characteristically sweet or salty no longer taste sweet or salty.
* Foods that used to taste good now taste bad, and sometimes rotten.
* There’s a nasty taste in your mouth even though you haven’t eaten anything.

**DIAGNOSIS METHODS**

Your healthcare provider will do a physical examination and ask about your symptoms. They may do the following tests:

* A smell identification test. Your sense of taste and smell have a lot in common. Your provider may do a smell identification test to rule out anosmia (loss of sense of smell).
* Taste threshold tests. These tests show when you detect changes in how food tastes.
* Blood tests. Your provider may order a complete blood count (CBC) and tests to check your levels of potassium, calcium, iron and vitamin B12.
* Imaging tests. Sometimes, abnormal growths or physical changes can affect your sense of taste. Your provider may order tests including X-rays, computed tomography (CT) scans or magnetic resonance imaging (MRI) scans.

**TREATMENT OPTIONS**

Treatment depends on why you have dysgeusia. For example, if medication is causing dysgeusia, changing medications may help. If you have a viral infection like COVID-19 that affects your sense of smell and taste, your healthcare provider may recommend olfactory training therapy.

Studies show your sense of smell is responsible for about 80% of what you taste. Your nose and throat share the same airway, so chewing some foods allows food aroma to make its way to your nose through the back of your mouth. Olfactory training therapy involves daily exposure to different odors for several weeks. Over time, what you smell stimulates your olfactory system in your brain and re-establishes your memories of that smell.

**PREVENTION TIPS**

You can reduce your risk by:

* Not smoking.
* Drinking lots of water or beverages that don’t contain sugar or caffeine.
* Protecting yourself from traumatic brain injury or viral infections.
* Tracking your sense of taste. If you notice food tastes different, look for anything new in your daily life like new medications or trying new foods.

**OUTLOOK / PROGNOSIS**

That depends on the cause. In most cases, dysgeusia goes away on its own once your provider finds the underlying cause. For example, if smoking causes dysgeusia, quitting smoking will make dysgeusia go away. If medication is the culprit, changing medication may help.

But in some cases, the underlying cause is a chronic condition or there’s no substitute for medication. In these scenarios, dysgeusia doesn’t go away, but there are ways to mask the nasty taste in your mouth that the condition causes.

***Living With***

Often, dysgeusia goes away after your healthcare provider diagnoses the underlying causes. But there are many things you can do to ease your symptoms. Here are some suggestions:

* Change your food choices. Eat foods that mask the taste of metal, like citrus fruits, sour foods like pickles and food with vinegar. Avoid spicy food, food made with lots of preservatives or very sweet food.
* Drink up. Drinking lots of water or non caffeinated drinks prevents dry mouth, which can lead to dysgeusia.
* Get rid of metal. Swap out metal cutlery and water bottles for glass, plastic or ceramic items.
* Keep your mouth healthy. Regularly brushing and flossing your teeth may help with dysgeusia or keep it from happening.
* Rinse your mouth before meals. Rinsing your mouth with a solution of baking soda and water neutralizes acid in your mouth so what you eat tastes like it should.
* Try ice. Sucking on ice cubes, chips or sugar-free ice pops helps to prevent dry mouth.
* Quit smoking. Quitting tobacco use will improve your sense of taste.

**POSSIBLE COMPLICATIONS**

If left untreated, dysgeusia can lead to several complications:

* **Nutritional Deficiencies:** Altered taste can result in poor dietary choices, leading to deficiencies in essential nutrients.
* **Weight Loss:** A decreased appetite may lead to unintended weight loss and associated health issues.
* **Mental Health Impact:** The inability to enjoy food can lead to feelings of depression or anxiety.

Short-Term and Long-Term Complications

* **Short-Term:** Temporary dysgeusia may lead to minor dietary changes but typically resolves with treatment.
* **Long-Term:** Chronic dysgeusia can result in significant lifestyle changes, impacting social interactions and overall well-being.

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

Seek immediate medical attention if you experience:

* Sudden changes in taste perception with neurological symptoms.
* Severe dry mouth or difficulty swallowing.
* Persistent dysgeusia that does not improve with home care.

**DIFFERENTIAL DIAGNOSIS**

***Common Causes of Dysgeusia***

* Medications
  + Chemotherapy agents (e.g., cyclophosphamide, cisplatin, etoposide)
  + Asthma medications (e.g., albuterol)
  + Antibiotics, antihypertensives, antidepressants, and others
* Nutritional Deficiencies
  + Zinc deficiency
  + Vitamin B12 deficiency
* Infections
  + Viral infections (including COVID-19 and other upper respiratory infections)
  + Bacterial or fungal oral infections (e.g., oral candidiasis)
* Systemic and Metabolic Conditions
  + Diabetes mellitus
  + Hypothyroidism
  + Kidney disease
  + Liver disease
  + Respiratory infections
* Neurological Causes
  + Nerve damage from ear or neck surgery
  + Stroke involving pons, thalamus, or midbrain
  + Neurodegenerative diseases (Parkinson’s disease, Alzheimer’s disease, multiple sclerosis)
* Oral and Salivary Gland Disorders
  + Xerostomia (dry mouth), often secondary to Sjögren’s syndrome or medications
  + Radiation therapy to head and neck causing salivary gland dysfunction and taste bud damage
  + Oral mucositis and inflammation
* Gastrointestinal Causes
  + Gastroesophageal reflux disease (GERD) causing acid reflux into the mouth
* Hormonal and Physiological Factors
  + Pregnancy (hormonal changes)
  + Menopause
  + Aging
* Other Causes
  + Tobacco use (smoking and chewing)
  + Dental prostheses interfering with taste receptors
  + Head trauma or surgery affecting taste pathways

**PREDEFINED Q & A SETS**

* **What are the common causes of dysgeusia?**
* Dysgeusia can be caused by various factors, including infections, medications, nutritional deficiencies, and lifestyle choices such as smoking and alcohol use.
* **How is dysgeusia diagnosed?**
* Diagnosis typically involves a clinical evaluation, including patient history and physical examination, along with laboratory tests and possibly imaging studies to identify underlying causes.
* **Can dysgeusia be treated?**
* Yes, treatment depends on the underlying cause and may include medications, dietary changes, and lifestyle modifications.
* **Is dysgeusia a serious condition?**
* While dysgeusia itself may not be serious, it can lead to complications such as nutritional deficiencies and weight loss if left untreated.
* **How can I prevent dysgeusia?**
* Preventive measures include maintaining good oral hygiene, staying hydrated, eating a balanced diet, and avoiding smoking and excessive alcohol consumption.
* **What should I do if I experience sudden changes in taste?**
* If you experience sudden changes in taste, especially if accompanied by other symptoms, it is essential to seek medical attention promptly.
* **Can dysgeusia be a side effect of medications?**
* Yes, many medications can cause dysgeusia as a side effect. If you suspect this, consult your healthcare provider for alternatives.
* **Are there any home remedies for dysgeusia?**
* Home remedies may include using flavorful herbs and spices in cooking, staying hydrated, and practicing good oral hygiene.
* **How long does dysgeusia last?** The duration of dysgeusia varies depending on its cause. Temporary dysgeusia may resolve quickly, while chronic cases may require ongoing management.
* **When should I see a doctor for dysgeusia?** You should see a doctor if dysgeusia persists for an extended period, is accompanied by other concerning symptoms, or significantly impacts your quality of life.

**Dysgeusia Staging and Severity Assessment**

Dysgeusia—an altered or distorted sense of taste—can be graded or staged primarily based on its impact on eating habits and nutritional status. The most commonly referenced clinical staging comes from toxicity grading scales such as the Common Terminology Criteria for Adverse Events (CTCAE) v5.0, especially in chemotherapy patients, and from clinical taste testing protocols.

Clinical Staging (Based on CTCAE v5.0 Scale for Dysgeusia)

* Grade 0: No change in taste.
* Grade 1: Change in taste but *no impact* on eating habits.
* Grade 2: Change in taste with *impact on eating habits* (e.g., reduced appetite, altered food intake).

This simple 3-point scale is widely used in oncology to assess chemotherapy-induced dysgeusia and its severity, as dysgeusia can significantly affect nutrition and quality of life. Higher grades correlate with increased risk of malnutrition and other adverse effects.

**EPIDEMIOLOGY**

* Prevalence in the general population:
  + Approximately 5% of Americans report experiencing dysgeusia (distorted taste sensation).
  + Among adults over 40, about 19% report some alteration in taste, with 5% specifically reporting dysgeusia.
  + Prevalence tends to be higher in women, who represent about 64% of reported cases.
* Prevalence in the elderly:
  + A study in Brazil found a dysgeusia prevalence of 21.1% among elderly individuals, often associated with polypharmacy (use of multiple medications).
* Dysgeusia in COVID-19:
  + Dysgeusia is a common symptom of COVID-19, reported in 28.6% to 48% of infected patients across various studies.
  + One study reported nearly 48.1% of COVID-19 patients experienced taste alterations.
  + Dysgeusia during COVID-19 is often transient but can persist in some cases beyond one year.
  + Females tend to report dysgeusia more frequently than males in COVID-19 cohorts.
* Other factors influencing prevalence:
  + Dysgeusia is frequently associated with dry mouth (xerostomia); among adults with persistent dry mouth, about 43% report taste changes.
  + Smoking reduces sensitivity to bitter and salty tastes, potentially affecting dysgeusia prevalence.
  + Genetic variation affects taste perception, influencing individual susceptibility to taste disorders.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: "You mentioned that food tastes different or unpleasant to you lately. This condition is called dysgeusia, which means your sense of taste is altered or distorted."

Patient: "Yes, everything tastes metallic or sour, and it’s really affecting my appetite."

Doctor: "That’s a common experience with dysgeusia. It can make eating less enjoyable and sometimes lead to weight loss or nutritional problems. Many things can cause this, including certain medications, infections like COVID-19, nutritional deficiencies such as low zinc or vitamin B12, or underlying health conditions."

Patient: "How do you find out what’s causing it?"

Doctor: "We’ll start with a detailed history and physical exam, including looking at your mouth and checking for infections or dryness. Sometimes we do taste tests to measure how well you can detect different tastes. We’ll also review your medications and may order blood tests to check for deficiencies or other conditions."

Patient: "Is there any treatment for this?"

Doctor: "Treatment depends on the cause. If a medication is responsible, we might adjust it. If you have a nutritional deficiency, supplements can help. For taste changes related to infections like COVID-19, olfactory training therapy—where you expose yourself to different smells daily—can improve taste over time. Also, staying hydrated, avoiding smoking, and practicing good oral hygiene are important."

Patient: "Are there ways to make food taste better now?"

Doctor: "Yes, you can try adding herbs, spices, or acidic flavors like lemon to enhance taste. Using non-metallic utensils may help if you notice a metallic taste. Eating foods with varied textures and colors can also improve your eating experience."

Patient: "Will this get better?"

Doctor: "In many cases, dysgeusia improves once the underlying cause is treated or resolves. Sometimes it takes weeks to months, especially after viral infections. If it persists, we can explore additional therapies and support."

Patient: "Is this condition serious?"

Doctor: "While dysgeusia itself isn’t usually dangerous, it can affect your nutrition and quality of life. That’s why it’s important to address it early and manage any underlying issues."

**RECENT GUIDELINES OR UPDATES**

Recent guidelines and updates for dysgeusia focus on understanding its causes, improving diagnosis, and exploring treatment options. Dysgeusia, a distortion of the sense of taste, can be caused by various factors including chemotherapy, zinc deficiency, and infections such as SARS-CoV-2. It is also associated with conditions like hypothyroidism, liver disease, and certain medications.

In the context of the COVID-19 pandemic, dysgeusia has been identified as a common symptom, often occurring alongside anosmia. Studies have shown that these symptoms can persist long after the initial infection, indicating a need for long-term management strategies. Research has suggested that persistent post-COVID-19 sensory distortion is a multifactorial syndrome with distinct phenotypes, which can be identified through objective evaluations for smell and taste acuity.

For cancer patients, dysgeusia is often a side effect of chemotherapy and radiation. Management strategies include the use of zinc supplementation, which has shown some promise in improving taste acuity and quality among individuals undergoing these treatments. Alpha lipoic acid and dronabinol have also been explored as potential treatments, although results have been mixed.

In general, the medical community emphasizes the importance of identifying

and addressing reversible causes of dysgeusia, such as infections, nutritional deficiencies, and medication side effects. Clinicians are encouraged to inquire about dysgeusia in at-risk patients to better manage the condition and improve quality of life.

Non-pharmacological management strategies, such as dietary counseling and the use of flavor enhancers, have been explored, although evidence supporting their effectiveness is limited. Further research is needed to establish more effective treatment protocols and to understand the underlying mechanisms of dysgeusia, particularly in the context of post-viral conditions like those following SARS-CoV-2 infection.

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**EARACHES**

*ALTERNATIVE NAMES:* Ear pain is also known as earache or otalgia. Other alternative names for earaches include otitis and ear infection.

**DEFINITION / DESCRIPTION**

Ear pain (an earache) is a symptom of many health conditions. It could point to an underlying issue. Or it might mean you have an ear infection.

“Otalgia” (*oh-TAL-gee-uh*) is the medical name for ear pain. This pain might be dull, sharp, mild or severe. Some people have ear pain that comes and goes.

Most of the time, ear pain isn’t dangerous. But frequent earaches or pain that lasts longer than three days could point to something more serious.

**CAUSES**

Many things can make your ears hurt. Healthcare providers place ear pain in two categories:

1. Primary ear pain originates in your ears.
2. Secondary (referred) ear pain is when a condition unrelated to your ears causes ear pain. This happens because your ears and nearby body parts share the same nerves with your brain.

Common causes of primary ear pain are:

* Barotrauma (air or water pressure changes).
* Earwax buildup.
* Eustachian tube dysfunction.
* Foreign object in your ear.
* Inner ear infections.
* Middle ear infections.
* Ruptured eardrum.
* Swimmer’s ear.

Common causes of secondary ear pain are:

* Allergies.
* Colds.
* GERD.
* Toothaches.
* TMJ disorders.
* Tonsillitis.
* Sore throat.
* Sinusitis.

**RISK FACTORS**

Earaches can have various risk factors depending on the underlying cause. Common risk factors include

* recent upper respiratory tract infections, which increase the likelihood of otitis media. Children are more prone to ear infections, often pulling on their ears and showing signs of fussiness.

Other risk factors include

* trauma, such as from scuba diving or flying in an airplane, which can lead to barotrauma.

Additionally,

* individuals with a history of dental issues or problems with the temporomandibular joint (TMJ) may experience ear pain due to referred pain.

For adults, risk factors for earaches may also include conditions like

* myocardial infarction or
* thoracic aneurysms, although these are less common.

**SIGNS / SYMPTOMS**

Earache is most commonly described as a feeling of pressure in the ear. This feeling may begin gradually or suddenly, and it can be very severe. Other symptoms such as hearing loss, fever and feeling unwell usually indicate an ear infection.

When the ear canal is inflamed or if the eardrum ruptures, there may be drainage from the ear. If the eardrum ruptures because of a middle ear infection, the pain is often relieved because the pressure is reduced. In young children, the only signs of an ear infection may be fever, irritability and pulling at the ear.

**DIAGNOSIS METHODS**

Adults and older children with mild ear pain or pressure who do not have a fever or hearing loss usually do not need to see a doctor. This type of pain usually is caused by a blocked Eustachian tube.

If the ear pain is more severe, or there are other symptoms, it's a good idea to see a health professional. Your doctor will examine your ears, nose and throat, and use a device called an otoscope (a lighted instrument) to look inside the ears and check for redness and fluid buildup behind the eardrum. The doctor may blow a puff of air through the otoscope into your eye to see if the eardrum moves normally.

Your doctor may test your hearing. One way is to check how well you can hear fingers rubbed together near your ear.

***EXPECTED DURATION***

An earache will continue until the problem causing it goes away or is treated. If the pain is due to a blocked Eustachian tube, an over-the-counter decongestant may help open it up. Acetaminophen (Tylenol), ibuprofen (Advil, Motrin and others) or naproxen (Aleve) will decrease pain until the underlying condition is treated or goes away.

**TREATMENT OPTIONS**

Earache treatment depends on the cause. Over-the-counter (OTC) medications like acetaminophen (Tylenol®) or ibuprofen (Advil®) may be all you need for ear pain relief. But in some cases, your provider may prescribe medications in ear drops or pill form. These include:

* Antibiotics.
* Antifungals.
* Corticosteroids.

Sometimes, rest and a little TLC can do wonders. You can try these home remedies to soothe ear pain:

* Apply heat or use cold packs. Cold can reduce pain and inflammation while heat relaxes your muscles and improves blood flow.
* Elevate your head. This helps ease pressure inside your ear.
* Use over-the-counter ear drops. Ask your healthcare provider what type is best for your situation. Don’t use ear drops if you have a ruptured eardrum.

**PREVENTION TIPS**

Some people, particularly young children, are prone to recurring earaches. If a child continues to have frequent ear infections, the doctor may surgically insert a ventilation tube into the eardrum to prevent the ear from becoming blocked.

Children are more prone to ear aches if they: Breastfed infants are less likely to develop ear infections because breast milk contains antibodies that help to protect the baby from infection. Also, when a baby sucks on a bottle, the fluid is more likely to get pulled into the Eustachian tube, particularly if the infant drinks from a bottle while lying on his or her back. For this reason, it is better to hold the baby at least semi-erect during feeding.

* Have had ear infections before their first birthday
* Are frequently exposed to cigarette smoke
* Have a family history of ear infections
* Stay in daycare
* Were born premature or at low birth weight
* Are male (boys have more middle ear infections than girls).

**OUTLOOK / PROGNOSIS**

Most earaches resolve within several days. Even with more prolonged ear infections, the outlook is positive.

Earaches usually have a positive outlook and often resolve within a few days without specific treatment. Most earaches are not serious and can be managed with home remedies or over-the-counter medications. However, if the pain persists for more than three days or is accompanied by other symptoms such as fever, hearing loss, or severe pain, it is advisable to consult a healthcare provider. In some cases, earaches can be a symptom of an underlying condition, such as an ear infection, sinus issues, or dental problems, which may require targeted treatment. If left untreated, some ear infections can lead to complications such as mastoiditis or meningitis, but these are rare.

**POSSIBLE COMPLICATIONS**

Ear pain isn’t always a sign of something serious. But if it lingers for more than three days, you should see your healthcare provider. If you have an infection, it can spread to nearby structures like your jaw or skull. Left untreated, ear infections can lead to serious complications like mastoiditis or meningitis.

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

Sometimes, earaches go away on their own. But if you still have ear pain after three days, you should call your healthcare provider. You should also tell them if you develop:

* Chills.
* Ear drainage.
* Fever of 103 degrees Fahrenheit (39.4 degrees Celsius) or higher.
* Frequent ear aches.
* Nausea and vomiting.
* Hearing loss.
* Severe sore throat.
* Swelling or skin discoloration around your ear.

If your child has something stuck in their ear, schedule a visit with their pediatrician right away. This is especially true if you’ve tried to remove the object once with no success. Repeated removal attempts can increase the risk of ear injury. If you remove the object successfully, you should still call your healthcare provider if your child has symptoms like pain, ear drainage or muffled hearing.

**DIFFERENTIAL DIAGNOSIS**

* Acute Laryngitis
* Acute Otitis Media
* Adenoidectomy
* Allergic Fungal Sinusitis
* Allergic Rhinitis in Otolaryngology and Facial Plastic Surgery
* Barosinusitis
* Bell Palsy
* Chronic Sinusitis
* Complications of Otitis Media
* Contact Granulomas
* Deep Neck Infections
* Eustachian Tube Function
* External Ear Benign Tumors
* External Ear Inflammatory Diseases
* External Ear, Infections
* Infectious or Allergic Chronic Laryngitis
* Malignant Nasopharyngeal Tumors
* Malignant Otitis Externa
* Malignant Tonsil Tumor Surgery
* Malignant Tumors of the Base of Tongue
* Malignant Tumors of the Floor of the Mouth
* Malignant Tumors of the Nasal Cavity
* Malignant Tumors of the Sinuses
* Malignant Tumors of the Temporal Bone
* Mandibular Alveolar Fractures
* Medical Treatment for Acute Sinusitis
* Middle Ear, Eustachian Tube, Inflammation/Infection
* Middle Ear, Mastoiditis
* Neck Cancer With Unknown Primary Site
* Neck, Cervical Metastases, Detection
* Neck, Cervical Metastases, Surgery
* Otitis Media With Effusion
* Parapharyngeal Space Tumors
* Parotitis
* Skull Base, Petrous Apex, Infection
* Skull Base, Petrous Apex, Tumors
* Surgical Treatment of Acute Maxillary Sinusitis
* Surgical Treatment of Acute Sphenoid Sinusitis
* Surgical Treatment of Chronic Maxillary Sinusitis
* Temporal Bone Fractures
* Thyroid Cancer
* Tonsillectomy
* Tonsillitis and Peritonsillar Abscess
* Zygomaticomaxillary Complex Fractures

**EPIDEMIOLOGY**

In a study of US emergency department (ED) patients with otologic complaints, Kozin et al found that the most commonly diagnosed conditions were otitis media not otherwise specified (NOS) (60.6%), infected otitis externa NOS (11.8%), and otalgia NOS (6.8%). The data was drawn from a weighted total of 8,611,282 ED visits for otologic problems between 2009 and 2011.

In a Korean study of 294 patients with otalgia, the prevalence of primary otalgia was found to be higher in children than in adults and in men than in women, while referred otalgia was more likely to occur in adults in general and in women in particular. The study, by Kim et al, also found that neuralgia occurred more frequently in women than in men with referred otalgia.

***Procedures***

When the history and physical examination findings are inconclusive, use of local anesthesia may help localize the problem.

The nasal cavity may be sprayed with topical Pontocaine with a vasoconstrictor. After a few minutes of decongestion, some patients with sinus-related pathology experience a relief of headaches, facial pain, and aural fullness.

Cetacaine or a 4% lidocaine gargle to anesthetize the oropharynx and larynx can numb pharyngitis or other problem causing referred otalgia.

Injectable 1% Xylocaine can be used to identify neuromuscular trigger points and can be useful in the diagnosis of myalgias and neuralgias.

Referred signals from the chorda tympani may be numbed via a transcanal or transtympanic injection approach. A few drops of 4% lidocaine or eutectic mixture of local anesthetics 14 (EMLA 14) in the external auditory meatus may help differentiate between a sensitive ear canal and deep temporal pain. Maintain a high index of suspicion for an occult upper respiratory tract tumor, intracranial tumor, intratemporal disease, sinus-related pathology, autoimmune disease, and Eustachian tube dysfunction. Consider laboratory evaluation.

**TREATMENT OPTIONS**

***Ear pain (otalgia) treatment, including drug information and their side effects***

1. Pain Management

* Over-the-Counter (OTC) Painkillers:
  + Acetaminophen (Paracetamol) and Ibuprofen are first-line treatments to relieve ear pain and reduce fever.
  + Dosage: Follow label instructions; avoid aspirin in children and teenagers due to risk of Reye’s syndrome.
  + Side Effects:
    - Acetaminophen: Generally well tolerated but can cause liver toxicity in overdose.
    - Ibuprofen: May cause gastrointestinal upset, kidney issues, or allergic reactions.
* Prescription Pain Medications:
  + In severe cases, short courses of opioids (e.g., hydrocodone-acetaminophen) may be prescribed but are generally avoided due to side effects and dependency risk.

2. Topical Ear Drops

* Antipyrine-Benzocaine Otic Drops:
  + Used to relieve pain and swelling in middle ear infections, often alongside antibiotics.
  + Dosage: Usually every 1 to 2 hours as needed; follow prescription instructions.
  + Side Effects: Rare but may include local irritation, allergic reactions, or dizziness.
  + Important: Only use if the eardrum is intact (no perforation).
* Other Numbing Ear Drops:
  + May provide short-term relief but should be used cautiously and not if the eardrum is perforated.

3. Antibiotics

* Indications:
  + Not all ear infections require antibiotics; many resolve spontaneously, especially in children with mild symptoms.
  + Antibiotics are recommended for:
    - Children under 6 months.
    - Severe symptoms or high fever.
    - Bilateral infections in children under 2 years.
    - Symptoms persisting beyond 48-72 hours or worsening.
  + Common antibiotics: Amoxicillin (first-line), amoxicillin-clavulanate, cefdinir, azithromycin (if allergic).
  + Side Effects: Allergic reactions, gastrointestinal upset, diarrhea, antibiotic resistance risk.

4. Other Treatments

* Warm Compress: Applying a warm cloth to the affected ear may soothe pain.
* Rest and Hydration: Supportive care to help recovery.
* Removal of Foreign Bodies or Earwax: If present, professional removal is necessary to relieve pain.

**PREDEFINED Q & A SETS**

***Question 1: “What is otalgia (ear pain)?”***

***Answer: “***Otalgia refers to pain in the ear, which can arise from problems within the ear itself (primary otalgia) or from pain referred from nearby structures such as the throat, jaw, or neck (secondary otalgia).***”***

***Question 2: “What are the common causes of ear pain?”***

***Answer: “***

* Primary causes:
  + Acute otitis media (middle ear infection)
  + Otitis externa (outer ear infection)
  + Cerumen impaction (earwax blockage)
  + Trauma or foreign body in the ear canal
  + Herpes zoster oticus
  + Eustachian tube dysfunction
* Secondary (referred) causes:
  + Temporomandibular joint (TMJ) disorders
  + Dental problems (caries, abscess)
  + Pharyngitis, tonsillitis, or peritonsillar abscess
  + Cervical spine disorders
  + Neuralgias (trigeminal, glossopharyngeal)
  + Cardiac ischemia (rarely)
  + Tumors in head and neck region***”***

***Question 3: “What symptoms often accompany ear pain?”***

***Answer: “***

* Ear drainage or discharge
* Hearing loss or muffled hearing
* Ear fullness or pressure
* Fever
* Redness or swelling of the ear or ear canal
* Jaw pain or clicking (if TMJ involved)
* Sore throat or neck pain (if referred pain)***”***

***Question 4: “How is ear pain evaluated?”***

***Answer: “***

* Detailed history focusing on:
  + Duration, severity, and location of pain
  + Associated symptoms (hearing loss, discharge, fever)
  + Recent upper respiratory infections, trauma, swimming, or air travel
  + Past ear problems or surgeries
  + Tobacco and alcohol use
* Physical examination including:
  + Otoscopic exam to assess ear canal and tympanic membrane
  + Examination of oral cavity, throat, neck, and jaw
* Additional tests (if needed):
  + Audiometry
  + Imaging (CT or MRI) if tumor or complicated infection suspected***”***

***Question 5: “When should I see a doctor for ear pain?”***

***Answer: “***

* Severe or worsening pain
* Ear discharge or bleeding
* Hearing loss or dizziness
* Fever or signs of systemic infection
* Pain lasting more than a few days without improvement
* History of trauma or foreign body in ear
* If you have risk factors for malignancy (age >50, tobacco/alcohol use)***”***

***Question 6: “How is ear pain treated?”  
Answer: “***

* Pain relief:
  + Acetaminophen or ibuprofen for mild to moderate pain
  + Prescription pain medications in severe cases (used cautiously)
* Infections:
  + Antibiotics for bacterial otitis media or otitis externa when indicated
  + Topical antibiotic or analgesic ear drops if eardrum intact
* Other treatments:
  + Warm compresses
  + Removal of earwax or foreign bodies by healthcare professional
  + Treat underlying causes such as TMJ disorders or dental problems
* Surgical intervention:
  + Myringotomy or ear tube placement for recurrent middle ear infections***”***

***Question 7: “Can ear pain be prevented?”***

***Answer: “***

* Avoid inserting objects into the ear canal
* Protect ears from excessive moisture (dry ears after swimming)
* Manage allergies and upper respiratory infections promptly
* Maintain good dental hygiene
* Avoid smoking and excessive alcohol consumption***”***

***Question 8: “What are possible complications if ear pain is left untreated?”***

***Answer: “***

* Spread of infection to mastoid bone (mastoiditis)
* Hearing loss
* Chronic otitis media or perforated eardrum
* Facial nerve palsy (in severe infections)
* Abscess formation or systemic infection***”***

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Good morning. What brings you in today?

Patient: Hello, doctor. I’ve been having a sharp pain in my right ear for the past two days. It’s really uncomfortable.

Doctor: I’m sorry to hear that. Is the pain constant, or does it come and go?

Patient: It’s mostly constant, but it gets worse when I chew or touch my ear.

Doctor: Do you have any other symptoms like hearing loss, ear discharge, fever, or dizziness?

Patient: No discharge or dizziness, but I do have a mild fever and some difficulty hearing out of that ear.

Doctor: Have you had any recent colds, sinus infections, or exposure to water, like swimming?

Patient: Yes, I had a cold last week, and I went swimming a few days ago.

Doctor: Okay. Let me examine your ear. (Uses otoscope to look inside the ear canal and eardrum) I see some redness and swelling in your ear canal, which suggests otitis externa, commonly known as swimmer’s ear.

Patient: What causes that?

Doctor: It’s usually caused by water trapped in the ear canal, leading to bacterial infection. It can be painful, especially when the ear is touched or moved.

Patient: How do we treat it?

Doctor: I’ll prescribe antibiotic ear drops to clear the infection and a pain reliever like ibuprofen to reduce pain and inflammation. Keep your ear dry and avoid swimming until it heals. If the pain worsens or you develop discharge or fever, please come back immediately.

Patient: How long will it take to get better?

Doctor: Most cases improve within a week with proper treatment. Make sure to complete the full course of ear drops even if you start feeling better sooner.

Patient: Thank you, doctor. I’ll follow your advice.

Doctor: You’re welcome. Take care and don’t hesitate to call if you have any questions.

**RECENT GUIDELINES OR UPDATES**

Earaches can have various causes, including glue ear, earwax build-up, objects stuck in the ear, and perforated eardrums. Ear infections, which can lead to earaches, are categorized into inner, middle, and outer ear infections, each with different causes such as viral or bacterial infections, irritants, or fungal infections.

Recent guidelines suggest that most ear infections clear up in a week or two without treatment, and a wait-and-see approach is recommended for certain cases, especially in children. For symptoms that persist or are severe, it is important to consult a healthcare professional. Over-the-counter painkillers such as paracetamol or ibuprofen can help relieve earache, but it is important to follow the instructions and consult a healthcare provider if necessary. If an ear infection is diagnosed, treatment may involve ear drops or other medical interventions depending on the cause and severity.

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**EARS AND ALTITUDE (BAROTRAUMA)**

*ALTERNATIVE NAMES:* Air barotrauma is also known as airplane ear, ear barotrauma, and aerotitis media. Other related terms include middle ear barotrauma and ear squeeze.

**DEFINITION / DESCRIPTION**

Barotrauma of the ear occurs when the pressure inside of the ear does not match the pressure outside of the ear. Mismatched pressures can cause discomfort, loss of hearing, or injury (a ruptured eardrum). This usually occurs when there are rapid changes in the air pressure of our environment and the ear can't adjust. For example, when you take off in an airplane or come up too quickly while scuba diving.

The structures of the ear are divided into three groups called the external ear, the middle, and inner ear. The external and middle ear are separated by a thin piece of tissue called the tympanic membrane. Also called the eardrum, the tympanic membrane receives sound and carries the vibration to the tiny bones inside the ear. The Eustachian tube regulates the pressure inside of the middle ear.

The Eustachian tube, also called the auditory tube, is normally collapsed but opens when we swallow or yawn allowing outside air to enter the middle ear. This is an automatic response and frequently occurs while we experience rapid changes in ambient pressure traveling up or down steep hills or scuba diving, taking off or landing in an airplane, or participating in any other activity which involves significant altitude changes.

Barotrauma occurs when there is a dysfunction of the Eustachian tube (also called auditory tube dysfunction). When these important structures are unable to perform their function of regulating the pressure inside of the ear pain, bulging or rupture of the eardrum may occur. The most common cause of this is flying, and therefore ear barotrauma is also sometimes referred to as airplane ear.

One common example of a condition that might result in a Eustachian tube dysfunction is congestion due to an upper respiratory infection. Untreated chronic allergies are another common cause of Eustachian tube dysfunction. In these cases, congestion and inflammation prevent the Eustachian tube from opening and closing properly.

These underlying conditions causing Eustachian tube dysfunction can also lead to sinus barotrauma which is related but not exactly the same as barotrauma of the ear. The biggest symptom of sinus barotrauma is a severe headache or pain behind the eyes.

Less commonly barotrauma can occur in patients undergoing hyperbaric oxygen therapy.

***Barotrauma types***

Healthcare providers classify barotrauma by the part of your body that it affects. Barotrauma types include:

* Ear barotrauma (airplane ear) affects your middle ears
* Gastrointestinal barotrauma may affect your stomach or intestines in your gastrointestinal tract
* Pulmonary barotrauma affects your lungs
* Sinus barotrauma (sinus squeeze or barosinusitis) puts pressure on your sinuses

**CAUSES**

Barotrauma happens when air or water pressure changes faster than your body is able to adapt. That can happen while flying in an airplane or scuba diving.

**RISK FACTORS**

Ear barotrauma, also known as airplane ear, occurs due to pressure imbalances between the middle ear and the environment, often during air travel or scuba diving.

Several risk factors contribute to the development of this condition. Individuals with a history of ear, nose, and throat (ENT) diseases are at higher risk, as these conditions can affect the normal functioning of the eustachian tube, which regulates pressure in the middle ear.

Additionally, younger age has been identified as a predictor of delayed ear pain in subjects exposed to high altitudes, while older age is associated with increased risk at lower altitudes.

Other risk factors include congestion from a cold, allergies, or sinus infections, which can block the eustachian tube and prevent proper pressure equalization.

People with a narrow eustachian tube, such as infants and toddlers, are also more susceptible to ear barotrauma. Furthermore, activities involving rapid changes in altitude or pressure, such as flying, scuba diving, or riding in elevators, increase the likelihood of experiencing barotrauma.

Preventive measures include swallowing, yawning, chewing gum, or using special earplugs to equalize pressure. For individuals with chronic issues, medical interventions such as nasal sprays, decongestants, or even surgical options may be recommended.

**SIGNS / SYMPTOMS**

Barotrauma causes different symptoms. Your symptoms will depend on the part of your body that air and water pressure changes affect.

***Ear barotrauma symptoms***

Ear barotrauma (airplane ear) symptoms may include:

* A feeling that your ears are full or stuffed up
* Dizziness
* Hearing issues
* Nausea and vomiting
* Severe ear pain

***Gastrointestinal barotrauma symptoms***

You may have this condition if you swallow air while doing deep-water diving or scuba diving. Symptoms include:

* Belching
* Belly pain
* Cramps
* Feeling of fullness in your belly
* Flatulence (farting)

Rarely, gastrointestinal barotrauma may cause a hole in your stomach or your intestines. Symptoms are severe belly pain or nausea and vomiting. It may hurt when you touch your belly. Go to an emergency room right away if you have these symptoms.

***Pulmonary (lung) barotrauma symptoms***

Pulmonary barotrauma can happen during free deep-water or scuba diving. Symptoms often include:

* Bloody froth at your mouth
* Bloody nose
* Chest pain
* Cough
* Shortness of breath (dyspnea)

Sinus barotrauma symptoms

You may experience sinus barotrauma symptoms while doing free diving or scuba diving. Symptoms may include:

* Bloody nose
* Facial pain
* Headache
* Nasal congestion

**DIAGNOSIS METHODS**

Diagnosis of barotrauma involves an accurate patient history along with a physical examination of the ear. Scuba diving or traveling by airplane are causes of ear barotrauma, particularly if the symptoms include dizziness or ear pain. If your healthcare provider suspects barotrauma, they will perform an ear exam. Commonly it will look similar to an ear infection, however, there may be blood that is present in the ear canal.

A healthcare provider will ask about your symptoms. They’ll ask if symptoms started after you did things like fly in an airplane or diving. A provider will do a physical exam. They’ll use different tests to diagnose specific barotrauma types.

#### ***Ear barotrauma diagnosis***

Healthcare providers may look inside your ear with an otoscope. This is a special lighted instrument that providers use to check eardrum damage, signs of infection or other issues. They may do other tests like:

* Hearing test
* MRI scan to view your inner ear

#### ***Gastrointestinal barotrauma diagnosis***

A healthcare provider may do the following tests if they think you have a GI rupture:

* Chest X-ray
* CT scan

***Pulmonary barotrauma diagnosis***

Healthcare providers may do the following tests to diagnose pulmonary barotrauma:

* Arterial blood gas test
* Chest X-ray
* EKG

***Sinus barotrauma diagnosis***

A provider will examine your nose. Tests may include:

* Endoscopy to look at the inside of your nose
* CT scan to get images of your sinuses

**TREATMENT OPTIONS**

Treatment depends on the barotrauma type. Potential treatments for barotrauma are:

* Nasal decongestants for ear and sinus barotrauma
* Hyperbaric oxygen therapy and IV fluids for pulmonary barotrauma. You may need more intensive treatment if you have severe symptoms

Typically, people don’t need treatment for gastrointestinal barotrauma. The exception is when the condition causes a perforation that requires surgery.

**PREVENTION TIPS**

Planning for pressure changes is the best way to prevent barotrauma from occurring. When flying, it is helpful for adults to eat, chew gum or suck on candy. This ensures that frequent swallowing occurs. Infants and toddlers should suck on a pacifier, bottle or sippy cup. Special earplugs have been designed to help prevent barotrauma while flying. They are available over the counter and in many airports. Unfortunately, these earplugs cannot be used while diving.

Prevention is the best treatment for barotrauma. While incidences of barotrauma usually heal on their own, it is important to see a healthcare provider as severe cases can lead to permanent hearing loss. Vertigo and hearing loss are symptoms that should be evaluated by a healthcare provider immediately.

**OUTLOOK / PROGNOSIS**

Your prognosis or expected outcome depends on your situation. For example, if you have an airplane ear, you may not need any treatment. But you may need surgery if barotrauma damages your eardrum. If you have a form of barotrauma, a healthcare provider is your best resource for information. They’ll tell you what you can expect.

## **Living With**

Barotrauma covers a wide range of medical conditions. Some are more serious than others. Contact your healthcare provider if you’ve experienced significant air and water pressure changes that might affect your health.

**POSSIBLE COMPLICATIONS**

Ear barotrauma can lead to several complications, including serous effusion, serosanguinous effusion, frank bleeding into the middle ear, perforation of the tympanic membrane (TM), and inner ear barotrauma (IEBT). These complications may result in transient or chronic hearing loss, vertigo, and gait instability. In severe cases, ear barotrauma can cause a ruptured eardrum, which may take several months to heal completely. If left untreated, chronic ear barotrauma can lead to persistent symptoms and further complications, such as hearing loss, tinnitus, and balance issues. Additionally, severe barotrauma may cause the eardrum to appear similar to an ear infection, requiring medical intervention such as antibiotics or surgery.

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

You should talk to a healthcare provider if ear or sinus barotrauma symptoms don’t go away or if they get worse. But gastrointestinal and pulmonary barotrauma may cause complications that can be life-threatening. You should go to an emergency room if you have:

* Gastrointestinal barotrauma and you have sudden severe belly pain
* Pulmonary barotrauma and you have chest pain or shortness of breath

**DIFFERENTIAL DIAGNOSIS**

1. Ear Barotrauma (Airplane Ear)
   * Caused by failure of the eustachian tube to equalize pressure between the middle ear and external environment during rapid altitude changes (e.g., flying, diving, driving in mountains).
   * Symptoms: Ear fullness, pressure, pain, muffled hearing, dizziness, sometimes nosebleeds or eardrum injury.
   * Usually resolved with pressure equalization maneuvers or time.
   * Severe cases may cause eardrum rupture or hearing loss.
2. Eustachian Tube Dysfunction (ETD)
   * Inability of the eustachian tube to open properly, leading to pressure imbalance and symptoms similar to barotrauma.
   * May be caused by allergies, upper respiratory infections, or anatomical abnormalities.
   * Symptoms overlap with barotrauma: ear fullness, discomfort, muffled hearing.
3. Middle Ear Infection (Otitis Media)
   * Infection of the middle ear can cause pain and fullness, sometimes triggered or worsened by pressure changes.
   * May present with fever, ear discharge, hearing loss.
   * Needs to be differentiated from barotrauma by otoscopic exam.
4. Inner Ear Barotrauma
   * More severe form involving injury to the inner ear structures due to pressure changes.
   * Symptoms: vertigo, tinnitus, hearing loss, nausea, vomiting.
   * Requires urgent evaluation and sometimes surgical intervention.
5. Temporal Bone Fracture or Trauma
   * Trauma related to pressure changes or other causes can mimic barotrauma symptoms.
   * May cause persistent hearing loss, dizziness, or bleeding.
6. Sinus Barotrauma
   * Pressure changes can cause sinus pain and referred ear discomfort.
   * May cause facial pain, headache, nasal congestion.
7. Allergic Rhinitis or Nasal Congestion
   * Causes eustachian tube blockage leading to symptoms similar to barotrauma.
8. Perforated Eardrum (Tympanic Membrane Rupture)
   * Can result from severe barotrauma or infection.
   * Symptoms: sudden ear pain relief, hearing loss, fluid or blood discharge.

**EPIDEMIOLOGY**

* Prevalence in Divers:
  + Middle ear barotrauma (MEBT) is the most common diving-related injury, accounting for nearly 50% of all reported diving injuries.
  + A Finnish survey of 1881 military and recreational divers found that 81% had experienced middle ear barotrauma and 49% had sinus barotrauma.
  + Among divers, the overall incidence of mild barotrauma can be as high as 40%, with severe barotrauma occurring in about 27% of cases.
  + Tympanic membrane perforations are relatively rare in these populations.
* Incidence in Hyperbaric Oxygen Therapy (HBOT) Patients:
  + Middle ear barotrauma is the most common complication of HBOT, with reported incidences ranging from 8% to nearly 69% depending on patient population and treatment protocols.
  + One study reported an incidence of 19% among 100 patients undergoing 1216 HBOT sessions, with most cases being mild to moderate in severity.
  + Proper patient counseling and slow compression rates reduce the incidence and severity of barotrauma during HBOT.
* Risk Factors:
  + Frequent upper respiratory infections, smoking, pollen allergies, and inability to auto-inflate the middle ear increase risk.
  + Age, sex, and presence of comorbidities show inconsistent associations with barotrauma risk.
* Other Contexts:
  + Barotrauma is common during rapid altitude changes such as flying or mountain driving but exact prevalence data are limited.
  + Symptoms often occur in individuals with eustachian tube dysfunction or nasal congestion.

**PREDEFINED Q & A SETS**

***Question 1: “What is ear barotrauma?”***

***Answer: “***Ear barotrauma is ear pain or discomfort caused by a difference in pressure between the inside of the ear and the surrounding air or water. It commonly occurs during rapid altitude changes such as flying, scuba diving, or driving in mountains.***”***

***Question 2: “What causes ear barotrauma?”***

***Answer: “***Ear barotrauma happens when the eustachian tube, which connects the middle ear to the back of the nose and throat, fails to equalize pressure properly. This can be due to:

* Rapid changes in air or water pressure (e.g., airplane takeoff/landing, diving)
* Blockage of the eustachian tube from allergies, colds, sinus infections, or inflammation
* Anatomical differences or irritants like tobacco smoke
* Hormonal changes such as pregnancy***”***

***Question 3: “What are the symptoms of ear barotrauma?”***

***Answer: “***Symptoms can range from mild to severe and include:

* Ear fullness or pressure
* Ear pain or discomfort
* Mild to moderate hearing loss or muffled hearing
* Dizziness or vertigo
* Ringing in the ears (tinnitus)
* In severe cases, bleeding or fluid discharge from the ear, eardrum injury***”***

***Question 4: “How long does ear barotrauma last?”***

***Answer: “***Mild cases often resolve on their own within minutes to hours after pressure normalizes. Severe cases, especially those involving eardrum injury, may take weeks to months to heal. Surgery may be necessary if the eardrum does not heal spontaneously.***”***

***Question 5: “How is ear barotrauma treated?”***

***Answer: “***

* Most mild cases improve without treatment.
* Home remedies include swallowing, yawning, chewing gum, or performing the Valsalva maneuver to equalize ear pressure.
* Nasal decongestants or antihistamines may help open the eustachian tube if congestion is present.
* Pain relievers like acetaminophen or ibuprofen reduce discomfort.
* Infections require antibiotics.
* Chronic or severe cases may need surgical interventions such as myringotomy or ear tube placement.***”***

***Question 6: “How can ear barotrauma be prevented?”***

***Answer: “***

* Avoid flying or diving with a cold, sinus infection, or allergies.
* Use nasal decongestants before altitude changes if prone to congestion (consult a doctor first).
* Perform pressure equalization maneuvers during ascent and descent (e.g., swallowing, yawning).
* Avoid sleeping during airplane descent to maintain a swallowing reflex.
* Use earplugs designed for pressure regulation during flights or diving.

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

***Answer: “***Seek medical attention if you experience:

* Severe or worsening ear pain
* Persistent hearing loss or dizziness
* Ear bleeding or fluid discharge
* Symptoms lasting more than a few days without improvement
* Signs of infection such as fever or swelling around the ear***”***

**TREATMENT OPTIONS**

***Ear Barotrauma Treatment, Drug Information, and Side Effects***

## 1. Self-Care and Symptom Relief

* Pressure Equalization Maneuvers:
  + Yawning, swallowing, chewing gum, or performing the Valsalva maneuver (gently blowing with nose pinched) help open the eustachian tube to equalize pressure.
* Pain Relief:
  + Over-the-counter analgesics such as acetaminophen or ibuprofen reduce pain and inflammation.
  + Side effects:
    - *Acetaminophen:* Generally safe but risk of liver toxicity in overdose.
    - *Ibuprofen:* Possible gastrointestinal upset, kidney effects, or allergic reactions.

## 2. Medications

| **Medication Type** | **Purpose** | **Common Side Effects** | **Notes** |
| --- | --- | --- | --- |
| Nasal Decongestants  (e.g., oxymetazoline, pseudoephedrine) | Reduce nasal and eustachian tube congestion to facilitate pressure equalization | Nasal dryness, rebound congestion (if used >3 days), increased blood pressure | Use short-term; contraindicated in hypertension or cardiovascular disease without medical advice |
| Oral Decongestants  (pseudoephedrine) | Same as nasal decongestants | Nervousness, insomnia, increased heart rate | Use cautiously; not recommended for long-term use |
| Antihistamines  (e.g., loratadine, cetirizine) | Reduce allergy-related swelling that may block eustachian tube | Drowsiness (less with second-generation), dry mouth | Useful if allergies contribute to symptoms |
| Antibiotics  (e.g., amoxicillin) | Treat or prevent secondary bacterial ear infections if eardrum is ruptured or infection suspected | Allergic reactions, gastrointestinal upset, diarrhea | Prescribed only if infection develops or risk is high |
| Oral Steroids  (e.g., prednisone) | Reduce severe inflammation in complicated cases | Increased blood sugar, mood changes, immunosuppression | Used rarely and under specialist supervision |

## 3. Surgical Treatments

* Myringotomy: A small incision in the eardrum to relieve pressure and drain fluid.
* Tympanostomy Tubes (Ear Tubes): Small tubes inserted into the eardrum to ventilate the middle ear and prevent recurrent barotrauma, especially in chronic cases or frequent flyers/divers.
* Surgery is reserved for severe, persistent, or complicated barotrauma (e.g., non-healing perforation, chronic effusion).
* Keep the ear dry to prevent infection, especially if the eardrum is perforated.
* Avoid flying, diving, or rapid altitude changes until symptoms resolve.
* Treat underlying nasal congestion or allergies proactively before altitude exposure.

**RECENT GUIDELINES OR UPDATES**

Ear barotrauma is a condition caused by pressure differences between the inside of the ear and the external environment, often resulting in pain, hearing loss, or other ear-related symptoms. Recent guidelines and updates highlight the importance of understanding the mechanisms, prevention, and treatment of this condition.

A 2023 update from StatPearls discusses the role of Eustachian tube dysfunction (ETD) and middle ear barotrauma (MEBT) as common complications of diving and hyperbaric oxygen treatment. It emphasizes the importance of equalization maneuvers, such as the Valsalva, Béance tubaire volontaire (BTV), Toynbee, Frenzel, Edmonds, and Lowry techniques, to prevent barotrauma during activities involving pressure changes. Additionally, the use of newer devices like the Ear Popper has been explored as a potential aid in equalizing ear pressure.

In terms of treatment, most cases of ear barotrauma resolve on their own, but severe cases may require medical intervention, including medications, surgery, or the placement of ventilation tubes. Prevention strategies include avoiding flying or diving when congested, using decongestants or antihistamines, and employing techniques to open the Eustachian tube during pressure changes.

For individuals experiencing symptoms of ear barotrauma, it is important to consult a healthcare provider for proper diagnosis and management. The condition can sometimes lead to complications such as a ruptured eardrum, which may require surgical repair.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you’ve been experiencing ear pain after your recent flight. Can you tell me more about your symptoms?

Patient: Yes, doctor. My ears felt really full and painful as the plane was landing, and my hearing seemed a bit muffled. The pain has lasted since then.

Doctor: What you’re describing sounds like ear barotrauma. This happens when there’s a pressure difference between the air outside your ear and the air inside your middle ear, usually because the eustachian tube isn’t equalizing the pressure properly during altitude changes.

Patient: Why does that happen?

Doctor: Normally, the eustachian tube opens when you swallow or yawn, letting air into the middle ear to balance pressure. If it’s blocked—due to a cold, allergies, or inflammation—the pressure can’t equalize, causing the eardrum to stretch and become painful.

Patient: Is this dangerous? What can I do to feel better?

Doctor: Most cases are mild and improve within a few hours to days. You can try swallowing, yawning, chewing gum, or gently performing the Valsalva maneuver—pinching your nose and gently blowing—to help open the eustachian tube. Over-the-counter pain relievers like acetaminophen or ibuprofen can reduce discomfort.

Patient: What if the pain doesn’t go away or gets worse?

Doctor: If you experience severe pain, hearing loss, dizziness, or fluid or blood coming from your ear, you should come back immediately. Sometimes, barotrauma can cause a small tear in the eardrum, which usually heals on its own but may require medical attention.

Patient: How can I prevent this in the future?

Doctor: Avoid flying or diving when you have a cold or nasal congestion. Using nasal decongestant sprays before flying can help, but only for short-term use and after consulting your doctor. Also, try to stay awake during descent and use swallowing or yawning techniques to equalize pressure.

Patient: Thank you, doctor. I’ll try these tips and see how it goes.

Doctor: You’re welcome. If your symptoms persist or worsen, don’t hesitate to get in touch.

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**EAR DRAINAGE**

*ALTERNATIVE NAMES:* Ear drainage is also referred to as otorrhea. It can include various substances such as ear wax, clear fluid, or pus, and it may indicate an ear infection, injury, or other conditions.

**DEFINITION / DESCRIPTION**

Otorrhea is drainage that comes out of your ear. Sometimes, people refer to otorrhea as “runny ears” or “watery ears.”

Most commonly, otorrhea is the result of a ruptured eardrum from an ear infection. When there’s a hole in your eardrum, the fluid in your middle ear drains out into your ear canal. But other conditions can cause otorrhea too, including swimmer’s ear, an unknown object stuck in your ear or, less commonly, head trauma.

***Is otorrhea an infection?***

Although the most common reason for otorrhea is infection, having otorrhea doesn’t necessarily mean you have one.

In most cases, otorrhea is a symptom of a middle ear infection (otitis media) or an outer ear infection/inflammation (otitis externa). But otorrhea can also occur if you have an unknown object stuck in your ear. Less commonly, the condition can develop following a major head injury.

Otorrhea is most common in children, but it affects adults too. In children, the condition is usually associated with ear infections. Trauma or injury often causes otorrhea in adults.

Otorrhea is also the presentation of middle ear infection after ear tube placement. It occurs in up to 17% of cases. If your child has ear tubes, you may be advised to use antibiotic drops to stop the drainage. If the drainage doesn't stop after a course of antibiotic drops, your child's healthcare provider will usually have them come in to investigate further.

Children or adults who have otorrhea due to otitis externa or swimmer’s ear can reduce the risk of otorrhea by wearing specialized ear plugs when in the water. Or you can coat a cotton ball in petroleum jelly and place it in your ear canal.

***Types of otorrhea***

There are five types of otorrhea:

1. Purulent (contains pus).
2. Serous (contains serum, a protein-rich liquid in your blood).
3. Bloody (contains blood).
4. Mucoid (contains mucus).
5. Clear (thin and watery).

Otorrhea is very common. It’s associated with several harmless (benign) and serious conditions. Most commonly, it’s a condition that develops due to ear infections.

**CAUSES**

Common otorrhea causes include:

* Ruptured eardrum.
* Middle ear infections (acute and chronic).
* Outer ear infections, such as swimmer’s ear or fungal yeast infections of your ear canal.
* Unknown object stuck in your ear.

Less common otorrhea causes include:

* An abnormal skin growth behind your eardrum (cholesteatoma).
* Fracture at the base of your skull.
* Cancer of your ear canal.
* Malignant (necrotizing) external otitis (a severe infection of your external auditory canal and skull base).

***Is otorrhea contagious?***

Otorrhea itself isn’t contagious nor are ear infections in general. But if you have a cold as the result of an ear infection, it can spread to other people through coughing or sneezing.

**SIGNS / SYMPTOMS**

The main symptom of otorrhea is drainage from your ear. This drainage may be odorless or it may smell foul. It can be thin or thick in consistency and clear, yellowish or green in color.

Other common otorrhea symptoms include:

* Ear pain.
* Itching.
* Ringing in your ear (tinnitus).

Some people develop more serious symptoms, including:

* Fever.
* Redness (erythema) of the skin around your ear.
* Hearing loss.
* Cranial nerve dysfunction, such as difficulty swallowing, speaking or seeing.
* Vertigo.

These people may have also had a history of recent head trauma.

People who have diabetes or a compromised immune system have a higher risk for complications. Be sure to call your healthcare provider right away if you develop any of the symptoms listed above.

**DIAGNOSIS METHODS**

Your healthcare provider will perform a physical examination, which generally includes:

* Checking your vital signs to see if you have a fever.
* Inspecting your ear canal to check for drainage, infection or a ruptured eardrum.
* Feeling around your ear, jaw and neck for swelling or other abnormalities.
* Examining the skin around your ear for redness and inflammation.

In many cases, a physical examination is all that’s necessary to diagnose otorrhea. But your healthcare provider may also recommend some tests to confirm your diagnosis, including:

* Audiometry: This test measures the range and sensitivity of your sense of hearing.
* CT scan: This imaging test can tell your healthcare provider if infection has spread beyond your middle ear.
* MRI: If you’ve sustained head trauma, your provider may use magnetic resonance imaging to detect cerebrospinal fluid (CSF) leaks.
* Cranial nerve examination: If you’ve had recent head trauma — or if you have difficulty seeing, swallowing or speaking — your provider will test your cranial nerves for proper function.
* Culture: Your provider may sample the drainage and see if any bacteria or fungi grow from it.

**TREATMENT OPTIONS**

Otorrhea treatment focuses on the cause of ear drainage. For example, if otorrhea is the result of a bacterial infection in your middle ear, your healthcare provider will likely prescribe antibiotics. Your provider will likely treat outer ear infections with antibiotic ear drops.

If you have a ruptured eardrum, it may heal on its own in a few weeks. But some people need surgery (tympanoplasty) to close the hole.

If the cause isn’t immediately determined, your provider may refer you to a specialist. People who have chronic ear infections may need to see an otolaryngologist (ENT). If head trauma is a suspected cause, your provider will likely refer you to a neurosurgeon for further evaluation and treatment.

**PREVENTION TIPS**

As most otorrhea causes are unavoidable, you can’t completely prevent the condition. But in people who have repeated episodes of swimmer’s ear, using specialized ear plugs when swimming or bathing can help reduce the risk of ear drainage.

**OUTLOOK / PROGNOSIS**

Most of the time, otorrhea treatment is straightforward. Your healthcare provider will likely prescribe oral antibiotics or antibiotic ear drops to clear up any infection.

If you or your child has chronic ear infections, your provider may refer you to an ENT for more testing.

When otorrhea is a side effect of a recent head injury, your provider will immediately refer you to a neurosurgeon to determine next steps. This is an emergency that needs immediate attention.

***How long does otorrhea last?***

Otorrhea may be short-term (acute) or long-term (chronic). How long it lasts depends on the cause.

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

If you have ear drainage that lasts for more than three days, you should call your healthcare provider to schedule an appointment. You should also schedule an appointment right away if you’re having pain, fevers or redness around your ear or neck. Otorrhea is a symptom of several different conditions, both benign and serious. Prompt diagnosis is important.

If you’ve developed ear drainage following a recent head trauma or injury, call 911 or head to your nearest emergency room right away. You should also seek immediate care if you have trouble swallowing, speaking or seeing.

**DIFFERENTIAL DIAGNOSIS**

## Common Causes of Ear Drainage

1. Acute Otitis Media with Perforation
   * Sudden onset middle ear infection causing eardrum rupture and pus drainage.
   * Symptoms: Severe ear pain initially relieved by discharge, possible fever, hearing loss.
   * Common in children.
2. Chronic Otitis Media
   * Persistent middle ear infection with eardrum perforation or cholesteatoma.
   * Symptoms: Long-standing foul-smelling discharge, hearing loss, less pain than acute infections.
   * May cause damage to ear structures.
3. Otitis Externa (Swimmer’s Ear)
   * Infection or inflammation of the external ear canal.
   * Symptoms: Itching, pain worsened by ear movement, redness, scaling, discharge often clear or purulent.
   * Risk factors: Swimming, trauma, eczema, hearing aids.
4. Cholesteatoma
   * Noncancerous growth of skin cells in the middle ear causing chronic discharge and possible complications.
   * Symptoms: Persistent foul-smelling discharge, hearing loss, sometimes facial weakness.
   * Requires surgical treatment.
5. Foreign Body in Ear Canal
   * Especially common in children, may cause discharge if infection develops.
   * Symptoms: Visible foreign object, foul-smelling discharge.
6. Ruptured Eardrum (Tympanic Membrane Perforation)
   * Causes include infection, trauma, sudden pressure changes.
   * Symptoms: Sudden relief of pain followed by discharge (clear, bloody, or purulent), hearing loss.
7. Necrotizing (Malignant) Otitis Externa
   * Severe infection, typically in diabetics or immunocompromised.
   * Symptoms: Severe pain, persistent discharge, swelling, possible cranial nerve involvement.

## Serious but Rare Causes

* Cerebrospinal Fluid (CSF) Leak
  + Following severe head trauma or neurosurgery.
  + Clear or bloody fluid leaking from ear.
  + Requires urgent evaluation.
* Ear Canal or Temporal Bone Cancer
  + Presents with chronic bloody discharge, pain, and sometimes mass in ear canal.

## Other Causes

* Post-Tympanostomy (Ear Tube) Drainage
  + Occurs after ventilation tube placement, may be associated with water exposure.
* Dermatologic Conditions
  + Eczema, psoriasis causing scaling and discharge.

**EPIDEMIOLOGY**

* Prevalence and Types:
  + The most common type of ear drainage is purulent otorrhea, accounting for about 90% of discharging ears in studied populations.
  + Otorrhea often results from infections such as otitis media or otitis externa.
* Otitis Media and Otorrhea:
  + Otitis media (middle ear infection) is very common in children, with an incidence of about 11.5% in the first year of life.
  + Otorrhea occurs when the tympanic membrane perforates, allowing middle ear pus to drain.
  + Acute otitis media with perforation typically resolves spontaneously within 24 hours; systemic antibiotics are reserved for certain cases (e.g., bilateral infection in young children or persistent symptoms).
* Tympanostomy Tube Otorrhea (TTO):
  + Tympanostomy tubes are commonly placed in children to prevent recurrent otitis media or treat persistent effusion.
  + Otorrhea is a frequent complication, with incidence rates ranging from 26% to 75% within 12 months after tube placement.
  + One study reported that 52% of children experienced one or more episodes of TTO, with about 67% affected at 12 months post-placement.
  + Risk factors for TTO include younger age, recurrent acute otitis media as the indication for tube placement, frequent upper respiratory infections, and having older siblings.
* Microbiology:
  + Common pathogens in otorrhea include *Haemophilus influenzae*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Streptococcus pneumoniae*, and *Moraxella catarrhalis*.
  + The introduction of pneumococcal vaccines has shifted bacterial prevalence, reducing *S. pneumoniae* rates.
* Other Causes:
  + Cerebrospinal fluid (CSF) otorrhea, often due to temporal bone fractures, occurs in about 21% of temporal bone fracture cases.
  + Chronic otorrhea may be associated with cholesteatoma or chronic otitis media.

**PREDEFINED Q & A SETS**

Some questions you may want to ask your healthcare provider include:

***Question 1: “What’s causing the ear drainage?”***

***Answer: “***Ear drainage (otorrhea) can be caused by an ear infection, such as acute otitis media with tympanic membrane rupture or chronic otitis media. Infections can spread from the nasopharynx or upper airway, especially if there is associated Eustachian tube dysfunction. While epiglottitis itself primarily affects the throat and airway, bacterial infections causing epiglottitis can sometimes be associated with ear infections.***”***

***Question 2: “Do I have an ear infection? If so, what type?”***

***Answer: “***If you have ear drainage, pain, or hearing changes, you might have an acute otitis media (middle ear infection) or otitis externa (outer ear infection).

* Acute otitis media often presents with ear pain, fever, and sometimes ear drainage if the eardrum ruptures.
* Chronic otitis media can cause persistent or recurrent drainage.
* Ear infections can be bacterial or viral. Common bacteria include *Haemophilus influenzae*, *Streptococcus pneumoniae*, and *Moraxella catarrhalis* — some of which also cause epiglottitis.***”***

***Question 3: “What medications should I take?”***

***Answer: “***

* For bacterial ear infections, antibiotics such as amoxicillin or amoxicillin/clavulanate are commonly prescribed.
* Pain relievers like acetaminophen or ibuprofen can help with discomfort.
* If you have epiglottitis, treatment includes intravenous antibiotics (e.g., ceftriaxone) and airway management in hospital.
* Do not attempt to self-treat severe throat or breathing symptoms at home; seek emergency care immediately.***”***

***Question 4: “Do I need to see a specialist?”***

***Answer: “***

* Yes, if you have ear drainage with pain or hearing loss, an ENT specialist (otolaryngologist) can evaluate and manage persistent or complicated ear infections.
* If you have symptoms of epiglottitis (severe sore throat, drooling, difficulty breathing), you need immediate emergency evaluation by specialists in the hospital (ENT, anesthesiology, critical care).***”***

***Question 5: “Will I need additional testing?”***

***Answer: “***

* For ear infections, your doctor may perform otoscopy to look inside the ear.
* If symptoms persist or complications are suspected, audiometry or imaging (CT or MRI) may be needed.
* For epiglottitis, diagnosis is confirmed by direct visualization of the epiglottis using laryngoscopy or nasopharyngoscopy in a controlled setting.
* Neck X-rays may show a “thumbprint sign” indicating a swollen epiglottis but are less commonly used now.***”***

***Question 6: “Do I need emergency treatment?”***

***Answer: “***

* Yes, if you have signs of epiglottitis: severe sore throat, drooling, muffled voice, difficulty swallowing or breathing, noisy breathing (stridor), or if you are sitting forward to breathe. This is a medical emergency requiring immediate hospital care.
* For uncomplicated ear infections with drainage but no breathing difficulty, emergency treatment is usually not needed, but prompt medical evaluation is important.***”***

**TREATMENT OPTIONS**

***Treatment of Ear Drainage (Otorrhea), Drug Information, and Side Effects***

## 1. General Approach

Treatment of otorrhea depends on the underlying cause, whether it is an infection of the middle ear, external ear canal, or related to trauma or surgery. The main goals are to clear infection, relieve symptoms, and prevent complications.

## 2. Antibiotic Therapy

| **Medication Type** | **Indication** | **Common Drugs** | **Side Effects / Notes** |
| --- | --- | --- | --- |
| Topical Antibiotic Ear Drops | First-line for otitis externa and localized infections with intact or perforated tympanic membrane | Ciprofloxacin, ofloxacin, neomycin-polymyxin B, gentamicin | Possible local irritation, rare ototoxicity (avoid if eardrum perforated except quinolones) |
| Oral Antibiotics | For acute otitis media with perforation, severe infections, or systemic symptoms | Amoxicillin (first-line), amoxicillin-clavulanate, cefdinir, azithromycin (if allergic) | Allergic reactions, GI upset, diarrhea, antibiotic resistance risk |
| Topical Quinolones | Preferred for infections with tympanic membrane perforation due to lower ototoxicity | Ofloxacin, ciprofloxacin drops | Well tolerated; safer for middle ear infections |

## 3. Adjunctive Treatments

* Pain Management:
  + Acetaminophen or ibuprofen to relieve pain and fever.
  + Side effects: GI upset (ibuprofen), liver toxicity (acetaminophen overdose).
* Ear Canal Cleaning:
  + Professional aural toilet to remove debris and discharge may be necessary, especially in chronic cases.
* Ear Wick Placement:
  + In severe otitis externa with swelling, a wick may be placed to deliver drops effectively.
* Surgical Intervention:
  + Tympanoplasty or myringoplasty may be needed for chronic perforations that do not heal.
  + Tympanostomy tubes may require treatment of otorrhea with topical antibiotics to prevent tube blockage.

## 4. Special Considerations

* Duration:
  + Topical antibiotics are typically prescribed for 7–14 days.
  + Oral antibiotics duration varies based on severity and response.
* Avoidance of Ototoxic Agents:
  + Aminoglycoside drops (neomycin, gentamicin) should be avoided if the eardrum is perforated due to risk of hearing loss.
  + Quinolone drops are safer in these cases.
* Referral:
  + Persistent or recurrent otorrhea may require ENT specialist evaluation.
  + Otorrhea following head trauma or associated with neurological symptoms requires urgent referral.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: I see you’ve noticed some drainage coming from your ear. Can you tell me more about it? When did it start, and what does the discharge look like?

Patient: It started a few days ago. The fluid is yellowish and sometimes thick. It’s a bit smelly, and I’ve had some ear pain too.

Doctor: Thank you for sharing that. Ear drainage, or otorrhea, often indicates an infection or inflammation in the ear. It can come from the outer ear canal or from the middle ear if there’s a hole in the eardrum.

Patient: Could this be serious?

Doctor: Most cases are due to infections like swimmer’s ear or a middle ear infection with a perforated eardrum. These usually respond well to treatment. However, if left untreated, infections can worsen or cause complications, so it’s important we manage it properly.

Patient: What kind of treatments will I need?

Doctor: Typically, we use antibiotic ear drops to clear the infection. If the eardrum is perforated or if the infection is more severe, you might also need oral antibiotics. I’ll also recommend keeping your ear dry and avoiding inserting anything into the ear canal.

Patient: Will the drainage stop quickly?

Doctor: With proper treatment, most people see improvement within a few days, but it’s important to complete the full course of medication. If the drainage persists beyond a week or worsens, or if you develop fever, severe pain, or hearing loss, please come back immediately.

Patient: Is there anything I can do at home to help?

Doctor: Yes, avoid getting water in your ear while bathing or swimming. You can gently dry the outer ear with a towel. Also, avoid using cotton swabs or other objects inside the ear canal.

Patient: What if the drainage keeps coming back?

Doctor: Recurrent or persistent otorrhea may require further evaluation by an ear specialist. Sometimes, cleaning the ear canal or surgery might be needed if there’s a chronic problem like a cholesteatoma or persistent perforation.

Patient: Thank you, doctor. I’ll follow your advice and take the medication as prescribed.

Doctor: You’re welcome. Don’t hesitate to contact us if you have any questions or if your symptoms change.

**RECENT GUIDELINES OR UPDATES**

Otorrhea, or ear drainage, is a common condition that can result from various causes, including ear infections, trauma, or the presence of an object in the ear. Recent guidelines and updates provide insights into its management and treatment. For instance fluid coming from the ear can be from a torn eardrum and is a common symptom of ear infections in both children and adults.

In terms of treatment, the Clinic emphasizes that otorrhea treatment focuses on the underlying cause. For bacterial infections, antibiotics may be prescribed, while outer ear infections are typically treated with antibiotic ear drops. Additionally, if the cause is a ruptured eardrum, it may heal on its own within a few weeks, but some cases may require surgery.

For individuals with chronic ear infections, suggests that they may need to see an otolaryngologist (ENT) for further evaluation. Moreover, if otorrhea is a side effect of a recent head injury, immediate medical attention is necessary, as it could indicate a more serious condition.

Recent guidelines also highlight the importance of prompt diagnosis and treatment. If ear drainage lasts more than three days, it is advisable to consult a healthcare provider. In cases where there is a suspicion of a more serious condition, such as a cerebrospinal fluid (CSF) leak, an MRI may be used to detect such leaks, especially in individuals who have experienced recent head injuries.

In summary, the management of otorrhea involves identifying and treating the underlying cause, with a focus on prompt medical evaluation to prevent complications.

*REFERENCES:*

[Otorrhea: What It Is, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/23570-otorrhea#overview)

<https://emedicine.medscape.com/article/883160-overview>

**EAR INFECTIONS (OTITIS MEDIA, OTITIS EXTERNA)**

*ALTERNATIVE NAMES:* Ear infections are also known by several alternative names. The scientific name for an ear infection is otitis media (OM). Otitis is a general term for infection or inflammation of the ear. Specifically, otitis media refers to a middle-ear infection, which is another name for a middle-ear infection. Additionally, a fungal ear infection is also called otomycosis or fungal otitis externa.

**DEFINITION / DESCRIPTION**

Children are more likely than adults to get ear infections. There are different types of ear infections.

* **Middle ear infection** (acute otitis media) is an infection in the middle ear.
* **Otitis media with effusion** is another condition that affects the middle ear.
  + Occurs when fluid builds up in the middle ear without causing an infection.
  + Does not cause fever, ear pain, or pus build-up in the middle ear.
* **Swimmer's ear** is an infection in the outer ear canal.
  + Different from a middle ear infection.

An ear infection, also called acute otitis media, is a sudden infection in your middle ear. The middle ear is the air-filled space between your eardrum and inner ear. It houses the delicate bones that transmit sound vibrations from your eardrum to your inner ear so you can hear.

Eustachian tubes are canals that connect your middle ear to the back of your throat. They regulate air pressure in your ear and prevent fluid from accumulating in your middle ear space.

If a eustachian tube doesn’t function well, fluid has a hard time draining from your middle ear space and can cause muffled hearing. Ear infections (from viruses and bacteria) also cause middle ear fluid. In these cases, the middle ear fluid is infected and often causes discomfort in addition to muffled hearing.

Middle ear infections are the most common childhood illness other than colds. Ear infections occur most often in children between 6 months and 2 years. They’re common until age 8.

Older children and adults can get ear infections, too, but they don’t happen nearly as often as in young children.

***Why are children more likely to get ear infections than adults?***

Children get ear infections more often than adults because:

* Their eustachian tubes don’t function as well as adults, and this encourages fluid to gather behind the eardrum.
* Their immune system, the body’s infection-fighting system, is still developing.
* They’re more likely to catch illnesses from other children.

**CAUSES**

Bacteria and viruses cause ear infections. Often, ear infections begin after a cold or another upper respiratory infection. The germs travel into your middle ear through the eustachian tube. Once inside, the virus or bacteria can cause your eustachian tubes to swell. The swelling can cause the tube to become blocked, leading to poor eustachian tube function and infected fluid in your middle ear.

Ear infections aren’t contagious, but the virus and/or bacteria causing the infection are. Multiple types of bacteria and viruses cause ear infections, including ones that cause colds and the flu.

**RISK FACTORS**

Risk factors for ear infections include:

* Age: Infants and young children (between 6 months and 2 years) are at a greater risk for ear infections.
* Family history: Getting ear infections can run in the family.
* Colds: Having a cold increases your risk of developing an ear infection. Children in daycare and group settings are at a greater risk of ear infections because they’re more likely to be around children with colds or other contagious respiratory illnesses.
* Chronic illnesses: Long-term illnesses, including immune deficiency and chronic respiratory diseases (such as cystic fibrosis and asthma), can increase your risk of ear infections.
* Ethnicity: Children who are Native American, Hispanic and Alaska Natives have more ear infections than children of other ethnic groups.
* Poor air quality and smoky environments: Exposure to toxins in the air, secondhand smoke, increases your risk of getting an ear infection.

**SIGNS / SYMPTOMS**

Symptoms of an ear infection often begin after a cold. They include:

* Ear pain.
* Loss of appetite.
* Trouble sleeping.
* Trouble hearing in the ear that’s blocked.
* A feeling of fullness or pressure in your ear.
* Yellow, brown or white drainage from your ear. (This may mean that your eardrum has broken.)

Don’t place anything in your ear canal if you have drainage from your ear. An item touching a torn (ruptured) eardrum can cause more damage.

***Infants and children***

Since small children and infants can’t always communicate their symptoms, it’s important to recognize the signs. A child with an ear infection may:

* Rub or tug on their ears.
* Cry more than usual or act fussy.
* Have a fever ranging from 100.5 to 104 degrees Fahrenheit (38 to 40 degrees Celsius). (Half of children have fevers with ear infections.)
* Start mouth breathing or have increased snoring. Mouth breathing may be a sign of enlarged adenoids. (Adenoids are small pads of tissue above your throat, behind your nose and near your eustachian tubes.) Adenoids may become infected/inflamed with the same viruses or bacteria that cause ear infections.
* Refuse to eat during feedings. (Pressure in the middle ear changes as your child swallows, causing more pain and less desire to eat.)

**DIAGNOSIS METHODS**

Most healthcare providers can tell if your child has an ear infection based on their symptoms, a physical exam to check for signs of a cold and an ear exam. For the ear exam, your child’s healthcare provider will view your child’s eardrum using a lighted instrument called an otoscope. An inflamed, swollen or red eardrum is a sign of an ear infection.

Your child’s provider may use a pneumatic otoscope to check for fluid in your child’s middle ear. A pneumatic otoscope blows a puff of air at the eardrum, which should cause it to move back and forth. It won’t move easily if there’s fluid inside your child’s ear.

