**VASCULAR ANOMALIES**

ALTERNATIVE NAMES: Alternative names for vascular anomalies include hemangiomas, capillary malformations, venous malformations, lymphatic malformations, and arteriovenous malformations. Other terms that have been used historically include birthmarks, stork bites, strawberry, portwine stains, cavernous hemangiomas, cystic hygromas, lymphangiomas, and cavernous malformations. However, these terms are often considered improper or outdated, and the medical community now prefers more accurate descriptors such as hemangioma, capillary malformation, venous malformation, lymphatic malformation, and arteriovenous malformation.

DEFINITION / DESCRIPTION

Vascular anomalies are abnormalities or disorders of the vascular system, either in veins or arteries. Vascular anomalies are classified as either a **vascular tumor** or a **vascular malformation**.

Blood is pumped through the body in tube-like structures called blood vessels. These vessels form a network. Some vessels, called arteries, pump the blood from the heart out to the body. Other vessels, called veins, bring blood back to the heart, where it gets oxygen from the lungs. The cells of the body use oxygen to make energy.

The body also has a network of lymphatic vessels. These vessels carry a clear fluid called lymph, which transport white blood cells in it. These white blood cells help fight infection and disease as part of the immune system.

Arteries, veins and lymphatic vessels have something important in common. They are all lined with a type of tissue called endothelium. Endothelium acts as a gatekeeper by letting some cells into the vessels and keeping other cells out. It also helps control blood pressure. This means that blood will travel faster or slower when needed.

These vessels and the endothelium that lines them are vital to the body’s health. Vascular anomalies are disorders of the endothelium and its associated blood vessels.

**Vascular malformations** are abnormalities that involve blood vessels. These changes are typically present at birth but frequently may not become evident until later in life during childhood or even in adulthood.

Vascular malformations can develop in any part of your body — from your head to your toes. They may present as a soft tissue mass, pain, swelling and/or skin discoloration. Some vascular malformations develop on your face or neck or near your brain or spinal cord. Others look like birthmarks or red blemishes.

Rarely, vascular malformations develop during adulthood after trauma or another incident. Vascular malformations that cause pain, impair function such as vision or activities or cause bleeding or other problems may need treatment.

Vascular refers to blood vessels. Vascular malformations can affect any blood vessel in your circulatory system. They may also develop in lymphatic vessels in the lymphatic system.

Affected blood vessels may include one or more of the following structures:

* Arteries and arterioles.
* Capillaries.
* Veins and venules.
* Lymphatic channels.

### **What are the types of vascular malformations?**

Vascular malformations may appear as birthmarks on an infant’s skin. Or they may develop in practically any part of your body, including your brain or spine. Healthcare providers determine the type of vascular malformation based on the affected blood vessels.

The most common types include:

* Venous malformation: The most common type of vascular malformation, a venous malformation, develops in a vein. Veins carry blood back to your heart to get oxygen.
* Arteriovenous malformation (AVM): An AVM is a tangle of arteries and veins that connect incorrectly. Instead of connecting to capillaries, the arteries pump blood directly into the veins through a cluster of channels called a nidus. AVMs can affect your brain or spine.
* Capillary telangiectasia: These small areas of enlarged capillaries tend to develop in the brain. Most capillary telangiectasias don’t cause problems. But occasionally, they cause a hemorrhage.
* Cavernous malformations: Tightly packed capillaries in your brain have long “caverns” (cavernous malformations). Blood moves slowly through these caverns.
* Lymphatic malformations: Dilated lymphatic channels forming fluid-containing cysts tend to develop in the soft tissues of your face, neck and axillary (arm pit) regions.

### **What’s the difference between vascular malformations and hemangiomas?**

Vascular malformations and hemangiomas result from irregularities in blood vessels (vascular anomalies). They both can cause birthmark-like blemishes, but there are differences:

* Hemangiomas are a type of noncancerous (benign) vascular tumor. They form when blood vessels clump together underneath the skin. Strawberry hemangiomas typically appear after birth. They grow rapidly for the first six months of an infant’s life. These tumors rarely cause problems and usually go away without treatment. When hemangiomas are large or affect function or cause pain or other problems, they usually can be managed with a medication that makes them shrink faster. Only very rarely is surgery necessary.
* Vascular malformations are present at birth but may not be noticeable until childhood or even adulthood. They grow slowly and may extend deeper into nearby tissues and structures, causing problems. Vascular malformations frequently require treatment.

### **What are slow-flow vascular malformations and fast-flow vascular malformations?**

Most vascular malformations are slow-flow. This term means blood moves slowly through the affected blood vessels. These are venous, lymphatic or venolymphatic malformations.

AVMs are fast-flow vascular malformations. Blood moves quickly from arteries to veins, typically through a cluster of abnormal vascular channels called a nidus. This fast blood flow in large AVMs can cause your heart to work harder, increasing the risk of heart failure.

### **How common are vascular malformations?**

Vascular malformations are rare. They occur in about 1% of all births. The most common type, venous malformations, affects approximately 1 in every 5,000 to 10,000 people.

**CAUSES**

Most vascular malformations are a result of localized or regional abnormal development of vascular and/or lymphatic channels which develop in utero. They are typically present at birth (congenital).

Less commonly, an injury in which there’s unrecognized damage to the vessels can over time develop into a vascular malformation. An injury or hormonal changes during puberty or pregnancy can make venous malformations noticeable for the first time.