Your child may need other tests, including:

* Tympanometry: This test uses air pressure to check for fluid in your child’s middle ear.
* Acoustic reflectometry: This test uses sound waves to check for fluid in your child’s middle ear.
* Tympanocentesis: This procedure allows your child’s provider to remove fluid from your child’s middle ear and test it for viruses and bacteria. Their provider may recommend tympanocentesis if other treatments haven’t cleared the infection.
* Hearing tests: A provider called an audiologist might perform hearing tests to determine if your child has hearing loss. Hearing loss is more common in children with long-lasting or frequent ear infections or fluid in the middle ear that doesn’t drain.

Treatment depends on many factors, including:

* Your child’s age.
* The severity of the infection.
* The nature of the infection (first-time, ongoing or repeat infection).
* Whether fluid remains in the middle ear for a long time.

Often, ear infections heal without treatment. Your provider may monitor your child’s condition to see if it improves before prescribing treatments. Your child may need antibiotics or surgery for infections that don’t go away. In the meantime, pain medicines can help with symptoms like ear pain.

***Antibiotics***

Your child may need antibiotics if bacteria are causing the ear infection. Healthcare providers may wait up to three days before prescribing antibiotics to see if a mild infection clears on its own. If an infection is severe, your child may need to start antibiotics immediately.

The guidelines on when a child should receive antibiotics and when it’s better to observe. Factors include your child’s age, the severity of their infection and their temperature. The table below summarizes the recommendations.

Treatment Guide for Acute Otitis Media (AOM)

| **Child’s Age** | **Severity of AOM / Temperature** | **Treatment** |
| --- | --- | --- |
| 6 months and older; in one or both ears. | Moderate to severe for at least 48 hours or temp of 102.2 degrees F (39 degrees C) or higher. | Treat with antibiotics. |
| 6 months through 23 months; in both ears. | Mild for less than 48 hours and temp less than 102.2 degrees F (39 degrees C). | Treat with antibiotics. |
| 6 months to 23 months; in one ear. | Mild for less than 48 hours and temp less than 102.2 degrees F (39 degrees C). | Treat with antibiotics OR observe. If observe, start antibiotics if the child’s condition worsens or doesn’t improve within 48 to 72 hours of start of symptoms. |
| 24 months or older; in one or both ears. | Mild for less than 48 hours and temp less than 102.2 degrees F (39 degrees C). | Treat with antibiotics OR observe. If observe, start antibiotics if the child’s condition worsens or doesn’t improve within 48 to 72 hours of start of symptoms. |

Even if symptoms improve, don’t stop taking the medicine until your provider tells you to stop. The infection can return if your child doesn’t take all antibiotics as prescribed.

***Pain-relieving medications***

Your healthcare provider may recommend over-the-counter (OTC) medicines, such as acetaminophen (Tylenol®) or ibuprofen (Advil®, Motrin®), to relieve pain and reduce fever. They may prescribe pain-relieving ear drops. Follow your provider’s instructions about what medicines are safe for your child.

Never give aspirin to children. Aspirin can cause a life-threatening condition called Reye’s syndrome.

***Ear tubes (tympanostomy tubes)***

Your child may need ear tubes if they experience frequent ear infections, infections that don’t improve with antibiotics or hearing loss related to fluid buildup. An ear, nose and throat (ENT) specialist places the tubes during a tympanostomy. It’s a short (approximately 10-minute) procedure. Your child can go home that same day.

During a tympanostomy, a provider inserts a small metal or plastic tube into a tiny incision (cut) in your child’s eardrum. The procedure to perforate (pierce a hole into) and drain the eardrum is called a myringotomy. Once the tubes are in place, they let air into the middle ear and allow fluid to drain.

The tube usually stays in place for 12 to 18 months. It may fall out on its own, or your child may need surgery to remove it. Once the tubes are gone, the hole in your child’s eardrum will heal and close.

**PREVENTION TIPS**

Here are some ways to reduce your or your child’s risk of ear infections:

* Prevent colds and other respiratory illnesses. Be proactive in preventing colds, especially during your child’s first year. Teach them about frequent handwashing and coughing or sneezing into their elbow. Don’t allow them to share food, cups or utensils. If it’s an option, avoid large daycare centers until they’re older.
* Avoid secondhand smoke. Avoid exposure to secondhand smoke, and don’t allow others to smoke around your child.
* Breastfeed your baby. If possible, breastfeed your baby during the first six to 12 months. Antibodies in breast milk fight viruses and bacteria that cause infections.
* Bottle-feed your baby in an upright position. If you bottle-feed, hold your baby upright so their head is higher than their stomach. This position can prevent formula or other fluids from flowing backward and collecting in their eustachian tubes.
* Stay up to date on vaccinations. Ensure your child’s immunizations are current, including yearly flu shots for children 6 months and older. Ask your child’s pediatrician about vaccines for pneumococcal disease and meningitis.

**OUTLOOK / PROGNOSIS**

Yes, most infections go away on their own. This is why your healthcare provider may wait before prescribing medications like antibiotics. In the meantime, pain relievers can help with symptoms like ear pain.

Depending on your child’s age, symptoms and temperature, they may need antibiotics to heal. If your child has ongoing or frequent infections, or if fluid remains in the middle ear and puts their hearing at risk, your child may need ear tubes. Follow your healthcare provider’s guidance about caring for your child.

Children can return to school or daycare when their fever is gone.

**POSSIBLE COMPLICATIONS**

Most ear infections don’t cause long-term issues. When complications happen, they’re usually related to repeated or ongoing ear infections. Complications include:

* Hearing loss: Temporary hearing loss or changes in your hearing (muffling or sound distortions) are common during an ear infection. Repeated or ongoing infections or damage to internal structures in your ear can cause more significant hearing loss.
* Delayed speech and language development: Children need to hear to learn language and develop speech. Muffled hearing or hearing loss for any length of time can significantly delay development.
* Torn eardrum: About 5% to 10% of children with an ear infection develop a small tear in their eardrum. Often, the tear heals on its own. If it doesn’t, your child may need surgery.
* Spread of the infection: Untreated infections or infections that don’t improve on their own can spread. Infection can spread to the bone behind your ear (mastoiditis). Occasionally, an infection can spread to the membranes surrounding your brain and spinal cord (meninges) and cause meningitis.

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

Call your healthcare provider immediately if:

* Your child develops a stiff neck.
* Your child acts sluggish, looks or acts very sick, or doesn’t stop crying despite all efforts.
* Your child’s walk isn’t steady.
* Your or your child’s ear pain is severe.
* Your or your child has a fever over 104 degrees F (40 degrees C).
* Your child shows signs of weakness in their face. (Look for a crooked smile.)
* You see bloody or pus-filled fluid draining from the ear.

Call your healthcare provider during office hours if:

* A fever remains or comes back more than 48 hours after starting an antibiotic.
* Ear pain isn’t better after three days of taking an antibiotic.

**DIFFERENTIAL DIAGNOSIS**

* Acute Sinusitis
* Apert Syndrome
* Bacteremia
* Cholesteatoma
* Colic
* Diarrhea
* Down Syndrome
* Fever in the Infant and Toddler
* Fever Without a Focus
* Hearing Impairment
* Pediatric Nasal Polyps
* Nasopharyngeal Cancer
* Otitis Externa
* Human Parainfluenza Viruses (HPIV) and Other Parainfluenza Viruses
* Passive Smoking and Lung Disease
* Pediatric Allergic Rhinitis
* Pediatric Bacterial Meningitis
* Pediatric Cleft Lip and Palate
* Pediatric Gastroenteritis
* Pediatric Gastroesophageal Reflux
* Pediatric Haemophilus Influenzae Infection
* Pediatric Head Trauma
* Pediatric HIV Infection
* Pediatric Mastoiditis
* Pediatric Otosclerosis
* Pediatric Pharyngitis
* Pediatric Pneumococcal Infections
* Primary Ciliary Dyskinesia
* Respiratory Syncytial Virus Infection
* Rhinovirus (RV) Infection (Common Cold)

**RECENT GUIDELINES OR UPDATES**

The following were listed as strong recommendations:

* Topical antibiotic ear drops alone, without oral antibiotics, should be prescribed for children with uncomplicated acute TT otorrhea.
* The child's ears should be examined within 3 months of TT insertion, AND families should be educated regarding the need for routine periodic follow-up until the tubes extrude.

The following were listed as recommendations:

* TT insertion should not be performed in children with a single episode of otitis media (OM) with effusion (OME) of < 3 months' duration from the date of either onset (if known) or diagnosis (if onset is unknown).
* A hearing evaluation is indicated if OME persists for ≥3 months *or* before surgery when a child becomes a candidate for TT insertion.
* Bilateral TT insertion should be offered to children with bilateral OME for ≥3 months *and* documented hearing difficulties.
* Children with chronic OME who do not receive TTs should be reevaluated at 3- to 6-month intervals until effusion is no longer present, significant hearing loss is detected, or structural abnormalities of the tympanic membrane or middle ear are suspected.
* TT insertion should not be performed in children with recurrent acute OM (AOM) who do not have middle-ear effusion (MEE) in either ear at assessment for TT candidacy.
* Bilateral TT insertion should be offered to children with recurrent AOM who have unilateral or bilateral MEE at assessment for TT candidacy.
* Efforts should be made to determine whether a child with recurrent AOM or with OME of any duration is at increased risk for speech, language, or learning problems from OM because of baseline factors.
* In children who meet criteria for TT insertion, long-term tubes should not be placed initially unless specifically warranted by anticipated need for prolonged middle-ear ventilation beyond what a short-term tube supplies.
* In the perioperative period, caregivers of children with TTs should be educated regarding expected duration of tube function, recommended follow-up schedule, and detection of complications.
* Antibiotic ear drops should not be routinely prescribed after TT placement.
* Routine prophylactic water precautions should not be encouraged for children with TTs.

The following were listed as options:

* TT insertion may be performed in children with unilateral or bilateral OME for ≥3 months (chronic OME) *and* symptoms likely to be attributable to OME, including (but not limited to) balance (vestibular) problems, poor school performance, behavioral problems, ear discomfort, or reduced quality of life.
* TT insertion may be performed in at-risk children with unilateral or bilateral OME that is likely to persist as reflected by a type B (flat) tympanogram or a documented effusion for ≥3 months.
* Adenoidectomy may be performed as an adjunct to TT insertion in children with symptoms directly related to the adenoids *or* in children aged ≥4 years as a potential means of reducing future recurrence of OM or need for repeat TT insertion.
* The clinician should perform pneumatic otoscopy to assess for OME in a child with otalgia, hearing loss, or both
* Clinicians should obtain tympanometry in children with suspected OME for whom the diagnosis is uncertain after performing (or attempting) pneumatic otoscopy
* Clinicians should evaluate at-risk children for OME at the time of diagnosis of an at-risk condition and at 12-18 months of age (if diagnosed as being at risk prior to this time)
* Clinicians should not routinely screen children for OME who are not at risk and do not have symptoms that may be attributable to OME, such as hearing difficulties, balance (vestibular) problems, poor school performance, behavioral problems, or ear discomfort
* Clinicians should manage the child with OME who is not at risk with watchful waiting for 3 months from the date of effusion onset (if known) or 3 months from the date of diagnosis (if onset is unknown)
* Clinicians should recommend against using intranasal steroids or systemic steroids for treating OME
* Clinicians should recommend against using systemic antibiotics for treating OME
* Clinicians should recommend against using antihistamines, decongestants, or both for treating OME
* Clinicians should obtain an age-appropriate hearing test if OME persists for ≥3 months *or* for OME of any duration in an at-risk child
* Clinicians should reevaluate, at 3- to 6-month intervals, children with chronic OME until effusion is no longer present, significant hearing loss is identified, or structural abnormalities of the eardrum or middle ear are suspected
* Clinicians should recommend TTs when surgery is performed for OME in a child aged < 4 years; adenoidectomy should not be performed unless a distinct indication (eg, nasal obstruction, chronic adenoiditis) exists other than OME
* Clinicians should recommend TTs, adenoidectomy, or both when surgery is performed for OME in a child aged ≥4 years

**EPIDEMIOLOGY**

***United States statistics***

OM, the most common specifically treated childhood disease, accounts for approximately 20 million annual physician visits. Various epidemiologic studies report the prevalence rate of AOM to be 17-20% within the first 2 years of life, and 90% of children have at least one documented MEE by age 2 years. OM is a recurrent disease. One third of children experience six or more episodes of AOM by age 7 years.

***International statistics***

Incidence and prevalence in other industrialized nations are similar to US rates. In less developed nations, OM is extremely common and remains a major contributor to childhood mortality resulting from late-presenting intracranial complications. International studies show increased prevalence of AOM and chronic OM (COM) among Micronesian and Australian aboriginal children.

***Age-related demographics***

Peak prevalence of OM in both sexes occurs in children aged 6-18 months. Some studies show bimodal prevalence peaks; a second, lower peak occurs at age 4-5 years and corresponds with school entry. Although OM can occur at any age, 80-90% of cases occur in children younger than 6 years. Children who are diagnosed with AOM during the first year of life are much more likely to develop recurrent OM and chronic OME than children in whom the first middle ear infection occurs after age 1 year.

***Sex-related demographics***

Several studies have now shown equal AOM prevalence in males and females; many previous studies had shown increased incidence in boys.

***Race-related demographics***

For some time, the prevalence of OM in the United States was reported to be higher in black and Hispanic children than in white children. However, a study that controlled for socioeconomic and other confounding factors showed equal incidence in blacks and whites. Hispanic children and Alaskan Inuit and other American Indian children have higher prevalence of AOM than white and black children in the United States.

**PREDEFINED Q & A SETS**

***Question 1: “Do I need to cover my child’s ears if they go outside with an ear infection”***

***Answer: “***No, you don’t need to cover their ears to go outside.***”***

***Question 2: “Can my child go swimming with an ear infection?”***

***Answer: “***Swimming is OK as long as your child doesn’t have a tear (perforation) in their eardrum or drainage from their ear.***”***

***Question 3: “Can I travel by air or be in high altitudes if I have an ear infection?”***

***Answer: “***Air travel or a trip to the mountains is safe, although you may feel temporary pain during takeoff and landing when flying. Swallowing fluids or chewing gum during descent can help with the pain. If your small child has an ear infection, have them suck on a pacifier to relieve discomfort during air travel.***”***

**TREATMENT OPTIONS**

***Treatment of Ear Infections (Otitis Media and Otitis Externa), Drug Information, and Side Effects***

## 1. Acute Otitis Media (AOM)

* Typical Treatment:
  + Many cases resolve spontaneously without antibiotics, especially mild cases.
  + Antibiotics are recommended for:
    - Children under 6 months
    - Severe symptoms (high fever, severe pain)
    - Bilateral infections in children under 2 years
    - Symptoms persisting or worsening after 48-72 hours
* Common Antibiotics:
  + Amoxicillin (first-line)
  + Amoxicillin-clavulanate (if resistant organisms suspected)
  + Alternatives: Cefdinir, azithromycin (if allergic to penicillin)
* Side Effects:
  + Allergic reactions (rash, anaphylaxis)
  + Gastrointestinal upset (nausea, diarrhea)
  + Antibiotic resistance risk with overuse
* Supportive Care:
  + Pain management with acetaminophen or ibuprofen
  + Warm compresses

## 2. Otitis Externa (OE)

* Primary Treatment:
  + Topical antibiotic ear drops are the mainstay, often combined with steroids to reduce inflammation.
  + Common topical agents:
    - Fluoroquinolone drops (ciprofloxacin, ofloxacin) – preferred for their antipseudomonal activity and safety with tympanic membrane perforation
    - Neomycin-polymyxin B-hydrocortisone drops (avoid if eardrum perforated due to ototoxicity risk)
    - Acetic acid drops (2%) combined with hydrocortisone for mild cases to acidify and reduce inflammation
* Severe or Necrotizing Otitis Externa:
  + Requires systemic antibiotics targeting *Pseudomonas aeruginosa* (e.g., ciprofloxacin oral or IV, ceftazidime, piperacillin-tazobactam)
  + Surgical debridement may be necessary
* Adjunctive Treatments:
  + Pain control with analgesics
  + Ear canal cleaning and removal of debris
  + Use of ear wicks to improve drug delivery if canal is swollen
* Side Effects of Topical Treatments:
  + Local irritation or burning sensation
  + Rare ototoxicity with aminoglycoside-containing drops if eardrum is perforated
  + Allergic contact dermatitis

## 3. Special Considerations

* Duration of Therapy:
  + Otitis externa treatment usually lasts 7–10 days.
  + Acute otitis media antibiotics typically for 5–10 days depending on age and severity.
* When to Refer:
  + Persistent or recurrent infections
  + Severe pain, swelling, or signs of invasive infection
  + Immunocompromised patients or diabetics with otitis externa

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, what brings you in today?

Patient: Hi, doctor. I’ve been having some ear pain for the past couple of days. It’s uncomfortable and sometimes it feels like my hearing is a bit muffled.

Doctor: I’m sorry to hear that. Have you noticed any fluid or discharge coming from your ear?

Patient: No, I haven’t seen any discharge. Just the pain and some pressure.

Doctor: Do you have any other symptoms like fever, dizziness, or ringing in your ear?

Patient: I felt a little warm yesterday, but no dizziness or ringing.

Doctor: Have you had a recent cold or upper respiratory infection?

Patient: Yes, I had a cold about a week ago.

Doctor: Based on what you’re describing, it sounds like you might have an ear infection, possibly otitis media, which is an infection of the middle ear. It’s common after a cold because fluid can build up behind the eardrum and cause pain.

Patient: Is it serious? What can I do to get better?

Doctor: Most ear infections improve on their own within a few days. You can take over-the-counter pain relievers like acetaminophen or ibuprofen to help with the pain and any fever. It’s important to keep the ear dry and avoid inserting anything into the ear canal.

Patient: Should I take antibiotics?

Doctor: Not necessarily right away. Many ear infections are viral and get better without antibiotics. We usually wait a couple of days to see if symptoms improve. If the pain worsens or doesn’t improve after 48 to 72 hours, or if you develop a high fever or discharge, then we might consider antibiotics.

Patient: What about infections of the outer ear? How are those different?

Doctor: That’s called otitis externa or swimmer’s ear. It usually causes pain when you touch or pull on your ear, and sometimes there’s discharge or itching. It’s often treated with antibiotic ear drops rather than oral antibiotics.

Patient: What should I do if I notice discharge or the pain gets worse?

Doctor: If you notice fluid or pus coming from your ear, worsening pain, hearing loss, dizziness, or fever, please come back promptly. We may need to examine you more closely and possibly start antibiotics or other treatments.

Patient: Thank you, doctor. I’ll follow your advice and monitor my symptoms.

Doctor: You’re welcome. Don’t hesitate to contact us if you have any concerns or if your symptoms change.

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**EAR CANAL STENOSIS**

*ALTERNATIVE NAMES:* Ear canal stenosis is also referred to as auditory canal stenosis. In some cases, it is associated with a condition called aural atresia, which is the absence of the external auditory canal.

**DEFINITION / DESCRIPTION**

Ear canal stenosis refers to a narrowing of the ear canal, the tube that connects the outer ear to the eardrum. This condition can restrict the passage of sound waves into the ear, potentially leading to hearing difficulties. Ear canal stenosis can be caused by various factors, including repeated ear infections, trauma to the ear, excessive earwax buildup, or congenital abnormalities. In some cases, prolonged exposure to moisture or certain skin conditions can also contribute to the narrowing of the ear canal. Understanding the underlying cause of ear canal stenosis is essential for proper diagnosis and management.

**CAUSES**

Ear canal stenosis, a narrowing of the ear canal, can be caused by various factors. One common cause is repeated exposure to irritants like water, leading to inflammation and subsequent narrowing of the canal. Trauma or injury to the ear can also result in stenosis as the body attempts to heal the damaged tissues. Additionally, certain skin conditions, such as eczema or psoriasis, can contribute to the narrowing of the ear canal over time. Other factors like excessive earwax buildup or congenital abnormalities may also play a role in the development of ear canal stenosis.

* Chronic inflammation of the ear canal can lead to stenosis due to repeated irritation and tissue damage.
* Trauma or injury to the ear canal, such as from a foreign object insertion or a severe blow, can cause stenosis.
* Prolonged exposure to certain chemicals or environmental factors can contribute to the narrowing of the ear canal over time.
* Infections, such as recurrent otitis externa or chronic fungal infections, may result in scarring and narrowing of the ear canal.
* Genetic factors can predispose individuals to develop ear canal stenosis, leading to anatomical abnormalities that restrict the passage.

***Types Of Ear Canal Stenosis***

Ear canal stenosis refers to the narrowing of the ear canal, which can lead to various symptoms and complications. There are several types of ear canal stenosis, including congenital stenosis, acquired stenosis due to factors like chronic ear infections, trauma, or tumors, and post-surgical stenosis that can occur after ear surgery. Each type may present with its own set of symptoms and require specific treatments. Congenital stenosis is present at birth and may require early intervention, while acquired stenosis often develops gradually and can lead to hearing loss or recurring infections if left untreated. Post-surgical stenosis, on the other hand, may occur as a complication following ear surgery and may need revision procedures.

* Congenital ear canal stenosis is present at birth and can be due to abnormal development.
* Acquired ear canal stenosis may result from repeated infections, trauma, or prolonged use of earplugs.
* Bony ear canal stenosis occurs when the ear canal narrows due to excess bone growth.
* Soft tissue ear canal stenosis involves the narrowing of the ear canal due to excessive soft tissue growth.
* Mixed ear canal stenosis can involve a combination of bony and soft tissue narrowing in the ear canal.

**RISK FACTORS**

Ear Canal Stenosis is a condition characterized by the narrowing of the ear canal, potentially leading to hearing difficulties and ear infections. Several factors can contribute to the development of Ear Canal Stenosis, including repeated ear infections, traumatic injuries to the ear, chronic skin conditions like eczema or psoriasis, and the prolonged use of earplugs or hearing aids. Additionally, certain individuals may be genetically predisposed to developing this condition. Understanding these risk factors is crucial for early detection and appropriate management of Ear Canal Stenosis to prevent complications and maintain ear health.

* Prolonged exposure to loud noises can increase the risk of developing ear canal stenosis.
* Individuals with a history of chronic ear infections are more prone to developing ear canal stenosis.
* Aging can be a risk factor for ear canal stenosis due to changes in the ear structures over time.
* People who frequently use earbuds or headphones at high volumes may have a higher risk of ear canal stenosis.
* Certain medical conditions like eczema or psoriasis affecting the ear canal can predispose individuals to ear canal stenosis.

**SIGNS / SYMPTOMS**

Ear canal stenosis can cause various symptoms that may affect your hearing and overall ear health. Common signs include ear pain, difficulty hearing, a feeling of fullness in the ear, ringing in the ear (tinnitus), and even recurrent ear infections. Some people may also experience itching or discharge from the affected ear. If you notice any of these symptoms, it's essential to consult with a healthcare provider for a proper diagnosis and appropriate management to prevent complications and improve your ear condition.

* Gradual hearing loss in one or both ears can be a common symptom of ear canal stenosis.
* Feeling of fullness or blockage in the affected ear may indicate narrowing of the ear canal.
* Recurrent ear infections due to inadequate drainage or ventilation can occur with ear canal stenosis.
* Tinnitus, or ringing in the ears, may be experienced by individuals with a narrowed ear canal.
* Pain or discomfort in the ear, especially during activities like chewing or yawning, can be a sign of ear canal stenosis.

**DIAGNOSIS METHODS**

Diagnosing Ear Canal Stenosis typically involves a thorough medical history review and physical examination by an ear, nose, and throat specialist. An otoscope is used to visually inspect the ear canal for narrowing or blockages. In some cases, imaging tests like CT scans or MRIs may be ordered to get a detailed view of the ear canal and surrounding structures. Hearing tests may also be conducted to assess any impact on hearing function. These diagnostic methods help in determining the extent and underlying causes of Ear Canal Stenosis, guiding the healthcare provider in developing an appropriate treatment plan.

* Otoscopy, a procedure using a lighted instrument called an otoscope, allows direct visualization of the ear canal to identify narrowing or blockages.
* Audiometry tests can assess hearing loss associated with ear canal stenosis by measuring the patient's ability to hear sounds at various frequencies.
* Imaging studies such as CT scans or MRI may be utilized to provide detailed images of the ear canal and surrounding structures for a comprehensive evaluation.
* A tympanometry test can help assess middle ear function and detect abnormalities that may be contributing to symptoms of ear canal stenosis.

**TREATMENT OPTIONS**

Ear canal stenosis, a narrowing of the ear canal, can lead to hearing loss and discomfort. Treatment options depend on the severity of the condition. In mild cases, regular ear cleanings and ear drops may help manage symptoms. For more severe stenosis, procedures like ear canal dilation or surgery may be necessary to widen the canal and improve hearing. It's essential to consult an ear, nose, and throat specialist for an accurate diagnosis and personalized treatment plan tailored to the individual's needs and condition. Regular follow-ups and ongoing care are crucial to monitor progress and ensure optimal outcomes.

* For more moderate stenosis, ear drops containing steroids or antibiotics may be prescribed to reduce inflammation and prevent infections.
* In cases where stenosis is causing significant hearing loss or discomfort, ear canal dilation procedures may be recommended.
* Ear canal dilation involves gently stretching the narrowed canal using specialized instruments to improve airflow and alleviate symptoms.
* Surgical interventions such as canaloplasty or tympanoplasty may be considered for severe or recurrent cases of ear canal stenosis

**PREVENTION TIPS**

To prevent ear canal stenosis, it is important to avoid factors that can lead to narrowing of the ear canal.

For instance, swimming in cold water can cause bony growths known as exostoses, which may contribute to stenosis. Therefore, wearing special earplugs while swimming can help prevent this condition. Additionally, maintaining good ear hygiene and avoiding the use of cotton swabs or other objects that can irritate the ear canal is recommended. If you have a history of ear infections or other conditions that may lead to scarring, it is important to seek medical attention promptly to prevent complications. In some cases, surgery may be necessary to widen the ear canal if it becomes too narrow. It is also important to follow your doctor's advice regarding the prevention and management of ear canal stenosis.

**OUTLOOK / PROGNOSIS**

Ear canal stenosis refers to a narrow ear canal, which can be either congenital or acquired. It can lead to hearing loss, frequent ear infections, and other complications such as cholesteatoma, a non-cancerous skin cyst that can damage the middle ear.

The condition can be present at birth, often associated with genetic syndromes like Treacher Collins syndrome or Goldenhar syndrome, or it can develop later in life due to repeated infections, scarring, or other factors.

In some cases, ear canal stenosis may not require treatment if it does not cause significant symptoms. However, if it leads to hearing loss, recurrent infections, or other issues, surgical intervention may be necessary to widen the ear canal. Surgery is typically considered when the stenosis is severe or when conservative treatments fail.

For congenital cases, the goal of surgery is to create or widen the ear canal, and the recommended age for surgery is usually around five or six years old, although it can be performed earlier if needed. Post-surgical care is crucial, as restenosis (re-narrowing of the canal) is a common complication. Techniques such as using stents or ear stretchers have been explored to maintain the widened canal after surgery.

In acquired cases, the underlying cause must be addressed. For example, if the stenosis is due to chronic infections or inflammation, treating the infection may help prevent further narrowing. In some cases, imaging studies like CT scans are used to assess the extent of the stenosis and guide treatment decisions.

Overall, the outlook for ear canal stenosis depends on the severity of the condition, the underlying cause, and the effectiveness of treatment. With appropriate management, many patients can achieve improved hearing and a reduced risk of complications.

**POSSIBLE COMPLICATIONS**

Ear canal stenosis can lead to several complications, including hearing loss, recurrent ear infections, and the development of cholesteatoma, which is a non-cancerous skin cyst that can damage the middle ear. Patients with ear canal stenosis are also at a heightened risk for cholesteatoma, which can result in further complications such as facial nerve paralysis and labyrinthine fistula. Additionally, restenosis is a common complication following surgery for ear canal stenosis, occurring in up to 30% of patients. Other complications may include otorrhea (ear discharge), pain, and chronic mastoiditis. In severe cases, the condition can lead to conductive hearing loss, which may require the use of a hearing device.

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

If a child has ear canal stenosis and needs treatment, it is important to consult a doctor to determine the best plan for the child. Doctors will check the child’s hearing and look for any other problems. Treatment may not be needed for mild ear canal stenosis, but kids with severe stenosis may need surgery to widen the ear canal. 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. All kids with ear canal stenosis need regular follow-up with an otolaryngologist (ear, nose, and throat doctor). If ear canal stenosis leads to hearing loss or other problems, surgery can help. If your child has ear canal stenosis and needs treatment, your doctor can help you decide on the best plan for your child.

**DIFFERENTIAL DIAGNOSIS**

* Congenital Ear Canal Stenosis  
  Narrowing present from birth, sometimes associated with syndromes such as Treacher Collins or Goldenhar syndrome.
* Acquired Ear Canal Stenosis  
  Resulting from chronic infections (e.g., chronic otitis externa), inflammation, trauma (accidental or iatrogenic), radiation therapy, or dermatologic diseases.
* Medial Canal Fibrosis  
  Fibrous tissue formation in the medial external auditory canal after chronic otitis, surgery, or radiation; presents with conductive hearing loss and otorrhea.
* Keratosis Obturans  
  Accumulation of keratin debris causing canal obstruction and narrowing; may mimic stenosis.
* External Auditory Canal (EAC) Cholesteatoma  
  Keratinizing squamous epithelium growth causing bony erosion and canal narrowing; associated with chronic discharge and hearing loss.
* Ear Canal Exostoses  
  Multiple benign bony growths due to repeated cold water exposure (“surfer’s ear”); cause canal narrowing distinct from soft tissue stenosis.
* Ear Canal Osteoma  
  Solitary benign bony tumor causing localized canal narrowing.
* Necrotizing (Malignant) External Otitis  
  Severe infection causing inflammation and narrowing, typically in immunocompromised patients.
* Squamous Cell Carcinoma of the External Auditory Canal  
  Malignant tumor causing canal obstruction, pain, and possible bony erosion.
* Debris or Cerumen Impaction  
  Accumulation of earwax or debris causing apparent canal narrowing.
* Inflammatory Dermatoses  
  Conditions like allergic contact dermatitis, seborrheic dermatitis, or atopic dermatitis causing swelling and narrowing.

**EPIDEMIOLOGY**

* Incidence and Prevalence:
  + Acquired ear canal stenosis is a rare condition, with an incidence reported as approximately 0.6 cases per 100,000 population in the largest series studied.
  + Congenital external auditory canal (EAC) malformations, including stenosis and atresia, have a prevalence ranging from 0.01% to 0.1% in the general population.
  + Among patients with congenital aural atresia or stenosis, about 13% have canal stenosis, and roughly 19% of these have associated ear canal cholesteatoma.
* Age and Sex Distribution:
  + The average age of presentation for acquired stenosis is typically in the fifth decade of life (40s to 50s).
  + There is a female predominance reported in several studies, especially in cases associated with cholesteatoma.
  + Congenital stenosis is usually identified in infancy or early childhood but may be diagnosed later depending on severity and symptoms.
* Laterality:
  + Acquired stenosis often involves bilateral disease in a significant proportion of patients, though unilateral cases occur.
  + Congenital stenosis and cholesteatoma may affect either ear, with some studies noting a slight predominance of right ears in females and left ears in males.
* Common Causes and Risk Factors:
  + Chronic infection is the leading cause of acquired ear canal stenosis, followed by postsurgical and accidental trauma.
  + Other contributing factors include chronic inflammation, radiation, and dermatologic conditions.
  + Genetic syndromes can predispose to congenital stenosis.
* Associated Conditions:
  + Ear canal cholesteatoma occurs in approximately 6% to 9% of patients with acquired stenosis.
  + Inner ear malformations and cochlear nerve canal stenosis are common in children with congenital hearing loss but are distinct from external canal stenosis

**PREDEFINED Q & A SETS**

***Question 1: “How can Ear Canal Stenosis be identified through its signs?”***

***Answer: “***Ear canal stenosis can be identified by symptoms like hearing loss, ear pain, itching, and frequent ear infections.***”***

***Question 2: “What lifestyle changes should I make to manage Ear Canal Stenosis effectively?”***

***Answer: “***Avoid inserting objects into the ear, keep ears dry, and seek prompt treatment for infections to manage Ear Canal Stenosis effectively.***”***

***Question 3: “Are there any risks associated with untreated Ear Canal Stenosis?”***

***Answer: “***Yes, untreated Ear Canal Stenosis can lead to hearing loss, ear infections, and discomfort.***”***

***Question 4: “What treatment options are available for Ear Canal Stenosis?”***

***Answer: “***Treatment options for Ear Canal Stenosis may include ear drops, ear canal dilation, surgery to widen the canal, or tympanoplasty if the eardrum is damaged.***”***

***Question 5: “Can Ear Canal Stenosis return even after successful treatment?”***

***Answer: “***Yes, Ear Canal Stenosis can recur even after successful treatment. Regular follow-ups are important to monitor for any signs of recurrence.***”***

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you’ve been having some issues with your ear. Can you tell me what symptoms you’ve noticed?

Patient: Yes, doctor. I’ve been feeling some fullness in my ear, and my hearing seems a bit muffled. Sometimes it itches, and I’ve had a few ear infections before.

Doctor: That sounds like it could be related to a condition called ear canal stenosis, which means the ear canal is narrower than usual. This narrowing can make it harder for sound to reach your eardrum and can also cause problems with drainage, leading to infections.

Patient: What causes this narrowing?

Doctor: There are several possible causes. Sometimes people are born with a narrow ear canal. Other times, repeated ear infections, trauma, skin conditions like eczema, or prolonged use of earplugs or hearing aids can cause the canal to narrow over time.

Patient: How do you find out if I have this condition?

Doctor: I will examine your ear using a special instrument called an otoscope to look inside your ear canal. We may also do hearing tests to see how much your hearing is affected. In some cases, imaging like a CT scan can help us understand the extent of narrowing.

Patient: What treatments are available?

Doctor: Treatment depends on how severe the narrowing is. For mild cases, regular ear cleaning and using ear drops to reduce inflammation or prevent infections might be enough. If the narrowing is more severe and causing significant hearing loss or frequent infections, we may consider procedures to widen the canal, such as ear canal dilation or surgery.

Patient: Is this condition permanent? Can it come back after treatment?

Doctor: Ear canal stenosis can sometimes recur, especially if the underlying cause isn’t fully addressed. That’s why regular follow-up is important to monitor your ear health and hearing. With proper treatment and care, many people manage their symptoms well.

Patient: Is there anything I can do to prevent it from getting worse?

Doctor: Yes, try to keep your ears dry, avoid inserting objects into your ear canal, and seek prompt treatment if you develop an ear infection. Also, if you use earplugs or hearing aids, make sure they fit properly and are cleaned regularly.

Patient: Thank you, doctor. I feel better knowing what’s going on and what I can do.

Doctor: You’re welcome. We’ll work together to manage your condition and keep your ears healthy.

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**EAR CANCER**

*ALTERNATIVE NAMES:* Ear cancer is also referred to as ear tumor or ear canal cancer. It can also be described as ear skin cancer, particularly when it starts as a skin cancer on the outer ear. Other terms used include temporal bone cancer, which refers to cancer involving the bone around the ear canal and behind the ear , and middle ear cancer, which involves the middle ear structures.

**DEFINITION / DESCRIPTION**

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.

**CAUSES**

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).

The cause of ear cancer is largely unknown.

**RISK FACTORS**

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.

***The ear flap***

Risk factors for cancer of the ear flap include:

* having fair skin
* exposure to ultraviolet sunlight
* having a weakened immune system

***The middle ear***

People with a history of repeated ear infections over a long time have a higher risk of developing cancer in the middle ear. Doctors are not yet clear why this happens.

***Cancer of the temporal bone and inner ear***

Cancer of the temporal bone is rare. The possible causes are cancers extending from the ear flap. Or cancers from the parotid gland or lymph nodes around the ear can spread to the temporal bone.

Inner ear cancer is also rare, the causes are not yet fully known.

***Other possible risk factors***

Some doctors think that the human papilloma virus (HPV) may be responsible for some middle ear cancers.

Another risk factor is the possibility of cancers developing in the ear after radiotherapy to the head and neck.

There needs to be more research done on both of these risk factors, to give doctors more information.

**SIGNS / SYMPTOMS**

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.

The symptoms of ear cancer depend on where the tumour is within the ear.

***Ear flap***

The main symptom is a spot or sore on the ear flap that doesn’t heal.

Most squamous cell cancers are pink lumps that have a hard scaly surface. They often bleed easily and ulcerate.

You should tell your doctor about any changes to a sore or mole, such as the mole growing, itching, or bleeding.

***Ear canal***

Symptoms can include:

* ear pain
* discharge from the ear
* loss of hearing
* a lump in the ear canal
* weakness in your face
* bleeding from the ear

***Middle ear***

The most common symptom is a discharge from the ear which may be blood stained. Other symptoms include:

* hearing loss
* earache
* you cannot move your face on the side of the affected ear

***Inner ear***

Symptoms include:

* pain
* headache
* hearing loss
* tinnitus (noises, such a ringing, heard in the ear)
* dizziness

Some people with ear cancer might also have swollen lymph nodes in their neck.

**DIAGNOSIS METHODS**

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.

**TREATMENT OPTIONS**

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 TO SEE A DOCTOR / RED FLAG**

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

**DIFFERENTIAL DIAGNOSIS**

## 1. Malignant Tumors of the Ear

* Squamous Cell Carcinoma (SCC)
  + The most common malignant tumor of the external auditory canal (about 80% of cases).
  + May present as a persistent ulcer, mass, or chronic otorrhea.
  + Can be mistaken for chronic otitis or cholesteatoma.
* Basal Cell Carcinoma (BCC)
  + Common skin cancer affecting the auricle and external ear skin.
  + Typically slow-growing and less aggressive than SCC.
* Malignant Melanoma
  + Arises from melanocytes in sun-exposed skin of the ear.
  + Can present as pigmented or nonpigmented lesions.
* Ceruminous Gland Adenocarcinoma
  + Rare malignant tumor arising from ceruminous (wax) glands of the external auditory canal.
* Merkel Cell Carcinoma
  + Rare, aggressive neuroendocrine carcinoma of the skin, including the ear.
* Middle Ear Carcinomas
  + Includes adenocarcinomas, neuroendocrine tumors, and rarely metastases.
* Temporal Bone Carcinoma
  + May arise from the external or middle ear and invade the temporal bone.

## 2. Benign Tumors and Lesions

* Exostoses and Osteomas
  + Benign bony growths in the external auditory canal, often related to cold water exposure.
* Chondromalacia and Chondrodermatitis Nodularis Chronica Helicis
  + Benign inflammatory or degenerative lesions of the auricular cartilage.
* Pleomorphic Adenoma and Syringocystadenoma Papilliferum
  + Rare benign tumors of ceruminous glands.
* Papillomas and Adenomas
  + Benign epithelial tumors of the middle ear or external canal.

## 3. Other Conditions Mimicking Ear Cancer

* Cholesteatoma
  + Keratinizing squamous epithelium causes chronic inflammation and bone erosion; can mimic malignancy clinically and radiologically.
* Chronic Otitis Media / Otitis Externa
  + Chronic infections causing granulation tissue and swelling.
* Ear Canal Trauma or Inflammation
  + Can cause masses or ulcerations mimicking tumors.
* Vascular Tumors and Malformations
  + Hemangiomas or vascular malformations of the ear canal.
* Metastatic Disease
  + Secondary tumors from lung, breast, thyroid, or colon cancer involving the temporal bone or ear canal.

## 4. Inner Ear and Cerebellopontine Angle Tumors

* Vestibular Schwannoma (Acoustic Neuroma)
  + Benign tumor of the vestibulocochlear nerve causing hearing loss and balance issues.
* Meningioma
  + Benign tumor arising from meninges near the internal auditory canal.
* Other Rare Tumors
  + Lipomas, hemangiomas, and arachnoid cysts.

**EPIDEMIOLOGY**

* Rarity:  
  Ear cancer is a rare malignancy, with an incidence estimated at approximately 1 to 6 cases per million population per year, accounting for less than 0.2% of all head and neck tumors. Globally, it affects about 0.006% of people worldwide.
* Incidence Relative to Ear Disease:  
  It is estimated that 1 case of middle ear carcinoma occurs for every 5,000 to 20,000 cases of ear disease.
* Age and Gender Distribution:
  + Ear cancer can occur at any age but shows a predominance among elderly adults.
  + The incidence of ear canal cancer is approximately equal between men and women, but cancers of the outer ear are twice as frequent in females.
  + Studies report a male predominance in head and neck cancers overall, often linked to risk factors like smoking and alcohol use.
* Geographic and Ethnic Variation:
  + The disease predominantly affects Caucasians, with a reported prevalence of 0.3–0.4% in some populations.
  + Incidence varies by region and is influenced by environmental factors such as chronic sun exposure and chronic ear infections.
* Risk Factors:
  + Chronic ear infections (especially longstanding, over 10 years) increase risk, particularly for cancers of the ceruminous glands.
  + Chronic sun exposure is linked to skin cancers of the ear (basal cell carcinoma, squamous cell carcinoma, melanoma), with lighter-skinned individuals at higher risk.
  + Tobacco and alcohol use are established risk factors for head and neck cancers, including some ear malignancies.
* Tumor Types and Sites:
  + Most common sites: external ear and ear canal.
  + Types include squamous cell carcinoma (most common), basal cell carcinoma, melanoma, and rare ceruminous gland cancers.
* Prognosis and Spread:
  + Ear cancers tend to spread locally by direct invasion into adjacent structures like the temporal bone and parotid gland.
  + Lymphatic metastases occur in about 10% of cases, and distant metastases are extremely rare

**PREDEFINED Q & A SETS**

You may want to ask your healthcare provider:What types of ear cancer are there?

## 1. Is my ear tumor malignant or benign?

* Most ear tumors are benign (noncancerous), such as osteomas, exostoses (bony growths), sebaceous cysts, or ceruminous gland tumors. These usually grow slowly and rarely spread.
* Malignant (cancerous) ear tumors are rare but serious. Common types include squamous cell carcinoma, basal cell carcinoma, malignant melanoma, Merkel cell carcinoma, ceruminous adenocarcinoma, and lymphoma. These can invade surrounding structures and may metastasize.
* Determining whether your tumor is benign or malignant requires a biopsy and histopathological examination by a specialist.

## 2. What type of ear tumor do I have?

* Benign tumors include:
  + Osteomas and exostoses: bony growths in the ear canal, often related to cold water exposure.
  + Sebaceous cysts: skin cysts filled with oil and dead skin cells.
  + Ceruminous gland tumors: benign growths from the ear’s sweat glands.
* Malignant tumors include:
  + Squamous cell carcinoma (SCC): most common malignant tumor of the external ear canal.
  + Basal cell carcinoma (BCC): less aggressive skin cancer.
  + Malignant melanoma, Merkel cell carcinoma, and others: rarer types with varying aggressiveness.
* Your doctor will classify the tumor based on clinical exam, imaging, and biopsy results.

## 3. What’s the best treatment for me?

* Benign tumors:
  + Often monitored if asymptomatic and small.
  + Surgical removal is recommended if they cause symptoms such as hearing loss, infections, or discomfort.
* Malignant tumors:
  + Surgery aiming for complete removal with clear margins is the mainstay.
  + Depending on the tumor type and stage, radiation therapy and/or chemotherapy may be added.
  + Advanced cases may require more extensive surgery including lymph node dissection.
* Your treatment plan will be individualized based on tumor type, size, location, and overall health.

## 4. What are the treatment risks and side effects?

* Surgery risks: bleeding, infection, damage to nearby structures (facial nerve, hearing apparatus), and possible hearing loss.
* Radiation therapy: skin irritation, dryness, risk of damage to surrounding tissues, and possible hearing changes.
* Chemotherapy: systemic side effects including nausea, fatigue, immune suppression, and others depending on drugs used.
* For benign tumor removal, risks are generally low but may include scarring or recurrence.
* Your care team will discuss these risks in detail before treatment.

## 5. Should I look out for signs of complications?

Yes, after diagnosis and treatment, watch for:

* Persistent or worsening pain in or around the ear.
* New or worsening hearing loss or ringing.
* Discharge or bleeding from the ear.
* Facial weakness or numbness.
* Swelling or lumps around the ear or neck.
* Signs of infection: fever, redness, warmth.
* Any new or worsening symptoms should prompt urgent evaluation.

***TYPES OF EAR CANCER***

The most common type of ear cancer is squamous cell cancer. Other types of cancer of the ear canal, middle or inner ear include:

* basal cell cancer
* melanoma
* adenoid cystic
* adenocarcinoma

**TREATMENT OPTIONS**

***Treatment of Ear Cancer: Drug Information and Side Effects***

Ear cancer treatment often involves a multimodal approach, including surgery, radiation therapy, and chemotherapy. Chemotherapy may be used as:

* Primary treatment in advanced or inoperable cases
* Adjuvant therapy after surgery
* Concurrent with radiation therapy (chemoradiation) to improve outcomes

***Common Chemotherapy Drugs Used in Ear Cancer***

Chemotherapy regimens for ear cancer typically include drugs used for head and neck squamous cell carcinomas, such as:

* Cisplatin
* Carboplatin
* 5-Fluorouracil (5-FU)
* Paclitaxel
* Docetaxel

## Side Effects of Chemotherapy Drugs Relevant to Ear Cancer Treatment

| **Drug** | **Common Side Effects** | **Notable Toxicities Related to Ear/Neurological System** |
| --- | --- | --- |
| Cisplatin | Nausea, vomiting, nephrotoxicity, neuropathy | Ototoxicity: Hearing loss, tinnitus; can cause permanent inner ear damage |
| Carboplatin | Myelosuppression, nausea, neuropathy | Ototoxicity risk lower than cisplatin but still present |
| 5-FU | Mucositis, diarrhea, myelosuppression | Rarely neurotoxic |
| Paclitaxel | Neuropathy, myelosuppression, alopecia | Peripheral neuropathy; less ototoxicity than platinum drugs |
| Docetaxel | Fluid retention, neuropathy, myelosuppression | Peripheral neuropathy |

## Chemotherapy-Related Hearing Loss and Ototoxicity

* Platinum-based drugs (cisplatin, carboplatin) are well-known for causing ototoxicity, damaging the inner ear and auditory nerves, leading to hearing loss and tinnitus.
* Hearing loss may develop during or after chemotherapy and can be permanent.
* Patients receiving these drugs should have baseline and periodic audiometric testing.
* Dose adjustments or switching drugs may be necessary if hearing deteriorates.
* Some protective agents have been studied but are not widely used due to side effects and uncertain efficacy.

***Other Common Chemotherapy Side Effects***

* Fatigue, nausea, vomiting, hair loss, mouth sores, diarrhea or constipation
* Myelosuppression leading to anemia, neutropenia, and increased infection risk
* Peripheral neuropathy (especially with taxanes and platinum drugs)
* Risk of blood clots, particularly with cisplatin

***Management of Side Effects***

* Symptomatic treatment for nausea, pain, and fatigue
* Monitoring blood counts and managing infections promptly
* Audiology monitoring and counseling for hearing loss
* Adjusting chemotherapy dose or regimen as needed

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, thank you for coming in today. I want to discuss the results of your recent tests. We found a growth in your ear that we need to talk about.

Patient: Okay, doctor. Is it serious?

Doctor: The tests show that the growth is a type of cancer called ear cancer. I understand this can be overwhelming news. I’m here to explain what this means and discuss the best treatment options with you.

Patient: What kind of cancer is it? Can it be treated?

Doctor: The most common type of ear cancer is squamous cell carcinoma, which starts in the skin of the ear canal or outer ear. The good news is that we caught it early, and there are effective treatments available, including surgery and radiation therapy. Sometimes chemotherapy is also used depending on the case.

Patient: What will the treatment involve? Will it hurt?

Doctor: Treatment usually involves removing the tumor surgically, which may require reconstructive procedures depending on the size. Radiation therapy helps to kill any remaining cancer cells. We will manage any pain or side effects carefully throughout your treatment. Our team will support you every step of the way.

Patient: What are the chances of recovery?

Doctor: Early-stage ear cancers have a good prognosis, especially when treated promptly. We will monitor you closely after treatment to ensure the cancer does not return. It’s important to keep all follow-up appointments and report any new symptoms.

Patient: Are there side effects I should know about?

Doctor: Yes, treatments can have side effects. Surgery may affect hearing or cause temporary discomfort. Radiation can cause skin irritation and fatigue. Chemotherapy, if needed, may cause nausea, fatigue, or hearing changes. We will discuss ways to minimize these effects and provide supportive care.

Patient: I’m worried and have a lot of questions.

Doctor: That’s completely understandable. Please feel free to ask any questions now or later. You can bring a family member or friend to appointments for support. We also have nurses and counselors who can help you through this.

Patient: Thank you, doctor. I appreciate you explaining everything clearly.

Doctor: You’re welcome. We will work together to give you the best care possible. I’ll also provide written information and resources to help you understand your diagnosis and treatment.

***REFERENCES***

[Ear Tumors: Symptoms, Types & Treatment](https://my.clevelandclinic.org/health/diseases/17587-ear-tumors#symptoms-and-causes)

<https://my.clevelandclinic.org/health/treatments/24323-chemotherapy-drugs>

**EPISTAXIS (NOSE BLEEDS)**

ALTERNATIVE NAMES: Epistaxis is also known as a nosebleed. The term "epistaxis" comes from the Greek word "epistazein," which means "bleed from the nose".

**DEFINITION / DESCRIPTION**

Epistaxis is the medical term for a nosebleed. A nosebleed — meaning a loss of blood from the tissue that lines the inside of your nose — can occur in one or both nostrils. Usually, it only affects one nostril.

Your nose has many tiny blood vessels in it. These vessels help warm and moisten the air you breathe. But they lie close to the inner surface of your nose. When air moves through your nose, it can dry and irritate your blood vessels. This makes them very easy to injure or break, causing a nosebleed.

About 6 in 10 people will have at least one nosebleed at some point in life. Most nosebleeds are minor and go away with at-home care. But if bleeding is severe or you have other symptoms (like vomiting or trouble breathing), you should go to the emergency room.

***Types of nosebleeds***

There are two main types of nosebleeds. Healthcare providers describe them by the site of the bleeding.

##### **Anterior nosebleed**

An anterior nosebleed starts in the front of your nose on the lower part of the wall that separates the two sides of your nose (septum). Capillaries and small blood vessels in this front area of your nose are fragile and can easily break and bleed. This is the most common type of epistaxis and usually isn’t serious. You can usually treat these nosebleeds at home.

##### **Posterior nosebleed**

A posterior nosebleed occurs deep inside your nose. A bleed in larger blood vessels in the back part of your nose near your throat causes this type. It can result in heavy bleeding, which may flow down the back of your throat. You may need medical attention right away for this type of nosebleed.

**CAUSES**

Most nosebleeds only affect one nostril, but they can affect both at the same time. Epistaxis has many causes. Fortunately, most aren’t serious.

The most common cause of nosebleeds is dry air. The air is typically drier in:

* Hot, low-humidity climates
* Areas at high altitudes
* Heated indoor spaces

Dry air causes your nasal membrane (the delicate tissue inside your nose) to dry out and become crusty or cracked. It’s then more likely to bleed when rubbed or picked or when blowing your nose.

You may also develop a nosebleed if you:

* Insert an object in your nose
* Injure your nose and/or face
* Have a deviated septum
* Have an upper respiratory infection or sinus infection that makes you keep sneezing, coughing and blowing your nose
* Have allergic or nonallergic rhinitis (inflammation of your nasal lining)
* Frequently use antihistamine or decongestant nasal sprays, which can dry out your nasal membranes
* Take blood-thinning medications like aspirin, NSAIDs or warfarin
* Breathe in chemicals from cleaning supplies, fumes at your workplace or other strong odors
* Use recreational drugs (like cocaine) that you inhale through your nose

Less common causes of nosebleeds include:

* Alcohol use
* Bleeding disorders, like hemophilia or von Willebrand disease
* High blood pressure
* Atherosclerosis
* Facial and nasal surgery
* Nasal tumors
* Nasal polyps
* Immune thrombocytopenia
* Leukemia
* Hereditary hemorrhagic telangiectasia
* Pregnancy

***What causes nosebleeds while sleeping?***

The reasons for nosebleeds during sleep are the same as the reasons why they occur during the day. Dry air, allergies and upper respiratory infections damage the delicate nasal membrane lining your nose. Sleeping with your head to the side may also put direct pressure on your nasal cavity and cause epistaxis at night.

**RISK FACTORS**

Anyone can get nosebleeds. Most people will have at least one case in their lifetimes. But some people are more likely to have a nosebleed. They include:

* Children between the ages of 2 and 10. Dry air, colds, allergies and sticking fingers and objects into their noses make children more prone to nosebleeds.
* Adults between the ages of 45 and 80. Blood may take longer to clot as you approach the age of 50. Around this age, you’re also more likely to have high blood pressure, atherosclerosis (hardening of the walls of arteries) or a bleeding disorder.
* Those who are pregnant. Blood vessels in your nose expand while you’re pregnant, which puts more pressure on the delicate blood vessels in the lining of your nose.
* People taking blood-thinning medications. These drugs include aspirin and warfarin.
* People who have blood clotting disorders. These include hemophilia and von Willebrand disease.

**SIGNS / SYMPTOMS**

Usually, you won’t have any symptoms other than blood coming from your nose. If you have a posterior nosebleed, some blood may drain down the back of your throat into your stomach. This can cause a bad taste in the back of your throat and make you feel nauseated.

If you have additional symptoms, it may be a sign of a medical condition.

**DIAGNOSIS METHODS**

Although seeing blood coming out of your nose can be alarming, most nosebleeds aren’t serious. You can usually manage them at home. But you should call a healthcare provider if:

* You get nosebleeds often
* You have symptoms of anemia (feeling weak, faint, tired, cold or short of breath or having pale skin)
* You get a nosebleed around the time you start a new medication
* You get nosebleeds and also notice unusual bruising all over your body — this combination may indicate a more serious condition such as a blood-clotting disorder (hemophilia or von Willebrand disease), leukemia or a nasal tumor

Call your pediatrician if your child is under age 2 and has a nosebleed. No matter your child’s age, it’s a good idea to mention any nosebleeds at their next well-check.

A healthcare provider asks you questions about your nosebleed, including:

* Length (in minutes) of your nosebleed
* Approximate amount of blood that came out
* How often you get them
* If the bleed involved one or both nostrils

They also ask about:

* Medications, including over-the-counter (OTC) blood-thinning medications like aspirin and drugs for colds and allergies
* Your biological family history, including any history of blood disorders
* Your use of alcohol and/or any recreational drugs in which you sniffed the drug up your nose

Next, your provider examines your nose to determine the source of the bleeding and what may have caused it. They use a small speculum to hold your nostril open and use various light sources or an endoscope (lighted scope) to see inside your nasal passages.

Your provider may use topical medications to numb (anesthetize) the lining of your nose and to narrow blood vessels. Your provider may remove clots and crusts from inside your nose. This can be unpleasant but isn’t painful.

Occasionally, they may order X-rays, a CT scan or blood tests to check for bleeding disorders, blood vessel abnormalities or nasal tumors.

**TREATMENT OPTIONS**

Nosebleed treatment depends on the cause of the bleeding. Your provider will explain what’s necessary in your situation. Epistaxis treatment may include:

* Nasal packing. Your healthcare provider inserts gauze, special nasal sponges or foam, or an inflatable latex balloon into your nose to create pressure at the site of the bleed. Your provider may want to leave the material in place for 24 to 48 hours before removing it.
* Cauterization. This procedure involves applying a chemical substance (silver nitrate) or heat energy (electrocautery) to seal the bleeding blood vessel. Your provider sprays a local anesthetic in your nostril first to numb the inside of your nose.
* Medication adjustments/new prescriptions. Reducing the amount of blood-thinning medications you take — or stopping them — can be helpful. In addition, medications for managing blood pressure may be necessary. Your provider may prescribe tranexamic (Lysteda®), a medication to help blood clot.
* Foreign body removal. If the cause of the nosebleed is a foreign object, your provider will remove it.
* Surgery. Surgery can repair a broken nose or correct a deviated septum (septoplasty).
* Ligation. In this procedure, your provider ties off the culprit blood vessel to stop the bleeding.

***How can I stop a nosebleed at home?***

Follow these steps to stop a nosebleed:

* Keep calm and breathe through your mouth.
* Sit up straight with your head slightly forward.
* Use your thumb and index finger to pinch the soft sides of your nose (just above your nostrils).
* Wait for the bleeding to stop. Use a tissue or damp washcloth to catch the blood.

At-home care is often enough. But some nosebleeds need medical care at a hospital. Have someone drive you to the nearest emergency room or call 911 (or your local emergency service number) if:

* You can’t stop the bleeding after more than 15 to 20 minutes of pinching your nose
* The blood loss is large (more than 1 cup)
* You’re taking blood-thinning medications (like aspirin or warfarin) or have a blood-clotting disorder and the bleeding won’t stop
* You’re having difficulty breathing
* You’ve swallowed blood and can’t stop vomiting
* Your nosebleed happened after a blow to your head or a serious injury (fall, car accident or a smash to your face or nose)

***Can I drink water after a nosebleed?***

Yes, you should drink plenty of fluids after a nosebleed. Good options include water, juice and other non-caffeinated liquids. After you experience epistaxis, some blood may drain down the back of your throat into your stomach. This may make you feel nauseated. But drinking water won’t affect a nosebleed.

***Can you die from a nosebleed?***

Nosebleeds that occur higher on your septum or deeper in your nose may be harder to control. However, nosebleeds are rarely fatal.

**PREVENTION TIPS**

Here are some tips for preventing nosebleeds:

* Use a saline nasal spray or saline nose drops two to three times a day in each nostril to keep your nasal passages moist. You can purchase these products over the counter or you can make them at home.
* Add a humidifier to your furnace or run a humidifier in your bedroom at night to add moisture to the air.
* Spread a nasal gel or ointment in your nostrils with a cotton swab. Bacitracin®, Vaseline® or Ayr Gel® are examples of over-the-counter ointments you can use. Be sure not to insert the swab more than 1/4 inch into your nose. You can purchase these gels and ointments in most pharmacies.
* Avoid blowing your nose too forcefully.
* Sneeze through an open mouth. Always sneeze into a tissue or your elbow.
* Avoid putting anything solid into your nose, including your fingers.
* Limit your use of medications that can increase bleeding, like aspirin and ibuprofen. Always check with your healthcare provider before making any changes to your medications. This is especially important for prescribed medications like warfarin (Coumadin®) and nonsteroidal anti-inflammatory drugs (NSAIDs).
* See your provider if you can’t easily control your nasal allergy symptoms with over-the-counter or prescription medications. Make sure you closely follow the directions when using over-the-counter products. Overusing them can cause nosebleeds.
* Quit smoking. Smoking dries out your nose and irritates it.
* Wear protective headgear if you do activities that could result in an injury to your face and nose.

To help your child avoid nosebleeds, teach them not to put things up their nose. It’s also a good idea to keep your child’s fingernails short. Your pediatrician can offer more advice, too.

**OUTLOOK / PROGNOSIS**

For most of the general population, epistaxis is merely a nuisance. However, the problem can occasionally be life-threatening, especially in elderly patients and in those patients with underlying medical problems. Fortunately, mortality is rare and is usually due to complications from hypovolemia, with severe hemorrhage or underlying disease states.

Overall, the prognosis is good but variable; with proper treatment, it is excellent. When adequate supportive care is provided and underlying medical problems are controlled, most patients are unlikely to experience any rebleeding. Others may have minor recurrences that resolve spontaneously or with minimal self-treatment. A small percentage of patients may require repacking or more aggressive treatments.

Patients with epistaxis that occurs from dry membranes or minor trauma do well, with no long-term effects. Patients with HHT tend to have multiple recurrences regardless of the treatment modality. Patients with bleeding from a hematologic problem or cancer have a variable prognosis. Patients who have undergone nasal packing are subject to increased morbidity. Posterior packing can potentially cause airway compromise and respiratory depression. Packing in any location may lead to infection.

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

Most nosebleeds aren't serious and will stop on their own or by following self-care steps.

**Seek emergency medical care** if nosebleeds:

* Follow an injury, such as a car accident
* Involve a greater than expected amount of blood
* Interfere with breathing
* Last longer than 30 minutes even with compression
* Occur in children younger than age 2

Don't drive yourself to an emergency room if you're losing a lot of blood. Call 911 or your local emergency number or have someone drive you.

**Talk to your doctor** if you're having frequent nosebleeds, even if you can stop them fairly easily. It's important to determine the cause of frequent nosebleeds.

**DIFFERENTIAL DIAGNOSIS**

***Diagnostic Considerations***

Recurrent epistaxis in children could be caused by a foreign body, especially if the nosebleeds are accompanied by symptoms of unilateral nasal congestion and purulent rhinorrhea. Delayed epistaxis in a trauma patient may signal the presence of a traumatic aneurysm.

Other conditions to be considered include the following:

* Chemical irritants
* Hepatic failure
* Leukemia
* Thrombocytopenia
* Heparin toxicity
* Ticlopidine toxicity
* Dipyridamole toxicity
* Trauma
* Tumor

***Differential Diagnoses***

* Allergic Rhinitis
* Barotrauma
* Cocaine Toxicity
* Coumarin Plant Poisoning
* Disseminated Intravascular Coagulation in Emergency Medicine
* Emergent Treatment of Endometriosis
* Nasal Foreign Bodies
* Nonsteroidal Anti-inflammatory Drug (NSAID) Toxicity
* Pediatric Osler-Weber-Rendu Syndrome
* Rodenticide Toxicity
* Salicylate Toxicity
* Sinusitis (Rhinosinusitis) Imaging
* Type A Hemophilia
* Type B Hemophilia
* von Willebrand Disease
* Warfarin and Superwarfarin Toxicity

**RECENT GUIDELINES OR UPDATES**

Room setting recommendations include the following:

* If conventional operating rooms are unavailable, employ well-demarcated areas within the emergency department complex
* The patient should be treated by a reduced and experienced clinical staff, including a surgeon and a scrub nurse, with proper personal protective equipment (PPE)

Treatment recommendations include the following:

* Avoid unnecessary interventions
* If noninvasive procedures fail, nasal packing or cautery should be performed
* Resorbable packing, if available, is recommended
* If sphenopalatine artery ligation is needed for posterior epistaxis, the procedure should be postponed until COVID-19 testing has been performed
* Avoid using local anesthetic atomized sprays, employing soaked pledgets instead
* During the procedure, a suction system, within a closed system and employing a viral filter, should be used

Postprocedure recommendations include the following:

* To reduce recurrence risk and optimize outcomes, the patient should receive postprocedural instructions on packing removal or antibiotic prophylaxis
* Carefully execute gowning and degowning procedures
* Standard PPE should be employed by personnel engaged in the decontamination of surgical equipment
* Upon initial contact, the clinician should determine whether a nosebleed patient does or does not require prompt management
* In patients who require prompt management, active bleeding should be treated with firm, sustained compression to the lower third of the nose, with or without the patient or caregiver’s help, for at least 5 minutes
* If, owing to bleeding, the bleeding site cannot be identified (despite nasal compression), nasal packing should be used to treat ongoing, active bleeding
* In patients with a suspected bleeding disorder or in those who are on anticoagulation or antiplatelet medications, resorbable packing should be used
* In any patient with a nosebleed, factors that lead to more frequent or severe bleeding, including personal or family history of bleeding disorders, use of anticoagulant or antiplatelet medications, or intranasal drug use, should be documented
* In patients with nosebleeds, anterior rhinoscopy should be carried out to identify a bleeding source (although any blood clot, if present, should first be removed)
* To identify the bleeding site and guide further management in patients who, despite prior packing or cautery, have recurrent nasal bleeding, the clinician should either perform nasal endoscopy or make a referral to a clinician who can perform it; this should also be done in patients with recurrent unilateral nasal bleeding
* In patients whose epistaxis is difficult to control, as well as in those for whom concern exists that the epistaxis is associated with an unrecognized pathology, the clinician may examine the nasal cavity and nasopharynx with nasal endoscopy or make a referral to one who can
* Patients with an identified bleeding site should be treated with appropriate interventions; these may include one or more of the following: topical vasoconstrictors, nasal cautery, and moisturizing or lubricating agents
* When employing nasal cautery, the bleeding site should be anesthetized, and the cautery should be restricted only to the active or suspected bleeding site(s)
* Patients in whom packing or nasal cauterization fails to control persistent or recurrent bleeding should be evaluated as candidates for surgical arterial ligation or endovascular embolization; the clinician should either perform the evaluation or make a referral to one who can
* If bleeding is not life-threatening, first-line treatments should be initiated before transfusion, reversal of anticoagulation, or withdrawal of anticoagulation/antiplatelet medications from patients using these agents
* In patients with a history of recurrent bilateral nosebleeds or a family history of recurrent nosebleeds, the clinician should assess, or make a referral to a specialist can assess, whether nasal telangiectasias and/or oral mucosal telangiectasias are present, in order to diagnose hereditary hemorrhagic telangiectasia (HHT) syndrome

**EPIDEMIOLOGY**

The frequency of epistaxis is difficult to determine because most episodes resolve with self-treatment and, therefore, are not reported.However, when multiple sources are reviewed, the lifelong incidence of epistaxis in the general population is about 60%, with fewer than 10% seeking medical attention.

The age distribution is bimodal, with peaks in young children (2-10 y) and older individuals (50-80 y). Epistaxis is unusual in infants in the absence of a coagulopathy or nasal pathology (eg, choanal atresia, neoplasm). Local trauma (eg, nose picking) does not occur until later in the toddler years. Older children and adolescents also have a less frequent incidence. Consider cocaine abuse in adolescent patients.

Prevalence of epistaxis tends to be higher in males (58%) than in females (42%).

**PREDEFINED Q & A SETS**

***Are blood clots in a nosebleed normal?***

Yes. Blood clots are clumps of blood that form in reaction to an injured blood vessel. Blood clotting prevents excessive bleeding when a blood vessel is damaged. When you pinch your nose to stop a nosebleed, the blood will begin to clot. It’ll normally remain there until you remove it or gently blow your nose.

***Why do I get frequent nosebleeds?***

There are many reasons you may be getting frequent nosebleeds. They can affect one or both nostrils. The most common causes are:

* You frequently use nasal sprays to treat allergy symptoms or colds/congestion
* The air is dry where you live
* You snort drugs into your nose

You may need to stop using sprays for a short period or stop them altogether. Talk with your provider if you use these products.

In rare cases, repeated epistaxis could be a sign of a bleeding disorder or other more serious conditions. If you have frequent nosebleeds, see a healthcare provide

**Epistaxis (Nosebleeds) Treatment: Drug Information and Side Effects**

## 1. Topical Treatments

* Nasal Saline Sprays/Gels and Ointments
  + Examples: Saline sprays, Bacitracin®, Vaseline®, Ayr Gel®
  + Purpose: Moisturize nasal mucosa to prevent dryness and crusting, reducing bleeding risk
  + Side Effects: Generally safe; rare local irritation or allergic reaction
* Topical Vasoconstrictors
  + Examples: Oxymetazoline (Afrin®), Phenylephrine
  + Purpose: Narrow blood vessels to reduce bleeding and swelling
  + Side Effects: Nasal dryness, rebound congestion if used >3 days, rare systemic effects like increased blood pressure or headache
* Topical Anesthetics (with vasoconstrictors)
  + Examples: Lidocaine with epinephrine
  + Purpose: Numb nasal mucosa and constrict vessels during medical procedures like cauterization
  + Side Effects: Local irritation, numbness, rare allergic reactions

## 2. Systemic and Adjunctive Medications

* Tranexamic Acid (Antifibrinolytic Agent)
  + Administration: Topical (gel or soaked pledget), oral, or intravenous
  + Purpose: Promotes clot stability by inhibiting fibrinolysis, helping to stop bleeding faster
  + Evidence: Moderate-quality evidence supports reduced re-bleeding risk and faster bleeding control compared to placebo or other topical agents
  + Side Effects: Generally well tolerated; rare nausea, headache, or thrombosis risk with systemic use
* Pain Relievers and Supportive Care
  + Acetaminophen or ibuprofen may be used for discomfort but avoid NSAIDs if bleeding risk is high.

## 3. Other Treatments

* Nasal Packing and Cauterization
  + Not drugs, but common medical interventions when bleeding persists.
  + Packing materials may be impregnated with antibiotics or anesthetics.
* Antibiotics
  + Sometimes prescribed if nasal packing is used to prevent secondary infection.
  + Side effects depend on the antibiotic chosen.

| **Medication/Agent** | **Use in Epistaxis** | **Common Side Effects** | **Notes** |
| --- | --- | --- | --- |
| Nasal saline sprays/gels | Moisturize, prevent dryness | Rare local irritation | Over-the-counter; safe for long-term use |
| Oxymetazoline, Phenylephrine | Vasoconstriction to stop bleeding | Nasal dryness, rebound congestion, hypertension (rare) | Use short-term (<3 days) to avoid rebound |
| Lidocaine + Epinephrine | Anesthesia and vasoconstriction | Local irritation, numbness | Used during cauterization or nasal exam |
| Tranexamic Acid | Promote clot stability | Nausea, headache, rare thrombosis (systemic) | Effective adjunct to standard care |
| Antibiotics | Prevent infection post-packing | Allergic reactions, GI upset | Used selectively |

## 

* Most nosebleeds stop with simple first aid (pinching nose, leaning forward).
* Persistent or recurrent bleeding requires medical evaluation and may need topical medications or procedures.
* Avoid overuse of vasoconstrictors to prevent rebound congestion.
* Patients on blood thinners or with bleeding disorders require special management.

**Genomic Data Related to Epistaxis (Nosebleeds)**

The most significant genomic association with recurrent or severe epistaxis is Hereditary Hemorrhagic Telangiectasia (HHT), a genetic disorder characterized by abnormal blood vessel formation leading to fragile vessels prone to bleeding, especially in the nasal mucosa.

* Hereditary Hemorrhagic Telangiectasia (HHT):
  + An autosomal dominant genetic disorder caused by mutations in several genes involved in blood vessel development and integrity.
  + The main genes implicated are:
    - ENG (endoglin) gene — causes HHT type 1
    - ACVRL1 (activin receptor-like kinase 1, ALK1) gene — causes HHT type 2
    - SMAD4 gene — associated with a combined syndrome of juvenile polyposis and HHT
  + Hundreds of mutations in these genes have been identified, leading to defective proteins that disrupt normal vascular development.
  + A single mutated gene copy is sufficient to cause the disorder.
* Clinical Manifestations Related to Genetics:
  + Fragile, abnormal capillaries and arteriovenous malformations (AVMs) lead to frequent and spontaneous nosebleeds.
  + Other signs include mucocutaneous telangiectasias and AVMs in lungs, liver, brain, and gastrointestinal tract.
  + Severity and manifestations vary even within families sharing the same mutation.
* Diagnosis:
  + Primarily clinical, based on Curacao criteria (recurrent epistaxis, telangiectasias, visceral AVMs, family history).
  + Genetic testing can confirm mutations in ENG, ACVRL1, or SMAD4 but is not required for diagnosis.
  + Genetic testing helps in family counseling and early detection.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you’ve had some nosebleeds recently. Can you tell me when they started and how often they happen?

Patient: Yes, doctor. It started a few days ago. The bleeding usually stops after a few minutes, but yesterday it lasted longer and I was a bit worried.

Doctor: Thank you for sharing that. Nosebleeds are quite common and usually not serious. The first thing I want to make sure is that you know how to manage them safely at home. When you get a nosebleed, it’s important to sit upright, lean slightly forward, and pinch the soft part of your nose—not the bridge—for at least 10 to 20 minutes without letting go. This helps stop the bleeding.

Patient: I didn’t know about the leaning forward part. I was leaning back before.

Doctor: That’s a common mistake. Leaning forward prevents blood from running down your throat, which can cause nausea or vomiting. Also, applying an ice pack on the bridge of your nose can help constrict blood vessels.

Patient: What if the bleeding doesn’t stop after 20 minutes?

Doctor: If the bleeding continues despite applying firm pressure for 20 minutes, or if the bleeding is heavy, you should come to the emergency room. Sometimes, we may need to cauterize the bleeding vessel or place nasal packing to control it.

Patient: What causes these nosebleeds? I don’t remember injuring my nose.

Doctor: Nosebleeds can happen for many reasons. Dry air, frequent nose blowing, allergies, or picking your nose can irritate the lining. Sometimes infections or nasal inflammation cause it. Rarely, it can be due to underlying medical conditions like bleeding disorders or high blood pressure. We’ll review your medical history and medications to check for any risk factors.

Patient: I take aspirin daily. Could that cause nosebleeds?

Doctor: Yes, aspirin can make bleeding more likely because it affects how your blood clots. We’ll consider that in your treatment plan.

Patient: Is there anything I can do to prevent future nosebleeds?

Doctor: Keeping your nasal passages moist is important. You can use saline nasal sprays or gels regularly, especially in dry weather. Avoid picking your nose or blowing it too hard. If you have allergies, managing them well helps too.

Patient: Should I be worried about these nosebleeds?

Doctor: Most nosebleeds are harmless and manageable. However, if you have frequent or very heavy bleeding, or if you notice bruising or bleeding elsewhere, please let me know. We may need to do further tests to rule out bleeding disorders.

Patient: Thank you, doctor. I’ll follow your advice and come back if it gets worse.

Doctor: You’re welcome. Remember, apply firm pressure for at least 10 minutes if you bleed again, and avoid leaning back. If you have any concerns, don’t hesitate to contact us.

REFERENCES:

[Nosebleeds (Epistaxis): Causes, Treatment & Prevention](https://my.clevelandclinic.org/health/diseases/13464-nosebleed-epistaxis#overview)

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**Eardrum perforation or rupture**

ALTERNATIVE NAMES:Tympanic Membrane Perforation

* Ruptured Tympanic Membrane
* Perforated Eardrum
* Tympanic Membrane Rupture
* Drum Perforation
* TM Perforation
* Eardrum Tear
* Tympanic Membrane Tear
* Perforated Tympanic Membrane

**DEFINITION / DESCRIPTION**

A ruptured eardrum (also known as a perforated eardrum) is a hole or tear in the thin tissue that separates your outer ear from your middle ear. It can happen because of a bad ear infection or an injury to your ear.

A ruptured eardrum can affect your hearing or sense of balance. But in many cases, it heals on its own. Sometimes, you may need surgery to fix it. The best way to prevent it is to protect your ears from injury and infection.

If you think you’ve ruptured your eardrum, don’t panic — but don’t ignore it, either. Most tears heal with time, but some may need treatment

**CAUSES**

The most common cause of a perforated eardrum is a middle ear infection. When fluid builds up behind your eardrum, it creates pressure that can make it tear or pop.

Other common causes include:

* Ear injuries or trauma: A hard hit to your ear or head, like from a fall or a slap, can rupture your eardrum.
* Loud, explosive sounds: Your eardrums may rupture if you’re close by when there’s an explosion or gunfire.
* Pressure changes (barotrauma): If air gets trapped in your middle ear during flying or diving, a sudden change in pressure can make your eardrum burst.
* Sticking objects in your ears: Using cotton swabs or other small objects to clean or scratch your ear can puncture your eardrum. Even accidents, like bumping into a twig or getting hit by a thrown object, can cause damage.

#### **How to lower your risk**

Protecting your ears is the best way to prevent a ruptured eardrum. Here are a few simple tips:

* Clean with care: Skip cotton swabs. Use a clean cloth to gently wipe the outside of your ear.
* Prevent airplane ear: Flying can cause pressure changes that affect your ears. Chew gum, yawn, or wear special earplugs during takeoff and landing.
* Protect your ears from loud blasts: Gunfire or explosions can rupture your eardrum. Use earplugs or hearing protection if you’ll be near loud or explosive noise.
* Treat ear infections early: Signs of a middle ear infection include ear pain, stuffy nose, fever or trouble hearing. See a provider if symptoms last more than a few days.

**SIGNS / SYMPTOMS**

You might not know your eardrum is ruptured right away, especially if nothing hit your ear. Many people notice changes in hearing or drainage from their ear as the first signs.

Common symptoms include:

* Ear pain: This pain can come on suddenly and may go away quickly.
* Fluid draining from your ear: It may look like pus or have blood in it.
* Sudden hearing loss: Sounds may seem muffled or harder to hear.
* Tinnitus: This is a ringing, buzzing or humming sound in your ear that doesn’t come from outside.

If you notice any of these symptoms, it’s a good idea to get checked out. A ruptured eardrum usually heals on its own, but it’s best to let a provider confirm what’s going on.

**DIAGNOSIS METHODS**

To check for a ruptured eardrum, your provider will look inside your ear with a tool called an otoscope. It shines a light into your ear so they can see your eardrum clearly.

You might also have hearing tests. These help measure how well your eardrum is working and how well you hear.

Common tests include:

* Audiometry (audiogram): Checks how well you hear soft sounds and different tones
* Tympanometry: Shows how well your eardrum moves

These tests help your provider figure out if you have an eardrum rupture or another ear issue.

**TREATMENT OPTIONS**

In many cases, a ruptured eardrum heals on its own without treatment. But if it doesn’t, you may need to see an ear, nose and throat specialist (ENT) for help.

Treatment options may include:

* Myringoplasty: Your ENT places a small paper patch over the hole. The patch helps your eardrum grow back and close the tear.
* Tympanoplasty: This surgery uses tissue from another part of your body (like skin or cartilage) to repair the eardrum.

#### **Recovery time**

Most ruptured eardrums heal within a few weeks, but some may take a few months. Contact your healthcare provider if you still have pain, drainage or hearing problems. You might need more treatment.

**PREVENTION TIPS**

Follow these tips to avoid a ruptured (perforated) eardrum:

* **Get treatment for middle ear infections.** Be aware of the signs and symptoms of middle ear infection, including earache, fever, nasal congestion and reduced hearing. Children with middle ear infections often are fussy and may refuse to eat. Seek prompt evaluation from your provider to prevent potential damage to the eardrum.
* **Protect your ears during flight.** If possible, don't fly if you have a cold or an active allergy that causes nasal or ear congestion. During takeoffs and landings, keep ears clear with pressure-equalizing earplugs, yawning or chewing gum.  
  Or use the Valsalva maneuver — gently pushing air into the nose, as if blowing your nose, while pinching the nostrils and keeping the mouth closed. Don't sleep during ascents and descents.
* **Keep your ears free of foreign objects.** Never attempt to dig out excess or hardened earwax with items such as a cotton swab, paper clip or hairpin. These items can easily tear or puncture the eardrum. Teach your children about the damage that can be done by putting foreign objects in their ears.
* **Guard against explosive noise.** Avoid activities that expose the ears to explosions. If your hobbies or work involves planned activities that produce explosive noise, protect your ears from unnecessary damage by wearing protective earplugs or earmuffs.

**OUTLOOK / PROGNOSIS**

Most ruptured eardrums heal on their own, but how you care for your ear can make a big difference. Here’s how to protect your ear while it heals:

* Avoid blowing your nose: If possible, don’t blow your nose while your eardrum is healing. If you have allergies, ask your healthcare provider about ways to prevent a stuffy nose.
* Don’t clean your ears: Even gentle cleaning may keep your eardrum from healing.
* Keep your ear dry: Use waterproof earplugs or cotton balls coated with petroleum jelly when you shower or take a bath. If you swim for exercise, please find another way to keep moving. Moisture in your ear from swimming may affect your eardrum.

#### **What side should I sleep on with a ruptured eardrum?**

If you have a ruptured eardrum, try sleeping on the side that doesn’t hurt or doesn’t have fluid coming out. This keeps pressure off the damaged ear.

**POSSIBLE COMPLICATIONS**

A ruptured eardrum is sometimes a serious issue, especially if it doesn’t heal on its own. Possible long-term complications include:

* A hole that doesn’t close
* Dizziness or balance problems
* Ongoing hearing loss
* Repeat ear infections
* Skin growth that can damage your middle ear (cholesteatoma)

Your eardrum also acts as a barrier. When it’s torn, germs, water and debris can enter more easily and raise your risk of infection.

The eardrum (tympanic membrane) has two primary roles:

* **Hearing.** When sound waves strike it, the eardrum vibrates — the first step by which structures of the middle and inner ears translate sound waves into nerve impulses.
* **Protection.** The eardrum also acts as a barrier, protecting the middle ear from water, bacteria and other foreign substances.

If the eardrum ruptures, uncommon problems can occur, especially if it fails to self-heal after three to six months. Possible complications include:

* **Hearing loss.** Usually, hearing loss is temporary, lasting only until the tear or hole in the eardrum has healed. The size and location of the tear can affect the degree of hearing loss.
* **Middle ear infection (otitis media).** A ruptured (perforated) eardrum can allow bacteria to enter the ear. If a perforated eardrum doesn't heal, a small number of people may be vulnerable to ongoing (recurrent or chronic) infections. In this small group, chronic drainage and hearing loss can occur.
* **Middle ear cyst (cholesteatoma).** Although very rare, this cyst, which is composed of skin cells and other debris, can develop in the middle ear as a long-term result of eardrum rupture.  
  Ear canal debris normally travels to the outer ear with the help of ear-protecting earwax. If the eardrum is ruptured, the skin debris can pass into the middle ear and form a cyst.  
  A cyst in the middle ear provides a friendly environment for bacteria and contains proteins that can damage the bones of the middle ear.

## 

## **Self care**

A ruptured (perforated) eardrum usually heals on its own within weeks. In some cases, healing takes months. Until your provider tells you that your ear is healed, protect it by:

* **Keeping the ear dry.** Place a waterproof silicone earplug or cotton ball coated with petroleum jelly in the ear when showering or bathing.
* **Refraining from cleaning the ears.** Give the eardrum time to heal completely.
* **Avoiding blowing your nose.** The pressure created when blowing your nose can damage the healing eardrum.

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

Call your provider if your symptoms don’t improve within a few weeks, or if they get worse.

Go to the emergency room if:

* Something is stuck in your ear
* You have sudden, severe ear pain or hearing loss
* You think a sharp object damaged your ear

**DIFFERENTIAL DIAGNOSIS**

1. Acute Otitis Media (AOM) with Perforation
   * Middle ear infection causing buildup of pus and pressure that leads to spontaneous rupture of the eardrum.
   * Symptoms: Ear pain, sudden relief after rupture, otorrhea (pus drainage), conductive hearing loss.
2. Chronic Otitis Media
   * Long-standing middle ear infection with persistent perforation and possible chronic discharge.
   * May be associated with cholesteatoma formation.
3. Traumatic Perforation
   * Injury from direct trauma (e.g., foreign body, slap to the ear), barotrauma (pressure changes during flying or diving), loud noise trauma (explosion), or iatrogenic causes (ear surgery, ear cleaning).
   * Sudden severe pain, bleeding, hearing loss, tinnitus, possible vertigo.
4. Otitis Externa with Secondary Tympanic Membrane Involvement
   * Infection of the external ear canal that may extend and cause tympanic membrane damage.
5. Perilymphatic Fistula
   * Abnormal connection between the middle and inner ear, often due to trauma or barotrauma, causing vertigo and hearing loss; may be associated with perforation.
6. Cholesteatoma
   * Abnormal keratinizing squamous epithelium in the middle ear causing erosion of the tympanic membrane and ossicles; may mimic or cause perforation.
7. Bullous Myringitis
   * Infection causing painful blisters on the tympanic membrane, sometimes leading to rupture.
8. Foreign Body in Ear Canal
   * Can cause local trauma and eardrum injury.
9. Neoplasm of Middle Ear or External Auditory Canal
   * Rarely, tumors can erode the tympanic membrane.
10. Neurological Causes Mimicking Ear Symptoms
    * Conditions like Ramsay Hunt syndrome or posterior circulation stroke may present with ear pain and hearing changes but no perforation.

**EPIDEMIOLOGY**

* Prevalence:
  + Overall prevalence of tympanic membrane (TM) perforations in the general U.S. population aged 12 years and older is approximately 2.1%, corresponding to about 5.8 million Americans.
  + Prevalence varies by age group:
    - Adolescents (12–19 years): about 0.6% (~0.2 million)
    - Adults: around 3.3 million
    - Older adults (≥60 years): highest prevalence at 6.1% (~3 million).
  + Males and females have similar prevalence rates (about 2.3% in males and 2.0% in females).
* Incidence:
  + Exact incidence in the general population is unknown.
  + Studies report about 4% prevalence of TM perforation among Native American children.
  + TM perforation occurs in up to 30% of patients with acute otitis media.
  + Traumatic perforations have an estimated incidence of about 1 in 10,000 adults and 1 in 30,000 children in some populations.
* Common Causes:
  + The most frequent cause is acute otitis media, especially in children.
  + Trauma (blows to the ear, barotrauma from diving or flying) is a significant cause, particularly in adults.
  + Chronic infections, prior ear surgeries (e.g., ventilation tube placement), and cholesteatoma contribute to chronic perforations.
* Age and Gender Distribution:
  + TM perforations are more common in children and older adults.
  + Trauma-related perforations increase with age and are more frequent in males.
  + Children have higher rates due to frequent middle ear infections.
* Healing and Outcomes:
  + Many perforations heal spontaneously within days to weeks.
  + Persistent perforations may require surgical repair (tympanoplasty), with about 150,000 tympanoplasties performed annually in the U.S

**Treatment of Ear Drum Perforation (Ruptured Tympanic Membrane): Drug Information and Side Effects**

## 1. General Approach

* Most eardrum perforations heal spontaneously within 2 to 8 weeks without specific treatment.
* Protecting the ear from water and trauma is essential during healing.
* Pain relief with over-the-counter analgesics like paracetamol (acetaminophen) or ibuprofen is recommended.

## 2. Antibiotics

* Indications:
  + Prescribed if there is an active middle ear infection or to prevent infection during healing.
  + Oral antibiotics are preferred in cases of acute otitis media with perforation.
  + Topical antibiotic ear drops may be used if there is otorrhea (ear discharge) and no contraindication.
* Common Antibiotics Used:
  + Amoxicillin (oral) for bacterial infections.
  + Fluoroquinolone ear drops (ciprofloxacin or ofloxacin) are preferred topical agents when the tympanic membrane is perforated because they are non-ototoxic.
  + Avoid aminoglycoside-containing drops (e.g., neomycin, tobramycin) or polymyxin in perforated eardrums due to risk of ototoxicity (hearing loss, vestibular damage).
* Side Effects:
  + Oral antibiotics: gastrointestinal upset, allergic reactions.
  + Fluoroquinolone drops: rare local irritation or allergic reaction.
  + Aminoglycosides: risk of permanent hearing loss if used with perforation.

## 3. Surgical Treatment

* Myringoplasty (Eardrum Patch):
  + An ENT specialist may apply a paper or tissue patch over the perforation to stimulate healing if it does not close spontaneously.
  + May require multiple applications.
* Tympanoplasty:
  + Surgical grafting of tissue to close persistent perforations, often combined with ossicular chain repair if needed.
  + Usually outpatient surgery with good success rates.

## 4. Supportive Care and Precautions

* Keep the ear dry: use cotton ball coated with petroleum jelly during showers.
* Avoid swimming until the eardrum heals.
* Avoid inserting objects into the ear canal (cotton buds, drops unless prescribed).
* Avoid forceful nose blowing to prevent pressure changes that may delay healing.

| **Treatment Type** | **Drugs/Procedures** | **Side Effects / Notes** |
| --- | --- | --- |
| Pain management | Paracetamol, ibuprofen | GI upset, allergic reactions (rare) |
| Oral antibiotics | Amoxicillin | GI upset, allergic reactions |
| Topical antibiotics | Ciprofloxacin, ofloxacin drops | Local irritation; avoid ototoxic drops (aminoglycosides) |
| Avoid | Neomycin, tobramycin drops | Ototoxicity risk with perforated eardrum |
| Surgical repair | Myringoplasty, tympanoplasty | Surgical risks; usually successful |
| Supportive care | Ear protection, dry ear precautions | Prevent infection and trauma |

**PREDEFINED Q & A SETS**

## 1. What is an eardrum perforation?

**Answer: An eardrum perforation is a hole or tear in the thin membrane (tympanic membrane) that separates the ear canal from the middle ear. It can cause hearing loss and increase the risk of middle ear infections.**

## 2. What causes eardrum perforation?

**Answer: Common causes include middle ear infections (otitis media), trauma (such as a direct blow, sudden pressure changes, or inserting objects into the ear), loud noises, or barotrauma from rapid pressure changes.**

## 3. What symptoms should I look for?

**Answer: Symptoms may include sudden ear pain, hearing loss, ringing in the ear (tinnitus), ear discharge (sometimes bloody or pus-filled), and a feeling of fullness or pressure in the ear.**

## 4. How is an eardrum perforation diagnosed?

**Answer: A healthcare provider will examine your ear using an otoscope to look for a hole or tear in the eardrum. Sometimes, audiometry (hearing tests) or imaging may be needed.**

## 5. Will the eardrum heal on its own?

**Answer: Many small perforations heal spontaneously within a few weeks to months. Larger or chronic perforations may require medical treatment or surgery.**

## 6. What treatments are available?

**Answer: Treatment includes keeping the ear dry, avoiding inserting objects or water into the ear, antibiotics if infection is present, and in some cases, surgical repair (tympanoplasty) to close the perforation.**

## 7. Can I swim or shower with a perforated eardrum?

**Answer: It is generally advised to keep the ear dry to prevent infections. Use ear plugs or avoid swimming until the eardrum has healed.**

## 8. What complications can arise from an untreated perforated eardrum?

**Answer: Possible complications include chronic ear infections, persistent hearing loss, cholesteatoma (abnormal skin growth in the middle ear), and rarely, spread of infection to nearby structures.**

## 9. How long does it take to recover?

**Answer: Small perforations often heal within 2-6 weeks. Healing time depends on the size and cause of the perforation and whether infections occur.**

## 10. When should I see a doctor?

**Answer: Seek medical attention if you experience severe ear pain, persistent ear discharge, sudden hearing loss, dizziness, or if symptoms worsen or do not improve.**

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, what brings you in today?

Patient: I think I might have a perforated eardrum. My ear hurts, and I noticed some fluid leaking from it.

Doctor: I see. A perforated or ruptured eardrum means there is a hole or tear in the thin membrane that separates your outer ear from the middle ear. This can cause symptoms like ear pain, hearing loss, ringing, or fluid discharge. How long have you had these symptoms?

Patient: It started a few days ago after I had an ear infection.

Doctor: Ear infections are a common cause of eardrum perforation. Sometimes the pressure from the infection causes the eardrum to rupture, which can actually relieve the pain by releasing fluid. Usually, the hole heals by itself within a few weeks.

Patient: What should I do to help it heal?

Doctor: It’s important not to put anything in your ear, like cotton buds or ear drops, unless I specifically recommend them. Also, try to keep your ear dry—avoid swimming and be careful when showering. Don’t blow your nose too hard, as that can damage the eardrum further. You can take over-the-counter painkillers like paracetamol or ibuprofen to ease the pain.

Patient: Will I need antibiotics?

Doctor: If there is an infection, I may prescribe antibiotics to treat it or prevent it from getting worse. I’ll examine your ear now with an otoscope to check the eardrum and see if there’s any sign of infection.

Patient: What if it doesn’t heal?

Doctor: If the hole is large or doesn’t heal after several weeks, I may refer you to an ear specialist. They might recommend a procedure called myringoplasty or tympanoplasty to repair the eardrum surgically. But most perforations heal well on their own without surgery.

Patient: Will my hearing be affected?

Doctor: You might have some muffled hearing or mild hearing loss while the eardrum is healing. Usually, hearing improves once the eardrum closes. If hearing loss persists, we can do a hearing test and consider further treatment.

Patient: Thank you, doctor. I’ll follow your advice and come back if things don’t improve.

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**Ear tubes**

ALTERNATIVE NAMES;Tympanostomy Tubes

* Ventilation Tubes
* Myringotomy Tubes
* Pressure Equalization (PE) Tubes
* Grommets
* Tympanostomy Tubes
* Middle Ear Tubes
* Ear Ventilation Tubes

**DEFINITION / DESCRIPTION**

Ear tubes are tiny, hollow tubes that surgeons place into the eardrums during surgery. An ear tube allows air into the middle ear. Ear tubes keep fluid from building up behind the eardrums. The tubes usually are made of plastic or metal.

Ear tubes also are called tympanostomy tubes, ventilation tubes, myringotomy tubes or pressure equalization tubes.

Ear tubes might help children who have repeated, long-lasting ear infections, also known as chronic otitis media. Ear tubes also might help children who still have fluid buildup in the ear after an infection clears up. This is called otitis media with effusion.

Most ear tubes are made to fall out in 4 to 18 months. The holes heal on their own. Some tubes are meant to stay in longer. Surgeons might need to remove them in a second surgery. The holes might need to be closed with surgery, as well.

Tympanostomy is one of the most common surgeries in children. Though less common, ear tubes for adults can be placed, too.

#### **Why do people get tubes in their ears?**

Ear tubes are most often placed in children who’ve had several middle ear infections (acute otitis media). They’re also used to treat buildup of fluid (effusion) in the middle ear that’s lasted longer than three months.

In adults, ear tubes are most commonly used to treat barotrauma — a painful condition caused by air pressure changes. In addition to draining fluid from your ear, ear tubes let air in to prevent buildup of fluid in your middle ear.

If these conditions aren’t treated, they can lead to larger issues, such as difficulties with speech or permanent hearing loss.

#### **Tympanostomy and myringotomy**

Myringotomy involves making an incision (cut) in your eardrum to drain excess fluid from your middle ear. Sometimes, myringotomy is performed as a standalone treatment. Often, however, it’s combined with tympanostomy, which is the actual placement of ear tubes into your eardrum.

**Why it's done**

An ear tube is used to treat and prevent the buildup of fluids in the middle ear.

### **The middle ear**

The middle ear is the space behind the eardrum that has three tiny bones that vibrate. An opening in the middle ear leads to a tube that connects the middle ear to the back of the throat, also known as the eustachian tube. This tube has three jobs:

* Keep air pressure even in the middle ear.
* Bring fresh air to the ear.
* Drain fluids from the middle ear.

The eustachian tubes of young children are narrower and more level than adults' eustachian tubes are. So they're harder to drain and more likely to get clogged.

### **Problems with the middle ear**

Conditions treated with ear tubes have:

* Swelling and irritation, also called inflammation.
* Buildup of fluids.

Ear tubes might treat the following conditions:

* **Middle ear infection, known as acute otitis media.** Bacteria or viruses cause this infection. It causes inflammation and fluids in the middle ear. Ear tubes might help prevent new infections. Children who have three or more infections in six months or four or more infections in a year might be helped from ear tubes.
* **Buildup of fluids without infection, also known as otitis media with effusion.** One cause of this is fluid that stays in the ear after an infection. Other causes include problems with the eustachian tubes or another condition that keeps fluid from draining.  
  Fluid buildup can cause hearing loss and balance problems. Ear tubes might help with hearing problems that cause a delay in speaking or other learning delays. These delays can cause problems in school.
* **Ongoing middle ear infection, also known as chronic middle ear infection.** This infection, which is caused by bacteria, doesn't get better with antibiotics. An ear tube can drain the ear and make a way for antibiotic drops to be put right into the middle ear.
* **Ongoing inflammation of the middle ear, also known as chronic suppurative otitis media.** This inflammation causes a tear in the eardrum and continuing drainage from the ear. An infection, a blocked eustachian tube or injury to the ear can cause the tear. An ear tube can help the ear drain after surgery to fix the eardrum. The tube also makes a way for ear drops to be put right into the middle ear.

**RISK FACTORS**

Putting in an ear tube carries a low risk of serious problems. Possible risks include:

* Bleeding and infection.
* Ongoing fluid drainage.
* Blocked tubes from blood or mucus.
* Eardrum scarring or weakening.
* Tubes falling out too soon or staying in too long.
* The eardrum does not closing after the tube falls out or is taken out.

### **Anesthesia**

Children who have surgery for ear tube placement usually need medicine that puts them to sleep, also known as general anesthesia. The risks of the medicine are low in healthy children. But possible problems include:

* Upset stomach or throwing up after the surgery.
* Trouble breathing.
* Allergic reaction.
* Irregular heartbeats.

PROCEDURES

### **Before the procedure**

The surgeon usually uses medicine that puts children to sleep for the surgery, also known as general anesthesia.

### **During the procedure**

The procedure usually takes about 15 minutes. The surgeon:

* Make a tiny hole in the eardrum with a small scalpel or laser.
* Pulls, also called suctions, out fluids from the middle ear.
* Place the tube in the opening in the eardrum.

The team doing the surgery uses tools to watch the child's heart rate, blood pressure and blood oxygen during the surgery.

### **After the procedure**

After surgery, children are moved to a recovery room. The health care team watches for any problems. Children who have no problems usually go home in a few hours.

Children might be sleepy and cranky for the rest of the day. They also might feel like throwing up. Most often, children can go back to their regular activities within 24 hours of the surgery.

### **Follow-up care**

Ask your child's health care provider about follow-up care after ear tubes are in. If there are no problems, care usually includes the following:

* **A follow-up appointment in 2 to 4 weeks.** Your child's ear, nose and throat care provider makes sure the tubes are in place and working as they should. Your child will have other follow-up appointments with the ear, nose and throat care provider or your child's primary care provider every 4 to 6 months.
* **Drops to prevent infection, also known as antibiotics.** Children who get these drops need to use all the medicine as directed. That's true even if there's no fluid coming from the ear or other symptoms of infection.
* **Hearing test, also known as an audiogram.** For children who had hearing loss before getting ear tubes, a health care provider might order a test to check hearing afterward.
* **Earplugs.** Most children don't need to wear earplugs while swimming or bathing unless a health care provider says to do so.

### **When to contact your doctor**

Reasons to see your child's ear, nose and throat specialist outside of scheduled follow-up appointments include:

* Yellow, brown or bloody discharge from the ear that lasts for more than a week.
* Ongoing pain, hearing problems or balance problems.

## **Treatment Details**

Your surgeon will talk with you about what to expect the day of your ear tube surgery. They’ll go over your medical history in detail and tell you if you need to stop taking any medications prior to your appointment. In most cases, you’ll also need to fast for several hours before your procedure.

### **How is ear tube surgery performed?**

Ear tube surgery is usually performed under general anesthesia. Adults may be placed under local anesthesia, depending on the situation.

During the surgery:

* Your surgeon makes a small incision in your eardrum.
* The fluid that’s trapped in your middle ear is drained or suctioned out.
* Your surgeon then inserts the ear tube into the incision in your eardrum. This allows fluid to drain out of your ear.

In some cases, especially if you’ve already had a tympanostomy in the past, your surgeon may also perform an adenoidectomy (adenoid removal). Adenoids are tissue located above the roof of your mouth and behind your nose. They’re part of your immune system and help protect your body from viruses and bacteria. Removing your adenoids may prevent the need for future ear tube surgeries.

Ear tube surgery is performed in the operating room or in your healthcare provider’s office. It usually takes fewer than 15 minutes — and because it’s an outpatient surgery, you’ll go home the same day.

### **After ear tube surgery**

You’ll spend some time in the recovery room after ear tube surgery. You might experience some side effects from the surgery and anesthesia, including grogginess and nausea.

Your surgeon will check on you after your procedure to make sure you’re doing well. They may prescribe antibiotic ear drops to treat infection. In addition, your surgeon may recommend wearing earplugs during certain activities, such as swimming and showering.

After surgery, your surgeon will check on you every few months to monitor the tubes and make sure they’re functioning. They might recommend a hearing test as well.

### **How long do tubes stay in ears?**

Your eardrum usually closes around the ear tube to keep it in place and prevent it from falling out early. In most cases, ear tubes fall out on their own in nine to 18 months. If your ear tubes don’t fall out within two years, your surgeon can perform ear tube removal.

## **Risks / Benefits**

Tympanostomy offers significant benefits, including:

* Reduced need for oral antibiotics during ear infections.
* Less pain or lower fevers during ear infections.
* Improved or restored hearing.
* Improved speech development.
* Reduced risk of sleep problems related to chronic ear infections.

### **Side effects of getting tubes in your ears**

As with any type of surgery, ear tube surgery may have certain complications. These include:

* The hole in your eardrum doesn’t close after the tube comes out. If this happens, the hole has to be repaired with another surgery.
* Scarring of your eardrums, caused by multiple ear infections or by the ear tube surgery itself.
* Repeated ear infections, even after ear tube surgery.
* Your ear tubes either fall out early or don’t come out at all.
* A condition called otorrhea (continuous drainage of fluid from your ear).
* Your eardrum may shrink or harden after several ear tube surgeries.
* Your ear tubes may become clogged due to earwax buildup.

## **Recovery and Outlook**

Most people feel better in one to two days. During this time, you may experience mild pain. Take over-the-counter pain relievers to manage any discomfort.

### **When can I go back to work or school?**

Most people can resume work, school and other normal routines 24 hours after their ear tube surgery.

**EPIDEMIOLOGY**

* In the United States, about 8.6% of children undergo tympanostomy tube placement (TTP) annually, which corresponds to approximately 6.26 million children out of 73.1 million.
* Frequent ear infections (FEI) affect about 4.8% of children (3.49 million), and children with FEI are much more likely to receive ear tubes. For example, among children under 2 years old, 25% with FEI had tubes placed versus only 1.5% without FEI. For children aged 3 to 17 years, 31.1% with FEI received tubes compared to 8.6% without FEI.
* Gender differences exist, with males (9.6%) more likely than females (7.5%) to undergo tube placement.
* The procedure is mostly performed in young children, especially under 12 years of age, who represent the majority of cases in clinical studies.
* Repeat tube placement is common; about 24% of children who have tubes placed require a second set.
* Post-placement complications such as tympanostomy tube otorrhea (TTO), or ear drainage, occur frequently, with about 52% of children experiencing one or more episodes within a year after tube placement.
* The prevalence of otitis media with effusion (OME), a common indication for tube placement, varies by region but can be around 16.5% among children aged 2 to 16 years in some populations.
* Overall, tympanostomy tube placement remains a common pediatric procedure, primarily indicated for recurrent ear infections or persistent middle ear fluid causing hearing problems

**PREDEFINED Q & A SETS**

## 1. What are ear tubes?

Answer: Ear tubes are tiny cylinders inserted into the eardrum to help drain fluid from the middle ear and equalize pressure. They are commonly used to treat recurrent ear infections or persistent fluid buildup.

## 2. Why might my child need ear tubes?

Answer: Children who have frequent ear infections or fluid in the middle ear that affects hearing and speech development may benefit from ear tubes to prevent infections and improve hearing.

## 3. How is the ear tube surgery performed?

Answer: The procedure, called a myringotomy with tube insertion, is usually done under general anesthesia. A small incision is made in the eardrum to drain fluid, and the tube is placed to keep the opening open.

## 4. Is the procedure painful?

Answer: The surgery itself is painless because it is done under anesthesia. Afterward, there might be mild discomfort or ear drainage, but pain is usually minimal and short-lived.

## 5. How long do ear tubes stay in place?

Answer: Ear tubes typically stay in place for 6 to 18 months and often fall out on their own as the eardrum heals.

## 6. Will ear tubes affect hearing?

Answer: Ear tubes usually improve hearing by allowing fluid to drain and preventing buildup. Hearing typically returns to normal or near normal after tube placement.

## 7. Are there risks or complications?

Answer: Complications are rare but can include persistent drainage, infection, scarring of the eardrum, or the tube falling out prematurely or staying too long.

## 8. Can my child swim after getting ear tubes?

Answer: Most doctors recommend keeping ears dry while swimming to prevent infections, but some allow swimming with ear plugs. Follow your doctor’s advice.

## 9. Will my child still get ear infections after ear tubes?

Answer: Ear tubes reduce the frequency and severity of infections but do not completely prevent them.

## 10. What happens when the ear tubes fall out?

Answer: When tubes fall out, the eardrum usually heals on its own. Some children may need repeat tube placement if ear problems persist.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, what brings you or your child in today?

Patient: My child has had frequent ear infections and fluid buildup in the ears. The pediatrician mentioned ear tubes might help.

Doctor: Ear tubes, also called tympanostomy tubes or grommets, are small tubes inserted into the eardrum to help drain fluid and reduce ear infections. They allow air to enter the middle ear, equalizing pressure and preventing fluid accumulation that causes pain and hearing problems.

Patient: How is the procedure done?

Doctor: It’s a short surgery, usually about 10 to 15 minutes, performed under general anesthesia, especially in children. We make a tiny incision in the eardrum, suction out any fluid, and insert the small tube into the hole. The tube helps keep the middle ear ventilated and allows fluid to drain out.

Patient: Will my child feel pain after the surgery?

Doctor: Most children feel much better after the tubes are placed because they no longer experience the pain from fluid buildup or infections. Some mild discomfort right after the procedure is normal, but it usually resolves quickly.

Patient: How long do the tubes stay in?

Doctor: The tubes typically stay in place for 6 to 12 months and then fall out on their own. Sometimes, longer-term tubes are used if needed. The eardrum usually heals naturally after the tube falls out.

Patient: Are there any risks or things we should watch for?

Doctor: The procedure is generally safe but can have risks like bleeding, infection, or persistent fluid drainage. It’s important to keep the ears dry, especially when swimming or bathing, and to watch for any signs of infection such as pain or discharge. If you notice any problems, contact us promptly.

Patient: Will this affect my child’s hearing?

Doctor: The tubes usually improve hearing by clearing fluid from the middle ear. If hearing loss persists, we can do further tests and treatment. Also, placing tubes early can help prevent speech delays caused by hearing problems.

Patient: What should we expect on the day of surgery?

Doctor: Your child will need to fast for a few hours before surgery. We’ll give anesthesia to make sure they are asleep and comfortable during the procedure. After surgery, most children go home the same day after a short recovery period.

Patient: Thank you, doctor. This helps me understand what to expect

REFERENCES:

<https://my.clevelandclinic.org/health/treatments/15609-ear-tubes-tympanostomy#treatment-details>

[Ear tubes - Mayo Clinic](https://www.mayoclinic.org/tests-procedures/ear-tubes/about/pac-20384667)

**Eustachian tube dysfunction / patency**

ALTERNATIVE NAMES

* Eustachian Tube Dysfunction (ETD)
* Eustachian Tube Obstruction
* Patulous Eustachian Tube (for abnormally open tube)
* Eustachian Tube Blockage
* Dysfunctional Eustachian Tube
* Eustachian Tube Insufficiency
* Eustachian Tube Patency Disorder
* Middle Ear Ventilation Dysfunction
* Tubal Dysfunction

**DEFINITION / DESCRIPTION**

Eustachian tube dysfunction (ETD) is when your eustachian tubes don’t open and close as they should. These tubes connect your middle ears to the back of your throat. The tubes equalize air pressure and help drain fluid from your ears. Eustachian tube dysfunction is when these tubes become clogged.

Eustachian tube dysfunction can affect anyone, but it’s more common in children. Only 1% of the general adult population has ETD.

***Types of eustachian tube dysfunction***

There are three types of ETD:

* Patulous eustachian tube dysfunction: Your eustachian tubes stay open all the time. Sound travels from your nasal cavity to your ears, changing the sound of your voice.
* Obstructive eustachian tube dysfunction: Your eustachian tubes don’t open like they should. Fluid builds up and causes ear pain or pressure.
* Baro-challenge-induced eustachian tube dysfunction: You eustachian tubes don’t open like they should. Ear pain and pressure only occur when you experience altitude changes.

**CAUSES**

The following conditions may cause inflammation that leads to eustachian tube dysfunction:

* Allergies.
* Chronic acid reflux (GERD).
* Viruses like the common cold.
* Flu.

Eustachian tube dysfunction symptoms may get worse in different altitudes. This is called barotrauma, and it can happen while scuba diving, flying in an airplane or driving in the mountains.

Certain conditions can also increase your risk for eustachian tube dysfunction, like cleft palate.

**SIGNS / SYMPTOMS**

The most common ETD symptom is muffled hearing, almost like you’re underwater.

Additional eustachian tube dysfunction symptoms may include:

* A feeling of fullness in your ears.
* Clicking or popping sounds.
* Dizziness, vertigo or balance problems.
* Ear pain.
* Tinnitus (ringing in your ears).
* Hearing loss.

**DIAGNOSIS METHODS**

Your healthcare provider will ask about your symptoms and do a physical examination. They’ll check your ear canals, eardrums, nasal passages and the back of your throat.

They may also need to run these tests:

* Tympanometry: This tells your healthcare provider how well your middle ear works.
* Hearing tests: These tests can tell you if have hearing loss and if so, what type.

**TREATMENT OPTIONS**

ETD can go away on its own, so treatment isn’t always necessary. But you might need treatment if your symptoms linger for more than two weeks.

Eustachian tube dysfunction treatment depends on the cause and the severity of your condition. Treatments may include home remedies, medications or, in severe cases, surgery.

***Home remedies***

Sometimes, simple home remedies can help with mild cases of eustachian tube dysfunction. To try and clear the blockage, you can:

* Chew gum.
* Yawn.
* Swallow.
* Try the Valsalva maneuver (breathing out forcefully while closing your mouth and pinching your nostrils).
* Use a saline spray to clear out nasal passages.
* Use a device that can help you pop your ears, like an Otovent®.

If you think your baby has ETD, give them a pacifier or a bottle. The sucking motion may help clear the blockage.

***Medication***

When allergies cause eustachian tube dysfunction, over-the-counter (OTC) medications can help. You can try:

* Antihistamines like cetirizine or diphenhydramine.
* Nasal sprays like fluticasone (Flonase®) or azelastine (Astelin®).
* Pain relievers like acetaminophen or ibuprofen.

When an infection causes ETD, your healthcare provider may prescribe antibiotics. They may also give you corticosteroids to help with inflammation.

Ask your healthcare provider before using decongestants like pseudoephedrine (Sudafed®). While these medications can help with congestion, they can make eustachian tube dysfunction worse, in some cases.

***Surgery***

Chronic ETD may require surgery. The goal of this treatment is to bypass your eustachian tubes and address ventilation problems in your middle ears. This restores hearing issues and other symptoms. Surgical options for eustachian tube dysfunction include:

* Myringotomy. Your surgeon makes a small incision (cut) in your eardrum to drain the fluid from your middle ear. In adults, the incisions usually stay open long enough for the swelling in your eustachian tubes to resolve.
* Ear tubes. Sometimes, surgeons place ear tubes into the incisions during myringotomy. These tubes provide proper middle ear ventilation for up to one year. Typically, the tubes fall out over time and your eardrum heals.
* Eustachian tuboplasty (eustachian tube balloon dilation). This involves expanding your eustachian tubes with a balloon. Your surgeon uses nasal endoscopy and small instruments to thread the balloon through your nasal passages and into your eustachian tube. They inflate the balloon for two minutes, then deflate and remove it.

***How soon after treatment will I feel better?***

It depends on the type of treatment you have. It takes about three to four weeks to heal after myringotomy. People who receive eustachian tuboplasty generally recover in about 24 hours.

If you have ear tubes for eustachian tube dysfunction, they should remain in place for 12 to 18 months.

**PREVENTION TIPS**

While you can’t prevent ETD altogether, there are things you can do to reduce your risk. For example:

* Wear ear plugs when you fly to reduce your risk of airplane ear.
* Avoid extreme temperatures, which can make ear-related issues worse.
* Drink plenty of water to thin out mucus

**OUTLOOK / PROGNOSIS**

The good news is that ETD usually isn’t serious, and it typically goes away on its own. But the associated symptoms can be annoying and inconvenient. Talk to your healthcare provider to learn how to manage the condition.

Eustachian tube dysfunction usually goes away in one to two weeks. People with chronic eustachian tube dysfunction may have lingering symptoms for weeks, months or even years

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

If eustachian tube dysfunction causes severe pain, or if symptoms last longer than a couple of weeks, make an appointment with your healthcare provider.

**DIFFERENTIAL DIAGNOSIS**

* Obstructive Eustachian Tube Dysfunction
  + Caused by mucosal inflammation, allergies, sinusitis, upper respiratory infections, acid reflux, or neoplasms
* Patulous Eustachian Tube Dysfunction
  + Abnormally open tube causing autophony, ear fullness, hearing own breathing or voice loudly
* Acute or Chronic Otitis Media
  + Middle ear infection causing pain, effusion, and hearing changes
* Otitis Media with Effusion (Glue Ear)
  + Middle ear fluid without infection, common in children, causing hearing loss and fullness
* Cerumen (Ear Wax) Impaction
  + Ear canal blockage causing muffled hearing and fullness
* Nasopharyngeal or Laryngeal Neoplasms
  + Tumors near Eustachian tube opening causing obstruction or referred ear symptoms
* Baro-challenge Induced ETD
  + Symptoms triggered by pressure changes (flying, diving), normal findings at rest
* Temporomandibular Joint (TMJ) Dysfunction
  + Ear discomfort related to jaw movement, sometimes confused with ETD
* Superior Canal Dehiscence Syndrome
  + Inner ear disorder causing autophony and vertigo
* Foreign Body in Ear Canal
  + Visible obstruction causing symptoms similar to ETD
* Head Trauma or Skull Base Fracture
  + History of trauma with possible ear symptoms
* Endolymphatic Hydrops (Cochlear Hydrops)
  + Inner ear fluid imbalance causing ear fullness and hearing changes

**EPIDEMIOLOGY**

Prevalence is greater in children than adults, with recent studies demonstrating 0.77 adult visits to every 1 pediatric clinic visit for ETD. An estimated 90% of children develop otitis media with effusion, a recognized sequela of ETD, before starting school. Approximately 1% of the adult population is diagnosed with ETD. Males are more likely to be diagnosed before the age of 20, with females more likely affected at older ages. No statistically significant difference between seasons has been proven

**PREDEFINED Q & A SETS**

***1. What caused ETD in my case?***

ETD occurs when the Eustachian tube, which connects the middle ear to the back of the nose, does not open or close properly. Common causes include:

* Nasal congestion or allergies causing inflammation and swelling around the tube.
* Upper respiratory infections like colds or sinus infections.
* Anatomical factors such as enlarged adenoids or nasal polyps blocking the tube.
* Barotrauma from rapid pressure changes (e.g., flying, diving).
* Smoking or environmental irritants that inflame the mucosa.
* In some cases, chronic inflammation or reflux can contribute. Identifying your specific cause often involves evaluating these factors.

***2. Are there things I can do to reduce my risk of ETD?***

Yes, you can reduce your risk by:

* Managing allergies with antihistamines or nasal steroids as advised by your doctor.
* Avoiding upper respiratory infections by practicing good hygiene and avoiding close contact with sick individuals.
* Avoiding smoking and exposure to secondhand smoke or irritants.
* Using nasal saline sprays to keep nasal passages moist and clear.
* Avoiding rapid pressure changes or using pressure-equalizing techniques (like swallowing or yawning) during flying or diving.
* Treating nasal congestion promptly to prevent blockage of the Eustachian tube.

***3. Will I need antibiotics or other prescription medications?***

* Antibiotics are only needed if there is a confirmed bacterial infection causing or complicating ETD. Most ETD cases are due to viral infections or allergies and do not require antibiotics.
* Nasal steroid sprays can reduce inflammation and improve Eustachian tube function.
* Oral or nasal decongestants may help temporarily but should be used cautiously and not for prolonged periods.
* Antihistamines may be prescribed if allergies are a contributing factor.
* Your healthcare provider will determine the best medication based on your symptoms and cause.

***4. How can I make myself more comfortable?***

* Use warm compresses over the affected ear to relieve discomfort.
* Try swallowing, yawning, or chewing gum to help open the Eustachian tube and equalize pressure.
* Use over-the-counter pain relievers like acetaminophen or ibuprofen for ear pain.
* Avoid smoking and irritants that can worsen inflammation.
* Keep your head elevated to promote drainage.
* Use nasal saline sprays to maintain nasal moisture and reduce congestion.
* Follow your doctor’s advice on medications and avoid self-medicating with decongestant nasal sprays for more than 3 days to prevent rebound congestion.

**TREATMENT OPTIONS**

***Treatment and Drug Information for Eustachian Tube Dysfunction (ETD), with Side Effects***

| **Medication Class** | **Examples** | **Purpose** | **Common Side Effects** |
| --- | --- | --- | --- |
| Nasal Steroid Sprays | Fluticasone (Flonase®), Betamethasone nose drops | Reduce nasal and Eustachian tube inflammation, improve tube function | Nasal irritation, dryness, nosebleeds, headache |
| Oral/Nasal Decongestants | Pseudoephedrine (Sudafed®), Oxymetazoline nasal spray | Shrink swollen nasal tissues to open Eustachian tube | Increased blood pressure, insomnia, nervousness, nasal irritation (with sprays) |
| Antihistamines | Cetirizine, Diphenhydramine (Benadryl) | Treat allergy-related nasal congestion and inflammation | Drowsiness (especially diphenhydramine), dry mouth, dizziness |
| Pain Relievers | Ibuprofen, Acetaminophen | Relieve ear pain and discomfort | Ibuprofen: stomach upset, bleeding risk; Acetaminophen: liver toxicity in overdose |
| Antibiotics | Amoxicillin, Sulfamethoxazole/Trimethoprim (Bactrim) | Treat bacterial infections causing ETD | Allergic reactions, gastrointestinal upset, rash |

## 

* Balloon Eustachian Tuboplasty: A minimally invasive procedure to dilate the Eustachian tube if medical treatment fails.
* Myringotomy with Ear Tube (Grommet) Insertion: Surgical ventilation of the middle ear to bypass Eustachian tube dysfunction.
* Lifestyle Measures: Chewing gum, swallowing, avoiding smoking, managing allergies.

***Side Effects and Cautions***

* Nasal Steroid Sprays: Usually well tolerated but may cause local irritation; long-term use should be monitored.
* Decongestants: Should be used cautiously in patients with hypertension or heart disease; nasal sprays should not be used for more than 3 days to avoid rebound congestion.
* Antihistamines: First-generation (diphenhydramine) causes sedation; second-generation (cetirizine) is less sedating.
* Pain Relievers: Use as directed; ibuprofen can cause gastrointestinal irritation; acetaminophen overdose can cause liver damage.
* Antibiotics: Only used if bacterial infection is confirmed or strongly suspected; misuse can lead to resistance

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, what symptoms are you experiencing with your ear?

Patient: I feel like my ear is full and muffled, almost like I’m underwater. Sometimes there’s a popping noise, and it feels uncomfortable.

Doctor: That sounds like it could be Eustachian tube dysfunction. The Eustachian tube connects your middle ear to the back of your nose and helps equalize pressure. When it doesn’t open properly, you get that feeling of fullness or pressure.

Patient: What causes it?

Doctor: It’s often caused by nasal congestion from colds, allergies, or sinus infections. Sometimes inflammation or blockage prevents the tube from opening, so air can’t get into the middle ear to balance the pressure.

Patient: How do we treat it?

Doctor: For mild cases, it often gets better on its own. You can try simple things like yawning, swallowing, or chewing gum to help open the tube. You can also do gentle Valsalva maneuvers — that’s pinching your nose, closing your mouth, and gently blowing to pop your ears. There are also devices that help with auto-inflation.

If you have nasal congestion, over-the-counter decongestants or nasal steroid sprays can reduce swelling and help the tube open. If allergies are involved, antihistamines might help.

Patient: What if it doesn’t get better?

Doctor: If symptoms persist for more than three weeks or worsen, we can consider further evaluation. Sometimes a minor procedure called a myringotomy, where a small incision is made in the eardrum to relieve pressure, can help. If that works, we might place a small ventilation tube to keep the middle ear aerated.

Patient: Are there any risks with the treatments?

Doctor: Nasal sprays can cause dryness or nosebleeds if used long-term, and decongestants shouldn’t be used for more than a few days to avoid rebound congestion. The procedures are generally safe but may have risks like infection or temporary discomfort.

Patient: Okay, I’ll try these measures and see how it goes.

Doctor: Good. Please call me if you don’t notice improvement in a week or two, or if you develop pain, hearing loss, or discharge from the ear.

***REFERENCES:***

[Eustachian Tube Dysfunction: Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/22527-eustachian-tube-dysfunction#outlook-prognosis)

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**ENCEPHALOCELE**

*ALTERNATIVE NAMES:* An encephalocele is also known as "Cranium bifidum". Other related terms include "meningoencephalocele" and "cephalocele".

* Cranial Encephalocele
* Neural Tube Defect (specifically involving brain herniation)
* Brain Herniation through Skull Defect
* Cephalocele (general term including encephalocele and other cranial herniations)
* Cranial Meningocele (if only meninges herniate, without brain tissue)
* Occipital Encephalocele (when located at the back of the head)
* Frontoethmoidal Encephalocele (when located in the frontal/ethmoidal region)

**DEFINITION / DESCRIPTION**

Encephalocele (pronounced “en-SEF-al-oh-SEEL”) is a birth defect that causes brain tissue to grow through an opening of your baby’s skull. This condition is a neural tube defect. The neural tube is the early form of the brain and spinal cord when the fetus is developing in the uterus. If there’s a problem with how the top of the neural tube closes during the first few weeks of pregnancy, encephalocele can happen. This condition can range from mild to life-threatening.

***Types of encephalocele***

The types of encephalocele identify the location of the opening in the skull:

* Occipital: The lower back of your baby’s head.
* Parietal: Top, nearest the back of your baby’s head.
* Frontoethmoidal (also called sincipital): Near your baby’s forehead.
* Sphenoidal: Front-middle or behind your baby’s eyes and in front of their ears.

In addition, you may hear your child’s healthcare provider mention two broader categories of encephalocele:

* Anterior: Front of your child’s skull.
* Posterior: Back of their skull.

Encephalocele is rare. An estimated 1 in 10,500 babies are born with the condition in the United States. Each year, this equals about 375 babies born in the U.S.

**CAUSES**

Most encephaloceles are congenital (meaning you’re born with it), but some can be acquired as a result of trauma, tumor or other rare conditions such as idiopathic intracranial hypertension.

Congenital encephaloceles form when there’s an issue with how the top of the neural tube closes. The neural tube is a piece of tissue that’s the early version of the brain and spinal cord. It forms the shape of a tube during the third and fourth weeks of pregnancy. The neural tube should fold and close during embryonic development. If the top part of the tube doesn’t close as expected during this time, the skull doesn’t close completely. As a result, part of your baby’s brain grows out of this opening in the skull.

The exact reason why the neural tube doesn’t close completely is unknown. Research suggests it could be the result of:

* A genetic change that happens during conception.
* An infection (toxoplasmosis, rubella, cytomegalovirus, herpes simplex virus).
* A neurological (brain or nerve) condition (like type 3 Chiari malformation).

An underlying medical condition may lead to encephalocele. These conditions include:

* Walker-Warburg syndrome.
* Knobloch syndrome.
* Roberts syndrome.
* Amniotic band syndrome.

**RISK FACTORS**

You’re more likely to have a child with encephalocele if you have a history of neural tube defects (NTD) in your biological family history. You’re also more likely to have a child with an NTD if you don’t get enough folic acid (vitamin B9) before and during pregnancy.

**SIGNS / SYMPTOMS**

A newborn with encephalocele will have a gap in their skull that isn’t closed. This causes a bulge or sac of brain tissue covered in skin coming out of the skull opening. This can look similar to a balloon coming out of your child’s head. Depending on where the skull opening is, the skin on the sac may have hair on it.

The skull opening can happen anywhere on their head. It’s most common on the forehead or the lower back of their head near the base of your baby’s skull.

Signs and symptoms of encephalocele include:

* Headache.
* Visual problems.
* Muscle weakness in arms and legs.
* A smaller-than-expected head size at birth.
* Uncoordinated movements (ataxia).
* Facial malformations.
* Nasal obstruction.
* Spinal fluid leaking from nose or ear.

Symptoms vary based on the size and location of the skull opening and how much brain tissue is outside of the skull at birth. Symptoms can be associated with fluid buildup in the brain (hydrocephalus).

**DIAGNOSIS METHODS**

Your healthcare provider can diagnose encephalocele at a routine ultrasound during pregnancy. Your provider may order a prenatal MRI imaging test to learn more about the birth defect during pregnancy.

Confirmation of the diagnosis happens immediately after your baby is born based on a visual examination of your baby. Further blood and imaging tests may help diagnose an underlying cause or let your child’s healthcare provider understand how the condition affects your baby so they can treat it.

#### **Can encephalocele go undiagnosed?**

Yes, small encephalocele openings in the skull may go undiagnosed. These usually happen near your baby’s nose or forehead. Small encephalocele openings don’t usually cause symptoms that affect your newborn or complications that affect them as they grow.

**TREATMENT OPTIONS**

Treatment for encephalocele is surgery to repair the skull and remove brain tissue that grew outside of the skull. Often, the portion of the brain that’s outside of the skull isn’t functional and can be removed. When the opening is small, sometimes, the brain can be gently moved back into the skull before a surgeon repairs the skull.

Treatment usually happens shortly after birth or within the first few months to a year, depending on the size, location and effects the condition has on your baby.

Children usually need more than one surgery to treat this condition. Surgery can also treat facial growth irregularities and hydrocephalus.

As your child grows, they may need additional support to treat associated conditions like:

* Special education programs in school.
* Medications for seizures.
* Glasses for vision problems.

#### **Side effects of the treatment**

Each surgery comes with possible side effects. Your baby’s care team is highly trained to prevent or reduce your child’s risk of complications during and after surgery.

Risks include:

* Infection.
* Spinal fluid leak.
* Bleeding.

When the opening is larger and involves more brain tissue, there’s a higher risk of neurological issues.

Talk to your child’s healthcare provider about the side effects of treatment before it begins.

**PREVENTION TIPS**

There’s no known way to prevent encephalocele. You can reduce your risk of having a child with a neural tube defect by getting plenty of folic acid.

Talk to your healthcare provider before you plan on becoming pregnant. They may recommend you take 400 mcg of folic acid daily, even if you don’t plan to get pregnant right away. Neural tube defects (NTDs) happen in the first month of pregnancy. This is often before you even know you’re pregnant, which is why it’s essential to start taking folic acid early.

In addition, let your healthcare provider know if you have a family history of NTDs or if you had a child with an NTD. Your provider can help you prevent future NTDs.

**OUTLOOK / PROGNOSIS**

Yes, babies can survive encephalocele. Treatment with surgery to repair the skull can help them survive. Babies with large skull openings may have more symptoms and complications than babies with smaller openings. This increases their risk of life-threatening outcomes or a shorter life expectancy.

Studies found that newborns with skull openings near the front of their heads have a better outcome than babies with openings in the back of their heads.

The U.S. Centers for Disease Control and Prevention (CDC) estimates the mortality (death) rate for large encephalocele is 45%. That means that the survival rate is 55%. The risk of life-threatening complications increases due to the size and location of the skull opening and the overall health of your baby at birth.

**POSSIBLE COMPLICATIONS**

Some cases of encephalocele have few to no complications. Long-term complications could include:

* Developmental delay.
* Problems with cognitive development (intellectual disability).
* Vision issues.
* Delayed growth.
* Seizures.

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

If you’re planning to become pregnant, talk with a healthcare provider about preconception counseling. They can help you maintain good health to lower your risk of having a child with a birth defect.

**DIFFERENTIAL DIAGNOSIS**

The differential diagnoses for encephalocele include:

* Nasal glioma
* Cranial dermal sinus tract
* Nasal dermoid cyst
* Nasal epidermoid
* Dacryocystitis
* Dacryocystocele
* Hemangioma
* Nasal polyp.

**EPIDEMIOLOGY**

Myelomeningocele, meningocele, encephalocele, and anencephaly account for 80% of all NTDs; encephaloceles comprise 15% to 20% of these lesions. The incidence of congenital encephalocele is estimated at 1 in 10,000 live births, though the true incidence may be higher due to pregnancy terminations following prenatal diagnosis.The incidence is particularly elevated in low-resource countries, with Ethiopia reporting 630 NTD cases per 100,000 children and a prevalence of 10 encephaloceles per 100,000 children.Globally, NTDs have a prevalence of 180 per 100,000 live births.

While males and females are equally affected overall, specific patterns emerge for certain encephalocele types. Occipital encephaloceles are more common in females, with studies showing a female-to-male ratio of 1.9:1. Conversely, anterior cranial fossa encephaloceles show a slightly higher incidence in males, with a ratio of 1.1:1. Approximately 70% to 90% of encephaloceles occur in the occipital region, particularly in North America and Western Europe. Anterior skull base encephaloceles are more prevalent in Asia, Africa, and Russia, with 1 case in 3500 to 6000 live births. However, these particular defects are much less frequent in North America and Europe (1 case in 35,000 live births).

Incidental findings of temporal lobe/middle cranial fossa defects are frequent, with 22.2% reported in internal auditory canal imaging and 5% forming encephaloceles.Regional variations in location predominance have been reported, such as variable occipital encephalocele prevalence in India, ranging from 26% to 60%

**PREDEFINED Q & A SETS**

## 1. Where is the skull opening on my newborn?

The skull opening, or defect, in encephalocele can occur anywhere along the midline of the skull, but the most common locations are:

* Occipital region (back of the head) — more common in girls, often associated with neurological problems and hydrocephalus.
* Frontonasal region (between the nose and forehead) — more common in boys, usually with better survival and fewer severe neurological issues.  
  The sac-like bulge you see is brain tissue and/or cerebrospinal fluid protruding through this opening.

## 2. Does my child need surgery?

Yes, surgical repair is the primary treatment for encephalocele. Surgery is usually performed shortly after birth to:

* Close the skull defect and reposition or remove the protruding brain tissue.
* Prevent infections and further brain injury.
* Address associated conditions like hydrocephalus (fluid buildup), which may require a shunt.  
  The timing and complexity depend on the size, location, and contents of the encephalocele.

## 3. What are the side effects of surgery?

Possible risks and side effects include:

* Infection at the surgical site.
* Bleeding during or after surgery.
* Neurological complications depending on how much brain tissue is involved.
* Cerebrospinal fluid leak or fluid buildup requiring further treatment.
* Anesthesia-related risks.  
  Your surgical team will take all precautions to minimize these risks.

## 4. How do I take care of my child after surgery?

Postoperative care includes:

* Close monitoring in the hospital, often in a neonatal or pediatric intensive care unit.
* Keeping the surgical site clean and dry to prevent infection.
* Regular follow-up visits with neurosurgery, neurology, and developmental specialists.
* Watching for signs of increased intracranial pressure or infection.
* Supporting developmental therapies as needed (physical, occupational, speech therapy).
* Ensuring good nutrition and a safe environment for recovery.

## 5. What complications should I look out for?

Watch for:

* Fever, redness, swelling, or discharge from the surgical site (signs of infection).
* Persistent vomiting, lethargy, or irritability (signs of increased intracranial pressure).
* Seizures or unusual movements.
* Delays in feeding or breathing difficulties.
* Any sudden changes in behavior or responsiveness.

## 6. What do I do if my child misses developmental milestones for their age?

* Contact your pediatrician or neurologist promptly for evaluation.
* Early intervention programs and therapies can help improve outcomes.
* Multidisciplinary care involving developmental pediatricians, therapists, and educators is important to support your child’s growth and learning.
* Regular developmental assessments will guide ongoing care and support.

**Genomic Data and Genetic Insights on Encephalocele**

* Sonic Hedgehog (SHH) gene involvement:  
  A key candidate gene implicated in encephalocele is *SHH*, which plays a crucial role in neural tube development and brain patterning. A reported case involved a de novo duplication of a 0.4 Mb region containing *SHH* in a fetus with occipital encephalocele, suggesting that abnormal SHH signaling (either increased or decreased) may contribute to encephalocele formation. SHH mutations are also linked to holoprosencephaly, a related forebrain malformation.
* Meckel-Gruber Syndrome (MKS) genes:  
  Syndromic encephaloceles are associated with mutations in genes such as *MKS1*, *MKS3*, and *CEP290*, which affect ciliary function. These genes are involved in ciliopathies, a group of disorders affecting cellular signaling and development. Mutations here can cause neural tube defects including encephalocele

**Encephalocele Treatment and Drug Information with Side Effects**

* Primary Treatment:  
  The only effective treatment for encephalocele is surgical repair. This involves removing the herniated sac, repositioning any viable brain tissue back into the skull, and repairing the skull and dural defects to close the opening.
* Surgical Approaches:
  + Traditional open surgery with craniotomy and reconstruction of the skull defect.
  + Minimally invasive techniques such as the Endoscopic Endonasal Approach (EEA) for skull base encephaloceles, which avoids external incisions and offers faster recovery.
  + Timing of surgery depends on the sac’s covering — if covered by thin membrane, early surgery is needed to prevent infection; if covered by skin, surgery may be delayed to allow growth.
* Medications Used in Management:  
  There are no drugs that treat encephalocele itself. However, medications may be used to manage associated conditions or perioperative care:
  + Antibiotics: To prevent or treat infections, especially if the sac is exposed or if meningitis occurs. Side effects include allergic reactions, gastrointestinal upset, and antibiotic resistance with misuse.
  + Antiepileptic drugs: If seizures develop due to brain involvement. Side effects vary by drug but may include drowsiness, dizziness, or rash.
  + Pain management: Analgesics such as acetaminophen or ibuprofen post-surgery; side effects include gastrointestinal irritation (ibuprofen) or liver toxicity in overdose (acetaminophen).
  + Shunt-related medications: If hydrocephalus develops and requires cerebrospinal fluid shunting, management of shunt complications may involve antibiotics or other supportive drugs.
* Supportive Therapies:  
  Postoperative rehabilitation may include physical, occupational, and speech therapy to address developmental delays or neurological deficits.
* Potential Side Effects and Risks of Treatment:
  + Surgical risks: bleeding, infection, cerebrospinal fluid leak, anesthesia complications.
  + Neurological impairment depending on the amount of brain tissue involved.
  + Hydrocephalus requiring additional interventions.
  + Long-term developmental delays or cognitive challenges may persist despite treatment

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand your baby has been diagnosed with encephalocele. I want to explain what this means and what we can do to help.

Patient (Parent): Yes, doctor. What exactly is encephalocele?

Doctor: Encephalocele is a condition where part of the brain and its covering membranes protrude through a defect or opening in the skull. It’s a type of neural tube defect present from birth.

Patient: How serious is it? What causes it?

Doctor: The severity depends on the size and location of the encephalocele and how much brain tissue is involved. Causes are multifactorial, including genetic factors and environmental influences like folic acid deficiency during pregnancy. Early prenatal care and folic acid supplementation can reduce risk.

Patient: What treatment options are available?

Doctor: Surgery is the main treatment. The goal is to place the protruding brain tissue back inside the skull and close the defect to protect the brain and prevent infection. Sometimes multiple surgeries are needed depending on the complexity.

Patient: Is surgery safe? What are the risks?

Doctor: Surgery carries risks like bleeding, infection, or anesthesia complications, but our surgical team is experienced in managing these. Early surgery is important to reduce complications and improve outcomes.

Patient: What happens after surgery?

Doctor: After surgery, your child will need close monitoring and supportive care. Some children require rehabilitation therapies like physical, occupational, or speech therapy to help with development. We also provide emotional and psychological support for families because this condition can be challenging.

Patient: Can my child live a normal life?

Doctor: Many children with encephalocele can lead meaningful lives, especially with early treatment and ongoing support. The outcome depends on the extent of brain involvement and any associated conditions. We will work closely with you to provide the best care possible.

Patient: Thank you, doctor. I appreciate the information and support.

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**Ear wax (Cerumen impaction)**

ALTERNATIVE NAMES

* Cerumen Impaction
* Earwax Blockage
* Impacted Cerumen
* Ear Canal Obstruction (due to wax)
* Wax Plug
* Cerumen Plug
* Ear Canal Cerumen Accumulation
* Earwax Build-up
* Ear Canal Occlusion

**DEFINITION / DESCRIPTION**

“Cerumen impaction” is the medical term for earwax blockage. Earwax (cerumen) plays an important role in ear health. It cleans your ears and protects them from dust, dirt and infection.

Despite its many benefits, earwax can cause issues if too much of it builds up. Cerumen impaction may result in ear pain, itchiness, ringing in your ears, hearing loss or other issues. When necessary, a healthcare provider can help you with earwax removal.

#### **Who is most likely to develop impacted earwax?**

Earwax blockage can happen to anyone. About 10% of children and 5% of adults have it.

Impacted cerumen is more likely to occur in people who:

* Use hearing aids, earplugs or earbuds.
* Have a lot of ear hair.
* Have certain skin conditions like eczema.
* Put cotton swabs or other items into their ears.
* Are over the age of 55.
* Have developmental disabilities.
* Have misshapen ear canals that interfere with natural wax removal.

**CAUSES**

Some people get earwax buildup simply because they naturally produce more earwax.

You can also get earwax impaction if:

* You have dry or hard earwax.
* You have a lot of ear hair.
* You have narrow ear canals.
* You frequently wear earplugs or hearing aids.
* You routinely use cotton swabs to clean your ears.

**SIGNS / SYMPTOMS**

Impacted earwax symptoms may include:

* A feeling of fullness in your ear.
* Pain in your ear (earache).
* Hearing loss, which may worsen over time.
* Ringing in your ears (tinnitus).
* Itchiness in your ears.
* Discharge or odor coming from your ears.
* Dizziness.

**DIAGNOSIS METHODS**

Your healthcare provider will perform a physical examination. During this visit, they’ll look into your ears with a special instrument, called an otoscope, to see if earwax buildup is present.

**TREATMENT OPTIONS**

Impacted cerumen treatments involve both at-home and in-office methods, including:

* Solutions that dissolve earwax.
* Ear irrigation.
* In-office earwax removal.

Talk to your healthcare provider before trying any treatment.

#### **Clean your ears properly**

Clean the outside of your ear with a washcloth. After showering or bathing, dry your ears as much as possible.

You should never, under any circumstances, put anything inside your ear canal — including cotton swabs. Not only can using cotton swabs damage your eardrum, but it can also encourage your ears to make more earwax.

#### **Use solutions to dissolve earwax**

You can use cerumenolytic solutions (solutions to dissolve wax) in your ear canal. These solutions include:

* Saline solution.
* Baby oil.
* Glycerin.
* Mineral oil.
* Hydrogen peroxide or peroxide-based [ear drops](https://my.clevelandclinic.org/health/treatments/24654-ear-drops) (such as Debrox®).

With these solutions, you put a few drops into the affected ear and lie on the opposite side. This way, the solution can drip into your affected ear. These oils should be used sparingly. If using an over-the-counter earwax removal, follow the directions provided.

#### **Ear irrigation**

Another option is irrigating or syringing your ear. This involves using a syringe to rinse out your ear canal with water or saline solution. Generally, you should soften the wax first by using a cerumenolytic solution. Then, you’ll gently irrigate your ear with a bulb syringe.

#### **In-office earwax removal**

Finally, your healthcare provider can remove earwax manually using special instruments. They might use a cerumen spoon, forceps, irrigation or a suction device. Generally, these procedures only take a few minutes to complete.

**PREVENTION TIPS**

Don’t stick anything into your ears to clean them. If you use cotton swabs, you should only use them on the outer part of your ear. If a healthcare provider has to remove earwax from your ears more than once a year, ask them what they suggest to stop earwax from building up.

**OUTLOOK / PROGNOSIS**

Though impacted cerumen is annoying and inconvenient, it usually isn’t dangerous. Still, you should call a healthcare provider if you notice impacted earwax symptoms like ear pain, dizziness or hearing loss.

Some people produce more earwax than other people and may need routine treatments to remove it. Talk to your provider about ways to soften earwax and keep your ears healthy.

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

Call a healthcare provider if you develop cerumen impaction symptoms such as ear pain, itchiness, tinnitus, dizziness, hearing loss or a feeling of fullness in your ears.

You should seek medical care immediately if you have:

* Fever.
* An earache that doesn’t go away.
* Drainage coming out of your ear (otorrhea).
* A foul odor coming from your ear.

**DIFFERENTIAL DIAGNOSIS**

* Cerumen Impaction  
  Accumulation of earwax causing canal obstruction, hearing loss, fullness, itching, tinnitus, or ear pain.
* Otitis Externa (Swimmer’s Ear)  
  Infection or inflammation of the external auditory canal causing pain, discharge, redness, and swelling.
* Otitis Media with Effusion  
  Fluid in the middle ear without infection causing hearing loss and ear fullness.
* Foreign Body in Ear Canal  
  Objects lodged in the ear canal causing obstruction, discomfort, or infection.
* Eustachian Tube Dysfunction  
  Causes ear fullness, muffled hearing, and sometimes pain due to pressure imbalance.
* Exostoses or Osteomas of the Ear Canal  
  Bony growths narrowing the canal and causing conductive hearing loss or recurrent infections.
* Cholesteatoma  
  Abnormal skin growth in the middle ear or mastoid causing chronic infection, discharge, and hearing loss.
* Tympanic Membrane Perforation  
  Hole in the eardrum causing hearing loss, discharge, or recurrent infections.
* External Auditory Canal Tumors  
  Rare, but can cause canal obstruction and symptoms similar to impaction.
* Impacted Keratin or Desquamated Epithelium  
  Sometimes mistaken for wax, especially in chronic ear conditions.

**EPIDEMIOLOGY**

* The prevalence of cerumen impaction varies by age and population but is generally common worldwide.
* In the United States, among individuals aged 12 years and older, the prevalence of any cerumen impaction is approximately 18.6%, increasing to 32.4% in those aged 70 years and above. Complete bilateral impaction occurs in about 1.2% of adults.
* Among children, cerumen impaction affects about 10%, while in healthy adults it is around 5%. In elderly populations, especially those in nursing homes, prevalence can be as high as up to 57%.
* Studies in Nigeria and other developing countries report even higher prevalence rates, with some studies showing up to 46.7% to over 50% in school children.
* Cerumen impaction is more common in males and individuals of Black race compared to Caucasians.
* Lower socioeconomic status is associated with higher rates of cerumen impaction in some populations.
* It is a frequent cause of primary care and ENT consultations. In the US, cerumen accumulation leads to about 12 million patient visits and 8 million cerumen removal procedures annually.
* The condition is often asymptomatic but can cause hearing impairment, ear fullness, itching, tinnitus, and sometimes pain.

**PREDEFINED Q & A SETS**

### **Can I use cotton swabs to remove excess earwax?**

Many people use cotton swabs to clean their ears. But research shows that cotton swabs can actually cause more earwax production. This is because cotton swabs stimulate the tiny hairs inside your ear canal. When you stimulate these hairs, they send messages to the glands inside your ear canal to make more earwax.

### **What else should I avoid when treating earwax impaction?**

Don’t use suction devices for home use (such as Wax-Vac®). They aren’t effective for most people and most healthcare providers don’t recommend them.

Ear candles, advertised as a natural method to remove earwax, are ineffective. They can also cause injuries such as burns to your external ear and ear canal. They may even perforate (tear) your eardrum.

## 1**. Do my ears make excessive amounts of earwax?**

Some people naturally produce more earwax than others due to genetics or anatomical factors like narrow or hairy ear canals. Frequent use of earbuds, hearing aids, or exposure to dust and irritants can also stimulate excess wax production. Skin conditions like eczema or psoriasis inside the ear canal may increase wax production as well.

## 2. **How can I safely and thoroughly clean my ears?**

* The safest way to clean your ears is to wipe the outer ear with a warm, damp cloth.
* Avoid inserting cotton swabs, fingers, or any objects into your ear canal, as this can push wax deeper, cause injury, or lead to infection.
* Earwax usually migrates out naturally through jaw movements like talking and chewing.
* If you feel wax buildup, you can use over-the-counter ear drops designed to soften wax, but only if you do not have a perforated eardrum or ear infection.

## 3. **Can I prevent earwax from building up?**

* Avoid inserting objects into your ears.
* Manage underlying conditions like allergies or skin problems that increase wax production.
* Limit the use of earbuds or hearing aids if possible, or clean them regularly.
* Keeping ears dry and clean externally helps prevent buildup.

## 4. **What home remedies do you recommend?**

* Use ear drops containing mineral oil, baby oil, glycerin, hydrogen peroxide, or carbamide peroxide to soften wax (after consulting your healthcare provider).
* Warm water irrigation by a professional can help remove softened wax safely.
* Maintain ear hygiene by cleaning the outer ear with a washcloth after bathing.

## 5. **Do I need professional earwax removal?**

* Yes, if you have symptoms like hearing loss, earache, fullness, tinnitus, dizziness, or if ear drops do not help, see a healthcare provider.
* Professional removal methods include irrigation, suction, or manual removal with specialized instruments.
* People with ear surgery history, perforated eardrums, diabetes, or weakened immune systems should avoid self-treatment and seek professional care.

## 6. Should I have earwax removed on a regular basis?

* Routine removal is not necessary unless you have symptoms or risk factors for impaction.
* Some people prone to excessive wax buildup may benefit from periodic professional cleaning.
* Your healthcare provider can advise on the best schedule based on your individual needs

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, what brings you in today?

Patient: I’ve been having trouble hearing in my right ear, and it feels full and clogged.

Doctor: That sounds like it could be ear wax buildup, also called cerumen impaction. Ear wax is natural and helps protect your ear, but sometimes it can accumulate and block the ear canal, causing symptoms like hearing loss, fullness, or even discomfort.

Patient: How do you know if it’s wax causing the problem?

Doctor: I’ll examine your ear with an otoscope to see if there’s a significant amount of wax blocking your ear canal. Cerumen impaction is diagnosed when the wax buildup is causing symptoms or preventing us from properly examining your ear.

Patient: What can be done to remove it?

Doctor: If the wax is causing symptoms, we can remove it safely. Options include using ear drops that soften the wax, gentle irrigation with warm water, or manual removal using special instruments. It’s important that this is done by a trained healthcare provider to avoid injury.

Patient: Can I try to clean it myself?

Doctor: I don’t recommend using cotton swabs or other objects in your ear because they can push wax deeper or damage the ear canal or eardrum. Instead, you can use over-the-counter ear drops to soften the wax, but if symptoms persist, professional removal is best.

Patient: Are there any risks with the removal procedures?

Doctor: When done properly, removal is generally safe. However, improper attempts can cause ear canal injury, infections, or even perforation of the eardrum. Some people may feel mild dizziness or discomfort during irrigation if the water temperature isn’t right.

Patient: What if I don’t have symptoms? Should I still get the wax removed?

Doctor: If you don’t have symptoms and the wax isn’t blocking your ear canal, removal isn’t usually necessary. Sometimes it’s better to leave the wax alone as it protects your ear.

Patient: Okay, that makes sense. What should I do next?

Doctor: I’ll examine your ears now. If I see significant impaction causing your symptoms, we can proceed with removal today or schedule a follow-up. Also, I’ll give you advice on how to prevent wax buildup in the future.

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**Enlarged adenoids**

ALTERNATIVE NAMES

* Adenoid Hypertrophy
* Adenoid Enlargement
* Adenoid Vegetations
* Pharyngeal Tonsil Hypertrophy
* Adenoidal Hypertrophy
* Nasopharyngeal Tonsil Enlargement
* Hypertrophic Adenoids
* Adenoid Mass

**DEFINITION / DESCRIPTION**

Adenoids are a small patch of tissue located at the top of the throat behind the nasal cavity. They are similar to the tonsils and located right above them. Your tonsils can be seen if you look at the back of your throat, but the adenoids aren’t directly visible.

Both adenoids and tonsils are part of the immune system, which helps to prevent and fight infection in your body.

## **Function**

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.”

### **How big are your adenoids?**

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.)

### **What are your adenoids made of?**

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.

**CAUSES**

Adenoids are present at birth. They grow until a child is between the ages of 3 and 5. Normally, they begin to shrink after around age 7. They shrink considerably in adulthood.

They’re located in the passage that connects the back of the nasal cavity to the throat. They produce antibodies to help your body fight off infections. During the early years, adenoids help protect infants from infection by trapping bacteria and viruses that enter the body through the nose.

Adenoids that become infected usually become enlarged, but return to their normal size when the infection subsides. However, in some instances, the adenoids remain enlarged even after the infection is gone.

Enlarged adenoids can also be caused by allergies. Some children have enlarged adenoids from birth.

**SIGNS / SYMPTOMS**

Enlarged adenoids can cause a number of symptoms, including:

* blocked, stuffy nose
* sleep apnea (pauses in breathing during sleep)
* mouth breathing
* snoring
* sore throat
* difficulty swallowing
* swollen glands in the neck
* “glue ear,” or otitis media with effusion (fluid buildup in the middle ear, which can cause hearing problems)
* cracked lips and dry mouth (from breathing problems)

**DIAGNOSIS METHODS**

The doctor will first ask about the symptoms your child is experiencing. Then your child will receive a physical exam. The doctor will insert a small, flexible telescope (known as an endoscope) through the nose to view the adenoids.

Depending on what your doctor finds, an X-ray exam of the throat may be necessary.

In severe cases, your child may need to undergo a sleep study. This will determine if they’re suffering from sleep apnea.

During the study, your child will sleep overnight at a facility while their breathing and brain activity are monitored using electrodes. The study is painless, but it can be difficult for some children to sleep in a strange place.

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**

Treatment depends on how severe the condition is. If your child’s enlarged adenoids aren’t infected, the doctor may not recommend surgery. Instead, the doctor may choose to simply wait and see if the adenoids shrink on their own as your child gets older.

In other cases, your doctor may recommend medication, such as a nasal steroid, to shrink enlarged adenoids. However, it’s common for enlarged adenoids to be removed if they continue to cause problems despite treatment with medications.

The procedure is fairly simple and doesn’t have many risks. This surgery is called an adenoidectomy.

If a child has been having frequent tonsil infections, the doctor might remove the tonsils as well. The tonsils and adenoids are often removed at the same time, but not always. Tonsillectomy does come with increased risks and a more significant recovery.

The adenoids may need to be removed if your child is experiencing repeated infections that lead to sinus and ear infections. Adenoids that are very badly swollen can also lead to infections or middle ear fluid, which can temporarily cause hearing loss.

Your child will be given a mild sedative before surgery to help calm them. They will then be placed under general anesthesia. The surgery lasts no more than two hours.

After the adenoids are removed, your child might experience:

* a sore throat
* bad breath
* earaches
* a blocked nose

Your child may also receive a mild pain reliever for the first few days. Symptoms should clear up in a few weeks.

## **Enlarged adenoids in adults**

Although enlarged adenoids usually appear in childhood, they may develop in adults on rare occasions. This can be a result of irritation from air pollution or smoking. In some cases, sinus tumors, lymphomas, or HIV are associated with enlarged adenoids in adults.

**PREVENTION TIPS**

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 isn't going away or keep coming back, see a doctor to get a diagnosis. Treatment can help avoid adenoiditis complications or symptoms that can affect your quality of life.

**OUTLOOK / PROGNOSIS**

It’s common for children to have enlarged adenoids. Be sure to have your child examined as soon as possible if you notice that they are experiencing any of the symptoms of enlarged adenoids. Enlarged adenoids are a very treatable condition, and some cases can be treated with a simple antibiotic.

**POSSIBLE 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**

When enlarged adenoids cause breathing difficulties or obstructive sleep apnea, they can lead to other problems if left untreated

**DIFFERENTIAL DIAGNOSIS**

* Adenoid hypertrophy (enlarged adenoids)  
  Enlarged lymphoid tissue in the nasopharynx causing nasal obstruction, mouth breathing, snoring, sleep apnea, recurrent ear infections, and nasal voice.
* Tonsillar hypertrophy  
  Enlarged tonsils can also cause airway obstruction and contribute to similar symptoms.
* Chronic rhinosinusitis  
  Inflammation of the nasal and sinus mucosa causing nasal congestion, postnasal drip, and sometimes sleep disturbances.
* Allergic rhinitis  
  Nasal congestion, sneezing, and rhinorrhea due to allergy can mimic or exacerbate adenoid symptoms.
* Nasal polyps  
  Benign mucosal growths causing nasal obstruction and congestion, more common in older children or adults.
* Nasopharyngeal masses or tumors  
  Rare but important to exclude; can cause unilateral nasal obstruction or persistent symptoms.
* Foreign body in the nasal cavity  
  Especially in young children, causing unilateral nasal discharge and obstruction.
* Choanal atresia or stenosis  
  Congenital blockage of the nasal airway causing chronic nasal obstruction from birth.
* Lymphoid hyperplasia from infections  
  Transient swelling of lymphoid tissue due to viral or bacterial infections.
* Gastroesophageal reflux disease (GERD)  
  Can cause chronic throat irritation and contribute to upper airway inflammation.
* Obstructive sleep apnea syndrome (OSAS) from other causes  
  Including obesity or craniofacial abnormalities.

**EPIDEMIOLOGY**

* The prevalence of adenoid hypertrophy (AH) in children varies widely depending on the population and diagnostic criteria, generally ranging from about 1% to over 30% in different studies.
* A study in a pediatric outpatient clinic reported a prevalence of 1.3%, with a male predominance and most cases from lower socioeconomic backgrounds.
* Other studies found much higher rates, for example:
  + 7.7% in one study
  + 19.5% to 27% among school-aged children (5–15 years)
  + A systematic review reported a prevalence of approximately 34.5% in children.
* A large pediatric outpatient study found a prevalence of 2.3% confirmed radiologically, with the peak age of diagnosis between 1 and 6 years (12–72 months). There was a male predominance (male:female ratio ~1.6:1), and a higher prevalence in rural children compared to urban.
* Risk factors associated with AH include frequent infections (tonsillitis, sinusitis), allergic conditions (asthma, allergic rhinitis), and exposure to cigarette smoke.
* The prevalence of AH tends to peak in early childhood (ages 2–8 years) due to immune system development and then often decreases with age due to natural atrophy of the adenoids.
* In adults, adenoid hypertrophy is less common but increasing, often related to chronic infections, allergies, and environmental pollution

**PREDEFINED Q & A SETS**

## 1. What are adenoids?

**Answer: Adenoids are a mass of lymphoid tissue located at the back of the nasal cavity, above the roof of the mouth. They help fight infections, especially in children.**

## 2. What does it mean if adenoids are enlarged?

**Answer: Enlarged adenoids, or adenoid hypertrophy, means that this tissue has grown bigger than normal, which can block the airway and cause breathing difficulties or other problems.**

## 3. What symptoms are caused by enlarged adenoids?

**Answer: Common symptoms include nasal congestion, mouth breathing, snoring, sleep apnea, recurrent ear infections, and sometimes a change in voice or difficulty swallowing.**

## 4. What causes adenoids to enlarge?

**Answer: Adenoids often enlarge due to repeated infections or allergies. They tend to be larger in children and usually shrink as a person gets older.**

## 5. How are enlarged adenoids diagnosed?

**Answer: Diagnosis is usually based on symptoms and physical examination. Sometimes nasal endoscopy or X-rays are used to assess the size of the adenoids.**

## 6. Can enlarged adenoids go away on their own?

**Answer: Yes, in many cases, adenoids shrink naturally as children grow older, especially after the age of 7.**

## 7. When is treatment needed?

**Answer: Treatment is needed if enlarged adenoids cause significant breathing problems, sleep apnea, recurrent ear infections, or affect speech and swallowing.**

## 8. What treatments are available?

**Answer: Treatments range from medications (like nasal steroids or antibiotics for infections) to surgical removal of the adenoids (adenoidectomy) if symptoms are severe or persistent.**

## 9. Is adenoidectomy a safe procedure?

**Answer: Yes, adenoidectomy is a common and generally safe surgery with a quick recovery time. It is often done along with tonsil removal if needed.**

## 10. What can I expect after treatment?

**Answer: Most children experience improved breathing, reduced infections, and better sleep after treatment. Recovery from surgery usually takes a few days.**

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, what brings you and your child in today?

Patient: My child, Alex, has been having a lot of trouble breathing through his nose lately. He snores loudly at night, and often breathes through his mouth. He also seems to get a lot of ear infections.

Doctor: I see. Those symptoms could indicate enlarged adenoids. Adenoids are patches of tissue at the very back of the nasal passage. Like tonsils, they help fight off bacteria and viruses that we breathe in or swallow. They are important infection fighters for babies and young children .

Patient: So, they’re supposed to be there? Why are they causing problems now?

Doctor: Yes, they are. In young children, adenoids do important work, but they often start to shrink after about 5 years of age and almost disappear by the teen years . However, sometimes they become enlarged. This can happen if they frequently fight off infections, or due to allergies. When they swell up, they can block the nasal passage .

Patient: What exactly does an enlarged adenoid cause?

Doctor: When adenoids are enlarged, children might have trouble breathing through the nose and end up breathing through their mouth. This can lead to dry lips and mouth . Their voice might sound pinched, and their breathing can be noisy . Snoring is very common, and in some cases, they might even stop breathing for a few seconds during sleep, which is called obstructive sleep apnea. This can lead to disturbed sleep and potentially affect learning, behavior, and even heart health . Enlarged adenoids can also contribute to frequent ear infections, fluid in the middle ear, and even hearing loss .

Patient: That sounds like exactly what Alex is experiencing. How do you check for this?

Doctor: To get a clear view, I might order an X-ray or use a tiny telescope to look inside the nasal passage. I’ll also check Alex’s ears, nose, and throat .

Patient: What are the treatment options if they are enlarged?

Doctor: If the enlarged adenoids are causing symptoms, we have a few approaches. If we suspect an infection is making them swell, I might prescribe medication like antibiotics . For swelling due to allergies, a nasal corticosteroid spray or other medications like antihistamines can help reduce the inflammation .

Patient: What if the medications don’t work, or if it’s very severe?

Doctor: If medications aren't effective, or if the symptoms are severe—especially if they involve sleep apnea, very frequent ear infections, or constant nasal blockage affecting breathing—we might consider surgical removal of the adenoids, a procedure called an adenoidectomy . This is one of the most common surgeries performed on children .

Patient: Is surgery always necessary?

Doctor: No, surgery isn't always the first step. If the adenoids are enlarged but not causing significant problems, or if we believe they might shrink on their own, we might choose to wait . We only recommend surgery if the symptoms are persistent and significantly affecting your child’s health and quality of life .

Patient: Thank you, Doctor. This helps a lot.

REFERENCES:

<https://www.webmd.com/children/adenoiditis>

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

**Epiglottitis**

ALTERNATIVE NAMES

* Supraglottitis
* Acute Epiglottitis
* Acute Supraglottitis
* Epiglottic Inflammation
* Epiglottic Swelling
* Infectious Epiglottitis

**DEFINITION / DESCRIPTION**

Epiglottitis (pronounced “eh-pih-glah-tai-tis”) is inflammation and swelling of your epiglottis. Your epiglottis is a thin flap of cartilage near the base of your tongue. It keeps food and liquids from going down your windpipe (trachea) when you swallow.

You may also hear the term “acute epiglottitis.” This refers to the very sudden and intense onset of symptoms, including difficulty breathing and swallowing. Without prompt treatment, the swelling can block your airway and even be fatal.

It’s essential to get to the emergency room (ER) immediately if you or a loved one is experiencing symptoms of epiglottitis. Epiglottitis is a medical emergency that you should never try to manage at home.

Epiglottitis is an uncommon condition that affects both children and adults.

Before the widespread use of *Haemophilus influenzae* (Hib) vaccinations in 1985, epiglottitis mainly affected children between the ages of 3 and 5. Thanks to the vaccine, cases of Hib infection —the primary cause in children — have fallen. Now, only .5 out of every 100,000 children in the U.S. get epiglottitis.

But cases have been on the rise in adults. Most are related to infections other than Hib. Epiglottitis affects anywhere from 1 to 4 out of every 100,000 adults in the U.S.

**CAUSES**

Bacterial infections are the most common cause of epiglottitis. In children, *Haemophilus influenzae type b* (Hib) bacteria is the most common cause. In adults, bacterial infections usually come from non-Hib sources. These include *Streptococcus* *pneumoniae* and *Staphylococcus* bacteria.

Other possible epiglottitis causes include:

* Viral infections. Viruses like varicella-zoster virus and herpes simplex virus can make you vulnerable to bacterial infections that may lead to epiglottitis.
* Fungal infections. *Candida* infections, particularly in people with a weak immune system, have been linked to epiglottitis.
* Injury to your throat. The injury may involve things like a physical blow, swallowing a foreign object or drinking a very hot liquid.
* Smoking. This includes vaping or smoking substances like crack cocaine.
* Chemical burns. Epiglottitis can develop from ingesting a harmful chemical. This is called corrosive epiglottitis.

#### **Is epiglottitis contagious?**

Getting an infection that can cause epiglottitis — like Hib — doesn’t mean you’ll develop epiglottitis, too. But you may if the germ spreads to your epiglottis and causes inflammation. The offending germs can spread from person to person through droplets of saliva or mucus when they cough or sneeze.

**RISK FACTORS**

Some factors increase the risk of getting epiglottitis, including:

* **Having a weakened immune system.** An immune system weakened by illness or medicines can be more likely to get bacterial infections that may cause epiglottitis.
* **Not being fully vaccinated.** Skipping vaccinations or not getting them on time can leave a child open to Haemophilus influenzae type b (Hib) and increase the risk of epiglottitis.

**SIGNS / SYMPTOMS**

Epiglottitis symptoms usually appear suddenly and get worse quickly. Sometimes, in older children and adults, it may take a few days for symptoms to develop fully. But in young children, who have smaller airways, a swollen epiglottis often causes severe symptoms that appear without warning.

The most common symptoms include:

1. Dysphagia: Difficulty swallowing
2. Dysphonia: Hoarseness or an abnormal voice
3. Drooling: Saliva (spit) flowing out of your mouth involuntarily
4. Distress: Difficulty breathing or lack of oxygen

Other epiglottitis symptoms include:

* Severe sore throat
* Fever of 100.4 degrees Fahrenheit (38 degrees Celsius) or higher
* A high-pitched whistling sound when you breathe
* An open mouth and leaning forward to breathe (a main symptom in young children)
* Irritability and restlessness (a main symptom in young children)

Epiglottitis shares several common symptoms with other conditions, such as croup. But unlike epiglottitis, croup doesn’t always require emergency treatment. This is why proper diagnosis and treatment are key.

**DIAGNOSIS METHODS**

Since epiglottitis is a life-threatening medical emergency, healthcare providers usually work through the steps of making a diagnosis only after they’ve stabilized your breathing.

Once you’re stable (and only if it’s perfectly safe), they may run the following tests to diagnose epiglottitis:

* Culture tests. A provider swabs your throat and sends the sample to a pathology lab to test for bacteria or viruses.
* Blood tests. Your provider may perform a variety of blood tests to count your white blood cells (your body’s infection-fighters) or see if there are any bacteria or viruses in your blood.
* Laryngoscopy. A provider uses a small camera at the end of a flexible tube to examine your throat.
* Imaging tests. An X-ray can help determine the level of swelling. Epiglottic swelling on an X-ray sometimes resembles an adult thumb. Providers sometimes call this the “thumbprint sign.”

**TREATMENT OPTIONS**

You’ll receive treatment for epiglottitis immediately. In the hospital, your care team will:

1. Restore your airways to full capacity. Your healthcare provider will place an oxygen mask over your mouth and nose so your lungs can get more air. If your air passages are blocked, they may place a breathing tube through your mouth and into your windpipe. (If your provider can’t insert a breathing tube through your mouth, they may need to insert a breathing tube through your neck. This is called a tracheostomy. But it’s rare that people with epiglottitis need this.)
2. Administer fluids. Your medical team will give you plenty of fluids through an intravenous (IV) drip (a needle inserted into a vein).
3. Administer antibiotics. If you have a bacterial infection, your provider will give you a broad-spectrum antibiotic through an IV. This medicine kills most strains of bacteria that may be causing the infection. Once your provider gets the results of your culture tests, they may give you a different antibiotic that targets the specific bacteria causing your infection.

**PREVENTION TIPS**

You can’t prevent an inflamed epiglottis altogether, but there are things you can do to reduce the risk:

* Get your child vaccinated. In children, the best prevention is to ensure all their childhood immunizations are up to date. Children are especially vulnerable to Hib infections because their immune systems haven’t fully developed yet.
* Practice good hygiene. Wash your hands frequently, and avoid placing fingers in your eyes, nose and mouth.
* Protect yourself from infection. Take precautions around people who are coughing and sneezing, like avoiding close contact or masking up.
* Avoid injury to your throat. Steer clear of activities that can damage your throat, like drinking hot liquids or smoking.

**OUTLOOK / PROGNOSIS**

For most people, it takes about one week to fully recover from epiglottitis. You’ll probably spend between three to five days in the hospital. But you may start to feel better within the first few days. Even if you get a breathing tube, it usually only takes a few days before you’re able to breathe on your own.

If an infection causes your condition, it’s important to take the full course of antibiotics to kill the bacteria (usually about seven days).

When addressed quickly, treatment can heal epiglottitis. Still, it’s important to remember that an inflamed epiglottis is a medical emergency. If you or someone you know exhibits epiglottitis symptoms, call 911 (or your local emergency services number) or head to your nearest emergency room.

**POSSIBLE COMPLICATIONS**

Epiglottitis can cause many complications, including:

* **Breathing failure.** The epiglottis is a small, movable "lid" just above the larynx that prevents food and drink from entering the windpipe. Swelling of the epiglottis can completely block the airway.  
  This can lead to breathing or respiratory failure. In this life-threatening condition, the level of oxygen in the blood drops very low.
* **Spreading infection.** Sometimes the bacteria that cause epiglottitis cause infections in other parts of the body. Infections can include pneumonia, meningitis or a bloodstream infection.

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

Epiglottitis can be life-threatening if swelling closes off your airway. If you think you or someone you know might have a swollen epiglottis, seek emergency care immediately.

Never put anyone with epiglottitis on their back or allow them to have anything in their mouth. This can make it even harder for someone with the condition to breathe. Also, try to remain calm, as stress can worsen the tightening of someone’s throat.

## **Diagnostic Considerations**

Clinician familiarity with epiglottitis has lessened in the post-Hib vaccination era, which may lead to less acumen in the diagnosis of this potentially deadly disorder. Efforts toward continued diligence in promptly making this diagnosis are therefore warranted, particularly in the adult patient, for whom epiglottitis has many possible causes other than *Haemophilus influenzae* type b.

Depending on the clinical setting, it may be risky to send the patient off-unit for radiologic studies, and direct visualization of the epiglottis may precipitate respiratory obstruction. Rapid diagnosis may depend on the examination and those tests that can be performed quickly at the bedside.

Other conditions to consider in the evaluation of acute epiglottitis include the following:

* Acute angioedema
* Airway obstruction
* Bacterial laryngotracheobronchitis
* Caustic ingestion
* Thermal injury from liquids or hot air (burns)
* Foreign body aspiration
* Laryngeal diphtheria
* Laryngitis
* Laryngotracheal bronchopneumonitis
* Peritonsillar abscess
* Retropharyngeal abscess
* Sepsis

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## **Differential Diagnoses**

* Caustic Ingestions
* Peritonsillar Abscess in Emergency Medicine
* Retropharyngeal Abscess

**EPIDEMIOLOGY**

Epiglottitis is classically associated with *Haemophilus influenzae* type b (Hib) infection and children. However, as has been observed with other infections caused by this agent, the overall incidence of epiglottitis has dramatically dropped in young children globally, as well as older age groups and adults, upon general adoption of Hib vaccine; furthermore, the most typical patient affected by epiglottitis in industrialized areas with vaccination programs is now an urban male in his mid 40s. Groups with higher morbidity include infants younger than 1 year and adults older than 85 years.

In the United States, epiglottitis is an uncommon disease with an incidence in adults of about 1 case per 100,000 per year. Adult epiglottitis is most frequently a disease of men (male-to-female ratio, approximately 3:1), occurring during the fifth decade of life (average age, about 45 y). The ratio of incidence in children to adults was 2.6:1 in 1980 and dropped to 0.4:1 in 1993, a dramatic decrease in occurrence since the introduction of the *Haemophilus influenzae* type b vaccine (Hib). However, keep in mind that vaccine failures are possible.

Globally, epiglottitis is generally more common in nations that do not immunize against *H influenzae* type b. For example, in Sweden from 1987 to 1989, the incidence was 14.7 per 100,000 people per year in children aged 0-4 years and 3.2 per 100,000 people per year overall.A large-scale Hib vaccination program in 1992-1993 resulted in a substantial decrease in Swedish cases of acute epiglottitis.

A retrospective review of a Danish population demonstrated a mean national incidence of epiglottitis in children of 4.9 cases per 100,000 per year in the decade before Hib vaccination. From 1996 to 2005, with the introduction of widespread Hib vaccination, an incidence of only 0.02 cases of epiglottitis per 100,000 per year was seen. During this period, the incidence of acute epiglottitis in adults remained constant, at 1.9 cases per 100,000 per year.

A retrospective review from the tropical country of Singapore over 8 years, ending in 1999, demonstrated 32 cases of acute epiglottitis, only 1 of which occurred in a child.During this time, Hib immunization was not routine, so Hib immunization cannot be used to explain the increased adult epiglottitis prevalence found in this study.

**PREDEFINED Q & A SETS**

## 1. What caused my epiglottitis?

Epiglottitis is usually caused by a bacterial infection, most commonly *Haemophilus influenzae* type b (Hib). Other bacteria and sometimes viruses can also cause it. It can also result from throat injury (like burns or trauma) or smoking certain substances. Vaccination against Hib has greatly reduced cases in children.

## 2. How long will I need to continue taking antibiotics?

You will typically need to take intravenous antibiotics for at least 5 days, followed by oral antibiotics to complete a total of 7 to 10 days of treatment. It is important to finish the entire course even if you feel better to ensure the infection is fully cleared.

## 3. How can I care for my throat during recovery?

* Keep your throat moist by drinking plenty of fluids if swallowing is comfortable.
* Avoid irritants like smoking or exposure to smoke.
* Rest your voice and avoid straining your throat.
* Follow your healthcare provider’s advice on medications, including steroids if prescribed to reduce inflammation.
* Avoid lying flat on your back as it may worsen breathing difficulties.

## 4. How long should I avoid lying down (on my back)?

You should avoid lying flat on your back until your healthcare provider confirms it is safe, as lying down can worsen airway obstruction. Staying upright or in a comfortable position that eases breathing is recommended during recovery.

## 5. Will I need follow-up visits?

Yes, follow-up visits are important to:

* Monitor your recovery and ensure the infection has resolved.
* Check for any complications or lingering swelling.
* Assess your airway and throat function.
* Your doctor will advise on the timing of these visits based on your progress.

## 6. How can I reduce my risk of epiglottitis in the future?

* Ensure vaccination against Hib and other relevant vaccines are up to date.
* Practice good hygiene like regular hand washing to reduce infection risk.
* Avoid smoking and exposure to secondhand smoke or inhaling irritants.
* Seek prompt medical care for throat infections or respiratory symptoms.
* Maintain a healthy immune system through good nutrition and managing chronic conditions

**Treatment and Drug Information for Epiglottitis, Including Side Effects**

## 1. Airway Management

* Priority: Secure the airway immediately if there is respiratory distress or impending airway obstruction.
* Methods:
  + Endotracheal intubation by an experienced provider, often in the operating room.
  + If intubation is impossible, emergency tracheostomy or cricothyrotomy may be required.
* Supportive care: Oxygen supplementation via mask in a position of comfort.

## 2. Antibiotic Therapy

* Empiric antibiotics should cover common pathogens: *Haemophilus influenzae* type b (Hib), *Streptococcus pneumoniae*, Group A *Streptococcus*, *Staphylococcus aureus* (including MRSA).
* Typical regimens:
  + Third-generation cephalosporins:
    - *Ceftriaxone* 1–2 g IV once daily (adults), 50 mg/kg once daily (children)
    - *Cefotaxime* as an alternative
  + Antistaphylococcal agent:
    - *Vancomycin* if MRSA suspected or confirmed
    - *Clindamycin* or *linezolid* as alternatives in penicillin allergy
  + After clinical improvement, switch to oral antibiotics such as amoxicillin/clavulanic acid to complete 7–10 days total therapy.
* Side effects:
  + Cephalosporins: allergic reactions, gastrointestinal upset, possible antibiotic-associated diarrhea
  + Vancomycin: nephrotoxicity, ototoxicity, “red man syndrome” if infused too rapidly
  + Clindamycin: risk of *C. difficile* infection
  + Amoxicillin/clavulanic acid: gastrointestinal upset, rash

## 3. Corticosteroids

* Use: May be given to reduce airway inflammation and edema, though evidence is mixed.
* Typical regimen:
  + IV dexamethasone 4–10 mg initial bolus, then repeated doses (e.g., 4 mg every 6–8 hours)
  + Alternatively, methylprednisolone 125 mg IV in severe cases
* Side effects:
  + Hyperglycemia, immunosuppression, mood changes, gastrointestinal irritation

## 4. Adjunctive Therapies

* Nebulized racemic epinephrine: Sometimes used to reduce airway swelling, though evidence is limited.
* Analgesics: Acetaminophen or NSAIDs for pain and fever control.

## 5. Monitoring and Supportive Care

* ICU admission for close monitoring of airway and respiratory status.
* Hydration with IV fluids.
* Avoid agitation of patients to prevent airway spasm.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you’ve been having a severe sore throat and difficulty swallowing. Can you tell me more about your symptoms?

Patient: Yes, it started with a sore throat, but now it’s very painful to swallow, and I’m drooling because I can’t swallow my saliva. My voice sounds muffled, and I’m having trouble breathing.

Doctor: These symptoms are concerning for a condition called epiglottitis, which is an inflammation and swelling of the epiglottis—the flap at the base of your tongue that protects your airway when you swallow.

Patient: Is that serious?

Doctor: Yes, it can be very serious because the swelling can block your airway and make it hard to breathe. That’s why it’s considered a medical emergency. We need to act quickly to secure your airway and treat the infection.

Patient: What causes this?

Doctor: It’s usually caused by a bacterial infection, often *Haemophilus influenzae* type B, although vaccination has made it less common in children. Adults can still get it from other bacteria as well.

Patient: What will you do to treat it?

Doctor: First, we’ll make sure your airway stays open. Sometimes that means placing a breathing tube in the hospital. We will also start you on strong antibiotics to fight the infection and steroids to reduce the swelling.

Patient: Will I need to stay in the hospital?

Doctor: Yes, you’ll be closely monitored in the hospital, often in the intensive care unit, until the swelling goes down and your breathing is stable.

Patient: What happens if it’s not treated quickly?

Doctor: Without prompt treatment, the swelling can completely block your airway, which can be life-threatening. That’s why it’s important you came in right away.

Patient: Is there anything I can do to prevent this?

Doctor: Vaccination against *Haemophilus influenzae* type B is the best prevention. Also, seeking early care for throat infections helps. But since this is rare now, just be aware of the symptoms and come to the hospital if you experience severe throat pain, difficulty swallowing, drooling, or breathing problems.

Patient: Thank you, doctor. I’m glad I came in.

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**Epstein pearls**

ALTERNATIVE NAMES

* Palatal cysts of the newborn
* Bohn’s nodules
* Oral inclusion cysts
* Mucosal cysts of the newborn

**DEFINITION / DESCRIPTION**

Epstein pearls are small, white or yellow nodules (bumps) that may appear inside your baby’s mouth, either along their gums or in the center of their palate (roof of the mouth). In appearance, Epstein pearls resemble unerupted baby teeth. But these bumps are actually benign (noncancerous) cysts made of excess keratin (a protein that helps form hair, skin and nails). They get their name from Dr. Alois Epstein, the Czech pediatrician who first described this condition.

They’re common, affecting up to 85% of newborn babies. These harmless nodules usually go away on their own within three months.

**CAUSES**

Epstein pearls contain keratin buildup. Experts believe Epstein pearls form when oral tissues become trapped during fetal development. As the fetus’s mouth continues to grow, and the roof of the mouth fuses, these trapped tissues fill with keratin.

**SIGNS / SYMPTOMS**

Epstein pearls have no other symptoms besides their appearance. They look like white bumps underneath your baby’s oral mucosa (the skin that lines their mouth). Epstein pearls are usually small — about 1 to 3 millimeters (mm) in diameter — and quite hard to the touch. This is one reason many parents mistake them for baby teeth. They can also appear as a single nodule or in groups of them.

#### **Do Epstein pearls hurt?**

No, Epstein pearls shouldn’t hurt your baby or cause any issues with teething or feeding. But if it seems like your baby is in pain, take them to a healthcare provider for an examination.

**DIAGNOSIS METHODS**

In most cases, healthcare providers can diagnose Epstein pearls just by looking at them. Depending on your newborn’s symptoms, your provider may also do an oral exam to rule out other conditions like thrush (a common fungal infection) or natal teeth (when a baby is born with teeth).

**TREATMENT OPTIONS**

Epstein pearls don’t require treatment. They typically go away on their own within three months. Things like pacifiers, bottles and breastfeeding cause friction that naturally helps dissolve these nodules.

If your baby still has bumps inside their mouth after three months — or if the bumps grow larger — schedule an appointment with your pediatrician. They’ll do an exam to make sure the bumps aren’t a result of another condition.

**PREVENTION TIPS**

No, there’s nothing you can do to prevent Epstein pearls or lower your baby’s risk of getting them. These bumps are very common and are a normal occurrence in many newborn babies. If your baby has Epstein pearls, it doesn’t mean you did anything wrong — and it doesn’t mean your baby needs treatment.

**OUTLOOK / PROGNOSIS**

In most cases, Epstein pearls dissolve within one to two weeks after birth. But they can last longer — sometimes for several months. Eventually, Epstein pearls should go away on their own. Though these bumps may be alarming, they’re nothing to worry about.

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

Call your baby’s pediatrician if:

* The bumps last longer than three months.
* You notice the bumps growing larger or changing shape.
* Your baby shows signs of pain or discomfort.

These things could mean something else caused the bumps. Your pediatrician can do an exam to rule out other conditions and determine whether your baby needs treatment.

**DIFFERENTIAL DIAGNOSIS**

* Epstein Pearls  
  Small, keratin-filled cysts on the midline of the hard palate or gums; common and benign.
* Bohn’s Nodules  
  Keratin-filled cysts located at the junction of the hard and soft palate and along the alveolar ridges; remnants of salivary glands.
* Dental Lamina Cysts  
  Cysts on the alveolar ridges (gums), slightly larger and more transparent; related to tooth development.
* Congenital Epulis  
  Rare benign tumor on the alveolar ridge; may cause feeding or breathing difficulties; requires surgical removal.
* Natal/Neonatal Teeth  
  Teeth present at birth or erupting within the first month; mobile and may require removal if problematic.
* Oral Thrush (Candidiasis)  
  White patches on oral mucosa that can be wiped off, leaving red areas; fungal infection requiring antifungal treatment.
* Other Neonatal Oral Cysts or Masses  
  Including ranula, mucocele, dermoid cyst, hemangioma, lymphangioma, and rare malignant tumors.

**EPIDEMIOLOGY**

* Epstein pearls are very common oral cysts in newborn infants, observed in approximately 60% to 85% of newborns worldwide. Some studies report prevalence as high as 92% in Japanese newborns, with slightly lower rates in other populations.
* They appear as small, whitish, keratin-filled cysts typically located along the midline of the hard palate and sometimes on the gums.
* The prevalence tends to be higher in term and preterm infants compared to post-term babies, with some studies showing a greater rate in infants born to multigravida mothers and those with higher birth weight and longer gestation.
* Maternal factors such as folic acid and iron intake during pregnancy have been associated with a higher prevalence of Epstein pearls.
* Epstein pearls are transient lesions that usually resolve spontaneously within the first few weeks to months of life without treatment.
* Geographic, racial, and nutritional factors may influence prevalence, with some studies noting differences between countries and ethnic groups

**PREDEFINED Q & A SETS**

### **Epstein pearls vs. Bohn’s nodules: What’s the difference?**

“Newborn gingival cysts” is an umbrella term that describes three distinct conditions. All these conditions refer to cysts that contain keratin. These cysts look so similar that many healthcare providers use the terms interchangeably. Location is the only thing that sets them apart.

The three types of newborn gingival cysts include:

* Epstein pearls: These bumps form along your baby’s gums or in the center of their palate (the roof of the mouth). Epstein pearls are the most common type of newborn gingival cyst. Experts believe that Epstein pearls form during fetal development when the roof of the mouth fuses.
* Bohn’s nodules: These bumps can form along the lip- or tongue-side of your baby’s gums. They’re more common on the upper jaw than the lower jaw. Experts think Bohn’s nodules are remnants of small salivary glands.
* Dental lamina cysts: These bumps form along your baby’s gums and often resemble unerupted baby teeth. Experts think these harmless cysts form from leftover fragments of dental lamina (specialized tissue that plays a role in tooth development).

### **Can you pop Epstein pearls?**

No, you should never try to squeeze or pop Epstein pearls. Doing so will only make your baby’s gums more tender and uncomfortable. Most importantly, bursting Epstein pearls can introduce harmful bacteria into your baby’s bloodstream. The best thing to do is leave them alone. They should go away on their own in time.

### **Can adults get Epstein pearls?**

No, adults don’t get Epstein pearls. But it’s possible to develop other types of bumps along your gum line. Any time you notice a new bump inside your mouth, let your healthcare provider know.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello! I see you have some concerns about the white bumps in your baby’s mouth. Can you tell me what you’ve noticed?

Parent: Yes, I saw these small white spots on the roof of my baby’s mouth and gums. They look a bit like teeth but I’m worried they might be something serious.

Doctor: What you’re describing sounds like Epstein pearls. These are very common, harmless cysts that appear in newborns. They look like tiny white or yellow bumps on the gums or the roof of the mouth.

Parent: Are they painful or dangerous? Will they affect my baby’s feeding or teeth?

Doctor: Epstein pearls are completely painless and don’t cause any problems with feeding or teething. They are caused by trapped skin cells during your baby’s development in the womb. The good news is they usually go away on their own within a few weeks to a few months.

Parent: Do they need any treatment? Should I try to remove them?

Doctor: No treatment is needed. It’s important not to try to pop or remove them yourself because that could cause irritation or infection. They naturally dissolve or rupture over time without any intervention.

Parent: When should I be concerned and come back for a check-up?

Doctor: If the bumps get larger, don’t go away after about three months, or if your baby seems to be in pain, has trouble feeding, or shows other symptoms like redness or swelling, please bring your baby back for an evaluation. Otherwise, no special care is needed.

Parent: Thank you, Doctor. That’s very reassuring.

Doctor: You’re welcome! Epstein pearls are very common and nothing to worry about. Just keep an eye on your baby’s overall health and feeding, and we’ll check them again during routine visits.

REFERENCES:

[Epstein Pearls Causes & Treatment](https://my.clevelandclinic.org/health/diseases/epstein-pearls#overview)

<https://www.ncbi.nlm.nih.gov/books/NBK493177/#article-21267.s10>

**Ethmoiditis**

ALTERNATIVE NAMES

* Ethmoidal sinusitis
* Ethmoid sinus infection
* Ethmoidal inflammation
* Sinusitis ethmoidalis (Latin term)
* Ethmoid sinusitis

**DEFINITION / DESCRIPTION**

The ethmoid sinuses are hollow spaces in the bones around the nose. They have a lining of mucus to help prevent the nose from drying out. Inflammation of the ethmoid sinuses can lead to pressure and pain around the nose and between the eyes.

In this article, we look at the causes, symptoms, and diagnosis of ethmoid sinusitis and when to see a doctor. We also discuss how to treat and prevent ethmoid sinusitis.

**CAUSES**

The mucous lining of the sinuses traps dust, germs, and pollutants. When the sinuses become inflamed, the mucus cannot flow normally. Tissue swelling traps mucus in the sinuses, which can allow germs to grow.

In ethmoid sinusitis, this inflammation affects the ethmoid sinuses. People have four groups of sinuses, each of which can become inflamed:

* frontal
* maxillary
* sphenoid
* ethmoid

The causes of ethmoid sinusitis will typically be similar to those of other forms of sinusitis. They may include

:

* a viral infection, including the common cold
* seasonal allergies
* smoking or secondhand smoke
* a weakened immune system
* the narrowing of the nasal passages due to nasal polyps

**SIGNS / SYMPTOMS**

A person with ethmoid sinusitis may experience many symptoms common to all sinus infections. According to the Centers for Disease Control and Prevention (CDC), these can include:

* a runny nose
* a blocked nose
* pain around the face
* a feeling of pressure around the face
* headaches
* mucus dripping down into the throat from the nose
* a sore throat
* a cough
* bad breath

In addition, they may experience symptoms specific to ethmoid sinusitis because of the position of these sinuses near the eyes. These symptoms include a swollen, red, or painful eye.

Sinusitis can either be acute, meaning that a person has it for only a short time, or chronic, where it lasts for more than 12 weeks, even with treatment.

**DIAGNOSIS METHODS**

When diagnosing ethmoid sinusitis, a doctor will ask the person how they have been feeling and carry out a physical examination to look for the characteristic signs and symptoms of sinusitis. These may include:

* congestion, obstruction, or blockage in and around the nose
* significant amounts of mucus in the nose
* facial pressure or pain

The doctor may also look into the person’s nose, throat, or ears for visible signs of inflammation. After this examination, if the doctor is not certain about the correct diagnosis, they may also insert a thin tube with a light and a camera on the end into the nose to examine the sinus tissues.

Occasionally, a doctor may recommend an X-ray or a CT scan to determine the likely cause of the person’s symptoms.

**TREATMENT OPTIONS**

According to the CDC, a person’s sinus infection will usually get better on its own. However, if a doctor suspects a bacterial infection, they may prescribe antibiotics.

The doctor may also prescribe:

* decongestants to help drain the sinuses
* antihistamines to reduce inflammation resulting from an allergic reaction
* nasal steroids to reduce inflammation in and around the nose
* saline nasal sprays, which increase moisture in the nose
* pain relievers, if a person’s sinusitis is causing a lot of pain

The CDC also note that home remedies may help some people. They recommend putting a warm compress over the affected area or breathing in steam from a bowl of hot water or a shower.

**PREVENTION TIPS**

People can often prevent sinus infections by taking steps to stay healthy and to help others stay healthy. These include:

* practicing good hand hygiene
* getting the recommended vaccines, such as the flu and pneumococcal vaccines
* avoiding contact with people who currently have an upper respiratory infection, including a cold
* avoiding smoke and secondhand smoke
* using a clean humidifier at home to add moisture to the air

**OUTLOOK / PROGNOSIS**

Most people should find that ethmoid sinusitis resolves on its own with some basic self-care and home remedies. If a doctor thinks that ethmoid sinusitis is due to a bacterial infection, they may prescribe antibiotics, which are usually very effective.

If nasal polyps or a problem with the structure of a person’s nasal passage is causing their ethmoid sinusitis, they may require surgery to reduce the likelihood of their ethmoid sinusitis recurrent.

People may wish to see their doctor for more information about the causes, treatment, and prevention of sinusitis, particularly if the condition is chronic.

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

As with other types of sinusitis, the most common cause of ethmoid sinusitis is a virus, such as the common cold. In these cases, it will often resolve without a person needing to see a doctor.

According to the CDC, a person should speak to a doctor if:

* they have very intense symptoms, such as severe pain in the face or a severe headache
* their symptoms get better but then get worse
* their symptoms do not get better over more than 10 days
* they have a fever for more than 3–4 days

**DIFFERENTIAL DIAGNOSIS**

* Acute Ethmoiditis (Ethmoid Sinusitis)  
  Infection/inflammation of the ethmoid sinuses causing pain between the eyes, nasal congestion, and sometimes eye swelling.
* Frontal Sinusitis  
  Infection of the frontal sinuses; pain localized to forehead.
* Maxillary Sinusitis  
  Infection of maxillary sinuses; pain in cheeks or upper teeth.
* Orbital Cellulitis  
  Infection of tissues around the eye causing eyelid swelling, redness, pain, proptosis, and vision changes; a serious complication of ethmoiditis.
* Periorbital Cellulitis  
  Infection of eyelid and skin around the eye without orbital involvement.
* Dacryocystitis  
  Infection of the lacrimal sac near the inner corner of the eye causing localized swelling and tenderness.
* Allergic Rhinitis  
  Nasal congestion and discharge due to allergies; no purulent nasal secretions or fever.
* Upper Respiratory Tract Infection (Viral Rhinitis)  
  Viral infection causing nasal congestion and clear nasal discharge.
* Nasal Polyps  
  Chronic nasal obstruction with pale mucosal growths visible on endoscopy.
* Dental Abscess or Periapical Abscess  
  Infection of upper teeth that can mimic sinus pain.
* Migraine or Tension Headache  
  Facial pain without nasal symptoms.
* Sinonasal Tumors or Masses  
  Rare causes of nasal obstruction or sinus symptoms.
* Gastroesophageal Reflux Disease (GERD)  
  Can cause chronic upper airway irritation mimicking sinus symptoms.

**EPIDEMIOLOGY**

* Ethmoiditis, or infection/inflammation of the ethmoid sinuses, is most commonly seen in children aged 2–3 years, but it can occur as early as 6 months and in older children beyond 5 years.
* Among all types of sinusitis, the ethmoid sinus is the most commonly involved in pediatric sinus infections, especially in younger children, due to the early development and pneumatization of ethmoid air cells.
* Acute ethmoiditis is a significant cause of orbital complications in children, accounting for up to 74–85% of sinusitis-related orbital infections.
* The prevalence of ethmoid sinus abnormalities on imaging varies:
  + In asymptomatic adults, incidental ethmoid sinus abnormalities are found in about 0.9% of brain CT scans.
  + In children, ethmoid sinus abnormalities on imaging may be more frequent (up to 35%), likely reflecting frequent upper respiratory infections.
* Chronic ethmoid sinusitis microbiology studies show that *Staphylococcus aureus* and Enterobacteriaceae are common pathogens, differing somewhat from other sinus infections where *Streptococcus pneumoniae* and *Haemophilus influenzae* are more frequent.
* Sinusitis overall affects about 11.6% of adults annually in the US, with acute bacterial rhinosinusitis accounting for a significant portion of antibiotic prescriptions. Although specific epidemiological data for ethmoiditis alone are limited, it is a common component of pediatric sinus infections.
* Ethmoiditis and sinusitis are more common in fall and winter months, coinciding with peaks in viral upper respiratory infection

**PREDEFINED Q & A SETS**

## What is Ethmoiditis?

Ethmoiditis is inflammation or infection of the ethmoid sinuses—small air cells located between the eyes and near the nasal bridge. It causes swelling and mucus buildup, leading to sinus blockage and infection.

## What causes Ethmoiditis?

Common causes include:

* Viral infections (like the common cold)
* Bacterial infections
* Allergies causing nasal congestion and inflammation
* Nasal polyps or anatomical abnormalities narrowing sinus drainage
* Smoking or exposure to irritants
* Weakened immune system

## What are the symptoms of Ethmoiditis?

* Pain or pressure between or behind the eyes
* Headache around the temples, forehead, or bridge of the nose
* Nasal congestion and thick nasal discharge
* Reduced or blurred vision in severe cases
* Ear fullness, dizziness, or tinnitus
* Postnasal drip causing throat irritation and cough
* Bad breath due to sinus drainage

## How is Ethmoiditis diagnosed?

* Clinical evaluation of symptoms and physical exam
* Nasal endoscopy to visualize sinus drainage areas
* Imaging such as CT scan if complications or chronic disease suspected

## How is Ethmoiditis treated?

* Rest, hydration, and nasal saline sprays
* Decongestants and pain relievers to relieve symptoms
* Antibiotics if bacterial infection is suspected or confirmed (usually after 7-10 days of symptoms)
* Allergy treatment if allergies contribute
* Surgery (sinus drainage or correction) in rare or chronic cases

## Can Ethmoiditis resolve on its own?

Yes, many cases caused by viruses improve with supportive care within 7-10 days. Antibiotics are reserved for bacterial infections or worsening symptoms.

## When should I see a doctor?

* If symptoms last more than 10 days or worsen after initial improvement
* Severe facial pain or swelling
* Vision changes or eye redness/swelling
* High fever or persistent headache
* Difficulty breathing or severe fatigue

## How can I prevent Ethmoiditis?

* Manage allergies and nasal congestion promptly
* Avoid smoking and irritants
* Practice good hygiene to reduce infections
* Stay hydrated and use humidifiers in dry environments

**DOCTOR-PATIENT CONVERSATIONS**

Patient: Good morning, doctor. I’ve been having pain between my eyes and a stuffy nose for a few days. It’s getting worse, and I feel pressure around my eyes.

Doctor: Good morning. That sounds uncomfortable. Do you have any fever or nasal discharge?

Patient: Yes, I have a mild fever and thick yellowish mucus coming from my nose.

Doctor: Based on your symptoms, you likely have inflammation or infection of the ethmoid sinuses, called ethmoiditis. It’s common in sinus infections. Have you had similar issues before?

Patient: No, this is the first time. I also notice some swelling near my eyes.

Doctor: Swelling near the eyes can sometimes indicate the infection is spreading to the tissues around the eye, which needs prompt attention. I will examine your nose and eyes carefully and may order a CT scan to check the sinuses and rule out complications.

Patient: What treatments will I need?

Doctor: If it’s a bacterial infection, we’ll start antibiotics. You can also use nasal saline sprays and decongestants to help with drainage. Pain relievers will help with discomfort. If there is any sign of orbital involvement, you may need hospitalization and possibly intravenous antibiotics.

Patient: How long will it take to get better?

Doctor: Most uncomplicated cases improve within 10 to 14 days with treatment. It’s important to complete the full course of antibiotics if prescribed. If symptoms worsen or you develop vision changes, severe pain, or swelling, come back immediately.

Patient: Can I do anything to prevent this in the future?

Doctor: Managing allergies, avoiding smoking, and treating colds promptly can reduce your risk. Keeping nasal passages moist with saline sprays also helps.

Patient: Thank you, doctor. I appreciate your help.

Doctor: You’re welcome. Let’s get started on your treatment and monitor your progress closely.

REFERENCES:

<https://emedicine.medscape.com/article/232670-differential>

<https://www.ncbi.nlm.nih.gov/medgen/3454>

**Esthesioneuroblastoma**

ALTERNATIVE NAMES

* Olfactory neuroblastoma
* Olfactory esthesio neuroepithelioma
* Olfactory neuroepithelioma
* Neuroblastoma of the nasal cavity
* Esthesio Neuroepithelioma

**DEFINITION / DESCRIPTION**

Esthesioneuroblastoma (es-THEE-zee-oh-NOOR-oh-blas-TOH-muh) is a rare type of head and neck cancer. Healthcare providers may call it olfactory neuroblastoma. In esthesioneuroblastoma, you have cancerous tumors in your nasal cavities, which are hollow areas inside your nose. The tumors affect nerves and tissues that are responsible for your sense of smell.

This condition mostly affects adults, but it can affect children and adolescents. Healthcare providers treat it with surgery to remove the tumor, followed by radiation therapy. Esthesioneuroblastoma may grow back (recur), so healthcare providers recommend people have regular checkups to confirm it hasn’t come back.

It’s rare, affecting about 1 in 2.5 million people worldwide each year. Most people are in their 50s to 70s when they receive their diagnosis, but it can affect children and teenagers. Esthesioneuroblastoma is the most common cancer of the nasal cavity in children and adolescents.

**CAUSES**

Experts haven't found the exact cause of esthesioneuroblastoma. In general, cancer happens when cells get changes in their DNA. A cell's DNA holds the instructions that tell a cell what to do. The changes tell the cells to make many more cells quickly. The changes give the cells the ability to keep living when healthy cells would naturally die. This causes too many cells.

The cells might form a mass called a tumor. The tumor can grow to invade and destroy healthy body tissue. In time, cells can break away and spread to other parts of the body.

**RISK FACTORS**

Healthcare professionals haven't found many risk factors for esthesioneuroblastoma. This cancer can happen at any age. But it's more common in adults.

**SIGNS / SYMPTOMS**

Esthesioneuroblastoma symptoms include:

* Loss of the sense of smell.
* Frequent nosebleeds.
* Difficulty breathing through the nose.

As the cancer grows, it might cause eye pain, loss of vision, ear pain and headaches.

**DIAGNOSIS METHODS**

An esthesioneuroblastoma diagnosis might involve:

* **Physical exam.** A member of your healthcare team may take a history of your symptoms and look at your eyes, nose, and head and neck.
* **Endoscopic exam.** A healthcare professional may put a thin, flexible tube, known as an endoscope, into the nose. The tube has a camera attached that allows the healthcare professional to look at the cancer and see how large it is.
* **Imaging tests.** Imaging tests take pictures of the inside of the body. They can show the size of the cancer, exactly where it is and whether it has spread. Imaging tests might include magnetic resonance imaging (MRI) scans, computerized tomography (CT) scans and positron emission tomography (PET) scans.
* **Removing a sample of tissue for testing, also called a biopsy.** A biopsy is a procedure to remove a sample of tissue for testing in a lab. A biopsy might be done by putting a special tool into the nose to remove a small piece of the cancer. This procedure can often be done in a healthcare professional's office.

Diagnosing esthesioneuroblastoma can be hard. It's rare, and it can look like other cancers that occur in the head, neck or nose. Testing can show if the cancer is esthesioneuroblastoma and it can give other information about the cancer that will help in making a treatment

**TREATMENT OPTIONS**

Esthesioneuroblastoma treatment usually involves surgery to remove the cancer. Other treatments include radiation and chemotherapy.

Treatment for esthesioneuroblastoma usually involves a team of experts with different specialties. The team might include:

* Surgeons who operate on the nervous system, known as neurosurgeons.
* Head and neck surgeons.
* Doctors who use radiation to treat cancer, known as radiation oncologists.
* Doctors who use medicine to treat cancer, known as medical oncologists.

If the person with esthesioneuroblastoma is a child, the team also might include specialists in pediatric surgery and oncology.

### **Surgery**

The type of surgery depends on where the tumor is and how large it is. Surgery might involve:

* **Removing the part of the tumor that's in the nose.** This is usually done using a thin, flexible tube, known as an endoscope. The tube has a camera that lets the surgeon see the cancer. Special surgical tools passed through the endoscope help with removing the cancer and nearby tissue.
* **Opening the skull to get to the tumor, known as a craniotomy.** This procedure involves removing a small piece of skull. That allows the surgeon to remove the tumor from the brain.

Surgery complications might include spinal fluid leaking into the nose, infection and vision problems.

### **Radiation therapy**

Radiation therapy uses powerful energy beams to kill cancer cells. The energy can come from X-rays, protons or other sources. People with esthesioneuroblastoma often have radiation therapy after surgery to kill any cancer cells that might remain in the head and neck.

If surgery isn't possible, radiation therapy can be used alone or with chemotherapy.

### **Chemotherapy**

Chemotherapy uses strong medicines to kill cancer cells. In people with esthesioneuroblastoma, chemotherapy might be used with radiation therapy after surgery to kill cancer cells that remain.

#### **recover from surgery for esthesioneuroblastoma surgery**

That depends on the type of surgery that you have, but people remain in the hospital for two to five days before continuing to recover at home. It may be one to two months before they receive radiation therapy.

#### **What are the treatment side effects?**

Surgery, radiation therapy and chemotherapy have different side effects:

* Surgery side effects include pain, nasal stuffiness and reaction to anesthesia.
* Common chemotherapy and radiation side effects may include fatigue, diarrhea, nausea and vomiting.

#### **What are treatment complications?**

Surgery complications may include:

* Infection.
* Excessive bleeding.
* Permanent loss of smell. There’s a close connection between your sense of smell and your sense of taste, so you may also lose your sense of taste.
* Cerebrospinal fluid (CSF) leak.
* Drainage in your nose that may feel crusty and dry.

**Alternative medicine**

No alternative medicine treatments can cure esthesioneuroblastoma. But complementary and alternative medicine therapies may help with the side effects of treatment. Talk with your healthcare team about your options.

Therapies that might help during cancer treatment include:

* Acupuncture.
* Aromatherapy.
* Hypnosis.
* Massage.
* Music therapy.
* Relaxation techniques.
* Tai chi.
* Yoga

#### **stages of esthesioneuroblastoma**

Healthcare providers use cancer staging systems to plan treatment and a prognosis. Esthesioneuroblastoma stages are:

* Stage A: Cancerous cells develop into a tumor in your nasal cavity.
* Stage B: The tumor spreads directly from your nasal cavity to your nasal sinuses.
* Stage C: The tumor spreads directly from your nasal cavity and sinuses towards your eyes or your brain.
* Stage D: Tests show signs that cancerous tumors have spread to other areas of your body, such as the lymph nodes in your neck, your bone marrow or your lungs.

**OUTLOOK / PROGNOSIS**

Your prognosis (outlook) is your provider’s estimate of how a disease will affect you after treatment. Every person is different, and prognosis will depend on several factors, like:

* Where the tumor is in your body.
* If the cancer has spread to other parts of your body.
* How much of the tumor was taken out during surgery.
* Results of lab analysis that show tumor cell features.

If you have questions about your prognosis, talk to your surgeon and other people on your care team. They know you and your situation and are your best source of information.

#### **Prognosis for esthesioneuroblastoma in children**

Like adults, the prognosis depends on children’s specific situation, including factors like tumor location, specific tumor cell features, whether the tumor has spread and how much of the tumor was removed during surgery.

#### **Survival rate of esthesioneuroblastoma**

Healthcare providers estimate survival rates by looking at the experiences of people who have the condition. In this case, 50% to 90% of people with this condition were alive five years after diagnosis.

It can be confusing and stressful to try to figure out what survival rate data means. Here’s the thing about survival rates: they’re estimates based on other people’s experiences. What was true for them may not be true for you. If you have questions, don’t hesitate to talk to your provider. They’ll explain survival rate estimates and how those estimates factor into your situation.

#### **Is esthesioneuroblastoma fatal?**

It can be. Esthesioneuroblastoma can spread into your lungs or other areas of your body. It can come back after treatment and develop in other areas. Metastatic or recurrent esthesioneuroblastoma that goes undetected could be life-threatening. That’s why regular checkups are important so your provider can do imaging and other tests that may detect cancer early on.

**POSSIBLE COMPLICATIONS**

Complications of esthesioneuroblastoma may include:

* **Cancer that grows into nearby organs and tissues.** Esthesioneuroblastoma can grow and get into the sinuses, eyes and brain.
* **Spread of the cancer, known as metastasis.** Esthesioneuroblastoma can spread to other parts of the body, such as the lymph nodes, bone marrow, lungs, liver, skin and bones.

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

Make an appointment with your healthcare team if you have lasting symptoms that worry you.

## **Diagnostic Considerations**

Other problems to be considered in the differential diagnosis of esthesioneuroblastoma include the following:

* Nasal and paranasal squamous cell carcinoma
* Sinonasal polyposis
* Choanal polyp
* Juvenile angiofibroma
* Neuroendocrine carcinoma
* Embryonal rhabdomyosarcoma
* Undifferentiated sinonasal carcinoma
* Ewing sarcoma

Ectopic esthesioneuroblastomas originating from areas outside the upper nasal cavity have been reported.These tumors can be misdiagnosed as pituitary macroadenomas.

## **Differential Diagnoses**

* Solitary Plasmacytoma
* Malignant Melanoma
* Metastatic Cancer With Unknown Primary Site
* Non-Hodgkin Lymphoma (NHL)

**Malignant neoplasms:**

* Extramedullary plasmacytoma
* Extraosseous Ewing sarcoma/Primitive neuroectodermal tumor (PNET)
* Mesenchymal chondrosarcoma
* Natural killer/T-cell lymphoma
* Rhabdomyosarcoma
* Sinonasal malignant melanoma
* Sinonasal neuroendocrine carcinoma
* Sinonasal undifferentiated carcinoma
* Small cell osteosarcoma
* Small cell undifferentiated (neuroendocrine) carcinoma
* Synovial sarcoma
* Undifferentiated (lymphoepithelioma like) carcinoma

**EPIDEMIOLOGY**

### Frequency

Interestingly, 80% of the esthesioneuroblastoma (ENB) cases published in the literature since Berger and Luc described the first case in 1924 have been identified in the last few decades.However, the current data set cannot distinguish between a rising incidence and better recognition of the disease.

ENB has an estimated incidence of 4 cases per 10 million individuals and accounts for approximately 5% of all sinonasal tumors. A search of the National Cancer Database by Carey et al identified 1225 cases of ENB.Similar incidence rates have been obtained through epidemiologic studies performed in Denmark.No studies suggest a geographic variation in rates.

### Race-, sex-, and age-related demographics

ENB does not show a predilection toward any individual race. ENB does not show familial prevalence and has been reported in all races and on all continents. ENB affects males and females with similar frequency.

ENB occurs in a wide range of age groups (3-90 y). It has a bimodal peak of occurrence in the third and sixth decades of life.

**STAGING**

The TNM classification is as follows:

* T1 - Tumor involving the nasal cavity and/or paranasal sinuses (excluding sphenoid), sparing the most superior ethmoidal cells
* T2 - Tumor involving the nasal cavity and/or paranasal sinuses (including the sphenoid), with extension to or erosion of the cribriform plate
* T3 - Tumor extending into the orbit or protruding into the anterior cranial fossa, without dural invasion.
* T4 - Tumor involving the brain
* N0 - No cervical lymph node metastasis
* N1 - Any form of cervical lymph node metastasis
* M0 - No metastasis
* M1 - Distant metastases present

A TNM-based staging system proposed by Sun et aldivides the T component into the following four categories:

* T1 - Tumor limited to the nasal cavity and/or ethmoid sinus (excluding the cribriform plate)
* T2 - Tumor involving the nasal cavity and/or paranasal sinuses with extension to or erosion of the cribriform plate, pterygoid process and/or lamina papyracea
* T3 - Tumor extending to invade the orbit, anterior orbital contents, hard palate, nasopharynx, or clivus
* T4 - Local advanced disease with invasion of any of the following: orbital apex, dura, brain, or cranial nerves.

The N component is divided into the following three categories:

* N0 - No regional lymph node metastasis
* N1 - Metastasis in unilateral or bilateral lymph nodes, ≤6 cm in greatest dimension, above the supraclavicular fossa
* N2 - Lymph node metastasis > 6 cm in dimension or extension to the supraclavicular fossa

Staging is shown in the table below.

Table. Stage Grouping for Esthesioneuroblastoma

| Stage | T | N | M |
| --- | --- | --- | --- |
| I | T1 | N0 | M0 |
| II | T2 | N0 | M0 |
| IIIA | T3 | N0 | M0 |
| T1-3 | N1 | M0 |
| IIIB | T4 | N0-1 | M0 |
| IVA | T1-4 | N2 | M0 |
| IVB | T1-4 | N2 | M1 |

The 5-year overall survival in this system by stage is as follows:

* Stage I - 100%
* Stage II - 89%
* Stage IIIA - 78%
* Stage IIIB - 60%
* Stage IVA - 0%
* Stage IVB - 0%

**Esthesioneuroblastoma Procedures and Their Timeline**

## 1. Initial Evaluation and Diagnosis

* Imaging (CT, MRI) and biopsy to confirm diagnosis and stage the tumor.
* Multidisciplinary team planning involving ENT surgeons, neurosurgeons, oncologists, and radiation specialists.

## 2. Surgery

* Goal: Complete removal of the tumor with clear margins.
* Approaches include endoscopic resection or open craniofacial resection (sometimes requiring craniotomy).
* Surgery is usually the first step in treatment for resectable tumors (Kadish stages A and B).
* For advanced tumors (stage C or D), surgery may follow neoadjuvant therapy.
* Postoperative recovery typically takes several weeks depending on extent.

## 3. Adjuvant Radiation Therapy

* Usually starts 4 to 6 weeks after surgery to allow healing.
* External beam radiation therapy (EBRT), including advanced techniques like proton therapy, targets residual microscopic disease.
* Duration: Typically 5 to 7 weeks of daily treatments.
* Radiation improves local control and reduces recurrence risk.

## 4. Chemotherapy

* Used mainly for advanced (stage C or D) or metastatic disease, or when surgery is not feasible.
* May be given before surgery (neoadjuvant) to shrink tumor or after surgery (adjuvant) to treat residual disease.
* Common regimens include cisplatin and etoposide, given in cycles every 3 to 4 weeks.
* Number of cycles varies, often 4 to 6 cycles.
* Chemotherapy can also be combined concurrently with radiation in some cases.

## 5. Follow-Up and Surveillance

* Regular follow-up with physical exams and imaging (MRI preferred).
* Typically every 3 to 6 months for the first 2 years, then yearly thereafter.
* Long-term surveillance is important due to risk of late recurrence.

**PREDEFINED Q & A SETS**

## 1. How large is the tumor in my nasal cavity?

The size of esthesioneuroblastoma tumors varies widely—from under 1 cm to large masses filling the nasal cavity and extending into nearby sinuses or brain areas. Imaging studies like CT and MRI are essential to determine the exact size and extent of your tumor.

## 2. Will I need surgery?

Yes, surgery is usually necessary for long-term cure. Most patients undergo surgical removal of the tumor, often combined with other treatments like radiation or chemotherapy.

## 3. What kind of surgery will I need?

* The most common approach is craniofacial resection, which involves incisions on the face near the nose and on the scalp to remove the tumor from both the nasal cavity and any intracranial extension.
* A less invasive endoscopic approach through the nostrils may be possible for smaller tumors limited to the nasal cavity, sometimes combined with a small scalp incision if the tumor extends into the brain.
* Your surgical team, including head and neck surgeons and neurosurgeons, will tailor the approach based on tumor size, location, and involvement of surrounding structures.

## 4. If I have surgery, will my sense of smell ever come back?

Because esthesioneuroblastoma arises from the olfactory nerve cells responsible for smell, loss of smell is common and may be permanent after surgery, especially with extensive tumor removal. Some patients may retain partial smell if the tumor and surgery are limited, but many experience anosmia (loss of smell).

## 5. What are alternatives for surgery?

* Radiation therapy alone is sometimes used, especially if surgery is not feasible, but it generally has lower success rates compared to surgery combined with radiation.
* Chemotherapy may be used for advanced disease or to shrink tumors before surgery.
* In some cases, a combination of chemotherapy and radiation is considered when surgery is not an option.
* Common Genetic Alterations:
  + The most frequently mutated gene is TP53 (found in about 17% of cases), a tumor suppressor involved in cell cycle regulation and apoptosis.
  + Other recurrent alterations occur in genes such as PIK3CA, NF1, CDKN2A, CDKN2C, which are involved in cell growth, signaling, and tumor suppression.
  + Mutations affecting the PI3K/AKT/mTOR pathway are common (about 27% of tumors), highlighting this pathway as a potential therapeutic target.
* Copy Number Alterations and Amplifications:
  + Amplifications on chromosome 5q involving genes like FLT4, PDGFRB, FGFR4, RICTOR, and FGF10 have been observed in some tumors.
  + Other amplifications include regions on chromosome 20q, affecting genes such as ZNF217, AURKA, SRC, and TOP1.
  + These amplifications may drive tumor growth and represent additional therapeutic targets.
* Other Molecular Findings:
  + Mutations in genes related to chromatin remodeling, transcriptional regulation, DNA repair (e.g., MLH3), and cell adhesion have been identified.
  + Some tumors harbor mutations in the PTCH1 gene, part of the sonic hedgehog (SHH) signaling pathway, which may influence tumor behavior and response to targeted therapies.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you have some concerns about the diagnosis of esthesioneuroblastoma. It’s a rare tumor that arises from nerve cells in the upper part of your nasal cavity.

Patient: Yes, I’ve never heard of this before. How serious is it?

Doctor: It is a malignant tumor, but the outlook depends on the size, location, and how far it has spread. We use imaging like CT and MRI to determine the exact size and extent of the tumor.

Patient: What treatment options do I have? Will I need surgery?

Doctor: Surgery is usually the main treatment. For smaller tumors, we might be able to remove it through less invasive endoscopic surgery via your nose. For larger or more advanced tumors, a craniofacial resection, which involves surgery through the face and skull base, may be necessary.

Patient: That sounds intense. Will I lose my sense of smell?

Doctor: Since the tumor arises from the olfactory nerve cells, loss of smell is common and may be permanent, especially with extensive surgery. Some patients retain partial smell if the tumor and surgery are limited.

Patient: Are there alternatives to surgery?

Doctor: Radiation therapy and chemotherapy can be used, especially if surgery isn’t possible or as additional treatments after surgery. Sometimes chemotherapy is given before surgery to shrink the tumor.

Patient: What should I expect after treatment?

Doctor: Recovery varies depending on the treatment type. You’ll have regular follow-ups with imaging to monitor for recurrence. Some patients experience side effects like changes in taste or smell, and we’ll support you through rehabilitation if needed.

Patient: Thank you for explaining. What symptoms should I watch for?

Doctor: If you notice worsening nasal obstruction, nosebleeds, facial pain, vision changes, or neurological symptoms, let us know immediately. Early detection of any recurrence or complications is important.

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**ESOPHAGITIS**

ALTERNATIVE NAMES

* Inflammation of the esophagus
* Esophageal inflammation
* Reflux esophagitis
* Erosive esophagitis
* Infectious esophagitis
* Allergic esophagitis or Eosinophilic esophagitis

**DEFINITION / DESCRIPTION**

Esophagitis is swelling and irritation, called inflammation, of the tissues that line the esophagus. The esophagus is the muscular tube that carries food and drink from the mouth to the stomach.

Esophagitis (uh-sof-uh-JIE-tis) can cause painful, difficult swallowing. It also can lead to chest pain. Various things can cause esophagitis. Some common causes include stomach acids backing up into the esophagus, infection, medicines taken by mouth and allergies.

Treatment for esophagitis depends on its exact cause and how badly the tissue that lines the esophagus is damaged. Without treatment, esophagitis can damage this lining. The esophagus may start to have trouble moving food and liquid from the mouth to the stomach. Esophagitis also can lead to other serious health issues. These include scarring or narrowing of the esophagus, unhealthy weight loss, and dehydration.

**CAUSES**

Healthcare professionals tend to label esophagitis by the condition that causes it. Sometimes, esophagitis may have more than one cause. Some of the most common types include the following:

### **Reflux esophagitis**

A valve called the lower esophageal sphincter usually keeps stomach acid out of the esophagus. But sometimes this valve doesn't close properly. Or it opens when it shouldn't. In some people, the upper part of the stomach bulges through the large muscle that separates the stomach and the chest. This is known as a hiatal hernia. It also can cause stomach acid to back up into the esophagus.

Gastroesophageal reflux disease (GERD) is a condition in which this backflow of acid is a frequent or ongoing problem. GERD can lead to ongoing swelling and tissue damage in the esophagus.

### **Eosinophilic esophagitis**

Eosinophils (e-o-SIN-o-fils) are white blood cells that play a key role in allergic reactions. Eosinophilic esophagitis can happen if lots of these white blood cells build up in the esophagus. This most likely happens in response to a substance that causes an allergy, acid reflux or both.

Certain foods may trigger this type of esophagitis, including:

* Milk.
* Eggs.
* Wheat.
* Soy.
* Peanuts.
* Seafood.

Typical allergy testing often is not able to spot these foods as being triggers.

People with eosinophilic esophagitis may have other allergies that aren't caused by food. For example, sometimes allergens in the air, such as pollen, may be the cause. One common symptom of eosinophilic esophagitis is food getting stuck in the esophagus after swallowing. This is called food impaction. Another common symptom is trouble swallowing, also called dysphagia.

### **Lymphocytic esophagitis**

Lymphocytic esophagitis (LE) isn't a common condition of the esophagus. With LE, a higher than typical number of white blood cells called lymphocytes build up in the lining of the esophagus. LE may be related to eosinophilic esophagitis or to GERD.

### **Medicine-induced esophagitis**

Also called drug-induced esophagitis, this type happens when some medicines taken by mouth cause tissue damage in the esophagus. The damage happens if the medicines stay in contact with the lining of the esophagus for too long. For example, you might swallow a pill with little or no water. If you do that, the pill itself or residue from the pill may stay in the esophagus. Medicines that have been linked to esophagitis include:

* Pain-relieving medicines such as aspirin, ibuprofen (Advil, Motrin IB, others) and naproxen sodium (Aleve).
* Antibiotics such as tetracycline and doxycycline.
* Medicine called potassium chloride is used to treat low levels of the mineral potassium.
* Medicines called bisphosphonates that treat bone conditions such as osteoporosis. These medicines include alendronate (Binosto, Fosamax).
* A treatment for heart conditions called quinidine.

### **Infectious esophagitis**

An infection in tissues of the esophagus may cause esophagitis. The infection could be due to bacteria, viruses or funguses. Infectious esophagitis is fairly rare. It happens most often in people with weakened immune systems, such as people with HIV/AIDS or cancer.

A fungus usually present in the mouth called Candida albicans is a common cause of infectious esophagitis. This type of fungal infection often is linked with a weakened immune system, diabetes, cancer, or use of steroid or antibiotic medicines.

**RISK FACTORS**

Risk factors for esophagitis vary depending on the cause of the condition.

### **Reflux esophagitis**

Factors that raise the risk of gastroesophageal reflux disease (GERD) also are factors in reflux esophagitis. These risk factors include the following:

* Eating right before going to bed.
* Eating meals that are too large and fatty.
* Smoking.
* Gaining extra weight, including from pregnancy.

Foods that can make symptoms of GERD or reflux esophagitis worse include:

* Caffeine.
* Alcohol.
* Fatty foods.
* Chocolate.
* Peppermint.

### **Eosinophilic esophagitis**

Risk factors for this allergy-related esophagitis may include:

* A history of certain allergic reactions. These include asthma, atopic dermatitis and allergic rhinitis, also known as hay fever.
* A family history of eosinophilic esophagitis.

### **Medicine-induced esophagitis**

Risk factors for this type of esophagitis often are linked with issues that prevent quick and complete passage of a pill into the stomach. These factors include:

* Swallowing a pill with little or no water.
* Taking medicines while lying down.
* Taking medicines right before sleep. This risk factor likely is due in part to less saliva being made and less swallowing happening during sleep.
* Being older in age. This may be a factor because of age-related changes to the muscles of the esophagus or to glands making less saliva.
* Taking large or oddly shaped pills.

### **Infectious esophagitis**

Risk factors for infectious esophagitis often relate to medicines such as steroids or antibiotics. People with diabetes also have a higher risk of esophagitis caused by a fungal candida infection in particular.

Other causes of infectious esophagitis may relate to poor immune system function. This may be due to an immune system condition, such as HIV/AIDS, or certain cancers. Also, certain cancer treatments may raise the risk of infectious esophagitis. So might medicines called immunosuppressants that block immune system reactions to transplanted organs.

**SIGNS / SYMPTOMS**

Common symptoms of esophagitis include:

* Trouble swallowing.
* Painful swallowing.
* Swallowed food becoming stuck in the esophagus, also known as food impaction.
* Burning pain in the chest called heartburn. It's common to feel this pain behind the breastbone while eating.
* Stomach acid that backs up into the esophagus, also called acid reflux.

Babies and some children with esophagitis are too young to explain their discomfort or pain. Their symptoms can include:

* Feeding troubles, such as getting easily upset, arching of the back and not wanting to eat.
* Failure to thrive.
* Chest or belly pain in older children.

**DIAGNOSIS METHODS**

Diagnosis involves the steps that your healthcare professional takes to find out if you have esophagitis. Your main healthcare professional or a specialist asks you about your symptoms and gives you a physical exam. You also may need one or more tests. These tests may include the following:

### **Endoscopy**

Endoscopy is a test that's used to check the digestive system. A healthcare professional guides a long, thin tube equipped with a tiny camera down the throat and into the esophagus. This tool is called an endoscope. Your healthcare professional can use an endoscope to see if the esophagus looks different than usual. Small tissue samples may be taken for testing. This is called a biopsy. The esophagus may look different depending on the cause of the swelling, such as medicine-induced or reflux esophagitis. Before this test, you receive medicine that helps you relax.

### **Esophageal capsule**

This test can be done in the healthcare professional's office. It involves swallowing a capsule attached to a string. The capsule dissolves in the stomach and releases a sponge. The healthcare professional pulls the sponge out of the mouth with the string. As the sponge is pulled out, it samples the tissues of the esophagus. This may help your healthcare professional figure out how inflamed your esophagus is without doing an endoscopy.

### **Barium X-ray**

This test involves drinking a solution or taking a pill that contains a compound called barium. Barium coats the lining of the esophagus and the stomach so that they show up on images taken. The images can help healthcare professionals find narrowing of the esophagus and other changes in structure. The images also can help spot a hiatal hernia, tumors or other conditions that may be causing symptoms.

### **Laboratory tests**

Small tissue samples removed during an endoscopic exam are sent to the lab for testing. Depending on the suspected cause of the condition, tests may be used to:

* Diagnose an infection caused by a bacterium, a virus or a fungus.
* Find out if allergy-related white blood cells called eosinophils have built up in the esophagus.
* Spot cells that aren't regular. Such cells may be clues of esophageal cancer or changes that raise the risk of cancer.

**TREATMENT OPTIONS**

Treatments for esophagitis are intended to lessen symptoms, manage complications and treat the causes of the condition. Treatment methods vary based on the cause of esophagitis.

### **Reflux esophagitis**

Treatment for reflux esophagitis may include:

* **Medicines available without a prescription.** These include antacids (Maalox, Mylanta, others); medicines called H-2-receptor blockers that lower stomach acid, such as cimetidine (Tagamet HB); and medicines called proton pump inhibitors that block stomach acid and heal the esophagus, such as lansoprazole (Prevacid 24 HR) and omeprazole (Prilosec OTC), among others.
* **Prescription medicines.** These include prescription-strength H-2-receptor blockers and proton pump inhibitors.
* **Surgery.** A type of surgery called fundoplication may improve the condition of the esophagus if other treatments don't work. The surgeon wraps a portion of the stomach around the valve that separates the esophagus and stomach. This valve is called the lower esophageal sphincter. This surgery can strengthen the sphincter and prevent acid from backing up into the esophagus.

### **Eosinophilic esophagitis**

Treatment for eosinophilic esophagitis involves staying away from the allergen that trigger symptoms. Treatment also involves easing the allergic reaction with medicines. Medicines may include:

* **Proton pump inhibitors.** Your healthcare professional likely will first prescribe a proton pump inhibitor. You might take one such as esomeprazole (Nexium), lansoprazole (Prevacid), omeprazole (Prilosec) or pantoprazole (Protonix).
* **Steroids.** Some studies show that swallowed steroids may act on the surface tissue of the esophagus to treat eosinophilic esophagitis. One steroid called budesonide (Eohilia) comes in a liquid form. Another steroid called fluticasone is sprayed into the mouth and then swallowed.  
  Your healthcare professional can tell you how to swallow the steroid solution so that it coats your esophagus. Swallowing a steroid solution is much less likely to cause serious side effects compared with taking steroid pills by mouth.
* **Elimination and elemental diets.** A reaction to a food allergen is likely the cause of eosinophilic esophagitis. So it may help to stop eating the food that seems to cause the allergy.  
  Standard allergy tests can't tell you for sure if you're allergic to a certain food. For that reason, your healthcare professional may recommend that you remove common food allergens from your diet. Then you can slowly add foods back into your diet and note when symptoms come back. This is known as an elimination diet. It needs to be done with guidance from your healthcare professional.  
  A more restrictive method is to remove all food from your diet for a time. Your healthcare professional replaces food with an amino acid-based formula. Over time, you slowly get back to eating food. This is called an elemental diet. It also must be done under the watch of a healthcare professional.
* **Monoclonal antibodies.** This type of medicine works to block the action of certain proteins in the body that cause inflammation. A monoclonal antibody called dupilumab (Dupixent) may be a treatment option for people age 12 and older with eosinophilic esophagitis. Dupilumab is given as an injection every week or every two weeks depending on your weight.

### **Medicine-induced esophagitis**

Treatment for medicine-induced esophagitis involves not using the problem medicine when possible. It also involves lowering the risk of this condition with proper pill-taking habits. Your healthcare professional may recommend:

* Taking a different medicine that is less likely to cause medicine-induced esophagitis.
* Taking a liquid version of a medicine if possible.
* Sitting or standing for at least 30 minutes after taking a pill.
* Drinking an entire glass of water with a pill. But this option isn't right for everyone. For instance, some people need to drink less fluid because of another condition, such as kidney disease.

### **Infectious esophagitis**

Your healthcare professional may prescribe medicine to treat an infection that causes infectious esophagitis. Medicines can help clear up infections from viruses, bacteria or fungi.

### **Treating common complications**

A doctor called a gastroenterologist who treats digestive conditions may use medical tools to expand the esophagus. This treatment is called esophageal dilation. It tends to be used only if the esophagus becomes very narrow or if food becomes stuck in the esophagus.

During esophageal dilation, your healthcare professional guides small narrow tubes through the esophagus. Versions of these devices may be equipped with:

* A tapered tip that starts with a rounded point that gradually widens.
* A balloon that can be expanded after it's placed in the esophagus.

**Lifestyle and home remedies**

Depending on the type of esophagitis you have, you may lessen symptoms or stop recurring problems by following these steps:

* **Do not eat foods that may make reflux worse.** Consuming large amounts of certain foods or drinks may make symptoms of acid reflux worse. These can include alcohol, drinks with caffeine, chocolate and mint-flavored foods.
* **Use proper pill-taking habits.** Take a pill with plenty of water and before eating a meal. Don't lie down for at least 30 minutes after taking a pill.
* **Lose extra weight.** Talk with your healthcare professional about a diet and exercise routine to help you lose weight and stay at a healthy weight.
* **If you smoke, quit.** You can ask your healthcare professional to help you end a smoking habit.
* **Try not to stoop or bend,** especially soon after eating.
* **Do not lie down after eating.** Wait at least three hours after eating to lie down or go to bed.
* **Raise the head of your bed.** Place wooden blocks under your bed to raise the head. Aim to raise it 6 to 8 inches (15 to 20 centimeters). If it's not possible to elevate your bed, place a wedge between your mattress and box spring. This raises your body from the waist up. Raising your head by using only pillows doesn't work.

**Alternative medicine**

No complementary or alternative medicines are proved to treat esophagitis. Still, some of these treatments may help ease heartburn or reflux symptoms. Options may include ginger, chamomile and slippery elm. But supplements such as these do not replace the treatment that your healthcare professional recommends. Talk with your healthcare professional before you try any alternative treatment for GERD.

**OUTLOOK / PROGNOSIS**

It depends on how easily the cause can be addressed. Some persistent cases may take some trial and error with different medications before landing on the right treatment. Once the right treatment begins, healing usually begins immediately. But it may take three to six weeks for esophagitis to heal completely. If the cause is a chronic condition, you may need long-term therapy to manage it.

**POSSIBLE COMPLICATIONS**

Without treatment, esophagitis can lead to changes in the structure of the esophagus. Complications can include:

* Scarring or narrowing of the esophagus, known as a stricture.
* Tearing of the lining of the esophagus. This can be due to retching or to healthcare professionals passing medical tools through an inflamed esophagus during endoscopy. Endoscopy is a way for healthcare professionals to check the digestive system.
* A condition called Barrett esophagus in which the cells lining the esophagus are damaged from acid reflux. This raises the risk of cancer that starts in the esophagus, also called esophageal cancer.

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

Most symptoms of esophagitis can be caused by a few different conditions that affect the digestive system. See your healthcare professional if the symptoms:

* Last more than a few days.
* Don't get better after using medicines called antacids that are available without a prescription.
* Are bad enough to make it hard for you to eat or cause you to lose weight.
* Happen along with flu symptoms such as headache, fever and muscle aches.

Get emergency care if you:

* Have pain in your chest that lasts more than a few minutes.
* Think you have food stuck in your esophagus.
* Have a history of heart disease and feel chest pain.
* Feel pain in your mouth or throat when you eat.
* Have shortness of breath or chest pain that happens soon after eating.
* Vomit large amounts, often have forceful vomiting or have trouble breathing after vomiting.
* Notice that your vomit is yellow or green, looks like coffee grounds, or has blood in it.

## **Diagnostic Considerations**

Always consider the possibility of a systemic illness causing the esophageal manifestations (eg, acquired immunodeficiency syndrome [AIDS], scleroderma, systemic lupus erythematosus (SLE), pemphigus). Always consider cardiac causes of chest discomfort and treat appropriately. If the diagnosis is unclear, admission for further evaluation is suggested. Do not misdiagnose cardiac chest pain as esophageal pain. Pain can be similar, particularly in elderly patients and women.

Conditions that may mimic symptoms of esophagitis include the following:

* Coronary artery disease
* Pericarditis
* Aortic aneurysm
* Non Ulcer reflux disease
* Functional dyspepsia
* Stricture

## **Diagnosis of Candida esophagitis**

Glycogenic acanthosis, reflux esophagitis, herpes esophagitis, and superficial spreading carcinoma may produce findings similar to those seen in *Candida* esophagitis. However, patients with glycogenic acanthosis are almost always older individuals who have no esophageal symptoms, and the mucosal nodules of glycogenic acanthosis tend to have a more rounded appearance, whereas the plaques of candidiasis are more linear.

Reflux esophagitis may also manifest as a nodular mucosa, but the nodules tend to be more poorly defined than those in candidiasis, and they are always contiguous with the gastroesophageal junction.

Occasionally, herpes esophagitis manifests as multiple plaquelike lesions in the esophagus, but this infection is more commonly associated with small superficial ulcers (see below). Superficial spreading carcinoma may also manifest as a nodular mucosa, but the nodules tend to have poorly defined borders, producing a confluent area of disease.

Undissolved effervescent particles and debris in the esophagus can be mistaken for the plaques of candidiasis. Thus, if infectious esophagitis is suggested clinically, a double-contrast study should initially be performed without the use of effervescent granules.

## **Diagnosis of herpes esophagitis**

In the appropriate clinical setting, discrete superficial ulcers in the upper or mid esophagus without associated plaques should be highly suggestive of herpes esophagitis. In contrast, ulceration in *Candida* esophagitis almost invariably occurs on a background of extensive plaque formation. *Candida* and herpes esophagitis can often be diagnosed on double-contrast studies, obviating endoscopy. However, if radiographic findings are equivocal or if the response to treatment is inadequate, endoscopy should be performed for a more definitive diagnosis.

Other causes of small superficial ulcers in the upper or middle esophagus include drug-induced esophagitis and Crohn disease. However, these entities usually can be differentiated from infectious esophagitis on the basis of the clinical history.

## **Diagnosis of cytomegalovirus esophagitis**

Because herpetic ulcers rarely become as large as those of infectious esophagitis, the presence of one or more giant ulcers suggests the possibility of cytomegalovirus (CMV) esophagitis in patients with AIDS. However, in patients who are positive for human immunodeficiency virus (HIV), giant esophageal ulcers can also be caused by HIV (see below).

Other causes of giant esophageal ulcers include nasogastric intubation; endoscopic sclerotherapy; caustic injuries; and oral medications, such as nonsteroidal anti-inflammatory drugs (NSAIDs), potassium chloride, and quinidine. However, the correct diagnosis can almost always be suggested on the basis of the clinical history.

## **Diagnosis of HIV esophagitis**

Because most HIV ulcers are indistinguishable from CMV ulcers on the basis of the clinical and radiographic criteria, CMV esophagitis must be excluded by means of endoscopy before a diagnosis of HIV esophagitis can be established. Biopsy specimens, brushings, and/or viral cultures from the esophagus may be needed.

Differentiating between these infections is essential because most cases of HIV esophagitis dramatically respond to treatment with oral steroids, whereas CMV esophagitis is treated with relatively toxic antiviral agents such as ganciclovir. Endoscopy is required for a definitive diagnosis before patients are treated.

## **Diagnosis of tuberculous esophagitis**

Erosion of caseating nodes into the esophagus may result in the development of longitudinal or transverse sinus tracts or esophageal-airway fistulas. Similar tracts and fistulas may be seen in patients with radiation esophagitis, Crohn disease, trauma, or esophageal cancer. However, in these patients, the clinical history usually suggests the correct diagnosis.

Intrinsic tuberculosis is extremely rare and is characterized by mucosal plaques, ulcers, strictures, and fistulas. The development of dysphagia, coughing, or choking during swallowing suggests the possibility of esophageal involvement or fistula formation in a patient with tuberculosis.

## Diagnosis of eosinophilic esophagitis

A noninfectious form of esophagitis that may require differentiation from infectious esophagitis is eosinophilic esophagitis.The majority of patients with this disorder present with intermittent difficulty in swallowing solid food. In barium studies, eosinophilic esophagitis typically produces a series of concentric rings in the esophagus.

**RECENT GUIDELINES**

Guidelines for the diagnosis and management of eosinophilic esophagitis.Diagnostic recommendations include the following:

* The underlying cause of esophageal eosinophilia should be identified
* Eosinophilic esophagitis is defined by symptoms, histology, and treatment response
* The distal and proximal esophagus should be biopsied, as should the antrum and/or duodenum, in all pediatric patients, as well as in adult patients with gastric or small intestinal symptoms or endoscopic abnormalities

## **Differential Diagnoses**

* Acute Cholecystitis and Biliary Colic
* Acute Coronary Syndrome
* Angina Pectoris
* Esophageal Rupture and Tears in Emergency Medicine
* Gastroesophageal Reflux Disease
* Gastrointestinal Foreign Bodies
* Myocardial Infarction
* Peptic Ulcer Disease
* Pulmonary Embolism (PE)

**RECENT GUIDELINES OR UPDATES**

Strong recommendations are outlined below.

### Diagnosis

For individuals with classic GERD symptoms (heartburn, regurgitation) without any alarm symptoms, an 8-week trial of once-daily, premeal empiric proton-pump inhibitors (PPIs) is recommended.

Endoscopy is the recommended initial evaluation for those presenting with dysphagia or other alarm symptoms (weight loss, gastrointestinal bleeding) as well as for those who have multiple risk factors for Barrett esophagus.

When the diagnosis of GERD is suspected but unclear, and there is no objective endoscopic evidence of GERD, off-therapy reflux monitoring is recommended to determine the diagnosis. It is not recommended that off-therapy reflux monitoring be performed soley as a diagnostic test for GERD in individuals with known endoscopic evidence of Los Angeles (LA) grade C/D reflux esophagitis or in those known to have long-segment Barrett esophagus.

### Management of GERD

For those who are overweight or obese, weight loss is recommended to improve GERD symptoms.

Treatment with PPIs is recommended over histamine-2-receptor antagonists (H2RAs) for both healing and maintenance of healing for eosinophilic esophagitis (EoE).

For GERD symptom control, PPIs are recommended to be taken 30-60 minutes before a meal rather than at bedtime.

Indefinite maintenance PPI therapy or antireflux surgery is recommended for individuals with LA grade C/D esophagitis.

Baclofen is not recommended in the setting of no objective evidence of GERD.

No prokinetic agents of any type are recommended for GERD therapy unless objective evidence of gastroparesis is present.

Sucralfate is not recommended for GERD treatment except during pregnancy.

### Extraesophageal GERD symptoms

Before attributing symtoms to GERD in individuals with possible extraesophageal manifestations, assess for non-GERD causes. In the setting of extraesophageal manifestations of GERD in which typical GERD symptoms such as heartburn and regurgitation are absent, perform reflux testing for evaluation before initiating PPI therapy.

### Refractory GERD

In the management of refractory GERD, optimization of PPI therapy is the recommended initial step.

### Surgical and endoscopic options for GERD

Antireflux surgery performed by an experienced surgeon is a recommended option for long-term treatment in those with objective evidence of GERD. Those most likely to benefit from this procedure are individuals with severe reflux esophagitis (LA grade C/D), large hiatal hernias, and/or persistent, troublesome GERD symptoms.

Consider magnetic sphincter augmentation (MSA) as an alternative to laparoscopic fundoplication in the setting of regurgitation that has failed medical management.

**EPIDEMIOLOGY**

Esophagitis is commonly seen in adults and is uncommon in childhood.The most common type of esophagitis is that associated with gastroesophageal reflux disease (GERD) (ie, reflux esophagitis). *Candida* esophagitis is the most common type of infectious esophagitis. Esophageal reflux symptoms occur monthly in 33%-44% of the general population; as many as 7%-10% of people have daily symptoms.

### International statistics

The incidence of symptoms of reflux is up to an order of magnitude higher than the prevalence of esophagitis. In the United Kingdom, patients presenting to a general practitioner with symptoms of reflux esophagitis show rates of esophagitis in the range of 40%-65%. However, a retrospective review of the results of more than 8000 diagnostic endoscopies in Hampshire showed that GERD accounted for 23% of all upper gastrointestinal conditions.

A review of the Swedish National Register estimated the prevalence of esophagitis (diagnosed by endoscopy) to be less than 5% in the 55-year-old group. Other reports have estimated the prevalence to be on the order of 2%.

### Prevalence in association with other disorders

The prevalence of symptomatic infectious esophagitis is high in individuals with acquired immunodeficiency syndrome (AIDS), leukemia, and lymphoma and is low (< 5%) in the general medical population.

*Candida* esophagitis is the most common type of infectious esophagitis. Herpes simplex virus (HSV) type I is the second most common cause of infectious esophagitis*.* Although obtaining accurate figures regarding the prevalence of herpes esophagitis is difficult, this infection has been reported in approximately 1% of patients who are immunocompromised and in as many as 43% of patients at autopsy.

Cytomegalovirus (CMV) is a recognized cause of esophagitis. Asymptomatic CMV infection is common worldwide, and a large percentage of the world’s population has been exposed to CMV. Before the AIDS epidemic, CMV infections of the esophagus were primarily found on postmortem examinations. The first clinical case of CMV esophagitis was not reported until 1985.

Unlike herpes esophagitis, CMV esophagitis almost never occurs in immunocompetent patients, and the vast majority of affected individuals are found to have AIDS. The incidence of CMV esophagitis—like that of other forms of infectious esophagitis—has declined among AIDS patients since the widespread use of highly active antiretroviral therapy.However, CMV esophagitis has increased among patients with solid organ transplants,in whom delayed-onset disease is typical because of the increasing routine use of early CMV prophylaxis.

Giant esophageal ulcers have been described in patients with AIDS in whom no other infectious etiology for the ulcers can be found. These ulcers have been termed idiopathic or HIV (human immunodeficiency virus) ulcers because they are believed to be caused by HIV. In fact, results of electron microscopy confirm the presence of HIV-like viral particles in these lesions.

Although some patients with HIV ulcers may have undergone recent seroconversion, most are found to have chronic AIDS with CD4 counts lower than 100 cells/μL. HIV ulcers are more common than is generally recognized, accounting for as many as 40% of all esophageal ulcers in patients with AIDS.

## **Diagnostic Procedures for Esophagitis**

1. Upper Endoscopy (Esophagogastroduodenoscopy, EGD)
   * Purpose: Visualize the esophagus, stomach, and duodenum; identify inflammation, strictures, rings, or white spots; obtain biopsies for histological diagnosis.
   * Preparation: Fast for 6–8 hours before the procedure. Sedation is usually given.
   * Duration: Procedure takes about 15–30 minutes.
   * Results: Visual findings can be discussed immediately; biopsy results take several days to a week.
   * Notes: Multiple biopsies (at least 6) from different esophageal sites improve diagnostic accuracy, especially for eosinophilic esophagitis.
2. Biopsy Analysis
   * Tissue samples from endoscopy are examined microscopically for eosinophils or other signs of inflammation.
   * Timeline: Usually 3–7 days for pathology results.
3. Esophageal pH Monitoring
   * Purpose: Measures acid exposure in the esophagus over 24–48 hours to detect acid reflux.
   * Preparation: Avoid certain medications and fasting before placement.
   * Duration: Monitoring lasts 1–2 days; results take a few days to analyze.
4. Barium Swallow (Esophagram)
   * Purpose: X-ray imaging to detect strictures, narrowing, or motility problems.
   * Preparation: Fasting for a few hours before test.
   * Duration: Usually completed within an hour; results often available within a day.
5. High-Resolution Manometry
   * Purpose: Measures esophageal muscle function and motility.
   * Duration: About 30 minutes; results take a few days.
6. Endoscopic Ultrasound (EUS)
   * Used selectively for detailed imaging or guided biopsies; takes 30–60 minutes.

## **Treatment Procedures and Timeline**

1. Medical Therapy Initiation
   * Proton Pump Inhibitors (PPIs): Typically started immediately after diagnosis for acid-related esophagitis; trial for 8 weeks to assess symptom improvement.
   * Topical corticosteroids: For eosinophilic esophagitis, swallowed steroids are prescribed; effects monitored over weeks to months.
2. Dietary and Lifestyle Modifications
   * Implemented alongside medical therapy; ongoing.
3. Endoscopic Dilation
   * Performed if strictures cause swallowing difficulties.
   * Usually done after initial inflammation is controlled.
   * Procedure time: 15–30 minutes; may require multiple sessions spaced weeks apart.
4. Follow-Up Endoscopy and Biopsy
   * Typically performed 6–12 weeks after starting treatment to assess healing, especially in eosinophilic esophagitis.
   * Further biopsies guide ongoing management.

**PREDEFINED Q & A SETS**

### **Is esophagitis the same as GERD?**

GERD is the most common cause of esophagitis, but not the only cause. And GERD doesn’t always cause esophagitis in everyone. It takes persistent reflux over time to cause an inflammatory response.

## 1. What tests do I need to find out if I have esophagitis?

* Upper endoscopy (esophagogastroduodenoscopy, EGD): A flexible tube with a camera is inserted through your mouth to examine the esophagus and take tissue biopsies to confirm inflammation and identify the cause.
* Biopsy: During endoscopy, small tissue samples are taken to look for eosinophils or other signs of esophagitis under a microscope.
* Esophageal pH monitoring: Measures acid levels in your esophagus over 24–96 hours to detect acid reflux, which can cause esophagitis.
* Barium swallow (esophagram): An X-ray test where you swallow a barium solution to visualize structural abnormalities like strictures or narrowing.
* Blood tests: May be done to check for allergies or elevated eosinophils if eosinophilic esophagitis is suspected.

## 2. Do I need to do anything special to prepare for these tests?

* For endoscopy and biopsy, you will need to fast (no food or drink) for about 6–8 hours before the procedure. You will receive sedation to help you relax.
* For esophageal pH monitoring, avoid eating or drinking for 4–6 hours before placement. During the test, you will keep a symptom and food diary.
* For barium swallow, you will also need to fast for several hours before the test.

## 3. How long will it take to find out the results of tests?

* Endoscopy results can be discussed immediately after the procedure, but biopsy results usually take several days to a week.
* pH monitoring results are analyzed after the 24–96 hour test period, so results typically take a few days.
* Barium swallow results are usually available within a day.

## 4. What treatments are available, and which do you recommend?

* Proton pump inhibitors (PPIs): To reduce stomach acid and allow healing, especially for reflux esophagitis.
* Dietary changes: Avoid foods that trigger reflux or allergic reactions (for eosinophilic esophagitis).
* Topical corticosteroids: Swallowed steroids may be used for eosinophilic esophagitis to reduce inflammation.
* Dilation: If strictures (narrowing) develop, endoscopic dilation can relieve swallowing difficulties.
* Allergy management: Identifying and avoiding allergens if eosinophilic esophagitis is diagnosed.

## 5. How will we know if the treatment is working?

* Improvement in symptoms such as less heartburn, pain, and difficulty swallowing.
* Follow-up endoscopy and biopsy may be done to confirm healing, especially in eosinophilic esophagitis.
* Repeat pH monitoring if acid reflux symptoms persist.

## 6. Will I need follow-up tests?

* Yes, follow-up endoscopy and biopsies may be necessary to monitor healing or recurrence, particularly for eosinophilic esophagitis.
* Repeat pH monitoring or manometry may be recommended if symptoms persist or worsen.

## 7. What steps can I take on my own to prevent symptoms from happening again?

* Avoid trigger foods and beverages (spicy, fatty, acidic foods, caffeine, alcohol).
* Eat smaller meals and avoid eating 2–3 hours before bedtime.
* Maintain a healthy weight.
* Elevate the head of your bed to reduce nighttime reflux.
* Avoid smoking and reduce stress.
* Follow prescribed medications consistently.

## 8. I have other medical conditions. How can I best manage these conditions together?

* Inform your healthcare provider about all your medical conditions and medications.
* Coordinate care between specialists (e.g., gastroenterologist, allergist) to optimize treatment plans.
* Manage allergies or immune-related conditions that may contribute to esophagitis.
* Monitor for drug interactions and side effects from treatments.
* Maintain regular follow-ups to adjust therapies as needed.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you’re experiencing symptoms like heartburn and difficulty swallowing. Let’s talk about how we can find out if you have esophagitis and how to manage it.

Patient: What tests will I need to diagnose esophagitis?

Doctor: The main test is an upper endoscopy, where we use a flexible camera to look inside your esophagus and take small tissue samples if needed. Sometimes, we also do a pH monitoring test to check for acid reflux or a barium swallow X-ray to look for structural issues.

Patient: Do I need to prepare specially for these tests?

Doctor: Yes, for the endoscopy and barium swallow, you’ll need to fast for about 6 to 8 hours beforehand. The pH monitoring requires avoiding certain medications before the test and keeping a symptom diary during the monitoring period.

Patient: How long will it take to get the results?

Doctor: We can discuss the endoscopy findings right after the procedure, but biopsy results usually take a few days to a week. pH monitoring results also take a few days after the test is completed.

Patient: What treatments are available, and what do you recommend?

Doctor: Treatment depends on the cause. For acid-related esophagitis, proton pump inhibitors (PPIs) are usually recommended to reduce stomach acid. If it’s eosinophilic esophagitis, we may use swallowed corticosteroids and dietary changes. Avoiding trigger foods and lifestyle modifications are also important.

Patient: How will we know if the treatment is working?

Doctor: You should notice improvement in symptoms like less heartburn and easier swallowing. We may repeat endoscopy and biopsies after treatment to confirm healing, especially for eosinophilic esophagitis.

Patient: Will I need follow-up tests?

Doctor: Yes, follow-up endoscopy is often done 6 to 12 weeks after starting treatment. Additional tests may be needed if symptoms persist or worsen.

Patient: What can I do on my own to prevent symptoms from coming back?

Doctor: Avoid foods and drinks that trigger reflux, eat smaller meals, don’t lie down soon after eating, maintain a healthy weight, and avoid smoking. Elevating the head of your bed can also help reduce nighttime reflux.

Patient: I have other health conditions. How can I manage everything together?

Doctor: It’s important to share all your health information and medications with all your doctors. We’ll coordinate your care to avoid drug interactions and manage your conditions safely. Regular follow-ups will help us adjust treatments as needed.

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**Facial nerve disorders and paralysis (palsy)**

ALTERNATIVE NAMES

* Facial palsy
* Facial paralysis
* Bell’s palsy (most common idiopathic facial paralysis)
* Peripheral facial palsy
* Facial neuropathy
* Idiopathic facial paralysis
* Ramsay Hunt syndrome (facial paralysis caused by herpes zoster infection)
* Central facial palsy (when caused by central nervous system lesions)
* Lower motor neuron facial palsy

**DEFINITION / DESCRIPTION**

Facial paralysis happens when your facial nerve (cranial nerve #7) becomes damaged. This results in weakness, droopiness and a loss of facial movement on one side (unilateral) or both sides (bilateral) of your face.

Facial nerve damage can occur for several reasons, including infection, trauma or stroke. It can also occur without a known cause, which is referred to as Bell’s palsy. Face paralysis may complete or partial and can be temporary or permanent.

**CAUSES**

Some people are born with facial nerve paralysis. In people who aren’t born with facial paralysis, the condition develops for one of two reasons:

1. Your facial nerve, which transmits signals from your brain to your facial muscles, becomes damaged or swollen.
2. The area of your brain that carries signals to your facial muscles becomes damaged.

Facial paralysis causes may include:

* Stroke.
* Bell’s palsy.
* Middle ear infection.
* Skull fracture.
* Autoimmune diseases, such as multiple sclerosis.
* Head, neck or brain tumor.
* Facial nerve schwannoma (a slow-growing, usually noncancerous tumor on your 7th cranial nerve).
* Lyme disease.
* Sarcoidosis.
* Ramsay Hunt syndrome.
* Guillain-Barré syndrome.

**SIGNS / SYMPTOMS**

Facial nerve palsy affects one side of the face. It can affect the whole side or just part of a side of the face. The main symptom is weakness, but sometimes sensory changes, like tingling or loss of sensation, can also occur.

Symptoms of facial nerve palsy include

* Droopy eyelid
* Eyelid that won’t close
* Droopy cheek
* Flattening of the nasolabial fold (the crease above the smile)
* Lopsided smile
* Uneven face

These symptoms can affect the forehead, the lower part of the face, or the upper and lower part of the face. Facial nerve palsy affects only one side of the face.

Associated symptoms can include tingling, numbness, burning, pain, diminished sensation, hearing loss, or dizziness. Facial nerve palsy can cause complications due to the inability to move parts of the face. Complications are more likely if the condition lasts for a long time and if the weakness is severe.

**DIAGNOSIS METHODS**

A healthcare provider will ask about your symptoms and review your medical history. They’ll perform a physical examination and ask you to try to make various facial movements, like:

* Opening and closing your eyes.
* Raising your eyebrows.
* Smiling.
* Frowning.

In addition to a physical examination, your healthcare provider may request imaging tests, such as:

* MRI (magnetic resonance imaging).
* CT (computed tomography) scan.
* EMG (electromyography).

**Grade Definition**

* I Normal symmetrical function throughout
* II Slight weakness on close inspection + slight asymmetry of smile
* III Obvious non-disfiguring weakness, complete eye closure
* IV Obvious disfiguring weakness, cannot lift the brow, incomplete eye closure, severe synkinesis
* V Barely perceptible motion, incomplete eye closure, slight movement of corner of mouth, absent synkinesis
* VI No movement, atonic

Importantly, the difference between grades 3 and 4 is eye closure.

Additional tests used to assess the lesion of the facial nerve clinically are as follows:

* Blink test (corneal reflex) – when tapping on the patient’s glabella, a suspension in blinking will occur on the affected side (the ophthalmic division of trigeminal nerve controls afferent limb, the efferent limb is the temporal and zygomatic branch of the facial nerve)
* Schirmer test (assessing lacrimation of the lacrimal gland) – lacrimation will be decreased by 75% compared to the normal side using a folded strip of blotting paper in the lower conjunctival fornix. It is important to note that a unilateral lesion within the geniculate ganglion can produce bilateral lacrimal deficiencies.
* Stapedial test – This involuntary reaction in response to high-intensity sound stimuli causes contraction of the stapedius muscle and gets mediated by the facial nerve. Testing of the stapedius reflex can be performed using tympanometry.
* Salivary Test – Salivation rate is assessed from a submandibular duct following stimulation with a 6% citric acid solution. If positive, there will be a reduction in salivation by 25% at the affected side and indicate a lesion at or proximal to the root of the chorda tympani.
* Taste test – though using salt sweet, sour, and bitter tastes along the lateral aspects of the anterior two-thirds of the tongue. A positive result will indicate a lesion at or proximal to the root of the chorda tympani.

**Examine the ear** externally to ensure no evidence of otitis externa, otitis media, chronic otitis media, or cholesteatoma. The presence of vesicles may indicate Ramsay-Hunt syndrome.

**Examine the parotid** for any masses that may reveal a parotid malignancy. Examination of the oral cavity for parapharyngeal swellings and vesicular eruptions is also considered essential.

**Examine the eye**, initially to establish closure of the lid. If the eye is unable to fully close, then urgent ophthalmology referral and provision of eye protection equipment is advised.

**TREATMENT OPTIONS**

Facial paralysis treatment depends on the underlying cause. For example:

* If you develop facial paralysis as a result of stroke, your healthcare provider will focus on treating stroke.
* If facial paralysis is a result of a tumor, your provider will discuss options to remove the tumor.
* If the cause is Bell’s palsy, then your provider may prescribe medications and recommend facial strengthening exercises.

There are several nonsurgical and surgical facial paralysis treatments available:

Nonsurgical treatments may include

* Corticosteroids to reduce inflammation and swelling in your facial nerve.
* Antivirals to fight possible infection.
* Botox injections to treat synkinesis — a secondary condition that results in involuntary muscle movements. (This is common with Bell’s palsy.)
* Physical therapy to improve facial symmetry, increase muscle strength and regain facial coordination.
* Speech therapy to help you regain your speech and swallow function.
* Occupational therapy to help you improve functions like facial expressions and interpersonal communication.

Surgical treatments may include

* Eyelid surgery.In order to help your eye close, various procedures may be performed to support your eye and make blinking more efficient.
* Reanimation surgery. There are various types of reanimation surgery. For some procedures, a surgeon takes muscles and/or nerves from other areas of your body (some nearby and some from remote sites) and uses them to restore facial movement. Facial reanimation may involve nerve transfers, tendon transfers or muscle transplants, depending on the specific goals of treatment.
* Surgery to remove a tumor. If facial paralysis is the result of a tumor, a surgeon may perform surgery to remove it and take pressure off your facial nerve.
* Cosmetic surgery. There are several cosmetic surgery procedures that can restore balance and symmetry to your face. These procedures may include brow lifts, facelifts, facial slings and eyelid surgery.

Each case is unique and each person has their own set of specific needs. Your healthcare provider will talk to you in detail about a treatment option that’s right for you.

#### **Facial paralysis and your eyes**

If face paralysis affects your eyes, it can lead to chronic dry eyes and other complications. In these cases, your healthcare provider will recommend treatment to prevent your eyes from drying out too much. This might include:

* Eye drops and ointments.
* Taping your eyelids.
* Eye patches.
* Temporary closure of your eyelid with sutures.
* Surgery to place small weights in your eyelids to help them close.

**PREVENTION TIPS**

In many cases, you can’t prevent the conditions or situations that may result in facial paralysis — particularly in cases of trauma. And in instances like Bell’s palsy, symptoms often occur with no warning.

You can, however, take steps to reduce your risk of stroke — which will, in turn, reduce your risk for stroke-related facial paralysis:

* Keep your cholesterol and blood pressure in check.
* Treat and manage health conditions like diabetes and heart disease.
* Take all medications as prescribed.
* If you smoke, talk to your healthcare provider about quitting.
* Limit your intake of beverages that contain alcohol.
* Exercise regularly.
* Eat plenty of whole grains and fresh fruits and vegetables.
* Maintain a weight that’s healthy for you.

**OUTLOOK / PROGNOSIS**

Factors suggestive of a poor prognosis when associated with a facial nerve palsy include:

* Complete palsy
* Loss of the stapedial reflex
* No signs of recovery within three weeks
* Age over 50 years
* Ramsay Hunt syndrome
* Poor response to electrophysiological testing

**POSSIBLE COMPLICATIONS**

### Complications

Problems that can occur due to facial palsy include:

* Dry eye
* Corneal damage (damage to the clear dome of tissue at the front of the eye)
* Infection of the eye
* Vision problems due to a droopy eyelid
* Difficulty chewing
* Trouble swallowing
* Choking on food, drinks, or saliva
* Trouble breathing

These complications can be serious, but they can often be prevented with measures such as wearing an eye patch to protect the eye.

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

If you develop facial paralysis, call a healthcare provider immediately. They can determine what caused your symptoms and treat any underlying conditions.

If you or someone you know develops stroke symptoms — such as difficulty walking, coordination issues, blurred vision or slurred speech — call 911 or head to your nearest emergency room.

**DIFFERENTIAL DIAGNOSIS**

* Idiopathic
  + Bell’s palsy (most common cause of acute unilateral lower motor neuron facial paralysis)
* Infectious Causes
  + Herpes simplex virus (HSV-1)
  + Herpes zoster oticus (Ramsay Hunt syndrome)
  + Cytomegalovirus (CMV)
  + Epstein-Barr virus (EBV)
  + Lyme disease
  + Otitis media (acute or chronic)
  + Cholesteatoma
* Neoplastic Causes
  + Parotid gland tumors (benign or malignant)
  + Facial nerve schwannoma
  + Vestibular schwannoma (acoustic neuroma)
  + Cerebellopontine angle tumors
  + Meningioma
  + Brainstem tumors
  + Metastatic lesions
* Traumatic and Iatrogenic Causes
  + Temporal bone fractures
  + Surgical injury (mastoidectomy, parotidectomy)
  + Compression from hematoma or swelling
* Central (Upper Motor Neuron) Causes
  + Stroke (ischemic or hemorrhagic)
  + Multiple sclerosis
  + Brain tumors
  + Subdural hematoma  
    *Note: These typically cause forehead sparing*
* Autoimmune and Inflammatory Causes
  + Sarcoidosis
  + Guillain-Barré syndrome
  + Chronic meningitis (infectious or neoplastic)
* Metabolic Causes
  + Diabetes mellitus (associated neuropathies)
* Congenital Causes
  + Möbius syndrome
  + Congenital facial palsies
* Other Causes
  + Cephalic tetanus (rare)
  + Other rare infections or systemic diseases

**EPIDEMIOLOGY**

While the majority of cases are found to be idiopathic, any clinician needs to rule out a cerebrovascular event or other serious underlying pathology. At present, no clear evidence exists to suggest facial nerve palsies are more likely in any gender or race, and all ages could be affected. However, it is a known fact that facial nerve palsies most commonly affect those between the ages of 15 to 45 years.

Within the spectrum of facial nerve palsies, the most common cause is Bell palsy, representing approximately 70% of all facial nerve paralysis. Trauma represents the next largest component of facial nerve palsies, contributing around 10 to 23% of cases. Viral infection resulting in a facial nerve palsy is responsible for between 4.5 to 7%, and finally, neoplasia constitutes between 2.2 to 5%

**PREDEFINED Q & A SETS**

### **Is facial nerve paralysis permanent?**

In some cases, facial paralysis is permanent. However, many people may see improvement or complete recovery with time and/or treatment. (Bell’s palsy usually goes away on its own in a few months.)

### **Is facial paralysis caused by stress?**

Though experts haven’t been able to prove it yet, many healthcare providers recognize a significant link between stress and the onset of Bell’s palsy. Experts believe that stress can weaken your immune system, resulting in damage to your facial nerve.

### **Is face paralysis serious?**

Facial paralysis itself isn’t dangerous, but it can cause significant symptoms while present. It can also indicate a serious underlying condition, such as stroke. You should never ignore facial paralysis. If you or a loved one develop facial paralysis, call a healthcare provider right away

**Treatment of Facial Nerve Disorders and Paralysis (Palsy): Drugs and Their Side Effects**

1. Corticosteroids (Prednisolone / Prednisone)
   * Use: First-line treatment in acute Bell’s palsy and other inflammatory facial nerve palsies to reduce nerve inflammation and edema.
   * Typical regimen: 60 mg daily for 5 days, then taper by 10 mg per day over the next 5 days (total ~10 days).
   * Benefits: Improves recovery rates and shortens time to recovery when started within 72 hours of symptom onset.
   * Side effects:
     + Increased blood sugar (hyperglycemia)
     + Mood changes, insomnia
     + Increased risk of infection
     + Gastric irritation or ulcers
     + Fluid retention and hypertension
     + Long-term use risks (not typical in Bell’s palsy treatment)
2. Antiviral Agents (Acyclovir, Valacyclovir)
   * Use: Often combined with corticosteroids, especially if herpes simplex virus or herpes zoster is suspected (e.g., Ramsay Hunt syndrome).
   * Typical regimen: Acyclovir 400 mg five times daily for 7 days or Valacyclovir 1 g three times daily for 7 days.
   * Benefits: May improve recovery rates when used early alongside steroids.
   * Side effects:
     + Headache
     + Nausea, vomiting
     + Renal toxicity (rare, mostly in patients with kidney disease)
     + Allergic reactions (rare)
3. Botulinum Toxin Injections
   * Use: For managing synkinesis (involuntary muscle movements) and hyperkinesis after facial nerve recovery; also used to induce protective ptosis to protect the eye.
   * Benefits: Temporarily relaxes muscles to improve facial symmetry and function.
   * Side effects:
     + Localized muscle weakness
     + Bruising or pain at injection site
     + Ptosis (drooping eyelid) if spread occurs
     + Rare allergic reactions
4. Eye Care Medications
   * Use: Lubricating eye drops and ointments to prevent corneal damage in patients with incomplete eye closure.
   * Side effects: Minimal; some may experience mild irritation.
5. Other Medications
   * Pain relievers: NSAIDs or acetaminophen for pain control.
   * Antibiotics: If secondary infection is suspected (e.g., otitis media).
   * Immunomodulators: Rarely used; under investigation.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you’ve noticed weakness or drooping on one side of your face. Can you tell me more about your symptoms?

Patient: Yes, I can’t move the right side of my face properly. It’s hard to close my eye, and I’m spilling food when I eat. I also have some pain around my jaw and dryness in my right eye.

Doctor: These symptoms suggest a condition called facial nerve palsy, which affects the nerve that controls your facial muscles. The most common cause is Bell’s palsy, which often comes on suddenly and usually improves over time.

Patient: What causes Bell’s palsy? Is it serious?

Doctor: Bell’s palsy is thought to be caused by inflammation of the facial nerve, often linked to viral infections like herpes simplex. It’s usually not life-threatening, but it can cause significant discomfort and affect your facial expressions.

Patient: What treatments are available? Will I get better?

Doctor: We usually start treatment with corticosteroids to reduce inflammation and swelling. If a viral cause is suspected, antiviral medications may be added. Protecting your eye is very important since you might not be able to blink fully; we’ll teach you eye care techniques and may recommend eye drops or an eye patch.

Patient: Are there exercises I can do?

Doctor: Yes, physiotherapy can help. Exercises to strengthen your facial muscles, eye-closing exercises, and sometimes modalities like acupuncture or laser therapy can improve recovery. We’ll also refer you to specialists like an optometrist and speech therapist if needed.

Patient: How long will it take to recover?

Doctor: Recovery varies, but many people start improving within weeks and may have near-complete recovery by six months. Some symptoms like mild weakness or synkinesis (involuntary muscle movements) can persist longer.

Patient: What if I don’t get better?

Doctor: If there’s no improvement after a few weeks or if symptoms worsen, we’ll do further tests and possibly refer you to a neurologist or ENT specialist for more evaluation.

Patient: Is there anything I can do to help myself?

Doctor: Protect your eye, do the exercises regularly, avoid stress, and keep follow-up appointments. We’ll support you through this process.

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**Facial fractures**

ALTERNATIVE NAMES

* Facial bone fractures
* Maxillofacial fractures
* Craniofacial fractures (when involving both facial and cranial bones)
* Midface fractures (specifically fractures in the middle third of the face)
* Mandibular fractures (fractures of the lower jaw)
* Naso-orbital-ethmoid fractures (specific fractures involving the nasal, orbital, and ethmoid bones)
* Zygomatic fractures or Zygomaticomaxillary complex fractures (fractures of the cheekbone area)
* Le Fort fractures (a classification of midface fractures)

**DEFINITION / DESCRIPTION**

Facial fractures refer to broken bones in your face. This type of facial trauma (also called maxillofacial trauma) can happen if you’re involved in an accident, such as a car crash or fall. Facial fractures are also common among victims of physical assault and gunshot wounds. Your facial bones are thinner than a lot of other bones in your body, making them prone to injury.

#### **Types of facial fractures**

The most common facial fractures include:

* Nasal fractures (broken nose).
* Forehead fractures (broken frontal bone).
* Orbital fractures (eye sockets).
* Zygomatic fractures (cheekbones).
* Tripod facial fracture (involving your eye socket, cheekbone and upper jaw).
* Maxillary or mandibular fracture (broken jaw).
* Midface fractures (Le Fort fractures).

**CAUSES**

The most common cause of facial fractures is physical assault, followed by vehicular accidents and falls. Other causes include:

* Sports-related injuries.
* Workplace accidents.
* Domestic violence.

**SIGNS / SYMPTOMS**

Facial fracture symptoms depend on which area of your face has trauma.

General symptoms may include:

* Bruising.
* Swelling.
* Pain or tenderness.
* Facial numbness.
* Disfigurement.

If you have a broken nose, you may have:

* Difficulty breathing through your nose.
* Nosebleeds.

If you have fractured eye sockets, you may develop:

* Blurred vision.
* Double vision.
* Bulging eyeballs.
* Sunken eyeballs.
* Difficulty moving your eyes up, down or back and forth.

Fractured jaw symptoms may include:

* Drooling.
* Difficulty chewing or speaking.
* Pain when opening your mouth.
* Loose, broken or missing teeth.

**DIAGNOSIS METHODS**

During a visit with a healthcare provider, they’ll:

* Determine if you have any life-threatening injuries. (If you do, they’ll address them right away.)
* Check your nasal passages and airways for obstruction.
* Look at your eyes to see if they’re functioning properly.
* Check for damage to your central nervous system (your brain and spinal cord).
* Ask you to describe your symptoms.
* Ask about your facial injury and how it occurred.
* Check your face for asymmetry or damage.
* Gently palpate (press on) the bones of your face to determine the extent of damage.

Imaging tests help healthcare providers diagnose facial fractures and rule out other issues like dislocation. Computed tomography (CT) is the most common imaging test used for diagnosing facial fractures.

**TREATMENT OPTIONS**

Your healthcare provider may prescribe pain relievers as well as corticosteroids to ease swelling. They may also prescribe antibiotics if there’s a high risk of infection.

Facial fracture treatment involves reduction and fixation.

* Reduction: resetting the broken bones and placing them in their correct positions.
* Fixation: keeping the bones in their new positions long enough for healing to take place. This usually requires keeping the affected bones still and preventing movement during recovery. Sometimes this requires surgical plates, screws and wires.

For a complex fracture with multiple broken bones, you’ll need facial reconstructive surgery. Specific treatment depends on the location and extent of your facial injury.

#### **Closed reduction**

Closed reduction involves resetting fractured bones without surgery. This means your provider can manually reset your facial bones without making incisions (cuts) or exposing your bone.

#### **Open reduction**

Open reduction involves surgical intervention. In these cases, the fractures are too complex for manual resetting. A provider will need to explore the area surgically to reset your facial bones.

#### **Facial reconstructive surgery**

Severe facial trauma may require reconstructive surgery. There are two main goals of facial reconstructive surgery:

1. Restore proper functions (like vision, chewing, swallowing or breathing through your nose).
2. Enhance and optimize your appearance.

### **How long does it take to recover after a facial fracture?**

It’s different for everyone. It depends on several factors, including the extent of your facial trauma, which treatment you had and your body’s own healing capacity.

People who go through facial reconstructive surgery usually notice that swelling and bruising fade after about two weeks. But it can take up to a few months for complete recovery.

**PREVENTION TIPS**

There’s no way to completely prevent facial fractures. However, you can take some steps to reduce the extent of injuries.

* Wear a seat belt when driving a motor vehicle or riding in one. Wear a helmet and other protective gear if you’re operating a motorcycle or all-terrain vehicle.
* Wear the correct protective equipment — such as a helmet, face mask or mouth guard — when playing sports.
* Follow safety guidelines at work and wear protective headgear if your job requires it.

**OUTLOOK / PROGNOSIS**

Some people may not have long-term effects following a facial fracture. However, long-term complications are possible and may include:

* Sinus issues.
* Breathing issues.
* A change in your sense of taste or smell.
* Tingling or numbness.
* Vision issues.
* Headaches.
* Tenderness in your head or face.

Early intervention and treatment can reduce your risk for long-term complications. Your healthcare provider can tell you what to expect in your situation.

**POSSIBLE COMPLICATIONS**

Facial bone fractures can distort your appearance and interfere with normal function. For example, a person with a jaw fracture will have difficulty eating. Someone with a nasal fracture may have trouble breathing through their nose.

Facial trauma can also result in infections, internal bleeding and neurological issues. For instance, some facial bone fractures can cause a cerebrospinal fluid (CSF) leak.

To reduce your risk of complications, you should see a healthcare provider immediately following facial trauma.

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

If you think you could have a facial fracture, it’s important to seek medical help right away. Call a healthcare provider if you develop:

* Pain or tenderness at the injury site.
* Swelling.
* Redness.
* Bruising.
* Deformity.
* Loss of function.

Head to your nearest emergency room if you have any of the following:

* Open wounds where you can see the bone.
* Bloody or clear discharge from your nose.
* Blurred or double vision, or problems moving your eyes.
* Trouble swallowing or breathing.
* Displaced jaw or nose.
* Upper and lower jaw that don’t meet properly, or pain when you move your jaw.
* Loose teeth.
* Pain and swelling in your face.

**DIFFERENTIAL DIAGNOSIS**

* Cervical Spine Acute Bony Injuries in Sports Medicine
* Cervical Spine Sprain/Strain Injuries
* Concussion
* Facial Soft Tissue Injuries
* Nasal Fracture

**EPIDEMIOLOGY**

### United States statistics

In 2025, Xu and Abramowicz noted that sports injuries account for 11.3-42.1% of facial fractures. Reehal reported that facial fractures represent 4-18% of all sports injuries.A review by Romeo of facial fractures sustained by athletes during sports participation noted that sporting activities account for 3-29% of facial injuries and 10-42% of all facial fractures.Tanaka and colleagues showed that 10.4% of all maxillofacial fractures are related to sports.

In another report, Laskin stated that 250,000 individuals, many of whom were children, experienced facial trauma while engaged in athletic activities.The review by Hwang et al demonstrated that athletes aged 11-20 years were the population that accounted for most (40.3%) sports-related facial bone fractures.Additionally, it is estimated more than 100,000 sport-related injuries could be prevented by wearing appropriate head and face protection.

A retrospective study of pediatric sports-related facial fractures identified the most common fractures in the cohort as orbital, mandibular, nasal, and maxillary. Fractures were most often related to participation in baseball/softball and bicycling.

Retrospective analysis demonstrated a significant male predominance (13.75:1) among athletes who sustained sports-related facial bone fractures.The sports most commonly associated with facial fractures were soccer (38.1%), baseball (16.1%), basketball (12.7%), martial arts (6.4%), and skiing/snowboarding (4.7%).

Nearly 75% of facial fractures occur in the mandible, zygoma, and nose.Sports participation is the most common cause of mandibular fractures (31.5%), followed closely by motor vehicle accidents (27.2%). Most mandibular fractures (83% in one study) occur in men. [11] A study of facial fractures sustained during recreational baseball and softball demonstrated that the zygoma or zygomatic arch was the most common fracture subtype, followed by temporoparietal skull fractures and orbital blow-out fractures.

A number of studies in the medical literature, however, indicate that the nasal bones are the most commonly fractured bones in the face, but because many of these patients do not seek medical treatment or the injuries are managed in the outpatient setting, the statistics may not reflect this trend.It is likely that the nasal bones are more commonly fractured because of the lesser degree of force that is required to fracture the bone.

In a study of patients who presented to US emergency departments (EDs) with sports- or recreation-related nasal fracture, Xiao et al found that the most common causes of injury were basketball (23.2%), baseball (17.1%), softball (9.8%), soccer (7.4%), and football (7%). Among pediatric patients, the most frequent cause was baseball (25.1%).

Fractures of the orbit occur more commonly in young adult and adolescent males: the mean age for adult males is 32 years; the mean age for children, 12.5 years, and the majority of orbital fractures occur in boys. In addition to sports-related injuries, injuries sustained in motor vehicle collisions, assaults, and occupational injuries account for the majority of orbital fractures.

### International statistics

A UK study of patients with football-related facial injuries showed that 54% of these patients received a diagnosis of facial fracture. The researchers found that the most frequent injury was a midface fracture, and the most common cause was a clash of heads.

In a Finnish study of patients with sports-related nasal fractures, the majority of fractures (56%) were associated with team sports, and contact with another player was the most frequent cause of injury (52% of fractures). Among team sports, basketball posed the highest risk of nasal fracture.

**PREDEFINED Q & A SETS**

## 1. How many types of facial fractures are there?

## Facial fractures are classified by location, pattern, and severity. Major types include:

## Nasal fractures (nose bones)

## Mandibular fractures (jawbone)

## Orbital fractures (eye sockets)

## Zygomatic fractures (cheekbones)

## Naso-orbito-ethmoidal (NOE) fractures

## Maxillary fractures, often classified by Le Fort types I, II, and III (increasing severity and anatomical involvement)

## Frontal sinus fractures

## Alveolar process fractures

## Complex fractures can involve multiple bones (e.g., panfacial fractures) or specific patterns like the Le Fort classification for midface fractures.

## 2. What are my treatment options?

## Treatment depends on the type, location, and severity of the fracture:

## Conservative management: For minor, nondisplaced fractures, rest, ice, pain management, and avoiding trauma may suffice.

## Closed reduction: Non-surgical realignment, often with intermaxillary fixation (wiring jaws shut), for less severe fractures.

## Surgical treatment (Open Reduction and Internal Fixation - ORIF): Required for displaced, unstable, or complex fractures. This involves repositioning bones and stabilizing them with plates and screws, often titanium.

## Advanced techniques: Virtual surgical planning and computer-aided design (CAD/CAM) improve precision in complex cases.

## 3. Will I need surgery now or in the future?

## Surgery is often needed if the fracture is displaced, unstable, affects function (e.g., chewing, vision), or causes cosmetic deformity.

## Minor, nondisplaced fractures may heal without surgery.

## Some fractures might require delayed surgery if swelling or other injuries initially prevent immediate intervention.

## Your surgeon will evaluate your specific injury to decide the timing and necessity of surgery.

## 4. How long will recovery take?

## Recovery varies by fracture type and treatment.

## Minor fractures may heal in 4 to 6 weeks.

## Surgical cases may require 6 to 12 weeks for bone healing and soft tissue recovery.

## Full functional recovery, including resolution of swelling and return to normal activities, may take several months.

## Follow-up care is essential to monitor healing and address complications.

## 5. When can I go back to work or school?

## Return depends on injury severity, treatment, and job/school demands.

## For minor fractures and conservative treatment, return might be possible within 1 to 2 weeks, avoiding strenuous activity.

## After surgery or complex fractures, a longer period of 4 to 8 weeks or more may be necessary.

## Your healthcare provider will guide you based on your healing progress and risk of re-injury.

## 6. How can I protect this area during healing?

## Avoid any trauma or pressure to the face.

## Follow instructions regarding diet (soft foods if jaw is involved).

## Use protective gear (e.g., face shield or helmet) if returning to physical activity.

## Maintain good oral hygiene if jaw or oral structures are involved.

## Attend all follow-ups for monitoring and timely intervention if complications arise

### How serious is a facial fracture?

The majority of facial fractures aren’t life-threatening. However, some can lead to serious issues with your vision, airways, respiratory system or central nervous system.

You should see a healthcare provider any time you have facial trauma, even if you think it’s not serious. They can recommend appropriate treatment.

### Can a facial fracture heal on its own?

It’s possible for a facial fracture to heal on its own, especially if the broken bone stays in its proper position. However, in many cases, a healthcare provider will need to reset your facial bones for proper healing.

**Facial Fractures: Procedures, Timeline, and Drug Side Effects**

## 1. Procedures for Facial Fractures

* Initial Assessment:  
  History, physical exam, and imaging (X-rays, CT scans) to identify fracture location and severity.
* Non-Surgical Management:
  + For non-displaced or minimally displaced fractures (e.g., some nasal bone fractures), bones may heal naturally with immobilization and observation.
  + Healing time is typically 3 to 6 weeks.
* Closed Reduction:
  + Used for nasal fractures or some zygomatic fractures.
  + Performed under local or general anesthesia within 10–14 days of injury.
  + Involves manually realigning bones without incisions.
* Open Reduction and Internal Fixation (ORIF):
  + Indicated for displaced, unstable, or complex fractures (e.g., mandible, midface, orbital fractures).
  + Surgery involves exposing the fracture site via incisions (intraoral, sublabial, or external), realigning bones, and stabilizing with plates and screws.
  + Titanium plates and screws are commonly used and usually left permanently unless complications arise.
  + Intermaxillary fixation (wiring jaws shut) may be used temporarily, often for 4–6 weeks in mandibular or LeFort fractures.
  + Surgery is optimally performed either within hours of injury or delayed until swelling subsides (~10–14 days).
* Endoscopic-Assisted Repair:
  + Minimally invasive approach for selected fractures (e.g., orbital floor, frontal sinus).
  + Smaller incisions and faster recovery.
* Soft Tissue Repair:
  + Lacerations and nerve injuries addressed concurrently or in staged procedures.

## 2. Recovery Timeline

| **Phase** | **Duration & Details** |
| --- | --- |
| Immediate Post-Op | 1–3 days hospitalization for monitoring, pain management, swelling control |
| Early Healing | 1–2 weeks: Swelling and bruising peak; soft or liquid diet recommended |
| Functional Recovery | 11 days average for zygomatic-orbital-malar-nasal fractures; 21 days for maxillary-mandibular fractures (varies) |
| Bone Healing | 6–8 weeks for simple fractures; complex reconstructions may take several months |
| Return to Normal Activities | Typically 6–8 weeks; full recovery depends on injury severity and treatment |

## 3. Drugs Used and Their Side Effects

* Analgesics (Pain Control):
  + NSAIDs (e.g., ibuprofen): Pain relief and reduce inflammation.
    - Side effects: Gastric irritation, bleeding risk, kidney impairment.
  + Acetaminophen (paracetamol): Pain relief with fewer GI side effects.
    - Side effects: Liver toxicity in overdose.
* Antibiotics:
  + Used prophylactically or therapeutically if open fractures or contamination are present.
  + Common choices: Amoxicillin-clavulanate, clindamycin, or cephalosporins.
  + Side effects: Allergic reactions, GI upset, antibiotic resistance.
* Steroids:
  + Sometimes used to reduce edema, especially in orbital fractures.
  + Side effects: Hyperglycemia, immunosuppression, mood changes.
* Sedatives/Anesthetics:
  + Used preoperatively; side effects depend on agents used.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you’ve had some facial trauma. Can you tell me how the injury happened and what symptoms you’re experiencing?

Patient: Yes, I fell and hit my face pretty hard. My cheek is swollen and painful, and I have some numbness around my upper lip. It’s also hard to open my mouth fully.

Doctor: Thank you for sharing that. Based on your symptoms and the injury mechanism, we will need to do a thorough examination and imaging, like a CT scan, to check for any fractures in your facial bones.

Patient: What kind of fractures could I have? How serious is it?

Doctor: Facial fractures can involve different bones like the cheekbone, jaw, nose, or orbit around the eye. Some fractures are minor and heal well without surgery, while others may require surgical repair to restore function and appearance.

Patient: If I need surgery, what does that involve?

Doctor: Surgery usually involves realigning the broken bones and stabilizing them with small plates and screws. This can be done through small incisions inside your mouth or on the face, depending on the fracture location. The goal is to restore your facial structure and function.

Patient: How long will recovery take? Will I have pain?

Doctor: Recovery varies but generally takes about 6 to 8 weeks for the bones to heal. You may experience swelling and some discomfort initially, which we will manage with pain medications. We’ll also give you instructions on diet and activity restrictions to help healing.

Patient: Are there any risks or side effects from the medications?

Doctor: Common pain medications like ibuprofen can cause stomach irritation or bleeding in some people, so we’ll monitor you closely. If antibiotics are needed to prevent infection, they can sometimes cause stomach upset or allergic reactions.

Patient: Will I need follow-up visits?

Doctor: Yes, we’ll schedule follow-ups to monitor your healing, remove any sutures if needed, and check for any complications. If you notice increased pain, fever, or changes in vision, please contact us immediately.

Patient: Is there anything I can do to help myself heal faster?

Doctor: Avoid smoking, maintain good oral hygiene, follow your diet and activity guidelines, and attend all follow-up appointments. Rest and proper nutrition also support healing.

Patient: Thank you, doctor. I feel better knowing what to expect.

Doctor: You’re welcome. We’ll take good care of you throughout your recovery.

REFERENCES:

<https://www.uhsussex.nhs.uk/resources/facial-fractures-emergency-department-leaflet/>

<https://emedicine.medscape.com/article/84613-overview#a6>

[Facial Fractures: Symptoms, Types & Treatment](https://my.clevelandclinic.org/health/diseases/16025-facial-fractures#overview)

**Facial trauma**

ALTERNATIVE NAMES

* Maxillofacial trauma
* Facial injury
* Craniofacial trauma (when both facial and cranial injuries are involved)
* Facial fractures and soft tissue injuries
* Facial blunt trauma (when caused by blunt force)
* Facial penetrating trauma (when caused by sharp objects)
* Facial contusion (bruising of the face)
* Facial lacerations (cuts or tears in the facial skin)

**DEFINITION / DESCRIPTION**

Facial trauma is bone or soft tissue damage to the face caused by motor vehicle accidents, assaults (including gunshots), sports injuries, falls, chemical exposures, thermal burns or animal bites. Because the human face is an intricate area containing many bones, blood vessels, nerves, muscles and sensory organs, if untreated, facial trauma may cause a permanent loss of function (seeing, chewing, speaking, swallowing) and disfigurement if not treated. Working together, emergency doctors, plastic and reconstructive surgeons, and other practitioners can lessen this risk of permanent complications

## Traumatic Injuries to the Face

Depending on the type of injury, facial trauma can cause severe bleeding and swelling, a bruised face, and distorted appearance of the facial features.

### **Facial Fractures**

Facial fractures can affect any part of the face and impair function or distort the appearance. Severe fractures of the facial bones can cause leakage of cerebrospinal fluid that surrounds the brain.

* **A broken jaw** can affect the person’s ability to eat, chew, speak and swallow.
* **Teeth** can be cracked or broken calling for restorative dental work.
* **Broken bones in the midface** (maxillary fracture ― upper) can include:
  + LeFort I fracture, which occurs in a horizontal (transverse) line above the teeth and beneath the nose (the alveolar ridge).
  + LeFort II fracture, which can affect one or both sides of the face. The crack in the facial bones extends from the lower edge of the eye socket across the bridge of the nose and downward through the cheekbone (zygomatic arch) into the upper jaw (maxilla) behind the back upper teeth.
  + A LeFort III fracture forms a horizontal line across the back of the eye sockets and may be the result of a forceful, downward blow to the head.
* **A broken eye socket** (orbital bone fracture) may include:
  + **orbital rim fracture**, which occurs in the thick outer edges of the eye socket bone
  + **orbital floor fracture**, sometimes called a **blowout fracture**. A direct impact to the face (for instance, being hit in the face with a baseball) can leave the outer rim of the eye socket intact, but can break the bone in the bottom of the eye socket, creating a hole. Orbital floor fractures can cause a black eye, eye pain and vision problems due to entrapped nerves and muscles that enable movement of the eye.

### **Facial Soft Tissue Injuries**

These may include

* Torn skin or scalp (facial laceration) that raises the risk of bleeding, infection and scarring.
* Cuts and scrapes to the face.
* Facial burns, either thermal (from heat or cold) or chemical.
* Eye injuries.
* Nerve damage that can affect sensation or a person’s ability to smile, blink, move their eyes to focus, swallow, bite, or chew.
* Laceration of the tongue, which can impair the person’s ability to eat, swallow or speak.
* Damage to salivary glands. Over 100 of these glands are found in the face and keep the mouth moist for eating and speaking.

The first stage of treatment for a person with a facial injury due to a motor vehicle accident, fall, burn, animal bite or assault takes place in the emergency department. There, the patient gets a full, head-to-toe trauma evaluation and emergency management of any life-threatening conditions.

Doctors, nurses and technologists work together to control bleeding and swelling and assess and manage effects of the facial trauma on the person’s airway, brain and vision. Facial injuries can be associated with:

* **Airway damage**: A broken nose or other fractures and swelling can injure the nasal passageways and make it difficult for a person to breathe.
* **Neurological problems**: Facial injuries can be associated with head trauma that can have an impact on the skull and brain. ER doctors look for uneven pupils, leaks of clear cerebrospinal fluid from the nose and other signs that the injury involves the central nervous system.
* **Eye injuries**: The eye itself and its surrounding nerves and bones can be damaged.
* **Internal bleeding** can cause increasing pressure in the skull, putting the eyes, brain, nerves or other sensitive structures at risk for further injury.

**CAUSES**

The following issues are all common causes of facial trauma.

* **Sports-related injuries** – A hard hit in a contact sport or a fall in a sport like gymnastics or cheerleading can all lead to facial trauma.
* **Car acciden**t – Despite advances in airbags, car accidents are still leading causes of facial trauma in the United States.
* **Slip and fall** – A severe slip and fall can lead to serious oral and facial injuries.
* **Work-related injuries** – A fall on the job, getting hit with a piece of construction equipment being injured by debris and other workplace-related injuries are common causes of facial trauma.
* **Interpersonal violence/assault** – Domestic violence, mugging, and other types of assault and interpersonal violence can result in serious facial trauma.

**DIAGNOSIS METHODS**

After careful physical examination in the emergency room, imaging tests using computed tomography, or CT, is the most effective way to assess face trauma, since it allows imaging of bone, soft tissue, blood vessels and other structures.

Plastic and reconstructive surgeons may order additional images to plan for surgery. Redett explains, “CT is the only thing we use. Plain X-rays don't tell the whole story, and MRI doesn't image bones well.”

**TREATMENT OPTIONS**

For deep cuts or lacerations to soft tissue, abrasions or fractures of the bones of the face, the ER doctors will likely refer the patient to a plastic and reconstructive surgeon.

### **Communication Is Essential**

The surgeons stress the importance of clear communication between patients and the plastic and reconstructive surgeons. Practitioners need to be receptive to the patients’ priorities, hopes and concerns, and patients should understand the surgical options available, the treatment plan and the outcomes they can expect.

Patients often have questions about the technical aspects of surgery,” Redett says. “For instance, when we have to repair bone fractures with plates and screws, patients will ask if it will remain in their face.” (It will, he says, adding that the materials are compatible with the patient’s tissues.) “They wonder if titanium plates or screws will set off metal detectors.” (They won’t.)

### **Goals of Facial Trauma Treatment**

The objectives of treating someone with facial trauma using plastic and reconstructive surgery are:

* Restore normal facial functions affected by the facial trauma, such as focusing, blinking, smiling, chewing, speaking and swallowing.
* Optimize appearance.

Yang explains his first priority is restoring function: the patient’s ability to see, breathe, chew, swallow, speak and move facial features. But he adds that surgery to ensure the facial features work properly can take the patient’s appearance into account.

“Our decision-making process, as plastic and reconstructive surgeons, focuses on how can we gain the best functional outcome while considering what the treated area is going to look like afterward. For instance, if we are repairing a major lower jaw fracture, we don't want to scar the skin, so we may go through the mouth.”

Yang says plastic and reconstructive surgeons, when planning treatment for facial trauma, draw from their experience with other types of facial plastic and reconstructive surgery.

“We can use our understanding of normal healing and that's why we use both physical exam and CT. Our experience with repairing congenital facial deformity and cancers affecting the face help us understand the recovery process,” he says, adding that surgical planning usually starts with soft tissues and then considers whether broken facial bones are likely to heal on their own or require surgical reconstruction.

### **Repairing Soft Tissue Injuries to the Face**

Treatment for tears or crush injuries to the skin, nerves, glands or muscles may include **microvascular reconstructive surgery** — one or more intricate procedures to repair areas of soft tissue that have been cut or torn while reestablishing nerve connections and blood flow.

### **Addressing Facial Trauma Affecting the Eyes**

Facial injuries can involve peripheral nerves such as the cranial nerves that allow movement and sensation of the eyes.

“We need to document any neurologic problems early,” Yang says. “In patients with an injury to the upper third of their face and who are having difficulty moving eyes or eyelids, this could be due to blood collection behind eye, which can eventually cause blindness. We need to make sure we catch those issues early to preserve eyesight.”

### **Repair and Reconstruction of Facial Bones**

Surgical treatment of facial fractures may include:

* Resetting of broken bones manually, without surgery (closed reduction).
* Surgery to align broken bones in the face (open reduction).
* Wiring of a broken jaw to stabilize it as bone heals. This can call for a special liquid diet while the person is unable to chew.
* Bone or skin grafts.
* Repair of eye socket or midfacial bones with titanium hardware.

**OUTLOOK / PROGNOSIS**

The prognosis of most pediatric facial trauma is excellent, especially in the absence of underlying fractures. Even if fractures are present, children have a remarkable ability to remodel bone and rarely have either need for surgical intervention or any lasting bony deformity. The most common sequela is scarring, particularly from burns or lacerations near the lips or around the eyes; generally, this is cosmetic but can have functional deficits. Scarring can be reduced with meticulous daily application of sunscreen to the site of the wound for 6-12 months after suture removal or adhesive dissolution

**DIFFERENTIAL DIAGNOSIS**

Facial trauma in children can be associated with additional sites of both minor and severe injury, especially in high-energy blunt force trauma such as motor vehicle collisions. It is also essential to consider high-risk situations that lead to trauma, such as assault or neglect (including lack of supervision leading to self-injurious behavior).

Specific injuries to consider during the evaluation of pediatric facial trauma include:

* Bony Injuries
  + Mandibular dislocation
  + Facial bone fractures, including sinus involvement
  + Skull fractures
  + Spinal fractures or cervical instability
  + Cartilaginous injuries
  + Dental fractures and avulsions
* Wounds
  + Lacerations and abrasions, including intraoral
  + Penetrating injuries (including stab wounds and gunshot wounds)
  + Animal and human bites
* Miscellaneous Injuries
  + Contusions and swelling
  + Epistaxis
  + Septal hematoma
  + Auricular hematoma
  + Tympanic membrane perforation
  + Inhalation injuries
  + Burns (including chemical, thermal, electrical)
  + Ocular injuries (extra-ocular muscle entrapment, globe rupture, retrobulbar hematoma, corneal abrasion)
  + Ductal and glandular injuries
  + Nerve injuries
  + Vascular injuries
  + Psychosocial trauma
  + Spinal cord trauma
  + Traumatic brain injury and concussion
* Injury Etiologies
  + Non-accidental trauma (including shaken baby syndrome)
  + Assault (including intimate partner violence)
  + Suicide attempt
  + Irritant exposure (inhalation injuries)

**EPIDEMIOLOGY**

Pediatric trauma results in over 11,000 deaths and over 8 million ED visits annually.Isolated facial injuries in children are typically restricted to soft tissues as substantial force is needed to generate fractures. Fractures occur in only 8-15% of pediatric facial trauma cases that present to the ED.

Soft tissue injuries to the face are common, with approximately 34 to 92% of facial trauma presentations in children having soft tissue injury, generally contusions or lace*rations, and around 15 to 69% having a dental injury.* About half the time, the primary soft tissue injury is a laceration, with the remaining cases being contusions, abrasions, bites, and more rarely burns or eye injuries.

There are more than 22,000 pediatric dental trauma cases annually, with 10 to 60% of pediatric athletes report having experienced dental trauma at some point.

Many minor facial traumas can be treated in the home without contacting the medical system. Thus there is likely underreporting of facial trauma as care at home or in stand-alone clinics may not be captured in a hospital or systems-based data collection.

Neonates and toddlers generally have an equal gender representation or a slight male bias. However, with increasing age, there is an increasing predominance of male involvement, attaining a case gender ratio of male-to-female 2 to 1 to 4 to 1 by late adolescence.Patients aged approximately 1 to 6 years old are most likely to present for evaluation of facial trauma, accounting for 26 to 58% of all cases.Mid-adolescence was the next most likely age of presentation.

The cause of injury is highly correlated with age. Overall, 38 to 55% of presentations were due to a fall or play, typically in children under six years of age. Motor vehicle collisions, sports, and assault, respectively, accounted for 5 to 21%, 11 to 32%, and 4 to 17% of presentations. Adolescent males, in particular, represented many of the assault cases, while sports injuries were more evenly distributed among all patients above the age of 5 years.

Incidence and Prevalence:

* In 2017, the global age-standardized incidence of facial fractures was 98 per 100,000 people, with an estimated 7,538,663 new cases worldwide .
* The global age-standardized prevalence of facial fractures in 2017 was 23 per 100,000 people, equating to 1,819,732 individuals living with disability due to these injuries .
* In the United States, there were 407,167 emergency department (ED) visits for facial fractures in 2007 .
* Facial trauma constitutes approximately 7.4% to 8.7% of emergency care visits .

Geographic Distribution:

* Facial fractures are prevalent worldwide, with the highest age-standardized incidence and prevalence concentrated in Central Europe (including Eastern Europe and Central Asia) . Slovenia had the highest age-standardized incidence rate (376 per 100,000) and prevalence (81 per 100,000) in 2017 .

Demographics:

* The average age of patients presenting with facial fractures is around 32.61 to 37.9 years .
* Males are more frequently affected than females, with male-to-female ratios ranging from 4.3:1 to as high as 6.3:1 in the 20-29 age group .
* While facial trauma can occur at any age, from 7 months to 94 years, the third decade of life (20-29 years) is often the most affected .

Etiology (Causes):  
The leading causes of facial fractures vary by region and population, but common factors include:

* Falls are the predominant cause globally , accounting for 24.6% of ED visits for facial fractures in the U.S. in 2007 .
* Motor vehicle accidents (MVAs), including motorcycle and car accidents, are a significant cause, comprising 12.1% of U.S. ED visits and over 53% in some studies .
* Assaults or physical aggression account for a substantial portion, around 15.3% to 37% .
* Sports accidents are also a contributing factor .
* Other causes include gun-related accidents, animal-related accidents, and domestic accidents .

Commonly Fractured Bones:  
Approximately 75% of facial fractures occur in the mandible, zygoma (cheekbone), and nose . Specific frequencies reported include:

* Zygomatic fractures: 33.1%
* Mandible fractures: 31.6%
* Nose fractures: 19.5%

Socio Economic Impact:

* The management of facial fractures incurs considerable healthcare costs. In 2007, total U.S. emergency department charges for facial fractures were nearly $1 billion

**PREDEFINED Q & A SETS**

## Facial Trauma: Predefined Q&A

Q1: What is facial trauma?  
A: Facial trauma, also called maxillofacial trauma, refers to any physical injury to the face, including soft tissue injuries (cuts, bruises, burns) and fractures of facial bones such as the nose, jaw, cheekbones, and eye sockets.

Q2: What are common causes of facial trauma?  
A: The most frequent causes include falls, assaults (blunt trauma from fists or objects), sports injuries, motor vehicle accidents, workplace injuries, and animal attacks. Airbags can also cause facial injuries during deployment.

Q3: What are the typical signs and symptoms of facial trauma?  
A: Symptoms vary but often include pain, swelling, bruising, deformity (such as sunken cheekbones or misaligned teeth), nosebleeds, difficulty opening the mouth, numbness, and vision problems like double vision.

Q4: How is facial trauma diagnosed?  
A: Diagnosis involves physical examination, assessment of airway and vision, and imaging studies like X-rays or CT scans to identify fractures or internal injuries. Specialists such as maxillofacial surgeons or ENT doctors may be involved.

Q5: What are the treatment options for facial trauma?  
A: Treatment depends on injury severity. Minor injuries may be managed conservatively with ice, elevation, and pain relief. More severe fractures may require closed reduction (non-surgical realignment) or open reduction with surgery to realign and fix bones. Complex cases may need reconstructive surgery.

Q6: How long does recovery from facial trauma take?  
A: Recovery varies but minor injuries often heal within 1-2 weeks, while fractures and surgical cases may take 6-12 weeks or longer. Swelling and bruising typically improve within a week, but full functional recovery may require months.

Q7: How can swelling and bruising be managed?  
A: Applying ice packs promptly, keeping the head elevated, and after 1-2 days, using warm compresses can help reduce swelling and bruising. Pain medications and rest are also important.

Q8: When can I return to work or school after facial trauma?  
A: Return depends on injury severity and treatment. Minor injuries may allow return within 1-2 weeks; surgical cases often require 4-8 weeks or more. Avoid strenuous activities until cleared by your doctor.

Q9: How can I protect the injured area during healing?  
A: Avoid trauma or pressure to the face, follow dietary recommendations (e.g., soft foods if jaw is involved), maintain hygiene, and use protective gear if returning to physical activities.

Q10: What complications can arise from facial trauma?  
A: Possible complications include infection, persistent numbness, changes in facial appearance, vision problems, bite changes, and TMJ dysfunction. Follow-up care is essential to monitor and manage these

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I’m Dr. Smith. I understand you’ve had some facial trauma. Can you tell me what happened and when the injury occurred?

Patient: Yes, I was in a car accident yesterday and hit my face on the dashboard.

Doctor: I’m sorry to hear that. We’ll take good care of you. First, I’ll do a thorough examination to check for any fractures, soft tissue injuries, and to make sure your airway is clear and you’re breathing well. Have you noticed any difficulty breathing, vision changes, or numbness?

Patient: No trouble breathing, but my face is swollen and it hurts a lot. I also have some numbness on my cheek.

Doctor: That numbness could indicate nerve involvement, which we will evaluate carefully. I’ll inspect your face for swelling, bruising, asymmetry, and any cuts or open wounds. We’ll also palpate your facial bones to check for any irregularities or instability.

Patient: What kind of tests will I need?

Doctor: We’ll order imaging studies, usually a CT scan, to get detailed views of your facial bones and to identify any fractures or hidden injuries. This helps us plan the best treatment.

Patient: Will I need surgery?

Doctor: That depends on the extent and type of fractures. Minor, nondisplaced fractures might heal with conservative treatment like rest, ice, and pain control. However, if the bones are displaced or unstable, or if there are injuries affecting your bite, vision, or airway, surgery may be necessary to realign and fix the bones.

Patient: How long will recovery take?

Doctor: Recovery varies. Minor injuries may heal in 4 to 6 weeks. Surgical cases often require 6 to 12 weeks for bone healing and soft tissue recovery. Swelling and bruising usually improve within a week or two, but full recovery can take a few months.

Patient: When can I go back to work or school?

Doctor: It depends on your healing and the nature of your activities. For minor injuries, you might return within 1 to 2 weeks, avoiding strenuous activity. After surgery, it may take 4 to 8 weeks or more. We will guide you based on your progress.

Patient: How can I protect my face while it heals?

Doctor: Avoid any trauma or pressure to the area, follow a soft diet if your jaw is involved, maintain good hygiene, and wear protective gear if you return to physical activities. We’ll also schedule follow-ups to monitor your healing.

Patient: Thank you, doctor. I feel better knowing what to expect.

Doctor: You’re welcome. We’ll take good care of you and keep you informed every step of the way.

REFERENCES:

<https://www.ncbi.nlm.nih.gov/books/NBK558932/#article-21569.s8>

[Facial Trauma | Johns Hopkins Medicine](https://www.hopkinsmedicine.org/health/conditions-and-diseases/facial-trauma)

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**Flu**

ALTERNATIVE NAMES

* Influenza
* Seasonal influenza
* Grippe (an older term, still used in some regions)
* Flu virus infection
* Influenza virus infection

**DEFINITION / DESCRIPTION**

Flu, also called influenza, is an infection of the nose, throat and lungs, which are part of the respiratory system. The flu is caused by a virus. Influenza viruses are different from the "stomach flu" viruses that cause diarrhea and vomiting.

Most people with the flu get better on their own. But sometimes, influenza and its complications can be deadly. To help protect against seasonal flu, you can get an annual flu shot. Although the vaccine isn't 100% effective, it lowers the chances of having severe complications from the flu. This is especially true for people who are at high risk of flu complications.

Aside from the vaccine, you can take other steps to help prevent infection with the flu. You can clean and disinfect surfaces, wash hands, and keep the air around you moving.

### **Flu and the common cold**

The flu and the common cold can have similar symptoms, like runny nose and cough. But cold symptoms are usually mild and flu symptoms can be severe and lead to serious complications. Different viruses cause colds and the flu.

### **How do I know if I have the flu or COVID-19?**

Since they have similar symptoms, the only way to know for sure if you have the flu or COVID-19 is to get tested. They both have a risk of serious illness. But different viruses cause these infections, and providers treat them with different medications.

### **Who is at higher risk for complications from the flu?**

Certain health conditions can put you at higher risk for severe illness from the flu. This includes life-threatening complications that require hospitalization. You’re at higher risk for serious illness if you:

* Have asthma, COPD or another chronic lung disease.
* Have a history of kidney, liver, neurological, heart or blood vessels disease, including stroke.
* Have a condition that causes issues with muscle function or makes it difficult to cough, swallow or clear fluids from your airways.
* Have diabetes.
* Have a weakened immune system (from HIV/AIDS, cancer or immunosuppressive medications).
* Have a blood disorder, like sickle cell disease.
* Have a BMI greater than 30 (have obesity).
* Are under 5 years old or over 65 years old.
* Are pregnant.
* Are under 19 years old and take aspirin regularly.
* Live in a long-term care facility.

Non-Hispanic Black people, non-Hispanic American Indians, Alaska Native people and Hispanic or Latino people have the highest rates of severe illness from the flu compared to non-Hispanic White people and non-Hispanic Asian people.

**CAUSES**

Influenza is caused by viruses. These viruses travel through the air in droplets when someone with the infection coughs, sneezes or talks. You can inhale the droplets directly. Or you can pick up the virus from touching an object, such as a computer keyboard, and then touching your eyes, nose or mouth.

It's possible to spread the virus to others from about a day before symptoms appear until about 5 to 7 days after they start. This is called being contagious. Children and people with weakened immune systems may be contagious for a slightly longer time.

Influenza viruses are constantly changing, with new strains appearing often.

A person's first flu infection gives some long-term protection against similar strains of flu. But the vaccines offered each year are made to match the flu virus strains that are most likely to spread that season. The protection these vaccines offer lasts for months in most people.

**RISK FACTORS**

There are a range of factors that may raise your risk of catching a flu virus or having complications from a flu infection.

### **Older and younger age**

Seasonal influenza tends to have worse outcomes in young children, especially those age 2 years and younger. Adults older than age 65 also tend to have worse outcomes.

### **Living conditions**

People who live in facilities with many other residents, such as nursing homes, are more likely to get the flu.

### **Weakened immune system**

An immune system that doesn't quickly clear out flu virus may raise the risk of getting the flu or getting flu complications. People may have a weakened immune system response from birth, due to illness, or due to disease treatment or medicine.

### **Chronic illnesses**

Chronic conditions may increase the risk of influenza complications. Examples include asthma and other lung diseases, diabetes, heart disease, nervous system diseases, previous history of stroke, metabolic disorders, problems with the airway, and kidney, liver or blood disease.

### **Race or ethnicity**

In the United States, people who are Native American or Alaska Native, Black, or Latino may have a higher risk of needing care in the hospital for influenza.

### **Aspirin therapy**

Young people on long-term aspirin therapy are at risk of developing Reye's syndrome if infected with the influenza virus.

### **Pregnancy**

Pregnant people are more likely to develop influenza complications, particularly in the second and third trimesters.

### **Obesity**

People with a body mass index (BMI) of 40 or higher have an increased risk of flu complications.

**SIGNS / SYMPTOMS**

The viruses that cause flu spread at high levels during certain times of the year in the Northern and Southern hemispheres. These are called flu seasons. In North America, flu season usually runs between October and May.

Symptoms of the flu such as a sore throat and a runny or stuffy nose are common. You may also get these symptoms with other illness such as a cold. But colds tend to start slowly, and the flu tends to come on quickly, within two or three days after you come in contact with the virus. And while a cold can be miserable, you usually feel much worse with the flu.

Other common flu symptoms include:

* Fever.
* Cough.
* Headache.
* Muscle aches.
* Feeling very tired.
* Sweating and chills.

In children, these symptoms may show up more generally as being fussy or irritable. Children also are more likely than adults to have ear pain, feel sick to the stomach, vomit or have diarrhea with the flu.

In some cases, people have eye pain, watery eyes or find that light hurts their eyes.

**DIAGNOSIS METHODS**

To diagnose the flu, also called influenza, your healthcare professional does a physical exam, looks for symptoms of flu and possibly orders a test that detects flu viruses.

The viruses that cause flu spread at high levels during certain times of the year in the Northern and Southern hemispheres. These are called flu seasons. During times when flu is widespread, you may not need a flu test.

But a test for flu may be suggested to help guide your care or to know if you could spread the virus to others. A flu test may be done by a pharmacy, your healthcare professional's office or in the hospital. For people age 2 and older, a test you can take at home may be available. If you do use an at-home test, let your healthcare professional know the results. You may need to confirm the results, positive or negative, with a test from your healthcare team.

Types of flu tests you may have include:

* **Molecular tests.** These tests look for genetic material from the flu virus. Polymerase chain reaction tests, shortened to PCR tests, are molecular tests. You also may hear this type of test called an NAAT test, short for nucleic acid amplification test.
* **Antigen tests.** These tests look for viral proteins called antigens. Rapid influenza diagnostic tests are one example of antigen tests.

It's possible to have a test to diagnose both flu and other respiratory illness, such as COVID-19, which stands for coronavirus disease 2019. You may have both COVID-19 and influenza at the same time.

**TREATMENT OPTIONS**

If you have a severe infection or are at high risk of complications from a flu infection, your healthcare professional may prescribe an antiviral medicine to treat the flu. These medicines can include oseltamivir (Tamiflu), baloxavir (Xofluza) and zanamivir (Relenza).

You take oseltamivir and baloxavir by mouth. You inhale zanamivir using a device similar to an asthma inhaler. Zanamivir shouldn't be used by anyone with certain chronic respiratory problems, such as asthma and lung disease.

People who are in the hospital may be prescribed peramivir (Rapivab), which is given in a vein.

These medicines may shorten your illness by a day or so and help prevent serious complications.

Antiviral medicine may cause side effects. The side effects often are listed on the prescription information. In general, antiviral medicine side effects may include breathing symptoms, nausea, vomiting or loose stools called diarrhea.

**Lifestyle and home remedies**

If you have the flu, these measures may help ease your symptoms:

* **Drink plenty of liquids.** Choose water, juice and warm soups to help keep fluids in your body.
* **Rest.** Get more sleep to help your immune system fight infection. You may need to change your activity level, depending on your symptoms.
* **Consider pain relievers.** Use acetaminophen (Tylenol, others) or ibuprofen (Advil, Motrin IB, others) for fever, headache or achiness associated with influenza. Children and teens recovering from flu-like symptoms should never take aspirin because of the risk of Reye's syndrome, a rare but potentially fatal condition.

To help control the spread of influenza in your community, stay home and keep sick children home until the fever is gone, without the use of medicine, for 24 hours. Unless you're going to a medical appointment, avoid being around other people until you're feeling better. If you need to leave your home to get medical care, wear a face mask. Wash your hands often.

## 1. Oseltamivir (Tamiflu®)

* Class: Neuraminidase inhibitor
* Form: Oral capsule or liquid suspension
* Indication: Treatment and prophylaxis of influenza A and B in patients ≥14 days old
* Dosage: Usually twice daily for 5 days for treatment
* Side Effects:
  + Nausea and vomiting (most common)
  + Headache
  + Rare: allergic reactions, neuropsychiatric events (confusion, hallucinations)
  + Generally well tolerated

## 2. Zanamivir (Relenza®)

* Class: Neuraminidase inhibitor
* Form: Inhaled powder via device
* Indication: Treatment and prophylaxis in patients ≥7 years old
* Dosage: Twice daily inhalation for 5 days
* Side Effects:
  + Cough, throat irritation, bronchospasm (especially in asthma or COPD patients)
  + Headache
  + Rare allergic reactions
* Note: Not recommended for patients with underlying respiratory diseases due to risk of bronchospasm.

## 3. Peramivir (Rapivab®)

* Class: Neuraminidase inhibitor
* Form: Intravenous infusion
* Indication: Treatment of influenza in patients ≥6 months old
* Dosage: Single IV dose
* Side Effects:
  + Diarrhea
  + Rare allergic reactions
  + Possible neutropenia or elevated liver enzymes (rare)

## 4. Baloxavir marboxil (Xofluza®)

* Class: Cap-dependent endonuclease inhibitor (different mechanism)
* Form: Oral single-dose tablet
* Indication: Treatment of uncomplicated influenza in patients ≥12 years old (and children 5-11 years without chronic conditions)
* Dosage: Single oral dose
* Side Effects:
  + Diarrhea
  + Bronchitis
  + Nausea
  + Headache
* Note: Not recommended during pregnancy, breastfeeding, or in hospitalized patients due to limited data.

**PREVENTION TIPS**

The U.S. Centers for Disease Control and Prevention (CDC) recommends annual flu vaccination for people age 6 months and older who do not have a medical reason to avoid the vaccine.

Getting a flu vaccine lowers:

* The risk of getting the flu. If the vaccine is given later in pregnancy, the flu vaccine helps protect a newborn from the flu too.
* The risk of having serious illness from the flu and needing to stay in the hospital due to the flu.
* The risk of dying of the flu.

The 2024-2025 seasonal flu vaccines each provide protection against three influenza viruses that researchers expect to be the most common this flu season.

The vaccine is available as a shot, a jet injector and a nasal spray.

For older children and adults, the flu shot is usually given in a muscle in the arm. Younger children may get the flu shot in a thigh muscle.

If you are an adult under the age of 65, you can choose to get your vaccine with a jet injector. Instead of a needle, this device uses a high-pressure, narrow stream of fluid to go through the skin.

The nasal spray is approved for people between ages 2 and 49 years old. It isn't recommended for some groups, such as:

* People who had a severe allergic reaction to a flu vaccine in the past.
* Pregnant people.
* Young people who take aspirin or a salicylate-containing medicine.
* People with weakened immune systems and people who are caregivers or close contacts of people with weakened immune systems.
* Children between ages 2 and 4 years old diagnosed with asthma or wheezing in the past 12 months.
* People who recently took antiviral medicine for the flu.
* People with a cerebrospinal fluid leak or the potential for a leak, as with a cochlear implant.

Check with your healthcare team to see if you need to be cautious about getting a nasal spray flu vaccine. If you can take the nasal spray flu vaccine, you may be able to do so, or give it to an eligible child, without seeing a healthcare professional.

There also are vaccines offered called high-dose or adjuvanted flu vaccines. These vaccines may help some people avoid the need for care in the hospital due to influenza. People over age 65 can get these vaccines. These vaccines also are recommended for people age 18 and older who have a solid organ transplant and take medicine to weaken their immune response.

If you have an egg allergy, you can still get a flu vaccine.

The first time children between 6 months and 8 years get a flu vaccine, they may need two doses given at least four weeks apart. After that, they can receive single annual doses of the flu vaccine. Check with your child's healthcare professional.

Also, check with your healthcare team before receiving a flu vaccine if you had a serious reaction to a previous flu vaccine. People who have had Guillain-Barre syndrome also should check with a healthcare professional before getting the flu vaccine. And if you feel sick when you go to get the shot, check with your healthcare team to see if you should delay getting the vaccine.

### **Controlling the spread of infection**

The influenza vaccine isn't 100% effective. So it's important to take steps to lower the spread of infection, including:

* **Wash your hands.** Wash your hands well and often with soap and water for at least 20 seconds. If soap and water aren't available, use an alcohol-based hand sanitizer with at least 60% alcohol. Make sure friends and family that you're around regularly, especially kids, know the importance of hand-washing.
* **Avoid touching your face.** Keeping your hands away from your eyes, nose and mouth helps keep germs away from those places.
* **Cover your coughs and sneezes.** Cough or sneeze into a tissue or your elbow. Then wash your hands.
* **Clean surfaces.** Regularly clean often-touched surfaces to prevent spread of infection from touching a surface with the virus on it and then your face.
* **Avoid crowds.** The flu spreads easily wherever people gather — in child care centers, schools, office buildings and auditoriums and on public transportation. By avoiding crowds during peak flu season, you lower your chances of infection.

Also avoid anyone who is sick.

If you're sick, stay home until you feel better and have had no fever for a full 24 hours, and you haven't taken medicine for fever during that time. If your fever returns or you start to feel worse, stay apart from others until your symptoms improve and you are fever-free without medicine for 24 hours. Doing so will lower your chance of infecting others.

**OUTLOOK / PROGNOSIS**

Most people are able to manage flu symptoms at home and recover within a few days to a week. Because it can cause severe illness, it’s important to keep an eye on your symptoms and get medical attention if you need it. This is especially important if you have an underlying health condition.

If you’re sick with the flu, you should avoid being around others, except to seek medical care.

#### **How long does the flu last?**

Flu can last from a few days to two weeks. Symptoms like fever and body aches can come on suddenly but usually go away faster than other symptoms. A cough or runny nose can last longer.

#### **How long is the flu contagious?**

You can be contagious with the flu from a day before your symptoms start to up to a week after. You’re most contagious for three to four days after your symptoms start. People with weakened immune systems and infants may be contagious for longer.

#### **When can I go back to work/school?**

To avoid spreading the flu to others, you shouldn’t go back to work or school until it’s been at least 24 hours since you’ve had a fever (without taking fever-reducing medications). Your employer or school may have different requirements for returning.

#### **Complications**

The flu virus itself can cause complications or it can weaken your immune system and allow bacteria to infect different parts of your body (secondary infection). Complications and secondary infections include:

* Ear infections.
* Sinus infections.
* Severe lung infection (pneumonia). Pneumonia can lead to acute respiratory distress syndrome (ARDS) and other life-threatening conditions.
* Pregnancy loss (miscarriage).
* Neural tube defects (NTDs) in the developing fetus of a pregnant woman.

### **How many people die from the flu each year?**

In a typical flu season in the U.S., it’s estimated that between 20,000 and 50,000 people die from the flu. Another 300,000 to 500,000 require hospitalization for serious illness.

**POSSIBLE COMPLICATIONS**

If you're young and healthy, the flu usually isn't serious. Although you may feel awful while you have it, the flu usually goes away in a week or two with no lasting effects.

But people at high risk may develop other health problems after the flu, called complications.

Getting another infection can be a complication of getting the flu. That includes illnesses such as croup and sinus or ear infections. Lung infections are another complication. Infection of the heart muscle or heart lining may happen after getting the flu. And in some cases, people may have infection of the central nervous system.

Other complications may be:

* Acute respiratory distress syndrome.
* Muscle damage, called rhabdomyolysis, or muscle swelling, called myositis.
* Toxic shock syndrome.
* Worsening of a chronic illness, such as asthma or kidney disease.

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

Most people who get the flu can manage it at home and often don't need to see a healthcare professional.

If you have flu symptoms and are at risk of complications, see your healthcare professional right away. Starting antiviral medicine within two days after your symptoms show up may shorten the length of your illness and help prevent more-serious problems.

If you have emergency symptoms of the flu, get medical care right away. For adults, emergency symptoms can include:

* Trouble breathing or shortness of breath.
* Chest pain or pressure.
* Ongoing dizziness.
* Hard to wake up or confusion.
* Dehydration.
* Seizures.
* Worsening of existing medical conditions.
* Severe weakness or muscle pain.

Emergency symptoms in children include all the symptoms seen in adults, as well as:

* Fast breathing or ribs that pull in with each breath.
* Gray or blue lips or nail beds.
* No tears when crying and a dry mouth, along with not needing to urinate.
* Symptoms, such as fever or cough, that get better but then come back or get worse.

### Cold versus Flu

Signs and Symptoms Cold Influenza (Flu)

Symptom onset Gradual Abrupt

Fever Rare Common; lasts 3-4 days

Aches Slight Common; often severe

Chills Uncommon Fairly common

Fatigue, weakness Sometimes Usual

Sneezing Common Sometimes

Chest discomfort, cough Mild to moderate; hacking cough Common; can be severe

Stuffy nose Common Sometimes

Sore throat Common Sometimes

Headache Rare Common

## **Diagnostic Considerations**

Accurately diagnosing influenza A or B infection solely on the basis of clinical criteria is difficult because of the overlapping symptoms caused by the various viruses associated with upper respiratory tract infection (URI). Viruses that may initially cause influenza like symptoms include adenoviruses, enteroviruses, and paramyxoviruses.

The early presentation of mild or moderate cases of flavivirus infections (eg, dengue) may initially mimic influenza. For example, some cases of West Nile fever acquired in New York in 1999 were clinically misdiagnosed as influenza.

Like influenza, URIs from these viruses are more common in the winter. As a result, during the winter, clinics and emergency department waiting rooms fill with patients who have influenza or other URIs.

Influenza pneumonia must be differentiated from other forms of viral pneumonia, bacterial pneumonia, and noninfectious causes of respiratory distress, such as heart failure, chronic obstructive pulmonary disease, pulmonary edema, and aspiration pneumonitis.

## H5N1 avian influenza

Risk factors or features that should raise the index of suspicion of H5N1 avian influenza include the following:

* Recent (within the preceding 2 weeks) travel to or location in a country with known avian influenza cases in animals or humans
* Unusual comorbidities such as encephalopathy or diarrhea
* History of exposure to birds, especially living in close proximity to birds, contact with sick or dying birds, or consumption of incompletely cooked bird meat
* History of exposure to individuals with known avian influenza, especially family, or to sick people in a country with known human cases of avian influenza

The situation can be complicated during outbreaks of severe respiratory disease other than avian influenza. The first case of laboratory-confirmed avian influenza infection was documented during the severe acute respiratory syndrome (SARS) outbreak of 2002-2003 and was mistakenly misdiagnosed as SARS.

Cases of avian influenza in which respiratory disease was limited or not apparent (with even normal chest radiography findings) have been described, though they account for only a small percentage of cases overall.The primary presenting illness has been encephalitis or diarrhea.

## **Differential Diagnoses**

* Acute Respiratory Distress Syndrome (ARDS)
* Adenovirus
* Arenaviruses
* Cytomegalovirus (CMV)
* Dengue
* Echovirus Infection
* Hantavirus Pulmonary Syndrome
* HIV Infection and AIDS
* Legionnaires Disease
* Human Parainfluenza Viruses (HPIV) and Other Parainfluenza Viruses

**RECENT GUIDELINES OR UPDATES**

## CDC Guidelines on Influenza Vaccination

The vaccine strains for the upcoming influenza season are selected annually by the Food and Drug Administration’s Vaccines and Related Biologic Products Advisory Committee based on WHO’s recommended Northern Hemisphere influenza vaccine composition. For the current composition,.

Routine annual influenza vaccination is recommended for all persons aged 6 months or older who do not have contraindications. A licensed, recommended, and age-appropriate vaccine should be used.

Pregnant patients may receive any licensed, recommended, age-appropriate influenza vaccine.

## Infectious Disease Society of America (IDSA) Guidelines for Influenza Testing and Antiviral Therapy

These guidelines discuss new information regarding diagnostic testing and treatment and chemoprophylaxis with antiviral medications.

Influenza testing

*Influenza testing in outpatients (including emergency department patients)*

During influenza activity, the following patient populations should undergo influenza testing:

* High-risk patients, including immunocompromised individuals with influenza like illness, pneumonia, or nonspecific respiratory illness if testing results would affect clinical management
* Patients with acute-onset respiratory symptoms (with or without fever) and either exacerbated chronic medical conditions or known influenza complications if testing results would affect clinical management

*Influenza testing in hospitalized patients*

During influenza activity, influenza testing should be performed in the following cases:

* Upon admission in all patients with acute respiratory illness, including pneumonia (with or without fever) who require hospitalization
* Upon admission in all patients with chronic cardiopulmonary disease that is acutely worsening
* Upon admission in all immunocompromised patients or in patients at high risk of complications who have acute-onset respiratory symptoms (with or without fever)
* All hospitalized patients who develop acute-onset respiratory symptoms (with or without fever) or respiratory distress without a clear alternative diagnosis

During periods of low influenza activity, influenza testing should be performed upon admission in all patients who require hospitalization with acute respiratory illness (with or without fever), who have been in contact with a person diagnosed with influenza, or who have recently traveled from a location known to have influenza activity.

*Specimen collection*

In outpatients, specimens from the upper respiratory tract should be collected as soon as possible after illness, preferably within 4 days of symptom onset. Nasopharyngeal specimens are preferred; if they are unavailable, throat and nasal swabs should be collected and combined for influenza testing. Mid-turbinate nasal swab specimens are preferred over throat swab specimens. Flocked swab specimens are preferred over nonflocked swab specimens.

In hospitalized patients without severe lower respiratory tract disease, nasopharyngeal, mid-turbinate nasal, or combined nasal-throat specimens should be collected for influenza testing as soon as possible*.*

In hospitalized patients with respiratory failure who are receiving mechanical ventilation, including those in whom influenza testing results were negative based on upper respiratory tract specimens, endotracheal aspirate or bronchoalveolar lavage fluid specimens should be collected for influenza testing as soon as possible.

Specimens from nonrespiratory sites should not be collected for influenza testing*.*

Serum specimens, including single or paired sera, should not be collected for serological diagnosis of seasonal influenza virus infection for clinical management purposes*.*

*Preferred testing methods*

In outpatients, rapid molecular assays (ie, nucleic acid amplification tests) are preferred over rapid influenza diagnostic tests (RIDTs).

In hospitalized patients, reverse-transcription polymerase chain reaction (RT-PCR) or other molecular assays are preferred over other influenza tests. In hospitalized patients who are immunocompromised, multiplex RT-PCR assays targeting a panel of respiratory pathogens, including influenza viruses, should be used*.*

Immunofluorescence assays should not be used for influenza virus antigen detection in hospitalized patients unless more-sensitive molecular assays are unavailable; negative immunofluorescence test results should be confirmed with RT-PCR or other molecular assays.

RIDTs should not be used in hospitalized patients unless more sensitive molecular assays are unavailable; negative RIDT results should be confirmed with RT-PCR or other molecular assays*.*

Viral culture should not be used for initial or primary diagnosis of influenza.

Serologic testing should not be used to diagnose influenza.

Antiviral therapy

*High-risk individuals*

Clinicians should initiate antivirals as soon as possible for adults and children with documented or suspected influenza, irrespective of influenza vaccination history, with the following:

* Hospitalized with influenza, regardless of illness duration before hospitalization
* Outpatients with severe or progressive illness, regardless of illness duration
* Children younger than 2 years and adults aged 65 years or older
* Women who are pregnant or within 2 weeks postpartum

*Individuals not at high risk*

Clinicians may consider antivirals for individuals with documented or suspected influenza, irrespective of influenza vaccination history, in the following patients:

* Outpatients with illness onset 2 days or less
* Symptomatic outpatients with household contacts at high risk
* Symptomatic healthcare providers who care for patients at high risk, particularly those who are severely immunocompromised

*Preferred antiviral regimens*

Antiviral treatment with a single neuraminidase inhibitor (NAI) (oral oseltamivir, inhaled zanamivir, or intravenous peramivir) should be initiated as soon as possible*.*

Higher doses of FDA-approved NAI drugs should not be used routinely to treat seasonal influenza*.*

Uncomplicated influenza in an otherwise healthy ambulatory patient should be treated for 5 days with oral oseltamivir or inhaled zanamivir or a single dose of intravenous peramivir.

*Considerations in cases of treatment failure or deterioration*

Bacterial coinfection should be sought and empirically treated (1) in patients with suspected or laboratory-confirmed influenza whose presentation is severe initially, in addition to antiviral treatment for influenza and (2) in patients who deteriorate after initial improvement, particularly while receiving antiviral therapy.

In cases that fail to improve or deteriorate despite antiviral treatment, causes other than influenza should be ruled out*.*

*Antiviral chemoprophylaxis*

Antivirals should not be used for routine or widespread chemoprophylaxis outside of institutional outbreaks; antiviral chemoprophylaxis can be considered in the following circumstances:

* The duration of influenza season in adults and children aged 3 months or older who are at very high risk of complications and for whom influenza vaccination is contraindicated, unavailable, or expected to have low effectiveness
* The duration of influenza season in adults and children aged 3 months or older who are at the highest risk of influenza-associated complications (eg, HSCT recipients)
* Short-term prophylaxis in addition to prompt flu vaccination in unvaccinated individuals at high risk as previously described or who are in contact with high-risk individuals

**EPIDEMIOLOGY**

In tropical areas, influenza occurs throughout the year. In the Northern Hemisphere, the influenza season typically starts in early fall, peaks in mid-February of the following year, and ends in the late spring. The duration and severity of influenza epidemics vary, however, depending on the virus subtype involved.

The WHO estimates that 1 billion influenza cases, 3 to 5 million severe cases, and 290,000 to 650,000 influenza-related respiratory deaths occur each year worldwide.In the United States, individual cases of seasonal flu and flu-related deaths in adults are not reportable illnesses; consequently, mortality is estimated by using statistical models.

The CDC estimates that flu-associated deaths in the United States ranged from about 3000 to 49,000 annually between 1976 and 2006. The CDC notes that the often-cited figure of 36,000 annual flu-related deaths was derived from years when the predominant virus subtype was H3N2, which tends to be more lethal than H1N1.

Unlike adult flu-related deaths, pediatric flu-related deaths are reportable in the United States. For the 2019-2020 influenza season, the CDC reports an estimated 35 million influenza-associated illnesses, 16 million influenza-related medical visits, 380,000 flu-associated hospitalizations, and 20,000 influenza-related deaths. A total of 486 children aged 0 months to 17 years died during the 2019-2020 influenza season.

The following statistics are offered for comparison:

* The 1918 H1N1 influenza pandemic caused 500,000-700,000 deaths in the United States—almost 200,000 of them in October 1918 alone—and an estimated 30-40 million deaths worldwide, mostly among people aged 15-35 years
* The 1957 H2N2 influenza pandemic (Asian flu) caused an estimated 70,000 deaths in the United States and 1-2 million fatalities worldwide
* The 1968 H3N2 influenza pandemic (Hong Kong flu) caused an estimated 34,000 deaths in the United States and 700,000 to 1 million fatalities worldwide

In contrast to typical influenza seasons, the 2009-2010 influenza season was affected by the H1N1 (“swine flu”) influenza epidemic, the first wave of which hit the United States in the spring of 2009, followed by a second, larger wave in the fall and winter; activity peaked in October and then quickly declined to below baseline levels by January 2010, but small numbers of cases were reported through the spring and summer of 2010.

In addition, the effect of H1N1 influenza across the lifespan differed from that of typical influenza. Disease was more severe among people younger than 65 years than in non pandemic influenza seasons, with significantly higher pediatric mortality and higher rates of hospitalizations in children and young adults. Of the 477 reported H1N1-associated deaths from April to August 2009, 36 were in children younger than 18 years; 67% of those children had one or more high-risk medical conditions.

No cases of the highly pathogenic H5N1 influenza have been reported in humans or birds in the United States. Frequently updated information on H5N1 avian influenza cases and pandemic flu preparedness is available from the CDC.Two case reports describe humans infected with another avian influenza virus, H7N2, one in Virginia in 2002 and the other in New York in 2003. The patients had no characteristic symptoms, but the first had positive serologic results and the second had mild respiratory symptoms.

As of 2021, 862 cases of avian influenza had been reported by the World Health Organization (WHO) worldwide, with 455 deaths.Reporting from areas with poor access to health care may be limited to clinically severe cases; illness that does not fulfill WHO diagnostic criteria is not reported.

Most cases have been in eastern Asia; some cases have been reported in Eastern Europe and North Africa. Underreporting has been a concern, particularly in China, but the prevailing attitude about the need to suspect, test, and report cases of avian influenza is growing. In 2013, cases were reported in Cambodia, Vietnam, China, Egypt, and Bangladesh.

**PREDEFINED Q & A SETS**

### **Is the stomach flu influenza?**

No, gastroenteritis, commonly called “stomach flu,” isn’t caused by the influenza virus. It’s not related to the seasonal flu.

## 1. How do I take my medication?

* If prescribed an antiviral like oseltamivir (Tamiflu), take it twice daily for 5 days, starting within 48 hours of symptom onset for best effect.
* For children, the dose depends on weight and age; follow your healthcare provider’s instructions carefully.
* Other antivirals like baloxavir are given as a single oral dose, and zanamivir is inhaled twice daily for 5 days but is not recommended for people with asthma or lung disease.
* Always complete the full course even if you start feeling better.

## 2. What over-the-counter medications can I use?

* Use acetaminophen (Tylenol) or ibuprofen (Advil, Motrin) to reduce fever, headache, and body aches.
* Avoid aspirin in children and teens recovering from flu-like symptoms due to the risk of Reye’s syndrome.

## 3. How do I treat my symptoms at home?

* Rest and get plenty of sleep to help your immune system fight the infection.
* Drink plenty of fluids like water, juice, and warm soups to stay hydrated.
* Use a humidifier or take steamy showers to relieve nasal congestion.
* Avoid smoking and exposure to irritants.

## 4. What severe symptoms should I look out for?

Seek immediate medical attention if you experience:

* Difficulty breathing or shortness of breath
* Chest pain or pressure
* Persistent high fever (>39°C or 102°F) not responding to medication
* Severe weakness or confusion
* Bluish lips or face
* Dehydration (dizziness, very little urine)
* Worsening symptoms after initial improvement

## 5. When should I go to the ER?

* If you develop any of the severe symptoms above.
* If you have underlying high-risk conditions (e.g., asthma, heart disease, immunosuppression) and your symptoms worsen.
* If you cannot keep fluids down or are severely dehydrated.

## 6. When should I follow up with you?

* If symptoms persist beyond 7-10 days without improvement.
* If you develop new or worsening symptoms.
* If you have risk factors for complications and need monitoring.
* Otherwise, routine follow-up is not usually necessary for uncomplicated flu.

## 7. How long might it take to feel better?

* Most people start improving within 3 to 5 days, but fatigue and cough can last for 1 to 2 weeks or longer.
* Antiviral treatment may shorten illness duration by about a day and reduce complications.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Good morning! What brings you in today?

Patient: Good morning, doctor. I’ve been feeling really tired and achy for the past couple of days. I have a fever, cough, and a sore throat.

Doctor: I see. When did your symptoms start?

Patient: About two days ago. It started with a headache and muscle aches, then the fever and cough began.

Doctor: Have you noticed any shortness of breath, chest pain, or difficulty swallowing?

Patient: No, just the cough and sore throat.

Doctor: Okay, it sounds like you might have the flu. Influenza often starts suddenly with fever, body aches, cough, and fatigue. Have you had the flu vaccine this season?

Patient: No, I haven’t gotten the vaccine yet.

Doctor: Getting the flu vaccine each year helps reduce the risk of getting sick or having severe illness. Since you’re already symptomatic, we can focus on managing your symptoms. I may prescribe an antiviral medication if you started symptoms within the last 48 hours.

Patient: What medications can I take to feel better?

Doctor: You can take over-the-counter medicines like acetaminophen or ibuprofen to reduce fever and relieve aches. Make sure to rest and drink plenty of fluids. Avoid aspirin, especially if you’re under 18, because of the risk of Reye’s syndrome.

Patient: How long will it take for me to get better?

Doctor: Most people start feeling better within 3 to 5 days, but some symptoms like cough and fatigue can last up to two weeks. If your symptoms worsen or if you develop difficulty breathing, chest pain, or confusion, seek medical attention immediately.

Patient: When should I come back to see you?

Doctor: If your symptoms don’t improve after a week or if you develop new symptoms, please follow up. Otherwise, rest at home and monitor your condition.

Patient: Thank you, doctor. I’ll take care and rest.

Doctor: You’re welcome. Feel free to call if you have any questions or concerns.

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**FUSION OF THE EAR BONES**

ALTERNATIVE NAMES: The condition known as "fusion of the ear bones" is also referred to by several other names. These include:

* Ossicular Fixation
* Ossicular Ankylosis
* Ossicular Chain Fixation
* Ossicular Chain Ankylosis
* Middle Ear Ossicle Fixation
* Ossicular Joint Fusion
* Ossicular Stiffening
* Ossicular Chain Stiffness
* Stapes Fixation (specifically when the stapes is involved)
* Ossicular Chain Immobilization
* Otosclerosis: A condition characterized by abnormal bone growth in the middle ear, which can lead to the fusion of the auditory ossicles and subsequent hearing loss.
* Stapes fixation: A term used to describe the fixation or immobility of the stapes bone, which is often associated with otosclerosis.

**DEFINITION / DESCRIPTION**

Fusion of the ear bones is an abnormal joining of the three bones of the middle ear. These are the incus, malleus, and stapes bones. Fusion or fixation of the bones leads to hearing loss, because the bones are not moving and vibrating in reaction to sound waves.

***Otosclerosis***

Otosclerosis is a term derived from oto, meaning “of the ear,” and sclerosis, meaning “abnormal hardening of body tissue.” The condition is caused by abnormal bone remodeling in the middle ear.

Bone remodeling is a lifelong process in which bone tissue renews itself by replacing old tissue with new.

In otosclerosis, abnormal remodeling disrupts the ability of sound to travel from the middle ear to the inner ear.

Otosclerosis affects more than three million Americans. Many cases of otosclerosis are thought to be inherited. White, middle-aged women are most at risk.

***How do we hear?***

Healthy hearing relies on a series of events that change sound waves in the air into electrochemical signals within the ear. The auditory nerve then carries these signals to the brain.

First, sound waves enter the outer ear and travel through a narrow passageway called the ear canal, which leads to the eardrum.

The incoming sound waves make the eardrum vibrate, and the vibrations travel to three tiny bones in the middle ear called the malleus, incus, and stapes—the Latin names for hammer, anvil, and stirrup.

***Hair cells in the inner ear***

Under great magnification, hair cells can be seen as
the arrow shaped structures at the top of the photo.

Under great magnification, hair cells can be seen as the arrow shaped structures at the top of the photo.

The middle-ear bones amplify the sound vibrations and send them to the cochlea, a fluid-filled structure shaped like a snail, in the inner ear. The upper and lower parts of the cochlea are separated by an elastic, “basilar” membrane that serves as the base, or ground floor, upon which key hearing structures sit.

Incoming sound vibrations cause the fluid inside the cochlea to ripple, and a traveling wave forms along the basilar membrane. Hair cells that sit on top of the membrane “ride” this wave and move up and down with it.

The bristly structures of the hair cells then bump up against an overlying membrane, which causes the bristles to tilt to one side and open pore-like channels. Certain chemicals then rush in, creating an electrical signal that is carried by the auditory nerve to the brain. The end result is a recognizable sound.

Hair cells near the base of the cochlea detect higher-pitched sounds, such as a cell phone ringing. Those nearer the middle detect lower-pitched sounds, such as a large dog barking.

**CAUSES**

***What causes otosclerosis?***

Otosclerosis is most often caused when one of the bones in the middle ear, the stapes, becomes stuck in place. When this bone is unable to vibrate, sound is unable to travel through the ear and hearing becomes impaired

Why this happens is still unclear, but scientists think it could be related to a previous measles infection, stress fractures to the bony tissue surrounding the inner ear, or immune disorders.

Otosclerosis also tends to run in families. It may also have to do with the interaction among three different immune-system cells known as cytokines. Researchers believe that the proper balance of these three substances is necessary for healthy bone remodeling and that an imbalance in their levels could cause the kind of abnormal remodeling that occurs in otosclerosis.

**RISK FACTORS**

Fusion of the ear bones, also known as otosclerosis, is a condition where the three tiny bones in the middle ear (the incus, malleus, and stapes) become abnormally joined or fixed, leading to hearing loss. The risk factors for this condition include family history, as it often runs in families.

Other risk factors may include age, with the condition typically starting in young adults and worsening over time.

Additionally, certain medical conditions such as previous measles infections, stress fractures to the bony tissue surrounding the inner ear, and immune disorders may increase the risk of developing otosclerosis.

**SIGNS / SYMPTOMS**

Hearing loss, the most frequently reported symptom of otosclerosis, usually starts in one ear and then moves to the other. This loss may appear very gradually. Many people with otosclerosis first notice that they are unable to hear low-pitched sounds or can’t hear a whisper. Some people may also experience dizziness, balance problems, or tinnitus. Tinnitus is a ringing, roaring, buzzing, or hissing in the ears or head that sometimes occurs with hearing loss.

**DIAGNOSIS METHODS**

Otosclerosis is diagnosed by health care providers who specialize in hearing. These include an otolaryngologist (commonly called an ENT, because they are doctors who specialize in diseases of the ears, nose, throat, and neck), an otologist (a doctor who specializes in diseases of the ears), or an audiologist (a health care professional trained to identify, measure, and treat hearing disorders).

The first step in a diagnosis is to rule out other diseases or health problems that can cause the same symptoms as otosclerosis. Next steps include hearing tests that measure hearing sensitivity (audiogram) and middle-ear sound conduction (tympanogram). Sometimes, imaging tests—such as a CT scan—are also used to diagnose otosclerosis.

**TREATMENT OPTIONS**

Treatment options include hearing aids to amplify the sound and surgery to improve the middle ear conduction of sound.

Related topics include:

* Chronic ear infection
* Otosclerosis
* Middle ear malformations

***How is otosclerosis treated?***

Currently, there is no effective drug treatment for otosclerosis, although there is hope that continued bone-remodeling research could identify potential new therapies.

Mild otosclerosis can be treated with a hearing aid that amplifies sound, but surgery is often required. In a procedure known as a stapedectomy, a surgeon inserts a prosthetic device into the middle ear to bypass the abnormal bone and permit sound waves to travel to the inner ear and restore hearing.

It is important to discuss any surgical procedure with an ear specialist to clarify potential risks and limitations of the operation. For example, some hearing loss may persist after stapedectomy, and in rare cases, surgery can actually worsen hearing loss.

**PREVENTION TIPS**

Fusion of the ear bones, also known as otosclerosis, is a condition where the small bones in the middle ear (the malleus, incus, and stapes) become fixed or fused, leading to hearing loss.

While there are no specific prevention tips for otosclerosis, understanding the risk factors and taking general measures to protect hearing can be beneficial.

Otosclerosis is often hereditary, and individuals with a family history of the condition are more likely to develop it. However, there are no known preventable risk factors for otosclerosis, such as exposure to loud noises, which are common in other hearing conditions.

It is important to note that while there are no proven methods to prevent otosclerosis, regular hearing check-ups and early detection can help manage the condition effectively. If you notice any changes in your hearing, it is advisable to consult a healthcare provider for proper evaluation and management.

In summary, while there are no specific prevention tips for otosclerosis, maintaining good ear health and seeking early medical advice can help in managing the condition.

**OUTLOOK / PROGNOSIS**

Fusion of the ear bones, also known as otosclerosis, is an abnormal joining of the three bones of the middle ear—the incus, malleus, and stapes—leading to hearing loss due to the bones not moving and vibrating in response to sound waves.

The prognosis for this condition is generally favorable with appropriate treatment. Treatment options include hearing aids to amplify sound and surgery to improve the middle ear's conduction of sound. These interventions can significantly improve hearing and quality of life for individuals affected by this condition.

**POSSIBLE COMPLICATIONS**

Fusion of the ear bones, also known as otosclerosis, is an abnormal joining of the three bones of the middle ear—the malleus, incus, and stapes. This condition leads to hearing loss because the bones are unable to move and vibrate in response to sound waves.

While the primary symptom is hearing loss, there can be other complications associated with this condition. For instance, individuals may experience dizziness, balance problems, or tinnitus, which is a ringing, roaring, buzzing, or hissing in the ears or head.

Additionally, although surgery such as a stapedectomy can be an effective treatment, it carries risks, including the possibility of persistent hearing loss or, in rare cases, worsened hearing. It is important to consult with an ear specialist to discuss potential risks and limitations of any surgical procedure.

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

If you notice any changes or decreases in your hearing ability, you should schedule an appointment with your healthcare provider. Prompt diagnosis and treatment can help manage the condition effectively.

If you experience symptoms such as hearing loss, balance issues, vertigo, tinnitus, or dizziness, it is important to consult a specialist, such as an otolaryngologist (ear, nose, and throat specialist), who can evaluate your condition and determine the best course of treatment.

**DIFFERENTIAL DIAGNOSIS**

Fusion of the ear bones, also known as otosclerosis, is a condition characterized by the abnormal joining of the three bones in the middle ear (the incus, malleus, and stapes), leading to hearing loss due to the bones not moving properly in response to sound waves.

The differential diagnosis for this condition includes other causes of conductive hearing loss, such as chronic ear infections, middle ear malformations, and other structural abnormalities of the ear.

Otosclerosis is often considered when a patient presents with progressive hearing loss, particularly affecting low-pitched sounds, and may be accompanied by symptoms such as tinnitus or balance issues. Other conditions that may need to be ruled out include otitis media, which is an infection of the middle ear, and other forms of ear malformations that can affect sound conduction.

Diagnosis typically involves a series of hearing tests, including audiograms and tympanograms, to assess the extent of hearing loss and the function of the middle ear. In some cases, imaging tests such as a CT scan may be used to provide more detailed images of the ear structures.

It is important to differentiate otosclerosis from other conditions that can cause similar symptoms to ensure appropriate treatment is provided.

**RECENT GUIDELINES OR UPDATES**

***What kinds of research on otosclerosis does the NIDCD support?***

The complicated architecture of the inner ear makes it difficult for scientists to study this part of the body. Because researchers can’t remove and analyze a sample of the inner ear from someone who has otosclerosis (or other hearing disorders), they must study ear bone samples from cadavers donated for research.

These samples, called temporal bone, are in short supply. To encourage more research on otosclerosis, the NIDCD supports national temporal bone collections, such as the Otopathology Research Collaboration Network at the Massachusetts Eye and Ear Infirmary.

This effort coordinates the collection and sharing of temporal bone tissue among laboratories. It also encourages scientists to combine modern biology, imaging, and computer technologies with information from patient history and pathology reports to look for new clues and solutions to ear disorders caused by bone abnormalities.

The NIDCD also funds genetic studies and bone-remodeling research to better understand the causes of otosclerosis as well as to investigate potential new treatments. NIDCD-supported researchers are currently testing—in animals—the effectiveness of an implantable device that can deliver a bone-growth inhibiting drug directly into the inner ear to correct the bone abnormalities that cause otosclerosis. If the results are promising, testing will later be done in people.

**EPIDEMIOLOGY**

Fusion of the ear bones, also known as otosclerosis, is a condition characterized by the abnormal joining of the three bones of the middle ear (the malleus, incus, and stapes), leading to hearing loss due to the inability of these bones to vibrate properly in response to sound waves.

In terms of epidemiology, otosclerosis affects more than three million Americans, making it the most common cause of middle ear mechanical hearing loss among young adults. The condition is more prevalent in white females between the ages of 20 and 45, and it can sometimes run in families.

While the exact cause of otosclerosis is not fully understood, it is believed to be related to genetic factors, as well as possible influences such as previous measles infections, stress fractures to the bony tissue surrounding the inner ear, or immune disorders.

Otosclerosis can also be associated with other conditions such as osteogenesis imperfecta (brittle bone disease), which increases the risk of developing the condition.

In summary, otosclerosis is a relatively common condition, particularly among white females, and is often hereditary. It is characterized by the abnormal hardening and fusion of the middle ear bones, resulting in progressive hearing loss.

**PREDEFINED Q & A SETS**

Here is an expert-validated predefined Q&A set addressing common patient queries about fusion of the ear bones, specifically related to otosclerosis, the condition involving abnormal bone growth causing fusion of the stapes bone in the middle ear:

Question: “What is fusion of the ear bones?”

Answer: Fusion of the ear bones refers to the abnormal hardening or fixation of one or more of the tiny bones (ossicles) in the middle ear, especially the stapes (stirrup) bone. This fusion prevents normal movement of the bones, which is essential for conducting sound vibrations to the inner ear, leading to hearing loss.

Question: “What causes fusion of the ear bones?”

Answer: The most common cause is otosclerosis, a condition where abnormal bone remodeling occurs in the middle ear. This abnormal bone growth typically starts around the footplate of the stapes bone, eventually causing it to become fixed or fused to the surrounding bone, restricting its motion.

Question: “What symptoms should I expect?”

Answer:

* Gradual hearing loss, usually conductive (sound vibrations cannot be transmitted properly)
* Possible tinnitus (ringing in the ears)
* In some cases, dizziness may occur after treatment
* Hearing loss can worsen over time if untreated.

Question: “How is this condition diagnosed?”

Answer: Diagnosis is made by specialists such as otolaryngologists (ENT doctors) or audiologists through:

* Hearing tests (audiogram)
* Middle ear sound conduction tests (tympanogram)
* Sometimes imaging like CT scans to confirm bone changes.

Question: “What treatment options are available?”

Answer:

1. Hearing aids: Amplify sound and are often used in mild cases or when surgery is not preferred.
2. Surgery (Stapedectomy or Stapedotomy): The most effective treatment for restoring hearing. It involves removing or bypassing the fixed stapes bone and inserting a tiny prosthesis to restore sound conduction.
3. Observation: In mild cases, monitoring without immediate intervention may be advised.

Question: “What does surgery involve and what are the risks?”

Answer:

* Surgery is performed under a microscope or endoscope through the ear canal.
* The surgeon frees the stapes bone and inserts a prosthetic device attached to the incus bone.
* Most patients experience improved hearing soon after surgery.
* Possible risks include dizziness, tinnitus, taste disturbance (if a small nerve is affected), reduced hearing, or, rarely, facial nerve damage.

Question: “Is otosclerosis hereditary and can it be prevented?”

Answer: Otosclerosis has a genetic component and can run in families. There are no known ways to prevent it, and it is not caused by exposure to loud noises or other preventable factors.

Question: “When should I see a doctor?”

Answer: If you notice any sudden or gradual changes in your hearing, it is important to schedule an appointment with a healthcare provider specializing in ear diseases promptly for diagnosis and management.

This Q&A set summarizes expert-validated, commonly asked patient questions about fusion of the ear bones due to otosclerosis and its management. If you have specific concerns, consulting an ENT specialist is recommended.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Thank you for coming in today. Can you tell me about your hearing concerns?

Patient: Yes, I've noticed my hearing has been getting worse over the past year, especially in my left ear. Sounds seem muffled, and sometimes I hear ringing.

Doctor: That’s a common presentation. Based on your symptoms and family history, I suspect otosclerosis, which is a condition where abnormal bone growth causes fusion of the stapes bone in your middle ear. This fusion prevents the bone from vibrating properly, leading to hearing loss.

Patient: How does this fusion happen exactly?

Doctor: Normally, the stapes bone moves freely to transmit sound vibrations from the middle ear to the inner ear. In otosclerosis, new bone grows around the footplate of the stapes, fixing it in place. This blocks sound conduction, causing what we call conductive hearing loss.

Patient: Can this be treated?

Doctor: Yes, there are three main options:

* We can monitor it if your hearing loss is mild.
* Use hearing aids to amplify sound.
* Or perform surgery called a stapedectomy or stapedotomy, where we remove or bypass the fixed bone and insert a prosthesis to restore movement.

Patient: Is surgery safe?

Doctor: When done by experienced surgeons, success rates are over 90%. Risks include dizziness, tinnitus, or rarely, worsening hearing, but most patients improve significantly.

Patient: What tests will you do?

Doctor: We'll do an audiogram to measure your hearing and look for a characteristic pattern called the Carhart notch. We'll also test your stapedial reflexes, which are usually absent in otosclerosis.

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**FOREIGN BODY ASPIRATION**

*ALTERNATIVE NAMES:* Foreign body aspiration is also known as pulmonary aspiration. It refers to the accidental inhalation of a foreign object into a person's airways.

**DEFINITION / DESCRIPTION**

Foreign body aspiration can be a life-threatening emergency. An aspirated solid or semisolid object may lodge in the larynx or trachea. If the object is large enough to cause nearly complete obstruction of the airway, asphyxia may rapidly cause death. Lesser degrees of obstruction or passage of the obstructive object beyond the carina can result in less severe signs and symptoms.

Chronic debilitating symptoms with recurrent infections might occur with delayed extraction, or the patient may remain asymptomatic. The actual aspiration event can usually be identified, although it is often not immediately appreciated. The aspirated object might even escape detection. Most often, the aspirated object is food, but a broad spectrum of aspirated items has been documented over the years. Commonly retrieved objects include seeds, nuts, bone fragments, nails, small toys, coins, pins, medical instrument fragments, and dental appliances.

Geographic differences in the spectrum of objects commonly found in a particular environment and variations in dietary and eating habits affect the relative frequency with which various objects are aspirated.

Acute choking, with respiratory failure associated with tracheal or laryngeal foreign body obstruction, may be successfully treated at the scene with the Heimlich maneuver, back blows, and abdominal thrusts. Even in non-emergency situations, expeditious removal of tracheobronchial foreign bodies is recommended. Rigid bronchoscopy is the procedure of choice for removing foreign bodies in children and in most adults.

**CAUSES**

***Types of Airway Obstruction***

Airway obstruction can occur in specific regions of the airway and presents with varying severity. The location and extent of the blockage significantly affect symptoms, risks, and immediate management.

1. ***Upper Airway Obstruction***

Upper airway obstruction affects the airway above the vocal cords, often involving the nose, throat (pharynx), or larynx. Typical causes include choking on food, swelling from allergic reactions, trauma, infections like epiglottitis, and tumors.

Key symptoms are noisy breathing (stridor), difficulty speaking, and visible struggle to breathe. Children and young adults are at higher risk due to smaller airway size. Fast intervention is essential, as complete blockage can lead to loss of consciousness and brain injury within minutes.

Heimlich maneuver or emergency tracheostomy may be required if a foreign object is responsible. Swelling is often managed with oxygen and medications, such as epinephrine or steroids. Infections may require antibiotics and airway monitoring.

1. ***Lower Airway Obstruction***

Lower airway obstruction occurs below the larynx, typically in the trachea or bronchi. Asthma, chronic obstructive pulmonary disease (COPD), airway tumors, and inhaled objects are primary causes. Lower airway blockages lead to wheezing, coughing, and breathlessness rather than stridor.

Conditions like severe asthma can cause tightening and swelling of airways, which may respond to inhalers or systemic medications. Foreign body aspiration leads to sudden onset of symptoms and is more common in children.

Diagnosis may need chest X-rays or bronchoscopy to locate and remove the obstruction. Prolonged blockage increases the risk of lung infection or collapse. Prompt identification and medical management are critical to restore airway patency.

1. ***Partial vs. Complete Airway Obstruction***

Airway obstruction is classified by the degree of blockage. Partial obstruction allows some air movement but causes noisy breathing, coughing, or cyanosis (bluish skin). The affected individual can often still cough or speak, although breathing is labored.

Complete obstruction stops all airflow. The person cannot speak, cough, or breathe and will lose consciousness rapidly if untreated. Immediate intervention is essential with back blows, abdominal thrusts, or emergency medical help.

Recognizing the signs is vital for rapid response. The distinction between partial and complete determines both urgency and the appropriate first aid steps.

Airway obstruction can occur suddenly or develop over time. The causes vary widely and may depend on age, environment, and underlying health conditions.

1. ***Foreign Bodies***

Foreign bodies are a leading cause of airway obstruction, especially in children. Small objects like coins, toys, or pieces of food can become lodged in the airway. This typically happens when an object is accidentally inhaled rather than swallowed.

Symptoms often appear quickly, including coughing, wheezing, gagging, or a sudden inability to speak. In severe cases, a complete blockage may cause cyanosis or unconsciousness. Children under age five are at higher risk due to their tendency to put objects in their mouths. Adults with neurological disorders or impaired swallowing also face increased risk.

Immediate removal of the foreign object is crucial. The Heimlich maneuver may be performed by bystanders, or medical intervention may be needed in more severe cases. Prevention involves keeping small objects out of reach of children and supervising mealtimes closely.

1. ***Trauma and Injury***

Direct trauma to the head, neck, or chest can damage the airway, resulting in swelling or internal bleeding that blocks the passage of air. Blunt injuries, such as those from car accidents or falls, can fracture facial bones or collapse airway structures. Penetrating injuries from sharp objects may also introduce foreign material or cause tissue swelling.

Burns from inhaling hot gases or smoke can lead to rapid swelling of airway tissues. Complications such as blood clots or tissue damage may further obstruct airflow. Even medical interventions like intubation or surgery carry risks of post-procedure swelling or scarring.

Symptoms may include hoarseness, noisy breathing, or visible deformity of the neck or face. Emergency treatment calls for airway management techniques and sometimes surgery. Prompt assessment and intervention are critical to prevent brain damage or death from lack of oxygen.

1. ***Infections and Inflammation***

Certain infections can inflame or swell airway tissues, narrowing the airway and making breathing difficult. Viral or bacterial infections such as croup, epiglottitis, and abscesses are more common in children but can affect any age group. In adults, infections of the throat, tonsils, or larynx may also cause problems.

Inflammatory conditions such as asthma or chronic bronchitis worsen the risk of obstruction. With severe swelling, symptoms may include stridor, rapid breathing, or difficulty swallowing. Airway obstruction related to infection often develops rapidly and can become life-threatening without swift treatment.

Antibiotics, corticosteroids, or airway support may be needed. Vaccinations and prompt treatment of respiratory infections help reduce the risk of this type of airway blockage.

1. ***Allergic Reactions***

Severe allergic reactions (anaphylaxis) can cause abrupt swelling of the airway, often within minutes of exposure to the allergen. Common triggers include foods (like peanuts), insect stings, medications, or latex.

Symptoms may begin with itching or swelling of the lips, tongue, or throat and can quickly progress to hoarseness, stridor, and difficulty breathing. The airway swelling in anaphylaxis can become fatal if not treated immediately.

An epinephrine injection is the primary emergency treatment. People with known allergies are advised to carry auto-injectors and avoid known triggers when possible. Education on recognizing early symptoms and seeking prompt care is vital for those at risk

**RISK FACTORS**

Certain characteristics make some people more susceptible to airway obstruction than others. These risks often relate to age, underlying medical conditions, and lifestyle or environmental exposures.

***Age-Related Risks***

Infants and young children face an increased risk of airway obstruction due to their small airways and tendency to place objects in their mouths. Choking on food or small toys is more common in this age group.

Older adults are also at higher risk because age-related muscle weakness, difficulty swallowing (dysphagia), or neurological diseases can impair airway protection.

In elderly individuals, reduced cough reflexes and a higher incidence of dental issues can contribute to aspiration and airway blockage. Both extremes of age are therefore more vulnerable—either due to developmental behavior or the effects of aging on airway anatomy and function.

***Medical Conditions***

Certain medical conditions significantly increase the risk of airway obstruction. Asthma and chronic obstructive pulmonary disease (COPD) can cause airway narrowing from inflammation or mucus buildup.

Individuals with neurological disorders, such as stroke, Parkinson’s disease, or amyotrophic lateral sclerosis (ALS), may have impaired swallowing or weakened airway protective reflexes.

Tumors in the neck or upper airway, allergic reactions causing swelling (anaphylaxis), or infections like epiglottitis and croup can also obstruct airflow.

Congenital conditions, such as tracheomalacia in infants, add further risk. Recognition and management of these conditions are critical to prevent serious complications.

***Lifestyle and Environmental Factors***

Lifestyle habits and environmental exposures play a crucial role in airway obstruction risk. Smoking, for example, leads to chronic inflammation and a greater chance of mucus production that may clog the airway. Exposure to occupational dusts, gases, or fumes can similarly irritate and narrow the airways over time.

Eating quickly, talking or laughing while eating, and consuming alcohol can increase the risk of choking, especially in adults.

Poor dental hygiene can lead to loose teeth or dental prosthetics, both of which can become airway obstructions.

Substance abuse, especially sedatives and opioids, depresses the cough reflex and increases the chance of aspiration, especially when a person is unconscious or semi-conscious.

**SIGNS / SYMPTOMS**

Airway obstruction presents with clear and alarming symptoms that require prompt attention. Recognizing specific signs, breathing issues, and changes in voice or sounds can help identify the problem early for faster intervention.

### **Immediate Signs**

Immediate signs often appear suddenly and may include visible distress. Individuals may experience sudden difficulty breathing, clutching at the throat, or an inability to cough effectively. Cyanosis, or a bluish tint to the lips and fingernails, can develop quickly if oxygen fails to reach the bloodstream.

Consciousness may be affected within minutes if airflow is severely restricted. Other urgent symptoms include agitation, panic, or loss of consciousness in extreme cases. These rapid-onset symptoms signal the need for immediate emergency evaluation.

Observation of these signs is especially crucial in children, who may not communicate distress. Caregivers should react swiftly if choking, pronounced wheezing, or sudden silence follows a bout of coughing.

### **Breathing Difficulties**

Breathing difficulties are often the most distressing symptom and can range in severity. Stridor—a high-pitched, wheezing noise when inhaling—is a classic feature of upper airway blockage. In more severe cases, individuals may show use of accessory muscles in the neck or chest to breathe.

Shortness of breath may worsen with activity or lying down and can be continuous or intermittent, depending on the obstruction’s cause or location. Chest movements may appear exaggerated or paradoxical, and retractions around the neck or ribs may be visible.

Some may develop rapid, shallow breathing as their body attempts to compensate for reduced airflow. Severe cases can progress to respiratory arrest if not treated promptly.

### **Voice and Sound Changes**

Alterations in the voice are frequent in airway obstruction. Hoarseness, a muffled or weak voice, or even complete loss of voice (aphonia) can occur if the obstruction affects the vocal cords or airway just above them. Speech may sound strained or raspy due to reduced air movement.

Sounds such as gurgling, wheezing, or whistling may be heard when the person tries to speak or breathe. These noises can indicate partial airway blockage, where air struggles to move past the obstruction.

If the obstruction is high in the airway, patients may only be able to produce faint sounds or whispers. The development of these changes, especially following injury or after eating, should prompt immediate assessment.

**DIAGNOSIS METHODS**

A small number of foreign body aspirations are incidentally found after chest radiography or bronchoscopic inspection. Patients may be asymptomatic or may be undergoing testing for other diagnoses. If present, physical findings may include stridor, fixed wheeze, localized wheeze, or diminished breath sounds. If obstruction is severe, cyanosis may occur. Signs of consolidation can accompany postobstructive pneumonia.

Identifying airway obstruction requires a systematic approach involving clinical assessment, diagnostic imaging, and specialized tests. Accurate diagnosis guides appropriate management and may reveal underlying causes.

### **Physical Examination**

A thorough physical examination is essential and usually the first step. Clinicians listen for abnormal breath sounds like wheezing, stridor, or decreased air movement. These findings can point to the type and location of the obstruction.

They also check for visible signs such as cyanosis (bluish skin), use of accessory muscles, and altered breathing patterns. Observation of the chest and neck during inhalation may show retractions or paradoxical movements.

Assessment of mental status helps determine the severity of hypoxia. Fast, targeted evaluation is crucial in urgent situations, as delays can worsen outcomes.

### **Imaging Studies**

Imaging provides visual confirmation and localization of airway obstructions. Chest X-rays are often performed first; they can detect foreign bodies, tumors, changes in lung inflation, or fluid buildup.

Computed Tomography (CT) scans offer detailed images and can reveal subtle or deep-seated blockages. They help distinguish between upper and lower airway involvement.

For suspected upper airway problems, a neck X-ray may be helpful. In some cases, direct visualization using bronchoscopy is performed to both diagnose and sometimes treat the cause.

### **Pulmonary Function Tests**

Pulmonary Function Tests (PFTs) help evaluate airflow limitation and differentiate between obstructive and restrictive lung disease. Spirometry is commonly used, measuring parameters like Forced Vital Capacity (FVC) and Forced Expiratory Volume in one second (FEV1).

A reduced FEV1/FVC ratio suggests obstruction. Flow-volume loops can indicate the level (upper vs lower) and type (fixed or variable) of airway narrowing.

These tests are most useful if the patient is stable enough to cooperate. Results assist in assessing severity and tracking changes over time. The findings also guide further investigations and treatment planning.

**TREATMENT OPTIONS**

Airway obstruction requires swift and appropriate treatment to prevent serious complications, including hypoxia and death. The choice of intervention depends on the severity, cause, and location of the blockage.

### **Emergency Interventions**

In acute cases, immediate action is critical. Common life-saving steps include the Heimlich maneuver for foreign body obstruction and rescue breathing or CPR for cases with respiratory arrest.

Oropharyngeal or nasopharyngeal airways may be used to maintain patency in unconscious patients without a gag reflex. In severe cases, bag-valve-mask ventilation provides temporary oxygenation until a definitive airway can be established.

Intubation is often required if basic measures fail. If intubation is impossible, a cricothyrotomy or tracheostomy may be performed to secure the airway. Rapid intervention can significantly reduce the risk of permanent harm.

### **Medical and Surgical Options**

Medical treatment targets the underlying cause. For asthma or allergic reactions, bronchodilators and corticosteroids reduce airway inflammation. Infections like epiglottitis may require antibiotics and close monitoring for signs of deterioration.

When tumors, trauma, or congenital anomalies cause obstruction, surgery may be necessary. This can include procedures to remove masses, repair structural defects, or reconstruct airways.

Patients with chronic obstructive conditions may receive ongoing therapies, such as continuous positive airway pressure (CPAP) or medications to maintain airway patency. Collaboration between specialties is often needed to select the best approach.

### **Long-Term Management**

Patients with a history of airway obstruction require follow-up to address risk factors and prevent recurrence. Education on recognizing symptoms and when to seek emergency care is essential for patients and their caregivers.

Monitoring may involve regular imaging or pulmonary function testing in those with structural or chronic conditions. Devices like tracheostomy tubes may be required for some individuals, necessitating ongoing care and proper hygiene.

Specialist referrals, home health support, and respiratory therapy play key roles in optimizing long-term outcomes and quality of life. Adjustments to therapy are often based on changes in symptoms or underlying disease status.

**PREVENTION TIPS**

Survival and recovery from airway obstruction depend primarily on how quickly the obstruction is recognized and treated. Certain methods can reduce risk and improve outcomes, especially in high-risk groups.

**Supervision** of young children during eating and play is essential, as small objects and foods are common choking hazards. Cutting food into small pieces and encouraging chewing can help prevent incidents.

Proper workplace and home safety standards, including allergen labeling and protective gear in hazardous environments, reduce the risk of airway obstruction. For individuals diagnosed with severe allergies, carrying and knowing how to use epinephrine auto-injectors is important.

Education in basic first aid and cardiopulmonary resuscitation (CPR) empowers bystanders to respond effectively during emergencies. For people with chronic conditions, routine medical follow-up and adherence to prescribed therapies (such as CPAP for sleep apnea) play a key role in prevention.

**OUTLOOK / PROGNOSIS**

According to the National Safety Council, choking remained the fourth leading cause of unintentional injury death in the United States as of 2021. In 2021, a total of 5325 deaths from unintentional ingestion or inhalation of food or other objects resulting in airway obstruction was reported.Death from choking is more common among the elderly. Living alone, having dentures or difficulty swallowing increases the risk of choking in older adults.The overall risk of death from choking is estimated to be 1.6 deaths per 100,000 people.Even if the patient does not die, symptoms often develop immediately. Morbidity increases if extraction of the object is delayed beyond 24 hours.

## **Diagnostic Considerations**

Frequently aspirated objects include food (especially nuts and seeds), teeth, dental appliances, and medical instruments. The original event might have been forgotten. Choking with severe dyspnea, leading to respiratory or cardiac arrest while eating, might be initially misdiagnosed as myocardial ischemia.

Aspiration of live fish, leeches, and roundworms has been reported in the literature. A fish aspiration is usually a witnessed event or obvious on examination, however, endoparasites, such as freshwater leeches, are aspirated from direct contact with leech-infested waters most often in rural populations with limited access to clean drinking water. The most common presentation is nosebleeds, pain or trouble swallowing, dyspnea, and hemoptysis. Leeches in the airway can mimic other respiratory ailments, such as bronchial asthma, and can be chronic in nature. Anemia is mostly found in children and can become severe enough to cause cardiorespiratory distress.

## **Differential Diagnoses**

* Alcoholism
* Aspiration Pneumonitis and Pneumonia
* Atelectasis
* Bacterial Pneumonia
* Chronic Obstructive Pulmonary Disease (COPD)
* Delirium
* Emphysema
* Lung Abscess
* Maxillary and Le Fort Fractures
* Pneumothorax
* Pulmonary Embolism (PE)
* Respiratory Failure
* Tuberculosis (TB)

**EPIDEMIOLOGY**

Literature on foreign body aspiration in adults is limited. Most of the literature relates to statistics, diagnosis, and treatment in children younger than 16 years.Local environments have an important influence on the types of objects aspirated, location in the tracheobronchial tree, and prognosis.

Geographic differences in the spectrum of objects commonly found in a particular environment and variations in dietary and eating habits affect the relative frequency with which various objects are aspirated. The heterogeneity of the populations studied, materials in the environment, and the availability of medical technology influence the reported incidence and prognosis.

Many aspirated foreign bodies are unexpectedly discovered, go undetected, or are misdiagnosed. The often-fatal syndrome of acute asphyxiation from upper airway obstruction associated with eating, known as the café coronary,and aspiration of gastric contents are usually not considered with other foreign body aspiration syndromes. For these reasons, the true incidence and prevalence of foreign body aspiration is unknown.

### Sex- and age-related demographics

The male-to-female ratio is 2:1, depending on the study.

Children, especially those aged 1-3 years, are at risk for foreign body aspiration because of their tendency to put everything in their mouths and because of the way they chew.Young children chew their food incompletely with incisors before their molars erupt. Objects or fragments may be propelled posteriorly, triggering a reflex inhalation.

Adults who (1) undergo oropharyngeal procedures, (2) have various oral appliances, (3) become intoxicated, (4) receive sedatives, or (5) may have neurological or psychiatric disorders are at increased risk of aspirating foreign bodies.

Because young children and older persons with neurological, cognitive, or psychiatric disorders might not be able to provide their history, diagnosis may be delayed. In Limper and Prakash's 1990 study, the median age for adults (ie, patients >16 y) with foreign body aspirations was 60 years, with an age range of 18-88 years.Numerous studies concur that children younger than 16 years account for most cases of foreign body aspiration.

**Foreign Body Aspiration: Treatment Drugs and Their Side Effects**

## 1. Medications Used in Foreign Body Aspiration

## a) Corticosteroids (e.g., Dexamethasone, Budesonide)

* Purpose: Reduce airway inflammation and edema, especially post-removal or when extraction is difficult due to swelling.
* Administration: Intravenous dexamethasone or nebulized budesonide are commonly used post-procedure.
* Side Effects:
  + Short-term: Increased blood sugar, mood changes, insomnia
  + Long-term (rare in this setting): Immunosuppression, adrenal suppression

## b) Antibiotics (e.g., Ceftriaxone)

* Purpose: Treat or prevent secondary respiratory infections such as pneumonia, especially if infection is present or suspected after foreign body aspiration.
* Common choices: Ceftriaxone or other broad-spectrum antibiotics depending on culture results.
* Side Effects:
  + Allergic reactions (rash, anaphylaxis)
  + Gastrointestinal upset (nausea, diarrhea)
  + Antibiotic-associated colitis (rare)

## c) Bronchodilators (e.g., Beta-2 agonists)

* Purpose: Relieve bronchospasm and improve airway patency after foreign body removal or in patients with reactive airway symptoms.
* Administration: Nebulized or inhaled beta-agonists (e.g., albuterol).
* Side Effects:
  + Tremors
  + Tachycardia
  + Nervousness

## d) Supportive Therapies

* Oxygen supplementation for hypoxia.
* Chest physiotherapy and postural drainage to clear secretions and improve lung function.

## 2. Primary Treatment: Bronchoscopic Removal

* Rigid bronchoscopy under general anesthesia is the gold standard for foreign body removal.
* Flexible bronchoscopy may be attempted in select cases.
* Postoperative care includes monitoring for airway edema, infection, and respiratory complications.

**PREDEFINED Q & A SETS**

Q1: What is foreign body aspiration?  
A: Foreign body aspiration occurs when an object is inhaled into the airway, potentially causing partial or complete airway obstruction. It is a medical emergency that can be life-threatening if not promptly recognized and treated.

Q2: What are the common clinical signs of foreign body aspiration?  
A: Classic signs include sudden onset coughing, unilateral decreased breath sounds, and unilateral wheezing. Stridor, hoarseness, or aphonia may indicate the foreign body is lodged in the larynx or upper trachea. However, only about 40% of patients have all three classic signs.

Q3: How is foreign body aspiration diagnosed?  
A: Diagnosis relies on a high index of suspicion, especially with a history of choking or sudden respiratory symptoms. Physical exam findings and imaging (like chest X-rays) help, but direct airway visualization by bronchoscopy (flexible or rigid) is the gold standard for diagnosis and removal.

Q4: What are the phases after foreign body aspiration?  
A: There are three clinical phases:

* Immediate phase: choking, coughing, possible airway obstruction.
* Latent phase: symptoms may improve temporarily but inflammation develops.
* Complication phase: infection, atelectasis, or bronchiectasis can occur if untreated.

Q5: What is the treatment for foreign body aspiration?  
A: Immediate removal by bronchoscopy is essential. Medical management alone (like chest physiotherapy or bronchodilators) is not recommended before removal, as it may dislodge the object causing complete obstruction. After removal, supportive care including corticosteroids and chest physiotherapy may be used if inflammation or atelectasis is present.

Q6: When should a patient be referred to a specialist?  
A: Patients with suspected foreign bodies in the throat, airway, or those with unsuccessful removal attempts should be referred to an ENT or pulmonology specialist. Emergency endoscopy is indicated if there are red flag signs or sharp/large objects.

Q7: What complications can arise if foreign body aspiration is not treated?  
A: Delayed diagnosis can lead to recurrent pneumonia, lung abscess, bronchiectasis, airway granulomas, and respiratory failure. Misdiagnosis can also lead to inappropriate treatments like unnecessary steroids or antibiotics.

Q8: How can foreign body aspiration be prevented?  
A: Prevention includes caregiver education about choking hazards, especially in children, avoiding small objects or foods that can be aspirated, and supervising at-risk individuals closely

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you or your child might have inhaled something accidentally. Can you tell me what happened?

Patient/Parent: Yes, there was a sudden coughing fit while eating, and now there’s some difficulty breathing and wheezing.

Doctor: That sounds like a possible foreign body aspiration, which means something might have entered the airway. It’s important we act quickly to prevent any airway blockage or lung problems.

Patient/Parent: What symptoms should I watch for?

Doctor: Common signs include sudden coughing, choking, noisy breathing like wheezing or stridor, difficulty breathing, or persistent coughing. Sometimes, if the object isn’t removed promptly, it can cause infections or lung collapse.

Patient/Parent: How do you find the object?

Doctor: We’ll start with a chest X-ray to look for any visible foreign body or signs like air trapping. If the X-ray is inconclusive but suspicion remains high, we may do a CT scan or proceed to bronchoscopy, which is a procedure where a small camera is inserted into the airway to locate and remove the object.

Patient/Parent: Is bronchoscopy safe?

Doctor: Yes, it is the standard and safest method to remove foreign bodies from the airway. It’s usually done under sedation or general anesthesia by specialists. We plan carefully to keep the airway open and ensure your safety during the procedure.

Patient/Parent: What happens after removal?

Doctor: After removal, we’ll monitor breathing and may give medications like steroids to reduce airway swelling or antibiotics if there’s an infection. Most patients recover well with prompt treatment.

Patient/Parent: What if the object isn’t removed quickly?

Doctor: Delayed removal can lead to complications like pneumonia, lung abscess, or chronic cough. That’s why early diagnosis and treatment are crucial.

Patient/Parent: Is there anything I can do to prevent this?

Doctor: Yes, especially in children, avoid giving small hard foods like nuts or hard candies, supervise during meals, and keep small objects out of reach.

Patient/Parent: Thank you, doctor. I feel better knowing what to expect.

Doctor: You’re welcome. If you notice worsening breathing difficulty, persistent coughing, or fever, come to the emergency room immediately.

This conversation covers recognition of symptoms, diagnostic steps, treatment options, safety, complications, and prevention in a clear, empathetic manner.

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**Fine needle aspiration**

ALTERNATIVE NAMES

Fine-needle aspiration (FNA) is a procedure healthcare providers use to get a cell sample from a suspicious lump or an abnormal area of your body. It’s also called a fine-needle biopsy. FNA involves using a thin needle and a syringe to pull out cells, tissue and fluids.

Your healthcare provider then sends the sample to a cytology lab. There, a cytotechnologist screens the cells, and a specialist called a pathologist examines them for analysis. Both providers use the study of cytology to examine the cells.

FNA is the least invasive (least damaging to your body) type of biopsy, but it has limits.

#### **What’s the difference between a core biopsy and fine-needle aspiration?**

A core biopsy and fine needle aspiration are both types of needle biopsies.

The needle for a core needle biopsy is wider than that used for FNA. A core biopsy gathers more tissue that can provide more information about the suspicious area than FNA can.

While FNA just involves a thin needle, a core biopsy sometimes requires a small incision to insert a spring-loaded biopsy needle.

Providers most commonly use core biopsies for breast biopsies. They use FNAs for several areas of your body.

### **What is fine-needle aspiration used for?**

Fine-needle aspirations have two main purposes: diagnostic and therapeutic.

Healthcare providers may also use FNAs to help guide treatment in cases where cancer has spread from the original tumor site (metastatic cancer). Pathologists can look for genetic or molecular markers in the cell samples that show if the cancer will respond better to certain cancer treatments.

#### **Diagnostic fine-needle aspiration**

Healthcare providers can use fine-needle aspiration (fine-needle biopsy) in any situation where a tissue or fluid sample would help with diagnosis. A pathologist looks at the collected cells under a microscope to determine their type and characteristics.

FNAs are one of several types of biopsies. Your provider may choose FNA or a different kind of biopsy, like excisional or incisional, depending on your unique situation.

Fine-needle biopsies may be necessary to assess a suspicious lump or mass. They can help diagnose:

* Cancer.
* Bacterial infections, like bursitis or septic arthritis.
* Non Cancerous masses, like cysts, fibroadenomas or lipomas.

Providers can use FNA on almost any region of your body. But providers most commonly use it to biopsy newly identified masses in your:

* Breast, like breast cysts.
* Thyroid, like thyroid nodules.
* Lymph nodes.
* Skin.

With the help of imaging guidance, like endoscopic ultrasound and computed tomography (CT) scan, providers can use FNA to collect tissue from deeper areas of your body, such as your:

* Pancreas.
* Gastrointestinal (GI) tract.
* Esophagus.
* Trachea.
* Lungs.
* Mediastinum (the space in your chest that holds important organs, like your heart).

#### **Therapeutic fine-needle aspiration**

Providers sometimes use FNAs to remove fluid from masses to help treat them, like:

* Abscesses (buildup of pus).
* Cysts (fluid-filled sacs).
* Seromas (abnormal buildups of fluid that are common after breast cancer surgery and plastic surgery).

They may use this technique instead of the standard incision and drainage approach in cosmetically sensitive areas, like your breast. However, FNAs can potentially spread infections, so providers can’t use them in all cases.

## **Test Details**

### **How do I prepare for a fine-needle aspiration?**

You usually don’t have to do anything special to prepare for fine-needle aspiration. In any case, your healthcare provider will let you know what to expect and how to prepare.

### **What should I expect during a fine-needle aspiration procedure?**

You’ll likely have an FNA in your healthcare provider’s office or a hospital as an outpatient (meaning you’re not staying overnight).

The process can vary based on which part of your body your provider is getting a sample from. But you can generally expect the following during a fine-needle aspiration:

* You’ll lie or sit on a medical table.
* Your provider will sanitize the area where they’ll insert the needle.
* Your provider may inject a local anesthetic to numb the area where you’ll receive the FNA. You may still feel a pinch or some discomfort as the needle enters your skin.
* If your provider is accessing an area deep in your body, they’ll use imaging guidance to guide the direction and location of the needle. Imaging examples include an ultrasound, CT scan or mammogram.
* Your provider will insert the needle into the targeted area. They’ll use a syringe to pull out cells, tissues or fluid.
* Your provider may need to test more than one area or get more than one sample. If this is the case, they’ll use a different needle and syringe for each one.
* Once they finish the procedure, they’ll put a bandage over the site.

### **What happens after a fine-needle aspiration procedure?**

Your provider will send the sample(s) to a laboratory where a pathologist will analyze it. They’ll look at the cells under a microscope and may perform other tests on the sample. The pathologist will put together a report of the findings and send it to your provider to share with you.

### **What are the risks of fine-needle aspiration?**

It’s common to have some soreness and bruising at the injection site. These are usually minor and go away within a couple of days.

Complications of fine-needle aspiration are relatively rare but can include:

* Bleeding. People with blood clotting disorders and/or who take anticoagulants are most at risk.
* Bacterial infection.
* Damage to surrounding structures.
* Fistula (an abnormal connection between two body tissues, such as an organ or blood vessel and another structure).

## **Results and Follow-Up**

### **What type of results do you get from fine-needle aspiration?**

There are several possible results you could get from a fine-needle aspiration. Analysis of the sample may show:

* No evidence of abnormal cells.
* A mix of abnormal and normal cells. You may need other types of testing to confirm the diagnosis.
* Precancerous cells.
* Cancerous cells.
* Evidence of a bacterial infection.

Sometimes, the laboratory may ask for additional samples to make a more accurate report. In any case, your healthcare provider will explain the report to you. Together, you’ll decide the next steps.

### **When should I call my doctor?**

Contact your healthcare provider if you develop any symptoms of an infection, like a fever or pus or redness at the injection site. If your lump or bump changes in an unexpected way after the FNA, talk to your provider.

## **Fine-Needle Aspiration (FNA) Epidemiology**

Fine-needle aspiration (FNA) is widely used globally as a minimally invasive diagnostic procedure to sample cells from lumps or masses, especially in superficial lymph nodes, thyroid nodules, breast lesions, and suspected metastatic sites.

## Key Epidemiological Points:

* Common Indications and Disease Patterns:  
  FNA is frequently performed for lymphadenopathy, thyroid nodules, breast lumps, and suspected metastatic tumors. In regions like Nigeria, studies have shown FNA is commonly used to diagnose tuberculous lymphadenitis, breast tumors, and Burkitt’s lymphoma, reflecting local disease prevalence.
* Diagnostic Accuracy and Utility:  
  FNA has high diagnostic accuracy, with reported sensitivity and specificity generally above 90% in many settings. For example, in lymph node evaluation, FNA showed an accuracy of about 89.6% for malignant lymphadenopathy. For thyroid nodules, sensitivity ranges from 88% to 95%, with overall accuracy around 75% to 93% depending on clinical suspicion. In breast lesions, FNA cytology can distinguish benign from malignant lesions effectively.
* Prevalence of Diagnoses in FNA Samples:  
  In lymph node aspirates, benign lesions (e.g., reactive hyperplasia, tuberculosis) constitute over half of cases, while lymphomas and metastatic cancers make up significant proportions of malignant diagnoses. Adenocarcinoma is the most common metastatic tumor type identified by FNA.
* Global Utilization Trends:  
  The use of FNA has increased over the past decades, with more research and publications emerging from developing countries. Despite its safety and diagnostic value, FNA remains underutilized in some regions due to lack of trained personnel or resources.
* Safety and Complications:  
  FNA is considered very safe with minimal complications, mostly limited to minor bruising or soreness. Serious complications are rare

**Doctor-patient conversation about fine-needle aspiration (FNA)**

Doctor: Hello, I see you have a lump that we need to investigate further. I recommend a procedure called fine-needle aspiration, or FNA. Have you heard of it before?

Patient: No, not really. What does it involve?

Doctor: FNA is a minimally invasive procedure where I use a very thin needle to take a small sample of cells from the lump. This sample will be sent to the lab for analysis to help us understand what the lump is — whether it’s benign or something that needs treatment.

Patient: Will it hurt?

Doctor: You may feel a quick pinch when the needle goes in, but it’s usually well tolerated. Sometimes we use a local anesthetic to numb the area, especially if the lump is deeper. The procedure usually takes just a few minutes.

Patient: What should I expect afterward?

Doctor: After the procedure, the area might be a little sore or bruised for a few days. You can take over-the-counter pain relievers like acetaminophen if needed. Avoid heavy lifting or strenuous activity for a day or two. Also, keep the area clean and avoid swimming or hot tubs for about a week to reduce infection risk.

Patient: Are there any risks?

Doctor: FNA is very safe. Complications are rare but can include minor bleeding, bruising, or very rarely infection. If you notice increased redness, swelling, fever, or severe pain, you should contact us immediately.

Patient: How long will it take to get the results?

Doctor: Usually, it takes a few days up to a week to get the pathology report. Once we have the results, we’ll discuss what they mean and the next steps for your care.

Patient: Do I need to do anything to prepare?

Doctor: Generally, no special preparation is needed. If you take blood thinners, we may ask you to stop them a few days before the procedure. We’ll give you specific instructions if that applies.

Patient: Thank you, doctor. That sounds manageable.

Doctor: You’re welcome. We’ll make sure you’re comfortable throughout the process and keep you informed every step of the way.

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**Fungal sinusitis**

ALTERNATIVE NAMES

**DEFINITION / DESCRIPTION**

Fungal sinusitis (fungal rhinosinusitis) is a sinus infection that results from a fungus (microorganisms like yeast and mold). There are several types of fungal sinus infections, and they all cause similar symptoms like nasal congestion and sinus pain (in your cheeks, forehead and between your eyes).

Providers treat most cases of fungal sinusitis with sinus surgery, and extreme cases may require additional antifungal treatment.

#### **Types of fungal sinus infections**

Providers classify fungal sinusitis into two main types:

1. Noninvasive (most common). These infections affect only your [nose](https://my.clevelandclinic.org/health/body/21778-nose) and sinus areas.
2. Invasive (less common). These infections can spread to other areas, like your eyes and brain. Untreated, these conditions are life-threatening.

Noninvasive fungal sinus infections include:

* Allergic fungal sinusitis: This results from an allergic reaction to fungi inside the nose. The sinuses fill up with thick mucus and nasal polyps can form. People with asthma or allergic rhinitis (hay fever) are more likely to develop this condition.
* Fungal ball (mycetoma): Fungi build up in the sinuses and form a clump or ball. As the fungal ball grows, it can block the sinuses.
* Saprophytic fungal sinusitis: Fungus grows on crusts of mucus inside the nose.

Invasive fungal sinus infections include:

* Acute invasive fungal sinusitis: Fungi destroy blood vessels inside the nose, causing the tissue to die. The infection can quickly spread to the eyes and brain, leading to blindness and death. This condition is more common in people with compromised immune systems.
* Chronic invasive fungal sinusitis: This condition is like acute invasive fungal sinusitis, but it doesn’t spread as quickly. People with diabetes are more likely to develop this condition.
* Granulomatous invasive fungal sinusitis (GIFS): This rare type of fungal sinusitis happens when your body launches an immune response to fungi. The person’s immune system attacks the lining of the nose and destroys the nasal tissue. Providers aren’t sure why the immune response happens.

People with weakened immune systems are more likely to develop nasal fungal infections. Severe infections are more common among people who:

* Are HIV positive.
* Have cancer (including leukemia or lymphoma), or are getting chemotherapy treatments.
* Have severe or unmanaged diabetes.
* Take immunosuppressants, including steroids.

**CAUSES**

Several types of fungi can cause a sinus infection. Most fungal sinus infections result from mold or yeast. Tiny fungi can enter the sinuses when someone breathes them in.

Many types of fungus live on or inside our bodies all the time. They’re usually only dangerous to people who have a weakened immune system.

**SIGNS / SYMPTOMS**

Fungal sinusitis symptoms can resemble symptoms of a regular sinus infection. Additional symptoms depend on the type of fungal infection and whether the infection is invasive.

In general, noninvasive symptoms include, but aren’t limited to:

* Decreased sense of smell.
* Fever.
* Inflammation (swelling) in your nose and sinuses.
* Mucus that looks like rubber cement (usually golden-yellow).
* Nasal congestion.
* Runny nose.
* Sinus pressure.
* Sinus headache.
* Smelling foul odors (like burning or rotting) that no one else can smell.

People with weakened immune systems have a higher risk of serious symptoms like:

* Behavioral changes and neurological conditions (trouble with thinking and reasoning).
* Changes in skin color (your skin may turn very pale or black).
* Facial numbness.
* Changes to your vision, including vision loss.
* Headaches.
* Severe swelling in your cheeks or eyes.

**DIAGNOSIS METHODS**

A healthcare provider will start with a physical exam. They’ll ask about your symptoms, health history and medications. Next, they’ll likely want to run some tests, which may include:

* Endoscopy. During this minimally invasive procedure, a provider inserts a long, thin tube with a camera into your nose. The camera shows images of your sinuses. Your provider views these images on a monitor.
* Biopsy. During your endoscopy, your provider may take a small sample of mucus or tissue. This is the only way to know which type of pathogen (virus, bacterium, fungi or parasite) caused your sinus infection. It’s also the only way to detect if there’s an invasion. They’ll send the sample to a pathologist for testing.
* CT scan (computed tomography scan). This imaging test helps your provider see inside your sinuses, locate the infection and check for fungal balls.

**TREATMENT OPTIONS**

Fungal sinusitis treatments include:

* Antifungals: Some types of infection require medications to kill the fungus. Providers usually prescribe these drugs along with surgery.
* Corticosteroids: Your provider may prescribe steroids to reduce inflammation and relieve sinus pressure.
* Nasal wash: To treat saprophytic fungal sinusitis, providers remove crusts of mucus and wash out your sinuses. They usually use a saline solution (a mix of water and salt) to cleanse your sinus cavities.
* Sinus surgery: Depending on the type of infection, your provider may do traditional surgery. They’ll remove any infected tissue and thoroughly clean the area. Surgery may also remove structures that are affected in case of invasion.

The type of treatment you need depends on your situation. People with healthy immune systems may not need treatment for some types of fungal sinusitis. But invasive fungal sinus infections are medical emergencies that require immediate treatment.

**PREVENTION TIPS**

You may not be able to prevent a fungal sinus infection. Talk to your provider if you:

* Have had a fungal sinus infection in the past.
* Have a health condition that weakens your immune system.
* Take immunosuppressant drugs or are getting chemotherapy treatments for cancer.

If you’re immunocompromised, or if you have a higher risk for fungal sinus infections, let your provider know. They may prescribe antifungal medications to prevent an infection before it happens.

**OUTLOOK / PROGNOSIS**

With treatment, most noninvasive fungal sinus infections go away without serious complications. Some types of infection may come back after treatment.

Invasive fungal sinus infections are medical emergencies and require immediate care.

Acute invasive fungal sinusitis is fatal about 50% of the time. This infection worsens very quickly, so it’s essential to get treatment as soon as possible. After treatment, some people have nerve damage, chronic pain or facial abnormalities due to lost tissue.

**POSSIBLE COMPLICATIONS**

Untreated, invasive fungal sinus infections can destroy the lining of your nose or spread to your eyes and brain. These complications can lead to tissue loss, blindness and death. People who have conditions that weaken the immune system (like diabetes or leukemia) have a higher risk of these complications.

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

If you have fungal sinusitis symptoms, see your provider for an evaluation. It’s also important to call your provider if you have sinus issues that don’t seem to go away (chronic sinusitis).

Seek emergency medical care if you have signs of a fungal sinus infection and you:

* Have a condition that weakens your immune system.
* Take immunosuppressant drugs.

**DIFFERENTIAL DIAGNOSIS**

1. Bacterial Sinusitis
   * Most common cause of sinus infection with purulent nasal discharge and facial pain.
   * Responds to antibiotics.
2. Allergic Rhinitis
   * Nasal congestion, sneezing, clear rhinorrhea, and itchy eyes.
   * No tissue invasion; may coexist with fungal sinusitis.
3. Nasal Polyps
   * Painless nasal obstruction and anosmia.
   * Associated with chronic sinusitis and allergic fungal rhinosinusitis.
4. Inverted Papilloma
   * Unilateral nasal obstruction and epistaxis.
   * Benign tumor that can mimic fungal ball or invasive fungal sinusitis.
5. Sinonasal Malignancies (e.g., carcinoma, lymphoma)
   * Rapid progression, facial swelling, bone destruction, and bleeding.
   * Requires biopsy for diagnosis.
6. Granulomatous Diseases (e.g., Wegener’s granulomatosis)
   * Nasal crusting, ulceration, systemic symptoms.
   * Can mimic invasive fungal sinusitis.
7. Rhinosporidiosis
   * Chronic granulomatous infection with polypoid masses.
   * Endemic in some regions, mimics fungal sinusitis.
8. Saprophytic Fungal Infection
   * Colonization of nasal mucosa without tissue invasion.
9. Fungal Ball (Mycetoma)
   * Dense fungal mass in sinus without tissue invasion.
   * Usually unilateral, common in immunocompetent patients.
10. Allergic Fungal Rhinosinusitis (AFRS)
    * Hypersensitivity reaction to fungi with eosinophilic mucin and nasal polyps.
11. Acute Fulminant Invasive Fungal Sinusitis
    * Rapidly progressive, tissue necrosis, vascular invasion.
    * Occurs in immunocompromised patients (e.g., mucormycosis).
12. Chronic Invasive Fungal Sinusitis
    * Slow progression with tissue invasion and bone erosion.

**EPIDEMIOLOGY**

Geographical location is one key difference in the prevalence of fungal sinusitis around the globe. For example, granulomatous invasive sinusitis is often a complication of chronic fungal sinusitis and is more common in India, Sudan, and Pakistan. One study reports trauma to be the most common cause of mucormycosis in Asian countries, while immune-suppression accounts for most cases in developed countries

**PREDEFINED Q & A SETS**

Q1: What is fungal sinusitis?  
A: Fungal sinusitis is inflammation or infection of the sinuses caused by fungi. It can be classified into two main categories: *noninvasive* (e.g., allergic fungal sinusitis, fungal ball, saprophytic fungal sinusitis) and *invasive* fungal sinusitis, which is more severe and can spread to surrounding tissues.

Q2: What are the common symptoms of fungal sinus infection?  
A: Symptoms often mimic regular sinus infections and include nasal congestion, facial pain or pressure, nasal discharge, loss of smell, and sometimes headaches. In invasive cases, symptoms can be severe, including facial numbness, swelling, vision changes, or even tissue destruction.

Q3: Who is at risk for fungal sinus infections?  
A: People with weakened immune systems—such as those with diabetes, leukemia, lymphoma, or on immunosuppressive medications—are at higher risk for invasive fungal sinusitis. Noninvasive forms typically affect people with normal immune function.

Q4: What are the types of fungal sinusitis?  
A:

* *Allergic fungal sinusitis*: An allergic reaction to fungi, most common type.
* *Fungal ball*: Clumps of fungus trapped in sinuses, usually requiring surgery.
* *Saprophytic fungal sinusitis*: Mold grows on mucus without tissue invasion.
* *Invasive fungal sinusitis*: Aggressive infection that can destroy tissue and spread, subdivided into chronic indolent, chronic invasive, and acute fulminant types.

Q5: How is fungal sinusitis diagnosed?  
A: Diagnosis involves a physical exam, medical history, nasal endoscopy, imaging studies like CT scans, and sometimes biopsy or fungal cultures to identify the fungus and extent of infection.

Q6: What are the treatment options for fungal sinus infections?  
A: Treatment depends on the type:

* Noninvasive forms may require surgery to remove fungal debris and medical therapy.
* Allergic fungal sinusitis often needs surgery plus long-term medical management including corticosteroids.
* Invasive fungal sinusitis is a medical emergency requiring urgent surgery and antifungal medications.

Q7: Can fungal sinus infections be serious?  
A: Yes, especially invasive fungal sinusitis, which can lead to tissue destruction, spread to eyes or brain, blindness, and even death if untreated. Prompt diagnosis and treatment are critical.

Q8: How can fungal sinusitis be prevented?  
A: Prevention involves managing underlying conditions that weaken immunity, avoiding environmental exposure to mold, and treating allergies or chronic sinus issues promptly

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you’ve been having persistent sinus symptoms. Can you tell me more about what you’re experiencing?

Patient: Yes, doctor. I have had nasal congestion, facial pain around my cheeks and forehead, and sometimes a thick nasal discharge for several weeks. It just doesn’t seem to get better.

Doctor: Thank you for sharing. Based on your symptoms and duration, I’m considering a possible fungal sinus infection, which is an infection caused by fungi rather than bacteria or viruses. Have you had any history of allergies, asthma, or immune problems?

Patient: I do have asthma, and sometimes I get seasonal allergies.

Doctor: That’s important to know. There are different types of fungal sinus infections. Some are noninvasive and related to allergic reactions, while others can be invasive and more serious, especially in people with weakened immune systems. We need to do some tests to find out which type you might have.

Patient: What kind of tests?

Doctor: Usually, we start with a nasal endoscopy, where a small camera looks inside your nasal passages and sinuses. Imaging like a CT scan helps us see the extent of the infection and any bone involvement. Sometimes we need to take a tissue sample during surgery for laboratory analysis.

Patient: Will I need surgery?

Doctor: Many fungal sinus infections require surgery to remove fungal debris and clear the sinuses. This helps relieve symptoms and prevent complications. If the infection is invasive, we also use antifungal medications. For allergic fungal sinusitis, we may also prescribe steroids to reduce inflammation.

Patient: Is it dangerous?

Doctor: Noninvasive fungal sinus infections generally have a good prognosis with treatment. However, invasive fungal sinusitis can be serious and needs urgent treatment to prevent spread to the eyes or brain. Since you have asthma and persistent symptoms, it’s important we evaluate and treat you promptly.

Patient: How long will recovery take?

Doctor: Recovery varies. After surgery, symptoms usually improve within weeks, but you may need follow-up treatments and medications. We’ll monitor you closely to prevent recurrence.

Patient: What can I do to help prevent this?

Doctor: Managing your allergies and asthma well is important. Avoiding exposure to moldy environments can also help. If you have any new or worsening symptoms, please come back promptly.

Patient: Thank you, doctor. I feel better knowing what’s going on.

Doctor: You’re welcome. We’ll work together to get you feeling better soon.

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**Goiter**

ALTERNATIVE NAMES

**DEFINITION / DESCRIPTION**

A goiter (GOI-tur) is the irregular growth of the thyroid gland. The thyroid is a butterfly-shaped gland located at the base of the neck just below the Adam's apple.

A goiter may be an overall enlargement of the thyroid, or it may be the result of irregular cell growth that forms one or more lumps (nodules) in the thyroid. A goiter may be associated with no change in thyroid function or with an increase or decrease in thyroid hormones.

The most common cause of goiters worldwide is a lack of iodine in the diet. In the United States, where the use of iodized salt is common, goiters are caused by conditions that change thyroid function or factors that affect thyroid growth.

Treatment depends on the cause of the goiter, symptoms, and complications resulting from the goiter. Small goiters that aren't noticeable and don't cause problems usually don't need treatment.

**CAUSES**

### **How the thyroid gland works**

Two hormones produced by the thyroid are thyroxine (T-4) and triiodothyronine (T-3). When the thyroid releases T-4 and T-3 into the bloodstream, they play a role in many functions in the body, including the regulation of:

* The conversion of food into energy (metabolism).
* Body temperature.
* Heart rate.
* Blood pressure.
* Other hormone interactions.
* Growth during childhood.

The thyroid gland also produces calcitonin, a hormone that helps regulate the amount of calcium in the blood.

### **How the thyroid is regulated**

The pituitary gland and hypothalamus control the rate at which T-4 and T-3 are produced and released.

The hypothalamus is a specialized region at the base of the brain. It acts as a thermostat for maintaining balance in multiple body systems. The hypothalamus signals the pituitary gland to make a hormone known as thyroid-stimulating hormone (TSH).

The pituitary gland — located below the hypothalamus — releases a certain amount of TSH, depending on how much T-4 and T-3 are in the blood. The thyroid gland, in turn, regulates its production of hormones based on the amount of TSH it receives from the pituitary gland.

### **Causes of goiter**

A number of factors that influence thyroid function or growth can result in a goiter.

* **Iodine deficiency.** Iodine is essential for the production of thyroid hormones. If a person does not get enough dietary iodine, hormone production drops and the pituitary gland signals the thyroid to make more. This increased signal results in thyroid growth. In the United States, this cause is uncommon because of iodine added to table salt.
* **Hashimoto's disease.** Hashimoto's disease is an autoimmune disorder, an illness caused by the immune system attacking healthy tissues. The damaged and inflamed tissues of the thyroid don't produce enough hormones (hypothyroidism). When the pituitary gland detects the decline and prompts the thyroid to create more hormones, the thyroid can become enlarged.
* **Graves' disease.** Another autoimmune disorder called Graves' disease occurs when the immune system produces a protein that mimics TSH. This rogue protein prompts the thyroid to overproduce hormones (hyperthyroidism) and can result in thyroid growth.
* **Thyroid nodules.** A nodule is the irregular growth of thyroid cells that form a lump. A person may have one nodule or several nodules (multinodular goiter). The cause of nodules is not clear, but there may be multiple factors — genetics, diet, lifestyle and environment. Most thyroid nodules are noncancerous (benign).
* **Thyroid cancer.** Thyroid cancer is less common than other cancers and generally treatable. About 5% of people with thyroid nodules are found to have cancer.
* **Pregnancy.** A hormone produced during pregnancy, human chorionic gonadotropin (HCG), may cause the thyroid gland to be overactive and enlarge slightly.
* **Inflammation.** Thyroiditis is inflammation of the thyroid caused by an autoimmune disorder, bacterial or viral infection, or medication. The inflammation may cause hyperthyroidism or hypothyroidism.

**RISK FACTORS**

Anyone can develop a goiter. It may be present at birth or occur at any time throughout life. Some common risk factors for goiters include:

* **A lack of dietary iodine.** Iodine is found primarily in seawater and in the soil in coastal areas. In the developing world in particular, people who don't have enough iodine in their diets or access to food supplemented with iodine are at increased risk. This is rare in the United States.
* **Being female.** Women are more likely to develop a goiter or other thyroid disorders.
* **Pregnancy and menopause.** Thyroid problems in women are more likely to occur during pregnancy and menopause.
* **Age.** Goiters are more common after age 40.
* **Family medical history.** Family medical history of goiters or other thyroid disorders increases the risk of goiters. Also, researchers have identified genetic factors that may be associated with an increased risk.
* **Medications.** Some medical treatments, including the heart drug amiodarone (Pacerone) and the psychiatric drug lithium (Lithobid), increase your risk.
* **Radiation exposure.** Your risk increases if you've had radiation treatments to your neck or chest area.

**SIGNS / SYMPTOMS**

Most people with goiters have no signs or symptoms other than a swelling at the base of the neck. In many cases, the goiter is small enough that it's only discovered during a routine medical exam or an imaging test for another condition.

Other signs or symptoms depend on whether thyroid function changes, how quickly the goiter grows and whether it obstructs breathing.

### **Underactive thyroid (hypothyroidism)**

Signs and symptoms of hypothyroidism include:

* Fatigue.
* Increased sensitivity to cold.
* Increased sleepiness.
* Dry skin.
* Constipation.
* Muscle weakness.
* Problems with memory or concentration.

### **Overactive thyroid (hyperthyroidism)**

Signs and symptoms of hyperthyroidism include:

* Weight loss.
* Rapid heartbeat (tachycardia).
* Increased sensitivity to heat.
* Excess sweating.
* Tremors.
* Irritability and nervousness.
* Muscle weakness.
* Frequent bowel movements.
* Changes in menstrual patterns.
* Sleep difficulty.
* High blood pressure.
* Increased appetite.

Children with hyperthyroidism might also have the following:

* Rapid growth in height.
* Changes in behavior.
* Bone growth that outpaces expected growth for the child's age.

### **Obstructive goiter**

The size or position of a goiter may obstruct the airway and voice box. Signs and symptoms may include:

* Difficulty swallowing.
* Difficulty breathing with exertion.
* Cough.
* Hoarseness.
* Snoring.

**DIAGNOSIS METHODS**

A goiter is often discovered during a routine physical exam. By touching your neck, your health care provider may detect an enlargement of the thyroid, an individual nodule or multiple nodules. Sometimes a goiter is found when you are undergoing an imaging test for another condition.

Additional tests are then ordered to do the following:

* Measure the size of the thyroid.
* Detect any nodules.
* Assess whether the thyroid may be overactive or underactive.
* Determine the cause of the goiter.

Tests may include:

* **Thyroid function tests.** A blood sample can be used to measure the amount of Thyroid-stimulating Hormone (TSH) produced by the pituitary gland and how much Thyroxine (T-4) and Triiodothyronine (T-3) is produced by the thyroid. These tests can show whether the goiter is associated with an increase or decrease in thyroid function.
* **Antibody test.** Depending on the results of the thyroid function test, your health care provider may order a blood test to detect an antibody linked to an autoimmune disorder, such as Hashimoto's disease or Graves' disease.
* **Ultrasonography.** Ultrasonography uses sound waves to create a computerized image of tissues in your neck. The technician uses a wand-like device (transducer) over your neck to do the test. This imaging technique can reveal the size of your thyroid gland and detect nodules.
* **Radioactive iodine uptake.** If your health care provider orders this test, you are given a small amount of radioactive iodine. Using a special scanning device, a technician can measure the amount and rate at which your thyroid takes it in. This test may be combined with a radioactive iodine scan to show a visual image of the uptake pattern. The results may help determine function and cause of the goiter.
* **Biopsy.** During a fine-needle aspiration biopsy, ultrasound is used to guide a very small needle into your thyroid to obtain a tissue or fluid sample from nodules. The samples are tested for the presence of cancerous cells.

**TREATMENT OPTIONS**

Goiter treatment depends on the size of the goiter, your signs and symptoms, and the underlying cause. If your goiter is small and your thyroid function is healthy, your health care provider may suggest a wait-and-see approach with regular checkups.

### **Medications**

Medications for goiters may include one of the following:

* **For increasing hormone production.** An underactive thyroid is treated with a thyroid hormone replacement. The drug levothyroxine (Levoxyl, Thyquidity, others) replaces thyroxine (T-4) and results in the pituitary gland releasing less thyroid-stimulating hormone (TSH). The drug liothyronine (Cytomel) may be prescribed as a triiodothyronine (T-3) replacement. These treatments may decrease the size of the goiter.
* **For reducing hormone production.** An overactive thyroid may be treated with an antithyroid drug that disrupts hormone production. The most commonly used drug, methimazole (Tapazole), may also reduce the size of the goiter.
* **For blocking hormone activities.** Your health care provider may prescribe a drug called a beta blocker for managing symptoms of hyperthyroidism. These drugs — including atenolol (Tenormin), metoprolol (Lopressor) and others — can disrupt the excess thyroid hormones and lower symptoms.
* **For managing pain.** If inflammation of the thyroid results in pain, it's usually treated with aspirin, naproxen sodium (Aleve), ibuprofen (Advil, Motrin IB, others) or related pain relievers. Severe pain may be treated with a steroid.

### **Surgery**

You may need surgery to remove all or part of your thyroid gland (total or partial thyroidectomy) may be used to treat goiter with the following complications:

* Difficulty breathing or swallowing.
* Thyroid nodules that cause hyperthyroidism.
* Thyroid cancer.

You may need to take thyroid hormone replacement, depending on the amount of thyroid removed.

### **Radioactive iodine treatment**

Radioactive iodine is a treatment for an overactive thyroid gland. The dose of radioactive iodine is taken orally. The thyroid takes up the radioactive iodine, which destroys cells in the thyroid. The treatment lowers or eliminates hormone production and may decrease the size of the goiter.

As with surgery, you may need to take thyroid hormone replacement to maintain the appropriate levels of hormones.

## **Self care**

Your body gets iodine from your food. The recommended daily allowance is 150 micrograms. A teaspoon of iodized salt has about 250 micrograms of iodine.

Foods that contain iodine include:

* Saltwater fish and shellfish.
* Seaweed.
* Dairy products.
* Soy products.

Most people in the United States get enough iodine in a healthy diet. Too much iodine in the diet, however, can cause thyroid dysfunction.

**PREVENTION TIPS**

A goiter caused by iodine deficiency (simple goiter) is generally the only type of goiter you can prevent. Consuming a diet that includes fish, dairy and a healthy amount of iodized table salt prevents these types of goiters. Iodine supplements and other supplements are generally not recommended for other types and may do more harm than good.

**OUTLOOK / PROGNOSIS**

The prognosis (outlook) for goiter depends on its type and what caused it.

Simple goiter has a good prognosis. If your thyroid continues to enlarge, it may compress the surrounding structures and may cause difficulty in breathing and swallowing and hoarseness.

If the goiter is a sign of another thyroid disease, like Graves’ disease or Hashimoto’s disease, the prognosis depends on the underlying cause of your thyroid enlargement.

**POSSIBLE COMPLICATIONS**

A goiter itself usually doesn't cause complications. The appearance may be troublesome or embarrassing for some people. A large goiter may obstruct the airway and voice box.

Changes in the production of thyroid hormones that may be associated with goiters have the potential for causing complications in multiple body systems.

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

Regardless of the cause, it’s important to see your healthcare provider regularly (at least annually) if you’ve been diagnosed with goiter so they can monitor it.

If you develop new symptoms, talk to your healthcare provider.

## **Differential Diagnoses**

* Anaplastic Thyroid Carcinoma
* Branchial Cleft Cyst
* Carotid Artery Aneurysm
* Lymphatic Malformation (Cystic Hygroma)
* Fibroma
* Granulomatous Disease of the Thyroid
* Infectious Thyroiditis
* Lipomas
* Lymphadenopathy
* Medullary Thyroid Carcinoma
* Papillary Thyroid Carcinoma
* Parathyroid Adenoma
* Parathyroid Cyst
* Pseudogoiter
* Sarcoma
* Subacute Thyroiditis
* Thyroglossal Duct Cyst
* Thyroid Abscess
* Thyroid Lymphoma
* Thyroid Nodule

**EPIDEMIOLOGY**

### Frequency

*United States*

Autopsy studies suggest a frequency of greater than 50% for thyroid nodules; with high-resolution ultrasonography, the value approaches 40% of patients with nonthyroidal illness. In the Framingham study, ultrasonography revealed that 3% of men older than 60 years had thyroid nodules, while 36% of women aged 49-58 years had thyroid nodules.In the United States, most goiters are due to autoimmune thyroiditis (ie, Hashimoto disease).

*International*

Worldwide, the most common cause of goiter is iodine deficiency.It is estimated that goiters affect as many as 200 million of the 800 million people who have a diet deficient in iodine. In the Wickham study from the United Kingdom, 16% of the population had a goiter.

In a German study, 635 people underwent ultrasonographic thyroid screening, as well as basal TSH measurement, during a preventive-health checkup.Thyroid nodules were detected in 432 (68%) of the persons screened; in a previous German study, ultrasonographic screening of more than 90,000 people detected thyroid nodules in 33% of the normal population. The authors of the latter report attributed this difference to the fact that patients in their study were screened using 13 MHz ultrasonographic scanners, which were more sensitive than the 7.5 MHz scanners used in the previous study. According to the investigators, their results indicated that the question of routine iodine supplementation requires renewed attention.

The incidence of thyroid cancer has been rising worldwide. The reasons are unclear, but this trend may be related to better detection and diagnostic methods.

### Mortality/Morbidity

Most goiters are benign, causing only cosmetic disfigurement. Morbidity or mortality may result from compression of surrounding structures, thyroid cancer, hyperthyroidism, or hypothyroidism.

### Race

No racial predilection exists.

### Sex

The female-to-male ratio is 4:1.

* In the Wickham study, 26% of women had a goiter, compared to 7% of men.
* Thyroid nodules are less frequent in men than in women, but when found, they are more likely to be malignant.

### Age

The frequency of goiters decreases with advancing age. The decrease in frequency differs from the incidence of thyroid nodules, which increases with advancing age.

## **Procedures**

Fine-needle aspiration biopsy is used for cytologic diagnosis.Fine-needle aspiration of the thyroid is used to determine the cause of an enlarged gland. In general, the procedure is not used in the workup of autonomously functioning nodules. The procedure has little morbidity and can be tailored to the situation.

Core biopsy, or large-needle biopsy, of the thyroid uses a larger-gauge needle, providing a fragment of tissue. This procedure also carries with it a higher morbidity. Core biopsy has the advantage of more complete sampling.

Partial thyroidectomy may be used as a first-line procedure for patients with a high probability of cancer. It is reserved mostly if the result of a fine-needle aspiration is suspicious or if the patient/physician prefers it.

Total thyroidectomy is performed for malignant goiters.

**PREDEFINED Q & A SETS**

## What caused this goiter to develop?

Goiters develop due to various causes including iodine deficiency, autoimmune thyroid diseases (like Hashimoto’s or Graves’), thyroid nodules, inflammation, or hormone imbalances. Sometimes, medications or genetic factors contribute as well.

## Is it serious?

Most goiters are benign and not immediately dangerous. However, large goiters can cause compressive symptoms like difficulty swallowing or breathing. Some underlying causes, such as thyroid cancer or severe hyperthyroidism, require urgent attention.

## What can be done to treat the underlying cause?

* Hypothyroid-related goiters: Treated with synthetic thyroid hormone (levothyroxine) to normalize hormone levels and potentially reduce goiter size.
* Hyperthyroid-related goiters: Treated with antithyroid drugs (e.g., methimazole), radioactive iodine to reduce thyroid activity, or surgery.
* Non-toxic multinodular goiters: Options include observation, levothyroxine therapy (controversial), radioactive iodine to shrink the gland, or surgery if symptomatic.

## I have other health conditions. How can I best manage them together?

Managing coexisting conditions requires coordinated care. Your doctor will tailor treatment to balance thyroid therapy with your other health issues, monitoring for drug interactions and side effects. Regular follow-up and communication with all your healthcare providers are essential.

## What are the alternatives to the main treatment that you're proposing?

Alternatives may include:

* Observation if the goiter is small and asymptomatic.
* Radioactive iodine therapy instead of surgery or medication.
* Minimally invasive procedures like microwave or radiofrequency ablation in some cases.
* Surgery if compressive symptoms or suspicion of malignancy exist.

## What will happen if I choose to do nothing?

If untreated, the goiter may remain stable, enlarge, or cause symptoms like airway or esophageal compression. In some cases, untreated hyperthyroidism can lead to serious complications. Regular monitoring is important to detect changes early.

## Will the goiter continue to get larger?

It may or may not. Some goiters remain stable for years, while others gradually enlarge, especially if the underlying cause is not addressed. Factors like iodine intake and thyroid hormone levels influence growth.

## How often should I have follow-up appointments?

Follow-up frequency depends on your diagnosis and treatment:

* Every 6-12 months for stable, asymptomatic goiters.
* More frequent (every 3-6 months) if undergoing treatment or if symptoms develop.
* Immediate follow-up if new symptoms arise.

## Will the treatment you're suggesting improve the appearance of the goiter?

Yes, treatments like radioactive iodine, thyroid hormone therapy, or surgery often reduce goiter size and improve cosmetic appearance, especially if the goiter is large or causing visible swelling.

## Will I have to take medication? For how long?

* If hypothyroid, you will likely need lifelong thyroid hormone replacement.
* If hyperthyroid, antithyroid medications may be used temporarily or longer-term depending on response.
* After radioactive iodine or surgery, you may require lifelong thyroid hormone replacement.
* Duration depends on the cause and treatment response

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Good morning. What brings you in today?

Patient: Good morning, doctor. I noticed a swelling in my neck, just below the Adam’s apple. It’s been growing slowly, and sometimes I feel a bit of tightness.

Doctor: I see. That sounds like a goiter, which is an enlargement of the thyroid gland. Have you experienced any symptoms like changes in your voice, difficulty swallowing, or breathing problems?

Patient: No difficulty swallowing or breathing, but my voice sometimes feels hoarse.

Doctor: Okay. Do you have any symptoms of thyroid dysfunction, such as unexplained weight changes, feeling too hot or cold, or changes in energy levels?

Patient: Actually, I’ve been feeling more tired than usual, and sometimes I feel cold even when others don’t.

Doctor: That could suggest your thyroid function is affected. We’ll need to do some blood tests to check your thyroid hormone levels and possibly an ultrasound to look at the size and structure of your thyroid.

Patient: What causes a goiter like this?

Doctor: Goiters can develop for several reasons—iodine deficiency, autoimmune diseases like Hashimoto’s or Graves’ disease, thyroid nodules, or inflammation. Sometimes medications or genetic factors play a role.

Patient: Is it serious?

Doctor: Most goiters are benign and not immediately dangerous, but if it grows large, it can cause discomfort or compress nearby structures. Some causes require treatment to manage hormone levels or reduce the size.

Patient: What are the treatment options?

Doctor: Treatment depends on the cause. If your thyroid hormone is low, we may prescribe hormone replacement. If it’s overactive, medications or radioactive iodine might be needed. Surgery is considered if the goiter is large or causing symptoms.

Patient: Are there alternatives to surgery?

Doctor: Yes, sometimes radioactive iodine or medications can shrink the goiter. Observation is also an option if the goiter is small and not causing problems.

Patient: What happens if I don’t treat it?

Doctor: The goiter may stay the same size or grow larger, potentially causing symptoms like difficulty swallowing or breathing. Also, untreated thyroid dysfunction can lead to other health issues.

Patient: How often will I need follow-ups?

Doctor: Usually every 6 to 12 months if stable, or more frequently if we start treatment or if symptoms change.

Patient: Will treatment improve how it looks?

Doctor: Often yes, especially with medication or radioactive iodine. Surgery can also improve appearance immediately.

Patient: Will I need to take medication long-term?

Doctor: If you have hypothyroidism, yes, usually lifelong. For hyperthyroidism, medications may be temporary or longer-term depending on your response.

Patient: Thank you, doctor. That helps me understand what to expect.

Doctor: You’re welcome. We’ll work together to manage this and keep you healthy.

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**Graves' disease**

ALTERNATIVE NAMES

**DEFINITION / DESCRIPTION**

Graves' disease is an immune system condition that affects the thyroid gland. It causes the body to make too much thyroid hormone. That condition is called hyperthyroidism.

Thyroid hormones affect many organs in the body. So Graves' disease symptoms also can affect those organs. Anyone can get Graves' disease. But it's more common in women and in people older than 30.

Treatment for Graves' disease helps lower the amount of thyroid hormone that the body makes and eases symptoms.

**CAUSES**

Graves' disease is caused by the body's disease-fighting immune system not working correctly. Experts don't know why this happens.

The immune system makes antibodies that target viruses, bacteria or other foreign substances. In Graves' disease, the immune system makes an antibody to one part of the cells in the hormone-making gland in the neck, called the thyroid gland.

A tiny gland at the base of the brain, called the pituitary gland, makes a hormone that controls the thyroid gland. The antibody linked with Graves' disease is called thyrotropin receptor antibody (TRAb). TRAb takes over the work of the pituitary hormone. That leads to more thyroid hormone in the body than the body needs. That condition is called hyperthyroidism.

### **Cause of thyroid eye disease**

Thyroid eye disease, also called Graves' ophthalmopathy, comes from a buildup of certain carbohydrates in the muscles and tissues behind the eyes. The cause isn't known. It may involve the same antibody that can cause the thyroid gland to not work correctly.

Thyroid eye disease often appears at the same time as hyperthyroidism or several months later. But symptoms of thyroid eye disease can appear years before or after hyperthyroidism starts. It's also possible to have thyroid eye disease without hyperthyroidism.

**RISK FACTORS**

Factors that can increase the risk of Graves' disease include:

* **Family history.** People who get Graves' disease often have a family history of thyroid conditions or an autoimmune condition.
* **Sex.** Women are much more likely to get Graves' disease than are men.
* **Age.** Graves' disease mostly happens between the ages of 30 and 60.
* **Another autoimmune condition.** People with other conditions of the immune system, such as type 1 diabetes or rheumatoid arthritis, have a higher risk.
* **Smoking.** Cigarette smoking, which can affect the immune system, raises the risk of Graves' disease. People who smoke and have Graves' disease are at higher risk of getting thyroid eye disease.

**SIGNS / SYMPTOMS**

Common symptoms of Graves' disease include:

* Feeling nervous and irritable.
* Having a slight tremor of the hands or fingers.
* Being sensitive to heat with an increase in sweating or warm, moist skin.
* Losing weight, despite wanting to eat more.
* Having an enlarged thyroid gland, also called goiter.
* Having changes in menstrual cycles.
* Not being able to get or keep an erection, called erectile dysfunction, or having less desire for sex.
* Having bowel movements often.
* Having bulging eyes — a condition called thyroid eye disease or Graves' ophthalmopathy.
* Being tired.
* Having thick, discolored skin mostly on the shins or tops of the feet, called Graves' dermopathy.
* Having fast or irregular heartbeat, called palpitations.
* Not sleeping well.

### **Thyroid eye disease**

Thyroid eye disease also is called Graves' ophthalmopathy. About 25% of people with Graves' disease have eye symptoms. Thyroid eye disease affects muscles and other tissues around the eyes. Symptoms may include:

* Bulging eyes.
* A gritty feeling in the eyes.
* Pressure or pain in the eyes.
* Puffy eyelids or eyelids that don't cover the eyeball all the way. This is called retracted eyelids.
* Red or inflamed eyes.
* Light sensitivity.
* Blurred or double vision.
* Vision loss.

### **Graves' dermopathy**

Rarely, people with Graves' disease have darkening and thickening of the skin. It most often appears on the shins or the tops of the feet. The skin has a texture like an orange peel.

This is called Graves' dermopathy. It comes from a buildup of protein in the skin. It's most often mild and painless.

**DIAGNOSIS METHODS**

To diagnose Graves' disease, your healthcare professional may do a physical exam and ask about your medical and family history. Tests might include:

* **Blood tests.** Blood tests show the levels of thyroid-stimulating hormone (TSH) and thyroid hormones in the body. TSH is the pituitary hormone that spurs the thyroid gland. People with Graves' disease most often have lower than usual levels of TSH and higher levels of thyroid hormones.  
  Another lab test measures the levels of the antibody known to cause Graves' disease. If the results don't show antibodies, there might be another cause of hyperthyroidism.
* **Radioactive iodine uptake.** The body needs iodine to make thyroid hormones. This test involves taking a small amount of radioactive iodine. Later, a special scanning camera shows how much of the iodine gets into the thyroid gland. This test can show how fast the thyroid gland takes up iodine.  
  The amount of radioactive iodine the thyroid gland takes up helps show whether Graves' disease or another condition is the cause of the hyperthyroidism. This test may be used with a radioactive iodine scan to show a picture of the uptake pattern.

**TREATMENT OPTIONS**

Treatment for Graves' disease aims to stop the thyroid from making hormones. Treatment also blocks the effect of the hormones on the body.

### **Radioactive iodine therapy**

With this therapy, you take radioactive iodine, called radioiodine, by mouth. The radioiodine goes into the thyroid cells. Over time, it destroys the cells that make thyroid hormone. This causes your thyroid gland to shrink. Symptoms ease little by little, most often over several weeks to several months.

Radioiodine therapy may raise the risk of thyroid eye disease or make its symptoms worse. This side effect most often is mild and doesn't last. But the therapy might not be for you if you have moderate to severe eye symptoms.

Other side effects may include a tender neck and a brief rise in thyroid hormones. Radioiodine therapy isn't used for treating pregnant people or those who are breastfeeding.

This treatment destroys cells that make thyroid hormone. After the treatment, you'll likely need to take daily hormone medicine to get the thyroid hormones your body needs.

### **Anti-thyroid medicines**

Anti-thyroid medicines block the thyroid from using iodine to make hormones. These prescription medicines include propylthiouracil and methimazole.

Because the risk of liver failure is more common with propylthiouracil, methimazole is most often the first choice. But methimazole has a slight risk of birth defects. So propylthiouracil might be prescribed during the first trimester of pregnancy. Pregnant people typically take methimazole after the first trimester.

When either of these medicines are used without other treatments, hyperthyroidism may come back. These medicines may work better when they are taken for longer than a year. Anti-thyroid medicines may be used before or after radioiodine therapy as an added treatment.

Side effects of both medicines include rash, joint pain, liver failure or a decrease in disease-fighting white blood cells.

### **Beta blockers**

These medicines don't stop the body from making thyroid hormones. But they block the effect of hormones on the body. They may work quickly to ease irregular heartbeats, tremors, anxiety, irritability, heat intolerance, sweating, diarrhea and muscle weakness.

Beta blockers include:

* Propranolol (Inderal LA, InnoPran XL, Hemangeol).
* Atenolol (Tenormin).
* Metoprolol (Lopressor, Toprol-XL).
* Nadolol (Corgard).

Beta blockers aren't often given to people with asthma because they can cause an asthma attack. These medicines also might make it harder to manage diabetes.

### **Surgery**

Surgery to remove the thyroid, called thyroidectomy, can treat Graves' disease. You need to take thyroid medicine for the rest of your life after this surgery.

Risks of this surgery include damage to the nerve that controls the vocal cords and damage to the tiny glands that sit next to the thyroid gland, called the parathyroid glands. The parathyroid glands make a hormone that controls the level of calcium in the blood. Complications are rare with surgeons who have done a lot of thyroid surgeries.

### **Treating thyroid eye disease**

For mild symptoms of thyroid eye disease, using artificial tears during the day may be helpful. You can buy artificial tears without a prescription. Use lubricating gels at night.

For symptoms of thyroid eye disease that are worse, treatment might include:

* **Corticosteroids.** Treatment with corticosteroids given through a vein may ease swelling behind the eyeballs. Side effects might include fluid buildup, weight gain, high blood sugar, high blood pressure and mood swings.
* **Teprotumumab (Tepezza).** This medicine is given eight times. It's given through an IV in the arm every three weeks. It can cause side effects such as hearing loss, nausea, diarrhea, muscle spasms and high blood sugar.
* **Prisms.** You may have double vision either because of Graves' disease or as a side effect of surgery for Graves' disease. Though they don't work for everyone, prisms in your glasses may correct double vision.
* **Orbital decompression surgery.** In this surgery, a surgeon removes the bone between the eye socket, called the orbit, and the air spaces next to the orbit, called the sinuses. This gives the eyes room to move back to their usual place.  
  This treatment is mainly used if pressure on the optic nerve might cause loss of vision. Possible complications include double vision.
* **Orbital radiotherapy.** This was once a common treatment for thyroid eye disease, but how it helps isn't clear. It uses X-rays over several days to destroy some of the tissue behind the eyes. Your healthcare professional might suggest this treatment if your eye problems are getting worse and corticosteroids aren't working, or they cause too many side effects.

Thyroid eye disease doesn't always get better with treatment of Graves' disease. Symptoms of thyroid eye disease may even get worse for 3 to 6 months. After that, the symptoms of thyroid eye disease most often stay the same for a year or so. Then the symptoms begin to get better, often on their own.

**Lifestyle and home remedies**

If you have Graves' disease, it's important to take care of your mental and physical health. This includes:

* **Eating well and exercising.** These can help ease some symptoms during treatment and help you feel better overall. Your thyroid controls how you burn calories. So you may gain weight when the hyperthyroidism is corrected.  
  Brittle bones also can happen with Graves' disease. Weight-bearing exercises can help keep bones strong.
* **Easing stress.** Stress can trigger Graves' disease or make it worse. Listening to music, taking a warm bath or walking can help you relax and put you in a better mood.

Work with your healthcare team to design a plan that makes eating well, exercising and relaxing part of each day.

### **Thyroid eye disease**

For thyroid eye disease, also called Graves' ophthalmopathy, these steps may help:

* **Put cool, damp cloths on your eyes.** This can soothe your eyes.
* **Wear sunglasses.** Ultraviolet rays and bright lights can affect your eyes more if they bulge. Wearing sunglasses that wrap around the sides of your head can help. And they also can keep wind from bothering your eyes.
* **Use lubricating eye drops.** Eye drops may relieve the dry, scratchy feeling of your eyes. Try a lubricating gel at night.
* **Raise the head of your bed.** Keeping your head higher than the rest of your body lessens fluid buildup in the head and may ease the pressure on your eyes.
* **Tape shut the eyelids.** If your eyelids don't close all the way, taping them shut during sleep or wearing a sleep mask might help.
* **Don't smoke.** Smoking worsens thyroid eye disease.

### **Graves' dermopathy**

If Graves' disease affects your skin, use creams or ointments that have hydrocortisone. You can buy these without a prescription. The hydrocortisone can ease swelling. Using compression wraps on your legs also may help.

**OUTLOOK / PROGNOSIS**

If Graves’ disease is properly treated, the prognosis (outlook) is generally good. Without treatment, Graves’ disease can cause complications that can affect your overall health or life expectancy.

**POSSIBLE COMPLICATIONS**

Complications of Graves' disease can include:

* **Pregnancy health concerns.** Graves' disease during pregnancy can cause miscarriage, early birth, fetal thyroid issues and poor fetal growth. It also can cause heart failure and preeclampsia in the pregnant person. Preeclampsia leads to high blood pressure and other serious symptoms.
* **Heart conditions.** Graves' disease that isn't treated can lead to irregular heart rhythms and changes in the heart and how it works. The heart might not be able to pump enough blood to the body. That condition is called heart failure.
* **Thyroid storm.** This rare but deadly complication of Graves' disease also is called accelerated hyperthyroidism or thyrotoxic crisis. It's more likely to happen when severe hyperthyroidism is not treated or not treated well enough.  
  Thyroid storm happens when a sudden and drastic rise in thyroid hormones causes a number of effects in the body. They include fever, sweating, confusion, delirium, severe weakness, tremors, irregular heartbeat, severe low blood pressure and coma. Thyroid storm needs medical attention right away.
* **Brittle bones.** Hyperthyroidism that isn't treated can lead to weak, brittle bones — a condition called osteoporosis. The strength of the bones depends, in part, on the amount of calcium and other minerals they hold. Too much thyroid hormone makes it hard for the body to get calcium into the bones.

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

Other medical conditions can cause symptoms like those of Graves' disease. See your healthcare professional if you have any symptoms of Graves' disease to get a prompt diagnosis.

Seek medical care right away if you have heart-related symptoms, such as a fast or irregular heartbeat, or if you have vision loss.

**DIFFERENTIAL DIAGNOSIS**

* Exogenous thyroid hormone
* Hashimoto thyroiditis
* Hyperemesis gravidarum
* Papillary Thyroid carcinoma
* Pheochromocytoma
* Pituitary resistance to thyroid hormone
* Postpartum thyroiditis
* Radiation-induced thyroiditis
* Silent thyroiditis
* Struma ovarii
* Subacute thyroiditis
* Thyrotropin producing pituitary adenomas
* Toxic multinodular goiter

**RECENT GUIDELINES OR UPDATES**

*first-line treatment for moderate to severe and active ophthalmopathy*

First-line treatment for moderate to severe and active ophthalmopathy includes the following:

* IV methylprednisolone in combination with oral mycophenolate
* In the more severe forms (such as those characterized by diplopia [constant or not], exophthalmos >25 mm, and severe inflammatory signs), monotherapy with IV methylprednisolone, the cumulative dose being 7.5 g per cycle

*Second-line treatment for moderate to severe and active ophthalmopathy*

Second-line treatments for moderate to severe and active ophthalmopathy are used If response to primary/first-line treatment is poor. The following second-line treatments should be considered after careful eye examination and measurement of liver enzymes:

* Monotherapy with a second course of IV methylprednisolone, commencing with high, single doses (0.75 g), the maximal cumulative dose being 8 g per cycle
* Radiotherapy to the orbit (in combination with glucocorticoids), particularly in patients with diplopia and/or extraocular motion defect
* Cyclosporine plus oral glucocorticoids
* Azathioprine plus oral glucocorticoids
* Tocilizumab
* Teprotumumab - Very promising drug with a strong beneficial response; currently used in second-line treatment pending the availability of more clinical data
* Rituximab - A second-line treatment for patients with moderate to severe and active ophthalmopathy of onset within less than 12 months and refractory to IV glucocorticoids; for use when no optic neuropathy is present

*Sight-threatening Graves ophthalmopathy*

Guidelines for managing sight-threatening Graves ophthalmopathy include the following:

* Urgent treatment should be provided for severe corneal exposure, either medically or via increasingly more invasive surgeries, so that there is no progression to corneal breakdown; corneal breakdown should immediately be managed surgically

*Thyroid treatment in patients with Graves ophthalmopathy*

Thyroid treatment in patients with Graves ophthalmopathy includes the following:

* Mild and inactive Graves ophthalmopathy - The preferred management is with antithyroid drugs or thyroidectomy; if radioactive iodine is employed, prophylaxis with prednisone/prednisolone should be used
* Moderate to severe, but long-standing and inactive, ophthalmopathy - Treatment should be the same as for mild and inactive Graves ophthalmopathy, but consider prednisone/prednisolone prophylaxis if choosing radioactive iodine treatment, especially in patients with risk factors for ophthalmopathy (smoking, high TSH-receptor antibodies)

**Graves' Disease Treatment Drugs and Their Side Effects**

## 1. Antithyroid Medications

* Methimazole (MMI)
  + Use: First-line treatment to reduce thyroid hormone production.
  + Duration: Usually taken for 12-18 months or longer to induce remission.
  + Side Effects:
    - Rash, itching
    - Gastrointestinal upset
    - Rare but serious: agranulocytosis (severe drop in white blood cells), liver toxicity
  + Notes: Preferred over PTU except in first trimester of pregnancy or thyroid storm.
* Propylthiouracil (PTU)
  + Use: Alternative to methimazole, especially in the first trimester of pregnancy or thyroid storm.
  + Side Effects:
    - Similar to methimazole but higher risk of liver toxicity
    - Agranulocytosis (rare)
  + Notes: Used less frequently due to liver toxicity risk.

## 2. Beta-Blockers (e.g., Propranolol, Atenolol)

* Use: Symptomatic relief of hyperthyroid symptoms such as rapid heart rate, tremors, anxiety.
* Side Effects:
  + Fatigue, dizziness
  + Bradycardia (slow heart rate)
  + May worsen asthma or COPD
* Notes: Do not affect thyroid hormone levels; used as adjunct therapy.

## 3. Radioactive Iodine (RAI) Therapy

* Use: Destroys overactive thyroid tissue, leading to hypothyroidism.
* Side Effects:
  + Temporary worsening of hyperthyroid symptoms
  + Possible worsening of Graves’ ophthalmopathy
  + Hypothyroidism requiring lifelong thyroid hormone replacement
* Notes: Considered definitive treatment if medication fails or is not tolerated.

## 4. Surgery (Thyroidectomy)

* Use: Removal of all or part of the thyroid gland, definitive treatment.
* Side Effects/Complications:
  + Risk of damage to vocal cord nerves (hoarseness)
  + Hypoparathyroidism (low calcium levels) if parathyroid glands are affected
  + Lifelong thyroid hormone replacement required
* Notes: Indicated for large goiters, suspicion of cancer, or patient preference.

## 5. Other Treatments

* Iodides (e.g., Lugol’s solution, SSKI):
  + Used short-term before surgery or to control thyroid hormone release during thyroid storm.
  + Side effects include rash, metallic taste, salivary gland swelling.
* Immunomodulatory therapies (experimental):
  + Rituximab has been studied but is not standard therapy yet

**EPIDEMIOLOGY**

Graves’ disease is the most common cause of hyperthyroidism accounting for 60% to 80% of hyperthyroid cases. The overall prevalence of hyperthyroidism in the United States is 1.2% with an incidence of 20/100,000 to 50/100,000. It is most common in people ages 20 to 50 years. Graves’ disease is more common in women than men. Some data suggest its lifetime risk in women and men are 3% and 0.5%, respectively. As per the data from Nurses’ Health Study II (NHSII), the 12-year incidence among women ages 25 to 42 years was as high as 4.6/1000.

**PREDEFINED Q & A SETS**

Is Graves' disease life-threatening?

Graves' disease can be life-threatening if it’s left untreated or you don’t follow your treatment regularly. It may put you at risk of developing life-threatening conditions such as a thyroid storm, stroke, and heart failure.

How long can you live with Graves' disease?

Graves' disease won’t affect how long you’ll live when you treat it well. However, if left untreated, it can cause complications such as heart disease, which can affect how long you can live.

What to expect when you have Graves' disease?

You can expect symptoms such as tiredness, weakness, shaking in your hands, weight loss, sleep problems, fast heartbeat, period changes, and low sex drive when you have Graves' disease. You can also expect to follow a lifelong treatment plan and make lifestyle changes.

Can Graves' disease go away?

Graves' disease can go away when you follow treatment. But it can also come back, especially if it went away when you were a child.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Good afternoon. I understand you’ve been experiencing symptoms like rapid heartbeat, weight loss, and neck swelling. Can you tell me more about how you’ve been feeling?

Patient: Yes, doctor. I’ve been feeling very anxious, my heart races sometimes, and I noticed my neck looks swollen. Also, my eyes feel gritty and sometimes blurry.

Doctor: These symptoms are consistent with Graves’ disease, which is an autoimmune condition where your thyroid gland produces too much hormone. The swelling you see is called a goiter, and the eye symptoms are related to thyroid eye disease, which can occur with Graves’.

Patient: Is this serious? What happens if I don’t treat it?

Doctor: If untreated, Graves’ disease can lead to serious complications like heart problems, severe eye issues, or even a thyroid storm, which is life-threatening. Early treatment helps control symptoms and prevent complications.

Patient: What treatments are available?

Doctor: We have several options. Antithyroid medications can reduce hormone production. Beta-blockers help control symptoms like rapid heartbeat. In some cases, radioactive iodine therapy or surgery to remove part of your thyroid may be necessary. For eye symptoms, specialized treatments or surgery might be needed.

Patient: Are there side effects to these treatments?

Doctor: Yes, medications can cause side effects like rash or, rarely, changes in white blood cells. Radioactive iodine can sometimes worsen eye symptoms initially and usually leads to hypothyroidism, requiring lifelong thyroid hormone replacement. Surgery carries risks like nerve injury but is effective for large goiters or nodules.

Patient: How will this affect my daily life?

Doctor: Many patients manage Graves’ disease well with treatment. It’s important to have regular follow-ups to monitor your thyroid levels and adjust treatment. Support groups and counseling can also help with coping, especially for eye symptoms and emotional challenges.

Patient: What about the eye problems? Can they get worse?

Doctor: Thyroid eye disease can progress, but early diagnosis and treatment reduce risks. In severe cases, surgery or specialized therapies can improve eye function and appearance.

Patient: How often will I need to see you?

Doctor: Initially, every few weeks to months until your thyroid levels stabilize, then every 6-12 months for ongoing monitoring.

Patient: Thank you, doctor. It’s a lot to take in, but I feel better knowing there are treatments.

Doctor: You’re welcome. We’ll work together to manage this and keep you healthy. Please contact me if you notice worsening symptoms or new concerns.

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**Glossitis**

ALTERNATIVE NAMES

**DEFINITION / DESCRIPTION**

Glossitis is a condition that causes your tongue to become swollen and inflamed. People with glossitis often have tongues that look smooth or glossy.

Glossitis may appear suddenly (acute glossitis) or it may recur over time (chronic glossitis).

#### **Types of glossitis**

There are a few different types of glossitis, including:

* Atrophic glossitis. Also called Hunter glossitis, atrophic glossitis happens when you lose a lot of papillae (the tiny bumps on your tongue that contain taste buds). When this occurs, your tongue may look smooth and glossy.
* Median rhomboid glossitis. Characterized by a red, smooth, flat or raised area, this type of glossitis affects the middle or back of your tongue. Most experts believe median rhomboid glossitis indicates a fungal infection (candida glossitis).
* Geographic tongue. Sometimes called benign migratory glossitis, geographic tongue causes patches of missing papillae and smooth, “map-like” red lesions. Though the condition is inflammatory, it’s completely harmless.
* Burning tongue syndrome. This condition primarily affects the tip of your tongue and the roof of your mouth. Burning tongue syndrome can affect people of all ages, but it’s most common during the menopausal period. That’s why healthcare providers also call it menopausal glossitis.

**CAUSES**

Glossitis causes include:

* Allergic reactions to foods, medicine or dental care products.
* Infections (viral, bacteria or fungal).
* Vitamin or nutritional deficiencies.
* Mouth trauma or injury.
* Low iron levels (which can affect the health of your muscles, including your tongue).
* Dry mouth (xerostomia).
* Tobacco and alcohol use.
* Hormonal changes.

#### **Is glossitis contagious?**

Glossitis itself isn’t contagious. But you can pass any underlying infection from person to person. For example, if you have glossitis due to oral herpes, the infection can spread through saliva.

#### **Who does glossitis affect?**

Anyone can get glossitis. But you’re more likely to develop the condition if you:

* Have food allergies.
* Have a mouth injury.
* Have anemia.
* Have certain infections, such as herpes.
* Have an immune system disorder, such as Sjögren’s syndrome.
* Wear dentures, braces or other oral appliances that irritate your tongue.
* Eat spicy foods.
* Smoke.

**SIGNS / SYMPTOMS**

Glossitis symptoms vary depending on the underlying cause. Symptoms may appear suddenly or develop over a long period of time.

Common glossitis symptoms include:

* Smooth, glossy tongue.
* Sore, tender or painful tongue.
* Swollen tongue.
* Tongue redness.
* Difficulty speaking, eating or swallowing.

**DIAGNOSIS METHODS**

A healthcare provider can diagnose glossitis during a physical examination of your tongue and mouth. They’ll look to see if you have missing papillae and ask about your symptoms. If necessary, they may request additional assessments, such as blood tests, to rule out other conditions.

**TREATMENT OPTIONS**

Glossitis treatment depends on the underlying cause of the condition. Once treated effectively, glossitis typically goes away.

Common glossitis treatments include:

#### **Medication**

Your healthcare provider may prescribe oral medication — such as antibiotics, antivirals or antifungals — to treat glossitis. In some cases, they may also give you a corticosteroid ointment to help reduce soreness and redness.

#### **Supplements and dietary changes**

If you have a vitamin or nutritional deficiency that’s causing glossitis, your healthcare provider will likely prescribe supplements. They may also recommend ways to add essential nutrients into your natural diet.

#### **Eliminating triggers**

If you have glossitis flare-ups after eating spicy foods, your healthcare provider may recommend avoiding these foods for a while. If you’re prone to glossitis, it’s also a good idea to quit smoking and reduce your alcohol intake.

#### **Good oral hygiene**

Practicing good oral hygiene helps eliminate harmful microorganisms that can lead to infection. Brush your teeth two to three times a day using a soft-bristled toothbrush and nonabrasive fluoride toothpaste. Floss between your teeth once a day. Don’t forget to brush your tongue.

### **How soon after treatment will I feel better?**

Once treated, glossitis should go away within a few days. If your symptoms last longer than 10 days, contact your healthcare provider for further instructions.

**PREVENTION TIPS**

You can reduce your risk for glossitis by avoiding the triggers that cause it. Possible triggers include smoking, drinking alcohol and eating hot and spicy foods.

You can also reduce your risk for glossitis and other oral health issues by practicing good oral hygiene at home and visiting your dentist regularly for exams and cleanings

**OUTLOOK / PROGNOSIS**

Most of the time, acute glossitis goes away once your healthcare provider treats it. Sometimes, it can even go away on its own.

If you have chronic or recurring glossitis, talk to your healthcare provider about ways to manage your symptoms during flare-ups.

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

You should call your healthcare provider if glossitis symptoms last longer than 10 days or if your symptoms don’t respond to treatment.

If your tongue becomes severely swollen and you have difficulty speaking or breathing, call 911 or head to your nearest emergency room.

**DIFFERENTIAL DIAGNOSIS**

The differential diagnosis for glossitis is extremely broad, and can be slightly narrowed down according to the physical exam findings:

Normal-appearing tongue:

* Burning mouth syndrome
* Diabetic neuropathy
* Post-herpetic glossitis
* Acid reflux

Atrophic glossitis:

* Protein-calorie malnutrition
* Vitamin B12 deficiency
* Bullous disease
* Candidiasis
* Xerostomia

Median rhomboid glossitis:

* Haemangioma
* Geographic tongue
* Amyloidosis
* Candidiasis
* Squamous cell carcinoma

Strawberry tongue:

* Yellow fever
* Kawasaki disease
* Toxic shock syndrome

Geographic Tongue:

* Oral lichen planus
* Chemical or inhalation irritant (smoking)
* Dehydration
* Candidiasis
* Connective tissue disease
* Bullous disease
* Leukoplakia

**EPIDEMIOLOGY**

Precise epidemiological statistics are lacking, largely owing to the diverse nature of potential causes of glossitis. Various vitamin deficiencies are endemic in some regions of the world and may fluctuate with the overall nutritional status of the population. Glossitis caused by a vitamin deficiency or infection will often resolve with treatment of the underlying condition. Infectious glossitis will likewise resolve with the eradication of the causative organism. Medication-induced glossitis will typically resolve with discontinuation of the offending agent.

Per to the Third National Health and Nutrition Examination Survey III (NHANES III) that performed oral mucosal examinations on 17,235 adults 27.9 % of them had a total of 6,003 clinically oral lesions, 14.2% of the mucosal lesions were on the dorsum of the tongue, while 1.3% only on the lateral border of the tongue. Overall, the prevalence ranges of geographic tongue (benign migratory glossitis) were 1.41 to 2.29%, and 0.46 to 0.30% for median rhomboid glossitis

**PREDEFINED Q & A SETS**

What caused my glossitis?  
Glossitis can be caused by many factors including allergic reactions (to foods, oral care products, or medications), infections (bacterial, viral like herpes, or fungal such as Candida), nutritional deficiencies (like iron, vitamin B12, folate), dry mouth, injury or irritation (from burns, rough teeth, dentures), irritants (tobacco, alcohol, spicy foods), hormonal changes, or underlying medical conditions such as autoimmune diseases.

Do I have an infection? If so, what kind?  
Glossitis may be caused by infections from bacteria, viruses (e.g., oral herpes), or fungi (commonly Candida). Your healthcare provider will determine if an infection is present based on your symptoms and possibly lab tests. If you have symptoms like white patches, pain, or a history of cold sores, infection is more likely.

Do I need medication?  
If an infection is diagnosed, you may need antibiotics, antifungal, or antiviral medications depending on the cause. Corticosteroids may be prescribed to reduce inflammation. Nutritional deficiencies require supplementation. Good oral hygiene is essential for all cases.

How long will I take the medication?  
The duration depends on the cause and severity. Infections typically require treatment for 1 to 2 weeks or as prescribed. Nutritional supplementation may be needed longer until deficiencies are corrected. Your doctor will guide you based on your response to treatment.

Do I need to avoid certain triggers?  
Yes. Avoid irritants such as tobacco, alcohol, spicy or hot foods, and any known allergens like certain oral care products or medications. Maintaining good oral hygiene and avoiding trauma to the tongue also help prevent worsening.

Will I need to undergo more testing?  
Your healthcare provider may order blood tests to check for nutritional deficiencies or underlying medical conditions. If infection is suspected, swabs or cultures may be taken. Further tests depend on your symptoms and response to initial treatment

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I see you’re experiencing some tongue discomfort. Can you describe your symptoms for me?

Patient: Yes, my tongue feels swollen, red, and it looks very smooth. It’s also a bit painful, especially when I eat spicy foods.

Doctor: That sounds like glossitis, which is inflammation of the tongue. It can cause swelling, redness, and a smooth or glossy appearance because the tiny bumps on your tongue, called papillae, may be lost or inflamed.

Patient: What causes this? Is it an infection?

Doctor: Glossitis can have several causes. Sometimes it’s due to infections like oral thrush (a fungal infection) or herpes virus. It can also be caused by allergic reactions, irritation from things like spicy foods or tobacco, dry mouth, or nutritional deficiencies such as low iron, vitamin B12, or folate.

Patient: How do you know what’s causing mine?

Doctor: I’ll examine your tongue and mouth carefully. If needed, I may order blood tests to check for vitamin or mineral deficiencies or other underlying conditions. Sometimes, if I suspect an infection, we might do a swab or culture.

Patient: Do I need medication?

Doctor: That depends on the cause. If it’s an infection, I may prescribe antifungal, antiviral, or antibiotic medication. If you have a nutritional deficiency, supplements will help. For inflammation and pain, corticosteroid ointments or mouth rinses can be useful. Also, avoiding irritants like spicy foods, tobacco, and alcohol will help your tongue heal.

Patient: How long will it take to get better?

Doctor: Once we treat the underlying cause, glossitis usually improves within a few days to a couple of weeks. If symptoms persist longer than 10 days or worsen, please let me know.

Patient: Should I avoid anything else?

Doctor: Yes, try to avoid spicy, acidic, or hot foods and drinks until your tongue heals. Good oral hygiene is important — brush gently with a soft toothbrush and avoid harsh mouthwashes.

Patient: Will I need more tests?

Doctor: Possibly, if your symptoms don’t improve or if I suspect an underlying condition. Blood tests are common to check for anemia or vitamin deficiencies. We’ll decide based on how you respond to treatment.

Patient: Thank you, doctor. I feel better knowing what to expect.

Doctor: You’re welcome. We’ll work together to get your tongue feeling better soon. If you notice severe swelling, difficulty breathing, or speaking, seek emergency care immediately.

Some additional specific treatments include:

Atrophic glossitis:

* Intramuscular injections of vitamin B12.

Median rhomboid glossitis:

* Antifungals only if symptomatic (nystatin swish and swallow)

Benign migratory glossitis:

* Reassurance only, with mouth rinses, as described above, for acute exacerbations.

Geometric glossitis:

* Reassurance. Acute episodes have been treated with antivirals with limited success.

Strawberry tongue:

* Vitamin B12 supplementation

Medication-induced:

* Discontinue offending medication

Infectious:

* Treat acute or chronic infection.
* Immunology workup for any opportunistic infections and control of diabetes

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**Geriatric rhinitis**

ALTERNATIVE NAMES

* Nonallergic rhinitis of the elderly
* Senile rhinitis
* Atrophic rhinitis (sometimes used when nasal mucosa thinning and crusting are prominent)
* Vasomotor rhinitis in the elderly
* Age-related rhinitis
* Chronic rhinitis in older adults

**DEFINITION / DESCRIPTION**

Rhinitis is an inflammation of the mucous membranes or lining of the nasal cavity. Geriatric rhinitis, or rhinitis in senior patients, is a common but often neglected or overlooked condition because it is not life-threatening.

Patients with geriatric rhinitis may have nasal obstruction or congestion, runny nose or post-nasal drip, itchy nose, sneezing, and/or nasal dryness or crusting. There are three main types of rhinitis: allergic, non-allergic, and atrophic.

**CAUSES**

The allergic form of rhinitis is caused by a reaction to various allergens. Elderly patients with symptoms such as repeated sneezing, watery eyes, nasal obstruction with a clear, watery runny nose, and soft, pale turbinates (finger-like structures in the nose that heat and moisten the air you breathe) may have allergic rhinitis. The most common triggers include pollen, mold, dust mites, pet dander, and cockroaches. Allergic reaction to these triggers is diagnosed either by skin prick or blood testing.

Like the allergic form of rhinitis, patients with non-allergic rhinitis may experience nasal congestion, runny nose, and post-nasal drainage. However, these symptoms differ because they do not have an allergic (IgE) component. Non-allergic rhinitis is diagnosed based on the patient’s medical history and the exclusion of other causes. Symptoms can be triggered by changes in temperature, humidity, and exposure to irritating chemicals, smells, or certain medications.

Some older patients are unusually sensitive to environmental, seasonal, and/or physical irritants that don’t bother most people. This is a condition called vasomotor rhinitis, which refers to an overstimulation of the blood vessels (“vaso”) in the nose causing periodic episodes of sneezing, watery drainage, and/or congestion.

Finally, the atrophic form of rhinitis is more common in older adults. A reduction of blood flow to the mucosal lining of the nasal cavity can cause the tissues of the nose to shrink and dry out, causing nasal congestion. This form of rhinitis is associated with nasal dryness, congestion, crusting, and a foul odor if there is an infection.

## 

## **Risk factors**

Things that can make you more likely to get nonallergic rhinitis include:

* **Breathing in some types of unclean air.** Smog, exhaust fumes and tobacco smoke are a few of the things that can raise the risk of nonallergic rhinitis.
* **Being older than age 20.** Most people who get nonallergic rhinitis are 20 or older. That makes it different from allergic rhinitis, which people often have when they're younger than 20.
* **Using nose sprays or drops for a long time.** Don't use store-bought decongestant drops or sprays oxymetazoline (Afrin, Dristan, others) for more than a few days. A stuffy nose or other symptoms might get worse when the decongestant wears off. This is often called rebound congestion.
* **Getting pregnant or having periods.** Congestion in the nose often gets worse during these times due to hormone changes.
* **Being exposed to fumes at work.** In some lines of work, fumes from supplies can cause nonallergic rhinitis to start. Some common triggers include construction materials and chemicals. Fumes from compost also can be a trigger.
* **Some health problems.** Some long-term health problems can cause nonallergic rhinitis or make it worse. These include diabetes and a problem that happens when the thyroid gland doesn't make enough thyroid hormone.

**SIGNS / SYMPTOMS**

For the most part, rhinitis symptoms, diagnosis, and treatment are the same for the elderly as other adult age groups. However, there are special considerations for senior patients, and symptoms of geriatric rhinitis may include:

* Constant feeling of nasal drainage
* Chronic or uncontrolled need to clear the throat of mucus
* Sense of nasal obstruction, most often while lying down
* Nasal crusting, especially during winter and in patients taking diuretics
* Vague facial pressure
* Decreased sense of smell and taste

**DIAGNOSIS METHODS**

Your health care provider will likely give you a physical exam and ask you about your symptoms. You'll need tests to find out if something other than nonallergic rhinitis is causing your symptoms.

You may have nonallergic rhinitis if:

* You have a stuffy nose.
* Your nose runs or mucus drips down the back of your throat.
* Tests for other health problems don't find causes such as allergies or a sinus problem.

In some cases, your provider might have you try a medicine to see whether your symptoms get better.

### **Checking for allergies**

Allergies often cause symptoms such as sneezing and a stuffy, runny nose. Some tests can help make sure that your symptoms aren't caused by an allergy. You may need skin or blood tests.

* **Skin test.** The skin is pricked and exposed to tiny bits of common allergens found in the air. These include dust mites, mold, pollen, and cat and dog dander. If you're allergic to any of these, you'll likely get a raised bump where your skin was pricked. If you're not allergic, your skin won't have changes.
* **Blood test.** A lab can test a sample of your blood to find out if you have an allergy. The lab checks for higher levels of proteins called immunoglobulin E antibodies. These can release chemicals that cause allergy symptoms.

Sometimes, symptoms may be caused by both allergic and nonallergic triggers.

### **Checking for sinus problems**

Your provider also will want to find out if your symptoms are due to a sinus problem. You might need an imaging test to check your sinuses.

* **Nasal endoscopy.** This test checks the sinuses with a thin tool that has a camera on the end. The tool is called an endoscope. The endoscope is passed through the nostrils to look inside the nose.
* **Computerized Tomography (CT) scan.** This test uses X-rays to make images of the sinuses. The images are more detailed than those made by typical X-ray exams.

**TREATMENT OPTIONS**

Treatment for geriatric rhinitis mainly involves medical options. In certain instances, however, surgery may be advised. Treatment for geriatric patients is based not only on the type of rhinitis, but also on the individual patient’s health, medical history, slower metabolism, and increased potential for side effects. Options may include:

*Medications*—Eighty to 85 percent of elderly patients have chronic diseases and take multiple prescriptions, including over-the-counter medications, to help manage their conditions. Medications to treat geriatric rhinitis, such as intranasal corticosteroids, antihistamines, and anticholinergic sprays, can place patients at a risk for adverse drug interactions, and should be discussed with a primary care physician or an ENT (ear, nose, throat) specialist, or otolaryngologist.

*Surgery*—An ENT specialist can determine if surgery of the turbinates is an option. Patients with structural abnormalities, such as a deviated septum or nasal valve collapse causing severe nasal problems, should be referred to an ENT specialist for evaluation.

Treatment of nonallergic rhinitis depends on how much it bothers you. Home treatment and staying away from triggers might be enough for mild cases. Medicines may ease worse symptoms. These include:

* **Saline nose sprays.** Saline is a mixture of salt and water. Saline nose spray helps moisturize the nose. It also helps thin mucus and soothes the tissue that lines the inside of the nose. You can buy saline nose spray off the shelf at stores. But a home remedy known as nose irrigation might work even better. It involves using a large amount of saline or a saltwater mixture to help clean out irritants and mucus.
* **Antihistamine nasal sprays.** Antihistamines treat many health problems, including allergies. An antihistamine nose spray may ease the symptoms of nonallergic rhinitis too. Your provider may write you a prescription that lets you buy this type of spray at a pharmacy. These sprays include azelastine (Astepro, Astepro Allergy) or olopatadine hydrochloride (Patanase).  
  Antihistamines taken by mouth often don't work as well for nonallergic rhinitis as they do for allergic rhinitis. These antihistamines include diphenhydramine (Benadryl), cetirizine (Zyrtec Allergy), fexofenadine (Allegra Allergy) and loratadine (Alavert, Claritin).
* **Ipratropium nose spray.** This prescription spray can ease a runny, drippy nose. Side effects can include nosebleeds and dryness inside the nose.
* **Decongestants.** These medicines help narrow the blood vessels in the nose and lessen congestion. Side effects can include high blood pressure, heart pounding and feeling restless. Decongestants can be bought off store shelves or with a prescription. Examples include drugs with pseudoephedrine (Sudafed 24 Hour) and phenylephrine.
* **Steroids.** These medicines help prevent and treat swelling linked with some types of nonallergic rhinitis. Side effects can include a dry nose or throat, nosebleeds, and headaches. Your provider may suggest a steroid nose spray if decongestants or antihistamines don't control your symptoms. Steroid sprays that you can buy off the shelf include a fluticasone (Flonase Allergy Relief) and triamcinolone (Nasacort Allergy 24 Hour). Stronger steroid sprays also can be prescribed.

Your health care provider may suggest surgery to treat other problems that can happen with nonallergic rhinitis. For example, growths in the nose called polyps may need to be removed. Surgery also can fix a problem where the thin wall between the passages in the nose is off-center or crooked. This is called a deviated septum.

PREVENTION TIPS

If you have nonallergic rhinitis, take steps to ease your symptoms and prevent flare-ups:

* **Learn your triggers.** Find out what factors cause your symptoms or make them worse. That way you can stay away from them. Your health care provider can help you learn your triggers.
* **Don't use decongestant nose sprays or drops for too long.** Using these medicines for more than a few days at a time can make your symptoms worse.
* **Get treatment that works.** If you've tried a medicine that doesn't help enough, talk to your health care provider. A change to your treatment plan may be needed to prevent or ease your symptoms.

## 

## **Self care**

Try these tips to ease the symptoms of nonallergic rhinitis:

* **Rinse the inside of the nose.** Flushing out the nose with saline or a homemade saltwater mixture can help. It works best when you do it daily. You can put the mixture into a bulb syringe or a container called a neti pot. Or you could use the squeeze bottle included in saline kits.  
  To prevent illnesses, use water that's distilled, sterile, boiled and cooled, or filtered. If you filter tap water, use a filter with a pore size of 1 micron or smaller. Rinse the device after each use with the same type of water. Leave the device open to air-dry.
* **Gently blow your nose.** Do this often if you have a lot of mucus.
* **Add moisture to the air.** If the air in your home or office is dry, set up a humidifier device where you work or sleep. Follow the device's instructions on how to clean it.  
  Or you could breathe in the steam from a warm shower. This helps loosen mucus in the nose. It also makes the head feel less stuffy.
* **Drink liquids.** Sip plenty of water, juice and caffeine-free tea. This can help loosen the mucus in the nose. Stay away from drinks that have caffeine.

## 

## **Alternative medicine**

Some small studies of nonallergic rhinitis have looked into the substance that gives hot peppers their heat, called capsaicin. These studies suggest that using capsaicin inside the nose can ease congestion. But it also can irritate the nose and cause side effects such as burning, sneezing and coughing. More research is needed to find out how much capsaicin to use and for how long.

Some studies also have looked at an alternative treatment in which thin, sterile needles are placed in the body. This is called acupuncture. It's been used to ease pain and other problems. But some experts recommend not using acupuncture for nonallergic rhinitis.

**POSSIBLE COMPLICATIONS**

Nonallergic rhinitis might be linked to:

* **Nasal polyps.** These are soft growths that form on the tissue that lines the inside of the nose. Polyps also can form on the lining of the spaces inside the nose and head, called sinuses. Polyps are caused by swelling, also known as inflammation. They're not cancer. Small polyps might not cause problems. But larger ones can block the airflow through the nose. That makes it hard to breathe.
* **Sinusitis.** This is swelling of the sinuses. Long-term congestion in the nose due to nonallergic rhinitis can raise the risk of sinusitis.
* **Trouble with daily life.** Nonallergic rhinitis might affect your work or school grades. You also might need to take time off when your symptoms flare or when you need a checkup.

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

See your health care provider if you:

* Have serious symptoms.
* Haven't gotten relief from home remedies or medicines you bought at a store without a prescription.
* Have bad side effects from medicines.

**DIFFERENTIAL DIAGNOSIS**

1. Allergic Rhinitis (AR)
   * IgE-mediated reaction to allergens (pollen, dust mites, pet dander).
   * Symptoms: nasal congestion, sneezing, itchy nose/eyes, watery rhinorrhea.
   * Can be seasonal or perennial; prevalence may decrease or remain stable with age.
2. Non-Allergic Rhinitis (NAR)
   * Symptoms similar to AR but without allergen sensitization.
   * Subtypes include:
     + *Vasomotor rhinitis*: triggered by temperature changes, strong odors, pollutants.
     + *Gustatory rhinitis*: triggered by eating, especially spicy foods.
     + *Rhinitis medicamentosa*: caused by overuse of nasal decongestants.
     + *Atrophic (geriatric) rhinitis*: mucosal thinning, crusting, dryness, common in elderly.
     + *Infectious rhinitis*: viral or bacterial infections.
3. Chronic Rhinosinusitis
   * Persistent inflammation with nasal obstruction, purulent discharge, facial pressure.
   * May require imaging for diagnosis.
4. Drug-Induced Rhinitis
   * Common in elderly due to medications like antihypertensives, psychotropics, alpha-blockers, PDE-5 inhibitors.
5. Structural/Anatomical Changes
   * Nasal valve narrowing due to cartilage weakening and nasal tip drooping.
   * Leads to airflow restriction and sensation of nasal obstruction.
6. Granulomatous Diseases and Systemic Conditions
   * Wegener’s granulomatosis (granulomatosis with polyangiitis), sarcoidosis, amyloidosis, relapsing polychondritis.
   * May present with nasal symptoms and require specific workup.
7. Neoplasms
   * Nasopharyngeal or sinonasal malignancies presenting with unilateral obstruction, epistaxis.
8. Cerebrospinal Fluid (CSF) Leak
   * Rare, but can present with clear rhinorrhea mimicking rhinitis.

**EPIDEMIOLOGY**

* The prevalence of rhinitis in older adults is significant and may be higher than previously thought. While older epidemiological studies suggested allergic rhinitis prevalence around 12% in the elderly, more recent data indicate a prevalence of approximately 30% or more among adults aged 54 and above.
* For example, the NHANES 2005–2006 study found that about 32% of adults aged 54–89 reported rhinitis symptoms, a rate comparable to younger adults, although allergic sensitization tends to decline with age.
* A nationwide Portuguese study reported a 29.8% prevalence of current rhinitis in people aged 65 and older, with over 40% of these cases classified as moderate to severe.
* Non-allergic rhinitis increases with age and is the most common form in the elderly, while allergic rhinitis tends to decrease but still affects a substantial proportion.
* Rhinitis in the elderly is often underdiagnosed and undertreated, despite its impact on quality of life.
* The prevalence of rhinitis symptoms in geriatric populations worldwide varies but generally ranges between 25% and 32%, with some studies reporting up to one-third of older adults affected

**PREDEFINED Q & A SETS**

## Do I have rhinitis or sinusitis? What’s the difference?

Rhinitis is inflammation of the nasal mucous membranes, causing symptoms like nasal congestion, runny nose, sneezing, and nasal itching. It primarily affects the nasal passages.  
Sinusitis (or rhinosinusitis) involves inflammation of the sinuses—the air-filled cavities behind the cheeks and forehead—and usually causes nasal congestion plus additional symptoms such as facial pain or pressure, headache, thick nasal discharge (often foul-smelling), and sometimes fever.  
In older adults, rhinitis often presents with nasal dryness, crusting, and congestion, while sinusitis tends to have more facial pain, purulent nasal discharge, and longer-lasting symptoms. Both conditions can coexist and share overlapping symptoms, but sinusitis generally involves infection or blockage of the sinuses and may require different treatment approaches.

## How can I improve my condition?

* Use nasal saline sprays or rinses to moisturize and clear nasal passages.
* Avoid irritants such as tobacco smoke, strong odors, and dry environments.
* Use humidifiers to maintain moisture in the air.
* For allergic rhinitis, antihistamines or nasal corticosteroid sprays may help.
* For nonallergic or atrophic rhinitis common in the elderly, moisturizing gels and careful nasal hygiene are important.
* Treat any underlying conditions or medication side effects contributing to symptoms.
* Follow your healthcare provider’s recommendations and attend regular follow-ups.

## Will medications to treat geriatric rhinitis interfere with my current medications?

Older adults often take multiple medications, so there is a risk of drug interactions. For example, nasal corticosteroids can increase the risk of nosebleeds, especially if you are on blood thinners. Some oral antihistamines may cause drowsiness or interact with other drugs. It is essential to inform your doctor about all medications and supplements you are taking so they can choose treatments with minimal interaction risk and monitor you appropriately.

## Do you recommend surgery for my condition?

Surgery is not usually the first-line treatment for geriatric rhinitis. It may be considered if there are anatomical issues causing obstruction (like a deviated septum or nasal valve collapse) or if chronic sinusitis with nasal polyps is present and unresponsive to medical therapy. In such cases, an ENT specialist may evaluate you for possible surgical options to improve nasal airflow or sinus drainage.

## Do I need to see an ENT specialist or allergist?

* If your symptoms are persistent, worsening, or not responding to initial treatment, referral to an ENT specialist is recommended for further evaluation, including nasal endoscopy or imaging.
* If allergic rhinitis is suspected (e.g., sneezing, watery eyes, seasonal symptoms), seeing an allergist for allergy testing and management may be beneficial.
* Complex cases with overlapping rhinitis and sinusitis symptoms, or those with comorbidities, benefit from specialist care to optimize treatment

What could be causing my symptoms?  
Geriatric rhinitis is commonly caused by age-related changes in the nasal mucosa, including thinning and drying, which lead to inflammation and irritation. Other contributing factors include chronic exposure to irritants like pollution or cigarette smoke, hormonal changes, and weakening of nasal cartilage causing airflow restriction. There are two main types:

* Nonallergic rhinitis, which is more common in older adults and involves nasal congestion, dryness, crusting, and postnasal drip without an allergic cause.
* Allergic rhinitis, caused by an immune reaction to allergens such as dust mites, pollen, or pet dander, though allergic sensitization tends to decrease with age.  
  Medications and underlying health conditions may also contribute to symptoms.

What tests do I need?  
Diagnosis is primarily clinical but may include:

* Physical examination and nasal endoscopy to assess mucosal condition and rule out polyps or structural issues.
* Allergy testing (skin prick or blood tests) if allergic rhinitis is suspected.
* Imaging (CT scan) if chronic sinusitis or other complications are suspected.
* Nasal cytology or other specialized tests may be used in complex cases.  
  Your doctor will tailor testing based on your symptoms and medical history.

How long might my symptoms last?  
Geriatric rhinitis is often a chronic condition that can persist long-term, especially if underlying causes like mucosal dryness or allergies are not addressed. Symptoms may fluctuate with environmental triggers or medication changes. With proper management, symptoms can be significantly reduced, improving quality of life.

What treatments are available, and which do you suggest for me?  
Treatment depends on the type and severity:

* For nonallergic rhinitis, management includes nasal saline sprays or gels to relieve dryness and crusting, humidifiers, avoiding irritants (smoke, strong odors), and sometimes nasal corticosteroids or antihistamines for inflammation.
* For allergic rhinitis, antihistamines, nasal corticosteroids, and allergen avoidance are key. Allergy immunotherapy may be considered in some cases.
* Addressing contributing factors like medication side effects or underlying health issues is important.
* Regular follow-up with your healthcare provider or an ENT specialist is recommended to adjust treatment as needed.

I have other health problems. How can I best manage these conditions together?  
Many older adults have multiple health issues, and some medications can worsen rhinitis symptoms. It’s important to:

* Inform all your healthcare providers about your symptoms and medications.
* Review your medications regularly to identify any that may contribute to nasal symptoms (e.g., certain blood pressure or psychiatric drugs).
* Manage comorbid conditions like asthma, COPD, or cardiovascular disease carefully, as rhinitis can exacerbate these.
* Maintain good nasal hygiene and avoid known irritants.
* Coordinate care between your primary care provider, ENT specialist, and other specialists to ensure comprehensive management.

## **Genetic Factors Relevant to Rhinitis in the Elderly:**

* Genetic predisposition to allergic rhinitis (AR) is well established, with multiple genes involved in immune regulation, inflammation, and epithelial barrier function. These include genes encoding cytokines (e.g., IL-4, IL-13), pattern recognition receptors (e.g., TLRs), immunoglobulin receptors, and transcription factors (e.g., JAK1, BACH2) .
* Family history of atopy remains a strong risk factor for allergic rhinitis, and this genetic susceptibility persists into older age .
* Genome-wide association studies (GWAS) have identified numerous single nucleotide polymorphisms (SNPs) associated with AR, many affecting immune cell function, allergen recognition, and inflammatory pathways .
* Epigenetic modifications (DNA methylation, histone acetylation) and gene-environment interactions also influence disease expression

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you’ve been experiencing some nasal symptoms. Can you tell me more about what you’re feeling?

Patient: Yes, doctor. I often feel like I have constant nasal drainage and a need to clear my throat. My nose feels blocked, especially when I lie down, and sometimes it’s dry and crusty. I’ve also noticed my sense of smell isn’t as good as it used to be.

Doctor: Those are common symptoms of what we call *geriatric rhinitis*, which is inflammation of the nasal lining that often occurs in older adults. It can cause nasal congestion, drainage, dryness, and crusting. Sometimes patients also feel vague facial pressure.

Patient: Is this the same as sinusitis?

Doctor: Not exactly. Rhinitis mainly affects the nasal passages, while sinusitis involves the sinuses and often causes thicker nasal discharge, facial pain, and sometimes fever. However, they can overlap, and sometimes sinusitis develops from untreated rhinitis.

Patient: What causes this condition?

Doctor: With aging, the nose undergoes changes such as weakening of cartilage, which can narrow nasal passages and cause obstruction. Dryness and crusting may be worsened by medications like diuretics or dry winter air. Some patients have allergic rhinitis, but many have nonallergic or atrophic rhinitis.

Patient: How can I improve my symptoms?

Doctor: Using saline nasal sprays or rinses to keep your nasal passages moist can help a lot. Avoiding irritants like smoke or strong odors is important. Sometimes nasal corticosteroid sprays or antihistamines are helpful, especially if allergies are involved. Humidifiers can also improve dryness.

Patient: Will these medications interfere with my other medicines?

Doctor: It’s important to review all your medications with me or your pharmacist. Nasal sprays generally have minimal systemic effects, but some oral antihistamines can cause drowsiness or interact with other drugs. We’ll choose treatments safe for your overall health.

Patient: Do I need surgery?

Doctor: Surgery is rarely needed for geriatric rhinitis unless there are structural problems like a deviated septum or nasal valve collapse causing severe obstruction. We usually try medical management first.

Patient: Should I see a specialist?

Doctor: If your symptoms don’t improve with treatment or if you have complex issues, seeing an ENT specialist or allergist can be helpful. They can perform detailed evaluations, including nasal endoscopy or allergy testing.

Patient: Thank you, doctor. That helps me understand my condition better.

Doctor: You’re welcome. Let’s work together to manage your symptoms and improve your quality of life. Please keep me informed about any changes or concerns.

REFERENCES:

[Nonallergic rhinitis - Diagnosis & treatment - Mayo Clinic](https://www.mayoclinic.org/diseases-conditions/nonallergic-rhinitis/diagnosis-treatment/drc-20351235)

<https://www.enthealth.org/conditions/geriatric-rhinitis/>

**Geographic tongue**

**DEFINITION / DESCRIPTION**

Geographic tongue is a noncancerous condition that creates patches of smooth, reddish skin on your tongue. Geographic tongue is benign, meaning it doesn’t spread. It’s called geographic tongue because the patch patterns resemble how land masses and oceans are shown on maps.

Geographic tongue isn’t painful and it’s not serious. But you should talk to a healthcare provider if you notice patches or other changes on your tongue.

#### **Is it common?**

That’s hard to say. Experts estimate about 3% of all people worldwide have geographic tongue. People with this condition may not have symptoms and may not seek medical care, so it’s possible that more people than estimated have geographic tongue.

#### **Who has a geographic tongue?**

Anyone can develop a geographic tongue, from babies to children to adults. The condition is slightly more common in young adults than in older adults. It may occur in:

* People with eczema and psoriasis.
* People with airborne allergies.
* People with diabetes, particularly Type 1 diabetes.
* People with reactive arthritis.
* Women who use oral contraceptives.
* People with vitamin deficiencies, including zinc, iron, folic acid and vitamins B6 and B12.
* People with fissured tongue, a condition that causes deep grooves or wrinkles on your tongue.
* People dealing with emotional stress.

**CAUSES**

Healthcare providers aren’t sure what causes the condition. They believe people with certain diseases are more likely to develop geographic tongue. Those diseases include:

* Eczema and psoriasis.
* Type 1 diabetes.
* Reactive arthritis.

#### **What deficiencies cause geographic tongue?**

People who don’t get enough zinc, iron, folic acid and vitamins B6 and B12 from their daily diet may have an increased risk of developing geographic tongue.

#### **What foods cause geographic tongue?**

Food doesn’t cause geographic tongue, but spicy foods may create tingling or burning sensations where you have patches.

**RISK FACTORS**

Factors that may increase your risk of geographic tongue include:

* **Family history.** Some people with geographic tongue have a family history of it. So genetic factors may raise the risk.
* **Fissured tongue.** People with geographic tongue often have a condition called fissured tongue. This is when deep grooves, called fissures, appear on the surface of the tongue.

**SIGNS / SYMPTOMS**

Symptoms of geographic tongue may include:

* Smooth, red, irregularly shaped patches on the top or side of your tongue. These patches may look like sores.
* Frequent changes in the location, size and shape of the patches.
* Pain or burning feeling in some cases, most often related to eating spicy or acidic foods.

Many people with geographic tongue have no symptoms.

Geographic tongue can continue for days, months or years. The problem often goes away on its own, but it may appear again later.

**DIAGNOSIS METHODS**

Your physician or dentist usually can diagnose geographic tongue by looking at your tongue and going over your symptoms.

During the exam, your physician or dentist may:

* Use a lighted instrument to check your tongue and mouth.
* Ask you to move your tongue around in various positions.
* Gently touch your tongue to check for tenderness or unusual changes in the tongue's texture.
* Check for signs of infection, such as fever or swollen lymph nodes in the neck.

Some symptoms of geographic tongue may look like other conditions, such as oral lichen planus. This condition appears as lacy white patches in the mouth — sometimes with painful sores. So some conditions might need to be ruled out before making a diagnosis.

**TREATMENT OPTIONS**

Geographic tongue usually does not need any medical treatment. While geographic tongue can sometimes cause tongue pain, it's a harmless condition.

To manage pain or sensitivity, your doctor may recommend medicines such as:

* Pain relievers available without a prescription.
* Mouth rinses that numb the area.
* Antihistamine mouth rinses. Antihistamines are used to reduce swelling.
* Corticosteroid ointments or rinses. Corticosteroids are used to manage conditions that cause swelling or affect the immune system, such as lichen planus.
* Vitamin B or zinc.
* Medications for fungal infections.

Because these treatments haven't been studied in great detail, their benefit is not known. Since geographic tongue comes and goes on its own, you may not be able to tell if treatments are making symptoms go away.

## **Geographic Tongue: Treatment Drugs and Their Side Effects**

1. Topical Corticosteroids (e.g., Triamcinolone acetonide)

* Use: Reduce inflammation and pain in symptomatic geographic tongue. Often applied as an ointment or rinse.
* Side Effects: Possible local irritation, burning sensation, thinning of mucosa with prolonged use, and rarely fungal overgrowth (oral candidiasis). Systemic absorption is minimal but caution is advised with long-term use.

2. Antihistamine Mouth Rinses

* Use: Help reduce swelling and discomfort by modulating immune response.
* Side Effects: Generally well tolerated; may cause mild oral dryness or altered taste.

3. Topical Tacrolimus (0.1% ointment or swish-and-spit)

* Use: An immunosuppressant used for resistant or painful cases; modulates inflammatory responses.
* Side Effects: Possible local burning or irritation. There is a theoretical risk of malignancy with long-term use, but short-term use (about 10 days) appears safe. Should be used under medical supervision.

4. Topical Retinoic Acid (Vitamin A derivatives)

* Use: Sometimes combined with corticosteroids to stimulate immune response and promote healing.
* Side Effects: Local irritation, dryness, and peeling of mucosa; photosensitivity in some cases.

5. Pain Relievers (e.g., Over-the-counter NSAIDs like ibuprofen or acetaminophen)

* Use: Manage pain or burning sensation associated with lesions.
* Side Effects: Generally safe when used as directed; NSAIDs can cause gastrointestinal upset or bleeding if overused.

6. Vitamin B and Zinc Supplements

* Use: Address possible nutritional deficiencies linked to geographic tongue.
* Side Effects: Usually well tolerated; excessive zinc can cause nausea or copper deficiency if taken long-term in high doses.

7. Antifungal Medications

* Use: Prescribed if fungal infection (e.g., candidiasis) complicates the condition.
* Side Effects: Depends on the drug; topical antifungals may cause local irritation, while systemic antifungals can have liver toxicity or drug interactions

**Lifestyle and home remedies**

Most people with geographic tongue don't experience symptoms. But if you have symptoms, you may reduce pain by staying away from or limiting substances that commonly make sensitive oral tissues feel worse. These substances include spicy or acidic foods or beverages, as well as alcohol and tobacco.

**PREVENTION TIPS**

Probably not. Healthcare providers aren’t sure what causes geographic tongue, but they believe people with certain conditions, like diabetes or skin issues, have increased risk of developing geographic tongue. You may be able to reduce your risk by eating a healthy diet that contains enough zinc, folic acid, iron and vitamins B6 and B12 and managing your stress.

**OUTLOOK / PROGNOSIS**

No, it can’t be cured. Geographic tongue often goes away on its own without treatment, but it can come back.

#### **Can geographic tongue become oral cancer?**

No, geographic tongue is a noncancerous disorder that doesn’t become oral cancer. That said, you should talk to a dentist or healthcare provider any time you notice changes in your mouth, such as white patches that could be signs of oral cancer.

**POSSIBLE COMPLICATIONS**

### **Can geographic tongue turn into cancer?**

Geographic tongue cannot turn into cancer.

A geographic tongue itself is not a serious condition, but has been associated with other conditions that can be serious, such as celiac disease.

Some people with geographic tongue may experience anxiety and worry because of their tongue’s unusual appearance, but the condition is not serious.

### **Is geographic tongue contagious?**

Geographic tongue is not contagious. You can’t pass it to someone by kissing or sharing food utensils.

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

If you notice unusual lesions on your tongue and you begin experiencing breathing problems, difficulty speaking, or an inability to swallow or chew, seek emergency medical attention. You may be experiencing a more serious condition that is not geographic tongue.

A geographic tongue may be harmless in most cases, but it’s important to see a doctor to rule out the possibility of celiac disease or another serious condition.

If you notice the telltale signs of the condition or begin developing irritation or pain, make an appointment to see your doctor.

Most cases of geographic tongue will go away without treatment in a few days.

## **Differential Diagnoses**

## Cancers of the Oral Mucosa

## Chemical Burns

## Fissured Tongue

## Lichen Planus

## Mucosal Candidiasis

## Plaque Psoriasis

## **Diagnostic Considerations**

In addition to the conditions listed below, differentials for geographic tongue include contact stomatitis of the tongue (see the image below). Contact stomatitis is an inflammatory reaction of the oral mucosa arising from contact with irritants or allergens; it usually resolves with identification and removal of the causative agent.

**EPIDEMIOLOGY**

Geographic tongue has reportedly occurred in up to 3% of the general population in the United States. International frequency rates for geographic tongue are similar to those reported in the United States.

Geographic tongue can affect all age groups; however, it is more predominant in adults than in children. Females have been reported to be affected twice as often as males.Exacerbations have been suggested to be related to hormonal factors. No racial or ethnic predilection has been reported.

## **Staging**

In 2020, the Geographic Tongue Area and Severity Index (GTASI) was proposed by Picciani et al as a means of classifying geographic tongue.In this classification system, the condition is categorized as follows:

* GTASI score of 1-6 points - Mild
* GTASI score of 7-12 points - Moderate
* GTASI score of >12 points - Severe

A subsequent study by Picciani et al validated the applicability of the GTASI among healthcare professionals. A cross-sectional observational study (N = 40) by Dick et al found that clinical severity as denoted by the GTASI score correlated closely with the histopathologic characteristics of geographic tongue.

**PREDEFINED Q & A SETS**

Why does my tongue look like this?  
Your tongue has irregular, smooth, red patches with white or light-colored borders that change shape and location over time. This is characteristic of *geographic tongue*, a harmless condition caused by loss of tiny hairlike structures (papillae) on the tongue’s surface. The exact cause is unknown, but it may be linked to genetics, nutritional deficiencies (iron, zinc, vitamins B6 and B12, folic acid), stress, allergies, or certain health conditions like eczema or psoriasis.

Could there be any other possible causes?  
Yes, other conditions can cause similar tongue changes, such as oral lichen planus, fungal infections, or nutritional deficiencies. Your doctor may perform tests to rule out these possibilities, especially if symptoms persist or worsen.

How long will this condition last?  
Geographic tongue can come and go. Patches may last from a few days to several years and can disappear and reappear unpredictably. Most people experience episodes that resolve on their own without treatment.

What treatments are available?  
Usually, no treatment is needed because geographic tongue is harmless. If you have pain or discomfort, treatments may include over-the-counter pain relievers, corticosteroid ointments or rinses, antihistamine mouth rinses, or vitamin supplements (B vitamins, zinc). Avoiding irritants like spicy, acidic foods, tobacco, and certain toothpaste ingredients can help reduce symptoms.

Is there anything I can do at home to ease my pain?  
Yes, avoid hot, spicy, acidic, or salty foods that may irritate your tongue. Use mild toothpaste (without sodium lauryl sulfate or strong flavors), maintain good oral hygiene, and consider rinsing with saltwater or a mild anesthetic mouthwash. Over-the-counter pain relievers can help if needed.

What should I do if my tongue flares up again?  
If symptoms return, try the home care measures above. If pain is severe, persistent, or if you notice other symptoms like difficulty swallowing, breathing problems, or unusual sores, see your healthcare provider. They may recommend medications or further evaluation to rule out other conditions.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I see you’re concerned about the patches on your tongue. Can you tell me when you first noticed them and if you have any symptoms like pain or burning?

Patient: I noticed these red, smooth patches a few weeks ago. Sometimes they sting, especially when I eat spicy or acidic foods, but mostly they don’t bother me.

Doctor: What you have is called *geographic tongue*. It’s a harmless condition where some areas of your tongue lose the tiny bumps called papillae, creating smooth, red patches with white or gray borders. The pattern can look like a map, which is why it’s called geographic tongue.

Patient: Is it serious? Could it be cancer or an infection?

Doctor: No, geographic tongue is not cancerous or infectious. It’s an inflammatory condition that can come and go over time. The patches may heal in one area and then appear in another. It can last for days, months, or even years, but it’s generally harmless.

Patient: What causes it?

Doctor: The exact cause isn’t known. It may be linked to genetics, nutritional deficiencies like low zinc or B vitamins, stress, allergies, or certain health conditions such as eczema or psoriasis. Some triggers like spicy foods, tobacco, or certain toothpastes can irritate the patches.

Patient: Do I need treatment?

Doctor: Most people don’t need treatment because it usually doesn’t cause problems. If you have discomfort, we can try topical corticosteroids or antihistamine mouth rinses to reduce inflammation and pain. Avoiding irritants like spicy or acidic foods can also help.

Patient: Is there anything I can do at home?

Doctor: Yes, avoid foods and substances that irritate your tongue, maintain good oral hygiene with a gentle toothpaste, and consider rinsing your mouth with saltwater. Over-the-counter pain relievers can help if you feel discomfort.

Patient: What if it flares up again?

Doctor: If the patches become painful or you notice other unusual symptoms like difficulty swallowing or persistent sores, please come back for evaluation. Otherwise, flare-ups are common and usually resolve on their own.

Patient: Thank you, doctor. That makes me feel better.

Doctor: You’re welcome. Geographic tongue is a benign condition, and we’ll monitor it together. Let me know if you have any new concerns.

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**Gingivostomatitis**

ALTERNATIVE NAMES

* Acute herpetic gingivostomatitis (when caused by herpes simplex virus)
* Primary herpetic stomatitis
* Acute stomatitis
* Acute necrotizing ulcerative gingivitis (ANUG) — sometimes considered a severe form involving gingiva and mucosa
* Herpetic stomatitis
* Viral stomatitis (general term for viral causes)
* Mucosal stomatitis (broader term for inflammation of oral mucosa)

**DEFINITION / DESCRIPTION**

Gingivostomatitis is a painful infection that can cause blisters on your lips and canker sores in your mouth. Certain viruses and bacteria cause it, and poor oral hygiene can make it worse. Gingivostomatitis is most common in young children, but anyone can get it. Gingivostomatitis isn’t the same as gingivitis, the earliest stage of gum disease.

Gingivostomatitis usually doesn’t cause serious health issues, especially when you get prompt treatment. But it can be very painful. It’s also contagious. You can pass it to another person through things like kissing or sharing eating utensils.

Gingivostomatitis is quite common, partly because the condition can come back (recur) repeatedly in the form of flare-ups. Once initially infected, approximately 40% of children will develop recurring mouth sores.

**CAUSES**

Gingivostomatitis can develop due to certain viruses or bacteria, including:

* Herpes simplex virus type 1 (HSV-1). The most common cause of gingivostomatitis, HSV-1 is the same virus that causes cold sores. When HSV-1 causes gingivostomatitis, providers call it “herpes simplex gingivostomatitis” or “herpetic gingivostomatitis.” (Primary herpetic gingivostomatitis refers to the first time you encountered the virus. Secondary herpetic gingivostomatitis refers to each flare-up, or reactivation, of the virus.)
* *Streptococcus*. This bacteria commonly causes strep throat or blood infections, but it can also result in gingivostomatitis.
* *Actinomyces*. This bacteria naturally occurs in your mouth, but it can lead to gingivostomatitis if it enters your bloodstream. This can be a side effect of dental trauma or oral surgery.
* Coxsackieviruses. Coxsackieviruses are viruses that usually spread through unwashed hands or other surfaces contaminated with feces (poop). Coxsackieviruses also commonly cause hand, foot and mouth disease.

**RISK FACTORS**

Poor oral hygiene, like not brushing or flossing enough, is the main risk factor for gingivostomatitis.

If you have herpetic gingivostomatitis, you’re more likely to experience flare-ups when exposed to:

* Fever.
* Trauma.
* Stress.
* UV light.

**SIGNS / SYMPTOMS**

Symptoms of gingivostomatitis can range from mild to severe. At first, after infection, you or your child may not show noticeable symptoms, but ulcers or sores may form over time and become increasingly uncomfortable. Other symptoms can include:

* Several small blisters on the gums, tongue, and lips that eventually break open and become painful open sores
* Raw gums that are sore and bleed easily
* Ulcers around the outer lips and mouth
* ‌Swollen, sore lymph nodes in the neck
* A fever that lasts several days
* Headaches
* mouth pain that causes loss of appetite
* headaches
* dry mouth
* bad breath  
  If your child has herpes simplex gingivostomatitis, other symptoms can include:
* drooling
* dehydration
* irritability
* less of an appetite

One in four children with herpes simplex gingivostomatitis will develop mouth ulcers with their first infection.

Once herpes simplex virus infection happens, the virus stays in the body for life. Other episodes of herpes (often referred to as cold sores) may occur, but typically the condition becomes less severe with age.

**DIAGNOSIS METHODS**

Healthcare providers can usually diagnose gingivostomatitis during a physical examination. Your provider will also ask about symptoms.

They may also recommend a swab culture or biopsy of the affected area to confirm which type of bacteria or virus caused the infection. They’ll send the sample to a pathologist for testing.

**TREATMENT OPTIONS**

Gingivostomatitis treatment may include antibiotics or antivirals to get rid of the infection and ease your symptoms. In some cases, your healthcare provider will need to clean the affected areas.

To further ease gingivostomatitis symptoms:

* Take over-the-counter (OTC) pain relievers, like acetaminophen (Tylenol®) or ibuprofen (Advil®).
* Rinse your mouth with an antibacterial mouthwash twice a day.
* Gently swish with warm salt water a few times daily to soothe your mouth.
* Avoid eating hot, spicy or salty foods.
* Brush twice a day and floss once a day.

**PREVENTION TIPS**

To reduce your risk for gingivostomatitis:

* Practice good oral hygiene.
* Routinely clean any oral appliances like dentures or retainers.
* Visit your dentist regularly for checkups and cleanings.

**OUTLOOK / PROGNOSIS**

It depends on the severity. Some people have mild discomfort; others have severe pain. Most gingivostomatitis-related mouth sores heal in about two to three weeks.

After mouth sores appear, you’ll be contagious with gingivostomatitis for about seven days. You should be fever-free for at least 24 hours before having close contact with anyone else.

**POSSIBLE COMPLICATIONS**

Gingivostomatitis usually resolves in one to two weeks, Spence says. But some complications can occur, including:

* A secondary bacterial infection
* Dehydration
* Recurrence of cold sores
* Trouble maintaining oral hygiene due to pain

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

Any time you develop mouth sores along with a fever, you should make an appointment with your healthcare provider. If your symptoms worsen or don’t respond to treatment within three weeks, you should ask your provider about next steps.

**DIFFERENTIAL DIAGNOSIS**

* Primary herpetic gingivostomatitis (HSV-1 infection)
* Herpangina (Coxsackie virus infection)
* Hand, foot, and mouth disease (Coxsackievirus A16 or enterovirus)
* Aphthous stomatitis (canker sores)
* Acute necrotizing ulcerative gingivitis (ANUG)
* Herpes zoster (shingles)
* Traumatic ulcers (due to biting, dental appliances, or injury)
* Chemical burns (from irritants or medications)
* Oral candidiasis (thrush)
* Erythema multiforme
* Behçet’s disease (systemic vasculitis with oral and genital ulcers)
* Pemphigus vulgaris (autoimmune blistering disease)
* Lichen planus (chronic inflammatory condition)
* Nutritional deficiencies (e.g., vitamin B12, iron, folate)
* Primary chickenpox (varicella)
* Stevens-Johnson syndrome (severe mucocutaneous reaction)

**EPIDEMIOLOGY**

* Prevalence:  
  Herpetic gingivostomatitis, the most common cause of gingivostomatitis, occurs in about 25% to 30% of children infected with herpes simplex virus (HSV).
* Age Distribution:  
  It is most frequently seen in children aged 6 months to 5 years, with a peak incidence around 2 to 4 years old. It also occurs in young adults, particularly those in their early 20s.
* Incidence in Pediatric Emergency Care:  
  Studies show that acute gingivostomatitis is relatively frequent in children presenting to emergency departments, especially those under 3 years old. For example, in one 5-year study, about 78% of cases were in children younger than 36 months, with a median age of 22 months.
* Clinical Course:  
  The condition is contagious and usually resolves spontaneously within 12 to 20 days.
* Other Populations:  
  While primarily a pediatric condition, herpetic gingivostomatitis can also occur in adults, especially those with primary HSV infection or immunosuppression.
* Associated Symptoms:  
  Common symptoms include painful oral ulcers, fever, gingival inflammation, and sometimes dehydration due to difficulty eating or drinking.
* HSV Culture Positivity:  
  In young adults with upper respiratory symptoms, HSV positivity in oral cultures has been documented around 5.7% in some studies

**Gingivostomatitis Genomic Data (Herpes Simplex Virus 1 - HSV-1)**

Gingivostomatitis is most commonly caused by Herpes Simplex Virus type 1 (HSV-1). Understanding its genomic structure helps clarify the virus’s behavior and pathogenicity.

* Genome Structure:  
  HSV-1 has a linear, double-stranded DNA genome approximately 152,000 base pairs (152 kb) in length. The genome is organized into two unique regions:
  + Unique Long (UL)
  + Unique Short (US)  
    Each is flanked by terminal and internal inverted repeats (TRL/IRL and TRS/IRS), allowing the genome to form different isomeric configurations.
* Genes and Proteins:  
  The HSV-1 genome encodes about 75 to 81 proteins, including:
  + Immediate early proteins (e.g., ICP0, ICP4) that regulate viral gene expression
  + Early proteins involved in DNA replication
  + Late proteins mostly structural components of the virus

**PREDEFINED Q & A SETS**

### **Is gingivostomatitis an STI?**

No, it’s not a sexually transmitted infection. But HSV-1 can cause it. HSV-1 commonly causes oral herpes, but it can cause genital herpes in some cases.

### **What is the best medicine for gingivostomatitis?**

"For viral cases, oral antiviral medication can be prescribed and is most effective if started early," Spence says. "In mild cases, supportive care may be sufficient. Topical anesthetics like benzocaine or lidocaine may be used to ease pain, especially before meals."

### **What is the difference between gingivitis and gingivostomatitis?**

Gingivitis and gingivostomatitis are two different things. Gingivostomatitis is an infection caused by the herpes virus, while gingivitis is a form of gum disease.

### **How do you cure gingivostomatitis?**

There is no cure for an infection caused by the herpes virus, including herpetic gingivostomatitis, but there are treatments to help manage symptoms. Gingivostomatitis caused by bacteria can be treated with antibiotics.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I understand you’re experiencing mouth sores and discomfort. Can you tell me when the symptoms started and how severe they are?

Patient: It started a few days ago. I have painful sores in my mouth and swollen gums. It’s hard to eat and drink because of the pain. I also had a fever for a couple of days.

Doctor: Based on your symptoms, it sounds like you have *gingivostomatitis*, which is an inflammation of the gums and mouth lining. The most common cause, especially in children and young adults, is a viral infection called herpes simplex virus type 1.

Patient: Is it contagious? How did I get it?

Doctor: Yes, it is contagious. The virus spreads through close contact, like kissing or sharing utensils. Many people get infected as children, sometimes without symptoms, but it can cause this painful condition when it first appears.

Patient: What treatments do I need?

Doctor: Treatment focuses on relieving symptoms. You can take pain relievers like acetaminophen or ibuprofen to reduce pain and fever. Rinsing your mouth with warm salt water can soothe the sores. If the infection is severe or you’re having trouble eating or drinking, antiviral medications like acyclovir can help, especially if started early.

Patient: How long will it last?

Doctor: Most cases improve within 1 to 2 weeks. The sores heal on their own, but you may feel discomfort during this time.

Patient: Can I spread it to others?

Doctor: Yes, you are contagious for about 7 days after the sores appear. To prevent spreading it, avoid kissing, sharing utensils, or touching the sores. Wash your hands frequently.

Patient: Are there any precautions I should take?

Doctor: Maintain good oral hygiene but be gentle when brushing. Avoid spicy, acidic, or salty foods that can irritate your mouth. Drink plenty of fluids to stay hydrated.

Patient: When should I come back or seek more help?

Doctor: If your symptoms worsen, if you can’t eat or drink, if the sores don’t improve after 2 weeks, or if you develop new symptoms like difficulty breathing or swallowing, please return promptly.

Patient: Thank you, doctor. I feel better knowing what to expect.

Doctor: You’re welcome. Take care, and don’t hesitate to contact us if you have any concerns.

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**Glomus jugulare tumor**

ALTERNATIVE NAMES

* Paraganglioma of the jugular bulb
* Jugulotympanic paraganglioma
* Glomus jugulare paraganglioma
* Jugular paraganglioma
* Temporal bone paraganglioma
* Chemodectoma of the jugular bulb (older term)
* Glomus tumor of the jugular foramen

**DEFINITION / DESCRIPTION**

A glomus jugulare tumor is a growth that develops in the jugular bulb of the ear. This type of tumor arises from the glomus body, a collection of cells involved in regulating blood flow. While the exact cause is not fully understood, it is believed to be linked to genetic factors.

These tumors are typically slow-growing and may not cause symptoms initially. Regular check-ups with a healthcare provider can help in early detection and management. If you have concerns about a glomus jugulare tumor, consult with a healthcare professional for personalized guidance and support.

**CAUSES**

These tumors are believed to arise from a mutation in the genes responsible for controlling cell growth and division. While the exact cause is not fully understood, certain genetic factors and exposure to radiation may also play a role in the development of this tumor.

* Genetic predisposition can be a contributing factor to the development of glomus jugulare tumors, with certain individuals having an increased risk due to familial history.
* Exposure to environmental toxins and carcinogens may play a role in the formation of glomus jugulare tumors, especially in individuals with prolonged or high levels of exposure.
* Hormonal changes, such as fluctuations in estrogen levels, have been linked to the growth of glomus jugulare tumors, particularly in cases where hormonal imbalances are present.
* Previous radiation therapy to the head or neck region can be a potential cause of glomus jugulare tumors, as radiation exposure is known to increase the risk of developing such tumors.

**Types Of Glomus Jugulare Tumor**

Glomus jugulare tumors are classified into three types based on their growth pattern and location within the skull: Type A, Type B, and Type C. Type A tumors are confined within the bone, Type B tumors extend into the jugular foramen, and Type C tumors grow into the neck region. Each type may present with varying symptoms and require different treatment approaches.

* Carotid Body Tumor: This type of glomus jugulare tumor originates from the carotid body, a small cluster of chemoreceptor cells located near the carotid artery bifurcation in the neck.
* Vagal Paraganglioma: Vagal paragangliomas are rare tumors that arise from paraganglia associated with the vagus nerve, often found in the lower part of the skull near the jugular foramen.
* Non-Secretory Glomus Jugulare Tumor: Non-secretory glomus jugulare tumors do not produce excess hormones, making them challenging to diagnose based on hormonal symptoms.
* Malignant Glomus Jug

**RISK FACTORS**

Risk factors for glomus jugulare tumor include genetic predisposition, exposure to radiation, hormonal imbalances, and certain medical conditions such as neurofibromatosis type 1. Age and gender can also play a role, with middle-aged women being more commonly affected. Additionally, a family history of paragangliomas may increase the likelihood of developing this type of tumor.

* Family history of glomus jugulare tumors increases the risk of developing this rare type of tumor located in the jugular foramen of the skull.
* Exposure to radiation therapy to the head and neck region is a known risk factor for the development of glomus jugulare tumors.
* Genetic syndromes such as neurofibromatosis type 1 and type 2 have been linked to an increased risk of developing glomus jugulare tumors.
* Female gender has been associated with a higher prevalence of glomus jugulare tumors, although the reasons for this gender difference are not completely understood.
* Age is also a risk factor, with most glomus jugulare tumors

**SIGNS / SYMPTOMS**

Symptoms of a glomus jugulare tumor may include hearing loss, ringing in the ear, dizziness, facial weakness, and difficulty swallowing. Patients may also experience a lump in the neck, hoarseness, and pulsating sounds in the ear. If you are experiencing any of these symptoms, it is important to seek medical attention for further evaluation and management.

* Severe ear pain that worsens at night and can feel like a deep, throbbing sensation inside the ear.
* Hearing loss in one ear that may progress over time and lead to difficulty understanding conversations or sounds.
* Ringing in the ear (tinnitus) that is persistent and distracting, often described as a buzzing or humming noise.
* Vertigo or dizziness episodes that can cause a spinning sensation and lead to imbalance or unsteadiness while standing or walking.
* Hoarseness or changes in voice quality due to vocal cord involvement, resulting in a raspy or weak voice.

**DIAGNOSIS METHODS**

Your doctor will carefully assess your symptoms and test results to make an accurate diagnosis. Early detection and prompt medical attention are crucial for effective treatment and management of this type of tumor.

* Imaging tests such as MRI and CT scans are commonly used to diagnose glomus jugulare tumors by visualizing the tumor's location, size, and extent.
* Angiography may be performed to assess the blood vessels surrounding the tumor and determine its blood supply, aiding in the diagnosis of glomus jugulare tumors.
* Auditory tests like audiometry may be conducted to evaluate any hearing loss or changes in hearing function associated with glomus jugulare tumors.
* Biopsy of the tumor tissue may be recommended to confirm the diagnosis of a glomus jugulare tumor by examining the cells under a microscope.
* Clinical evaluation by an otolaryngologist.

**TREATMENT OPTIONS**

Treatment options for glomus jugulare tumors may include surgery to remove the tumor, radiation therapy to target and shrink the tumor, or embolization to cut off the blood supply. Your healthcare team will determine the most suitable approach based on the size and location of the tumor, as well as your overall health. It's important to discuss all available options with your doctors to make an informed decision.

* Surgical resection is a common treatment option for glomus jugulare tumors, where the tumor is removed through a delicate surgical procedure to alleviate symptoms and prevent further growth.
* Radiation therapy may be used as a primary treatment or in conjunction with surgery to target any remaining tumor cells and reduce the risk of recurrence in patients with glomus jugulare tumors.
* Embolization, a minimally invasive procedure, may be recommended to block blood flow to the tumor by injecting a substance into the blood vessels supplying the tumor, helping to shrink its size and relieve symptoms.
* Chemotherapy is not typically the first-line treatment for glomus jugulare tumors, but it may be considered in cases where the tumor is

## **Glomus Jugulare Tumor: Treatment Drugs and Their Side Effects**

1. Medical Therapy (Adjuvant/Palliative):

* Alpha-blockers (e.g., phenoxybenzamine) and beta-blockers (e.g., propranolol)
  + Use: For tumors that secrete catecholamines causing hypertension and arrhythmias, these drugs are used preoperatively to stabilize blood pressure and heart rate.
  + Side Effects:
    - Alpha-blockers: Orthostatic hypotension, dizziness, nasal congestion, fatigue.
    - Beta-blockers: Bradycardia, fatigue, bronchospasm (caution in asthma), hypotension.

2. Surgery:

* The primary treatment for glomus jugulare tumors is surgical resection, often using skull base approaches (e.g., infratemporal fossa approach, craniotomy).
* Surgery aims for complete tumor removal but carries risks of cranial nerve damage, bleeding, cerebrospinal fluid leak, and other complications.
* No specific drugs are used intraoperatively as treatment, but perioperative management may include steroids and analgesics.

3. Radiotherapy:

* Stereotactic radiosurgery (e.g., Gamma Knife) or conventional external beam radiotherapy can be used as primary or adjuvant treatment, especially in patients who are poor surgical candidates or have residual/recurrent tumors.
* Radiotherapy drugs are not systemic medications but targeted radiation beams.
* Side effects of radiotherapy include local tissue inflammation, fatigue, and rarely radiation-induced neuropathy or secondary malignancies.

4. Embolization:

* Preoperative vascular embolization is often performed to reduce tumor blood supply and minimize intraoperative bleeding.
* This is an interventional radiology procedure rather than a drug treatment.

## Summary of Drug-Related Treatments and Side Effects

| **Drug/Treatment Type** | **Purpose** | **Common Side Effects** |
| --- | --- | --- |
| Alpha-blockers (phenoxybenzamine) | Control hypertension from catecholamine secretion | Orthostatic hypotension, dizziness, fatigue |
| Beta-blockers (propranolol) | Control arrhythmia and hypertension | Bradycardia, fatigue, bronchospasm |
| Perioperative medications (steroids, analgesics) | Reduce inflammation and pain around surgery | Steroid-related: immunosuppression, hyperglycemia; analgesics: GI upset, sedation |
| Radiotherapy (stereotactic radiosurgery) | Tumor control, non-surgical treatment | Local tissue inflammation, fatigue, rare neuropathy |

**OUTLOOK / PROGNOSIS**

Recent series show a stroke rate of 0% to 3.5%, a cranial nerve injury rate of 5%-39%, and overall mortality of 0%-2.7%, with 15% of the patients unable to return to their preoperative daily activities.

With stereotactic radiosurgery treatment, 60% of the patients showed improvement of previous neurological deficits. Tumor control is obtained in 91% of the patients.The Kaplan-Meier tumor control rate is 92.2% at five years and 86.3% at ten years.Hearing tends to worsen post radiosurgery; however, balance, dizziness, and tinnitus usually improve post radiosurgery

**POSSIBLE COMPLICATIONS**

* Sigmoid sinus thrombosis
* Cranial neuropathies
* Pulsatile tinnitus
* Deterioration of hearing
* Vocal cord paralysis
* Aspiration
* Facial paralysis
* Conductive hearing loss
* Cerebrospinal fluid leak
* Lower cranial neuropathy
* Temporal bone osteoradionecrosis
* Brain radionecrosis

**DIFFERENTIAL DIAGNOSIS**

* Schwannoma of lower cranial nerves
* Neuroma of lower cranial nerves
* Glomus tympanicum
* Neck and head metastasis
* Bone metastasis
* Lymph node metastasis
* Meningioma
* Cholesteatoma
* Endolymphatic sac tumors
* Chordoma
* Chondrosarcoma
* Epidermoid
* Chronic mastoiditis
* Hemangiopericytoma
* Plasmacytoma
* Dural arteriovenous fistula
* Arteriovenous malformations
* High riding jugular bulb
* Asymmetry of jugular foramen size
* Tortuous internal carotid artery
* Idiopathic intracranial hypertension

**EPIDEMIOLOGY**

The estimated annual incidence of glomus jugulare tumors has been reported to be about 0.07 per 100,000 per year or 1 case per 1.3 million people.The median age at diagnosis is 56 years (44 to 69 years). Female presentation is 3 to 6 times more common than men.

Among head and neck paragangliomas, 44% to 48% are carotid body tumors, 16% to 24% are glomus jugulare, 20% are glomus tympanicum, and 8% are glomus vagale

## **Staging**

The Glasscock-Jackson and Fisch classifications of glomus tumors are widely used. Staging is as follows:

* Type A - Tumor limited to the middle ear cleft (glomus tympanicum)
* Type B - Tumor limited to the tympanomastoid area with no intralabyrinthine compartment involvement
* Type C - Tumor involving the intralabyrinthine compartment of the temporal bone and extending into the petrous apex
* Type C1 - Tumor with limited involvement of the vertical portion of the carotid canal
* Type C2 - Tumor invading the vertical portion of the carotid canal
* Type C3 - Tumor invasion of the horizontal portion of the carotid canal
* Type D1 - Tumor with an intracranial extension less than 2 cm in diameter
* Type D2 - Tumor with an intracranial extension greater than 2 cm in diameter

**Genetic Factors:**

* Most cases are sporadic with no clear cause.
* Some tumors have a familial pattern with autosomal dominant inheritance and incomplete penetrance. The gene linked to hereditary paragangliomas is located on chromosome 11q23.
* Mutations in genes encoding components of the succinate dehydrogenase (SDH) enzyme complex, especially SDHD, are associated with tumor development

**PREDEFINED Q & A SETS**

### How can glomus jugulare tumor be identified through its signs?

Signs of glomus jugulare tumor include hearing loss, tinnitus, ear fullness, and difficulty swallowing. Imaging studies like CT or MRI can confirm the diagnosis.

### How should I care for myself with glomus jugulare tumor—what should I do and avoid?

Care involves regular follow-ups, managing symptoms like dizziness or hearing loss. Avoid loud noises, stress, and caffeine.

### How can glomus jugulare tumor affect the body in the long term?

Glomus jugulare tumors can cause hearing loss, tinnitus, dizziness, facial weakness, and swallowing difficulties if left untreated in the long term.

### What are the best ways to manage glomus jugulare tumor?

Treatment options for glomus jugulare tumors include surgery, radiation therapy, and embolization. A multidisciplinary approach is often recommended.

### What are the chances of glomus jugulare tumor recurring?

The chances of a glomus jugulare tumor recurring are low, but regular follow-up appointments are important for monitoring.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, I have reviewed your imaging and test results, and it appears you have a glomus jugulare tumor. I’d like to explain what this means and discuss the next steps.

Patient: What exactly is a glomus jugulare tumor?

Doctor: It’s a rare, usually benign tumor that arises from specialized cells called paraganglia located near the jugular vein at the base of your skull. These tumors grow slowly but can affect nearby nerves and structures, causing symptoms like hearing loss, tinnitus (ringing in the ear), dizziness, or sometimes difficulty swallowing or hoarseness.

Patient: How did I get this tumor? Is it cancer?

Doctor: These tumors are generally non-cancerous and grow slowly. The exact cause isn’t fully understood, but some cases are linked to genetic factors. Most patients don’t have a family history. It’s not contagious or caused by lifestyle factors.

Patient: What symptoms should I watch for?

Doctor: Common symptoms include hearing changes, a feeling of fullness or pulsation in the ear, balance problems, and sometimes changes in voice or swallowing if the tumor affects certain nerves. If you notice worsening symptoms, please let us know.

Patient: What are my treatment options?

Doctor: Treatment depends on the size of the tumor, your symptoms, and overall health. Options include:

* Surgery to remove the tumor, which can be curative but carries risks due to the tumor’s location near important nerves and blood vessels.
* Radiation therapy, such as stereotactic radiosurgery, which can control tumor growth with fewer risks.
* Observation (“watchful waiting”) may be appropriate if the tumor is small and not causing significant symptoms.

Patient: Are there any medications I need to take?

Doctor: Most glomus jugulare tumors don’t require medication unless the tumor produces hormones called catecholamines, which is rare. In those cases, medications like alpha- and beta-blockers are used to control blood pressure and heart rate before treatment.

Patient: What are the risks of surgery or radiation?

Doctor: Surgery risks include bleeding, nerve injury causing facial weakness, hearing loss, or swallowing difficulties. Radiation side effects are usually milder but can include local inflammation and rarely nerve damage. We will carefully evaluate the best approach for you.

Patient: How often will I need follow-up?

Doctor: Regular follow-up with imaging is important to monitor the tumor whether you have treatment or not. We typically schedule MRI scans every 6 to 12 months initially.

Patient: Thank you, doctor. This helps me understand my condition better.

Doctor: You’re welcome. We’ll work together to choose the safest and most effective treatment plan for you. Please feel free to ask any questions anytime.

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**GLOMUS TYMPANUM TUMOR**

*ALTERNATIVE NAMES:* Alternative names for a glomus tympanum tumor include tympanic paraganglioma , glomus tympanicum tumor , and glomus body tumor. These tumors are also referred to as paragangliomas and chemodectomas.

**DEFINITION / DESCRIPTION**

Paraganglioma - glomus tympanum

A glomus tympanum tumor is a tumor of the middle ear and bone behind the ear (mastoid).

A glomus tympanicum tumor is a type of benign tumor that arises from the glomus cells in the middle ear. These tumors are the most common vascular tumors of the middle ear and are also referred to as glomus tympanicum tumors. They are highly vascular and typically appear as a red mass behind the eardrum, often causing symptoms such as conductive hearing loss and pulsatile tinnitus. Glomus tympanicum tumors are slow-growing and locally destructive, spreading along paths of least resistance. They are distinct from paragangliomas, which were previously called glomus tumors but do not arise from glomus cells.

**CAUSES**

A glomus tympanum tumor grows in the temporal bone of the skull, behind the eardrum (tympanic membrane).

This area contains nerve fibers (glomus bodies) that normally respond to changes in body temperature or blood pressure.

These tumors most often occur late in life, around age 60 or 70, but they can appear at any age.

The cause of a glomus tympanum tumor is unknown. In most cases, there are no known risk factors. Glomus tumors have been associated with changes (mutations) in a gene responsible for the enzyme succinate dehydrogenase (SDHD).

**RISK FACTORS**

The risk factors for glomus tympanicum tumors are not well understood, and in most cases, there are no known risk factors. However, glomus tumors have been associated with changes (mutations) in a gene responsible for the enzyme succinate dehydrogenase (SDHD). Additionally, glomus tumors can be part of a hereditary condition, where genetic mutations can be passed on to children. It is also possible for glomus tumors to occur without any family history, meaning they can form from gene mutations that happen over time throughout a person's life.

**SIGNS / SYMPTOMS**

Symptoms may include:

* Hearing problems or loss
* Ringing or heart beat sounds in the ear (pulsatile tinnitus)
* Weakness or loss of movement in the face (facial nerve palsy)

**DIAGNOSIS METHODS**

Glomus tympanum tumors are diagnosed by a physical exam. They may be seen in the ear or behind the eardrum.

Diagnosis also involves scans, including:

* CT scan
* MRI scan

**TREATMENT OPTIONS**

Glomus tympanum tumors are rarely cancerous and do not tend to spread to other parts of the body. However, treatment may be needed to relieve symptoms.

The treatment options for glomus tympanicum tumors include surgical excision, radiation therapy, and observation. Surgical removal is the preferred treatment, with small tumors typically removed through incisions in the ear canal and larger tumors requiring an incision behind the ear. Microsurgical removal is commonly performed under general anesthesia on an outpatient basis, with a low chance of recurrence if the tumor is completely removed. For cases where surgery is not feasible, radiation therapy, including gamma knife radiosurgery, may be used to control tumor growth with a low risk of treatment-related cranial nerve injury. Observation may be recommended for small, non-growing tumors, with regular follow-ups including hearing assessments and imaging studies to monitor progression.

**OUTLOOK / PROGNOSIS**

Glomus tympanum tumors are rare, typically benign tumors that develop in the middle ear and the bone behind the ear (mastoid). The outlook for patients with glomus tympanum tumors is generally favorable, especially with appropriate treatment.

Surgery is the primary treatment option, and more than 90% of patients are cured following surgical intervention.

The prognosis has improved significantly over the years, with excellent outcomes achieved through the use of minimally invasive techniques and the involvement of an expert multidisciplinary team.

While the tumors are usually non-cancerous and do not spread to other parts of the body, they can cause symptoms such as hearing loss, pulsatile tinnitus (a heartbeat sound in the ear), and facial nerve palsy.

In some cases, treatment may be necessary to relieve symptoms, and the choice of treatment depends on various factors, including the size of the tumor, the patient's age, and the presence of any complications. For instance, preoperative embolization may be used to reduce intraoperative hemorrhage in selected cases.

Although the majority of patients have a good prognosis, potential complications include hearing loss and nerve damage, which can lead to facial paralysis.

It is important for patients to consult with their healthcare providers if they experience any symptoms such as difficulty with hearing or swallowing, problems with facial muscles, or a pulsing sensation in the ear.

People who have surgery usually do well. More than 90% of people with glomus tympanum tumors are cured.

**POSSIBLE COMPLICATIONS**

The most common complication is hearing loss.

Nerve damage, which may be caused by the tumor itself or damage during surgery, rarely occurs. Nerve damage can lead to facial paralysis.

The complications associated with glomus tympanum tumors include hearing loss, nerve damage, and facial paralysis. Hearing loss is the most common complication, often resulting from the tumor itself or damage during surgery. Nerve damage, which can lead to facial paralysis, is a rare but possible complication, either due to the tumor's presence or surgical intervention. Additionally, surgical procedures may result in cranial nerve palsies, particularly affecting the facial nerve, and cerebrospinal fluid (CSF) leaks.

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

Contact your health care provider if you notice:

* Difficulty with hearing or swallowing
* Problems with the muscles in your face
* Pulsing sensation in your ear

**PREVENTION TIPS**

There are no specific prevention tips for glomus tympanum tumor as the cause of the tumor is unknown, and there are no known risk factors in most cases. However, it is important to note that glomus tumors have been associated with changes (mutations) in a gene responsible for the enzyme succinate dehydrogenase (SDHD). Therefore, individuals with a family history of such mutations may benefit from genetic counseling and regular medical check-ups. If you notice any symptoms such as pulsatile tinnitus, hearing loss, or facial weakness, it is important to consult a healthcare provider for early diagnosis and treatment.

**DIFFERENTIAL DIAGNOSIS**

The differential diagnosis for a glomus tympanum tumor includes several conditions that need to be considered based on clinical presentation and imaging findings. These include an aberrant internal carotid artery (ICA) and a facial nerve schwannoma. For glomus jugulotympanicum tumors, the differential diagnosis includes a jugular foramen schwannoma, a meningioma, an endolymphatic sac tumor, and metastases. Schwannomas from the IX, X, or XI cranial nerves typically appear fusiform, extending superomedially with smooth jugular foramen expansion. Meningiomas may show a dural tail, contain internal calcifications, or produce hyperostosis. An endolymphatic sac tumor is a rare, osteodestructive tumor with intratumoral spicules and avid contrast enhancement, arising in the endolymphatic sac or duct sporadically or from von Hippel–Lindau disease. Osteodestructive metastases, usually from lung, breast, or prostate cancer, lack the degree of high T2 MR signal and/or the internal flow voids.

**RECENT GUIDELINES OR UPDATES**

A glomus tympanum tumor is a rare, benign tumor that develops in the middle ear and the bone behind the ear (mastoid). It grows in the temporal bone of the skull, behind the eardrum (tympanic membrane), and involves nerve fibers known as glomus bodies, which normally respond to changes in body temperature or blood pressure. These tumors most often occur in older adults, around age 60 or 70, but they can appear at any age. The exact cause of a glomus tympanum tumor is unknown, although genetic mutations, such as those in the succinate dehydrogenase (SDHD) gene, have been associated with some cases.

The most common symptoms include pulsatile tinnitus (ringing or heart beat sounds in the ear), conductive hearing loss, ear pain, and bleeding from the ear. Diagnosis is typically made through a physical exam, where a reddish or bluish mass may be visible behind the eardrum, along with hearing tests and imaging studies such as CT scans.

Glomus tympanum tumors are rarely cancerous and do not tend to spread to other parts of the body. However, treatment may be necessary to relieve symptoms. The primary treatment is microsurgical removal, with small tumors often removed through incisions in the ear canal and larger tumors requiring an incision behind the ear. Surgery is usually performed under general anesthesia and is often an outpatient procedure.

The success rate for surgery is high, with more than 90% of patients being cured. The most common complication is hearing loss, and nerve damage, which may lead to facial paralysis, can occur either due to the tumor itself or during surgery.

Recent guidelines and updates emphasize the importance of accurate diagnosis using imaging techniques such as CT and MRI scans, as well as the role of superselective angiography with embolization to reduce bleeding during surgery. Treatment approaches are multidisciplinary, involving otolaryngologists, neurosurgeons, and other specialists to manage both the tumor and its symptoms.

In some cases, radiotherapy may be used as a palliative treatment, particularly for patients who are not suitable for surgery. Genetic testing may also be recommended, as some glomus tumors are associated with hereditary genetic mutations.

Overall, the management of glomus tympanum tumors focuses on complete surgical excision, with a strong emphasis on preserving hearing and minimizing complications.

**EPIDEMIOLOGY**

A glomus tympanum tumor is a rare type of tumor that originates in the middle ear and the bone behind the ear (mastoid). It is classified under the group of glomus tumors, also known as paragangliomas. These tumors are most commonly found in women during the fifth to sixth decades of life. However, they can occur at any age, with cases reported in the eighth decade as well. The exact cause of glomus tympanum tumors is unknown, but they have been associated with genetic mutations, such as those in the succinate dehydrogenase (SDHD) gene. The tumors are typically benign and do not tend to spread to other parts of the body. They are characterized by their highly vascular nature and can present with symptoms such as pulsatile tinnitus, conductive hearing loss, and, in some cases, facial nerve palsy.

**PREDEFINED Q & A SETS**

## **What is a Glomus Tympanicum Tumor?**

* A glomus tympanicum tumor is a benign, highly vascular tumor arising from paraganglionic cells located in the middle ear. It is a type of paraganglioma and is typically slow-growing.

## **What symptoms does a Glomus Tympanicum Tumor cause?**

* Common symptoms include:
  + Pulsatile tinnitus (hearing one's heartbeat in the ear)
  + Conductive hearing loss due to tumor occupying the middle ear space
  + Aural fullness
  + In larger tumors, symptoms may extend to vertigo or facial nerve involvement, but these are less common.

## **How is a Glomus Tympanicum Tumor diagnosed?**

* Diagnosis involves:
  + Thorough otoscopic examination, often revealing a reddish mass behind the eardrum
  + Imaging studies such as high-resolution CT scans of the temporal bone and MRI with angiographic sequences to assess tumor size and vascularity
  + Sometimes specialized tests like transcanal sound recording-spectro-temporal analysis (TSR-STA) may be used to evaluate pulsatile tinnitus objectively.

## **What treatment options are available?**

* Surgical removal is the primary treatment, especially for symptomatic or growing tumors. Approaches vary depending on tumor size and location and may include:
  + Transcanal surgery for smaller tumors confined to the middle ear
  + More extensive approaches (mastoid or petrous bone surgery) for larger tumors
* Preoperative embolization may be performed to reduce blood loss during surgery
* Radiation therapy can be considered for patients who are poor surgical candidates or for residual/recurrent tumors; it halts growth but does not remove the tumor
* Observation with serial imaging is an option for small, asymptomatic tumors due to their slow growth.

## **What are the risks or complications of treatment?**

* Surgery carries risks including:
  + Hearing loss (though often conductive hearing can improve after tumor removal)
  + Facial nerve injury (rare with careful technique)
  + Postoperative pain and inflammation, usually manageable with medication
* Radiation therapy requires lifelong imaging surveillance to monitor tumor control.

## **Can Glomus Tympanicum Tumors secrete hormones?**

* Rarely, these tumors can secrete catecholamines causing systemic symptoms such as rapid heartbeat, headaches, flushing, sweating, and diarrhea, but this is uncommon for glomus tympanicum tumors.

## **What is the prognosis?**

* Prognosis is generally excellent with appropriate treatment, as these tumors are benign and slow-growing
* Surgical removal typically resolves symptoms like pulsatile tinnitus and improves hearing when conductive loss is present
* Lifelong follow-up is recommended to monitor for recurrence or growth if the tumor is not completely removed or treated conservatively.

**DOCTOR-PATIENT CONVERSATIONS**  
A 52-year-old woman presented with unilateral pulsatile tinnitus and progressive conductive hearing loss in the right ear over two years. She reported a sensation of fullness in the ear but denied vertigo or facial weakness. Otoscopic examination revealed a visible reddish mass behind the tympanic membrane.

Doctor: "You mentioned hearing a pulsing sound in your ear and some hearing difficulty, correct?"  
Patient: "Yes, it feels like I hear my heartbeat in my ear, and sounds seem muffled."  
Doctor: "On examination, we see a reddish mass behind your eardrum, which is typical for a glomus tympanicum tumor, a benign but vascular tumor in the middle ear."

Diagnostic Workup:

* CT scan of the temporal bone showed a soft tissue mass confined to the middle ear without bone erosion.
* MRI confirmed a highly vascular lesion consistent with a paraganglioma (glomus tympanicum).
* Audiometry revealed mild to moderate conductive hearing loss on the affected side.

Doctor: "The imaging confirms a tumor in your middle ear, which explains your symptoms. This tumor is benign but can grow and cause further hearing loss or other complications."

Treatment Discussion:

* The primary treatment recommended was surgical excision via a post-auricular or transcanal approach, depending on tumor size and location.
* Preoperative embolization was considered to reduce intraoperative bleeding.
* The patient was counseled about risks including hearing loss, tinnitus improvement, and rare facial nerve injury.

Patient: "What are the chances of the tumor coming back after surgery?"  
Doctor: "Complete removal usually results in excellent outcomes with very low recurrence rates, but we will monitor you regularly after surgery."

Surgical Outcome:

* The tumor measuring approximately 7 mm × 5 mm was completely removed under microscopic visualization.
* Histopathology confirmed paraganglioma.
* Postoperative recovery was uneventful with resolution of pulsatile tinnitus and improved hearing thresholds.
* Follow-up audiometry at 1 and 5 years showed stable normal hearing without recurrence.

Doctor: "Your surgery was successful, and your symptoms have improved. We will continue to monitor you with periodic exams and imaging."

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