In a small number of cases, people inherit genetic changes (mutations) that make vascular malformations more likely. Researchers are still learning more about these genetic causes.

### **Risk for vascular malformations**

Some people inherit gene changes that cause conditions that increase the risk of vascular malformations. These conditions include:

* Blue rubber bleb nevus syndrome causes venous malformations in your intestines and digestive system. It also causes dark blue, red or black skin lesions (bumps or patches of skin).
* CLOVES (congenital lipomatous overgrowth, vascular malformations, epidermal nevi and spine deformities) causes AVMs in your spine. It also causes scoliosis, fatty tissue growths and a deep red rash.
* Hereditary hemorrhagic telangiectasia (also called Osler-Weber-Rendu syndrome) causes abnormal tangles of small capillaries or AVMs.
* Klippel-Trenaunay syndrome (KTS) causes port-wine stains, bony or tissue growths and venous or lymphatic malformations.
* Parkes Weber syndrome causes AVMs in your arms or legs.

### **Symptoms of vascular malformations**

Symptoms of vascular malformations depend on the type. Vascular malformations that affect your skin may look like a raised red, blue, purple, brown or black birthmark. These marks may swell, bleed or cause pain.

An AVM in your brain may not cause symptoms unless it bleeds. AVMs of the brain that bleed can cause headaches, seizures or muscle weakness (paralysis) on one side of your body.

Venous malformations can cause body aches, pain, swelling, problems with blood clotting and organ damage.

**DIAGNOSIS METHODS**

### **vascular malformations diagnosed**

Because vascular malformations don’t always cause symptoms, providers sometimes discover the condition only after ordering tests to check for a different problem.

Healthcare providers use specialized imaging tests to view blood flow and check for vascular malformations. These imaging tests include:

* Ultrasound, including vascular ultrasound.
* MRI, including MR Angiogram (MRA).
* CT scan, including CT Angiogram.
* Angiogram an/or venogram.
* Plain X-rays.

**TREATMENT OPTIONS**

### **vascular malformations treated**

Treatments for vascular malformations focus on minimizing symptoms and reducing potential complications. Malformations that don’t cause problems may not need treatment and can just be observed over time.

Treatments depend on the affected blood vessels. They often involve closing off or surgically removing affected blood vessels. Most malformations can be treated using minimally invasive techniques. Providers may use:

* Sclerotherapy.
* Catheter embolization.
* Laser treatments.
* Radiation therapy (radiosurgery).

Sometimes, your healthcare provider may recommend a biopsy to confirm the diagnosis and/or to obtain tissue for genetic testing.

Due to the complexity and rarity of vascular malformations, it’s best managed using a team approach with health care providers of multiple specialties.

### **Can vascular malformations come back after treatment?**

Yes, vascular malformations can recur after treatment. You may need regular follow-up and testing to detect a recurrent malformation.

**PREVENTION TIPS**

### **prevent vascular malformations**

Vascular malformations are often present at birth (congenital). That means there isn’t a way to prevent them.

If you have a family history of a condition that causes vascular malformations, you may want to meet with a genetic counselor. This specialist can discuss options to lower the risk of passing the condition to children.

**OUTLOOK / PROGNOSIS**

### **outlook for people with vascular malformations**

Vascular malformations that appear as birthmarks can affect appearance and self-confidence, leading to depression and anxiety. Most of these malformations respond well to treatments.

More serious malformations like AVMs in your brain can cause life-threatening problems if they begin to bleed.

The vast majority of malformations are treatable and respond well to treatment.

**POSSIBLE COMPLICATIONS**

### **complications of vascular malformations**

Some malformations cause no problems and can be observed. More commonly, malformations are likely to cause pain and swelling.

Some malformations interfere with exercise, sports, work or activities of daily living due to pain, or from muscle, joint or nerve involvement.

Large, high flow malformations can over time lead to heart failure.

Vascular malformations in solid organs such as your liver, kidney or uterus can lead to organ dysfunction and other complications.

Certain vascular malformations like AVMs in your brain or spine can reduce the flow of oxygenated blood to your brain. Life-threatening problems may occur, such as:

* Aneurysms.
* Brain bleeds (intracranial hemorrhage).
* Strokes.

**DIFFERENTIAL DIAGNOSIS**

The differential diagnosis (DDx) of vascular anomalies primarily divides into two major categories: vascular tumors and vascular malformations. Here is a clear list of key entities within these groups, highlighting important types for clinical consideration:

## Differential Diagnoses of Vascular Anomalies

| **Category** | **Key Types/Diagnoses** | **Clinical/Diagnostic Features** |
| --- | --- | --- |
| Vascular Tumors | - Infantile hemangioma (most common) | Proliferative lesion in infancy with rapid growth followed by involution. Solid mass on imaging. |
|  | - Congenital hemangioma (rapidly involuting or non-involuting types) | Present at birth, may not involute or do so quickly. |
|  | - Kaposiform hemangioendothelioma | Rare, locally aggressive tumor, often in infants. |
|  | - Tufted angioma | Benign but locally infiltrative tumor with characteristic histology. |
|  | - Other rare vascular tumors (e.g., angiosarcoma) | Malignant tumors with aggressive behavior. |
| Vascular Malformations | - Venous malformation | Low-flow lesion, compressible, bluish, may contain phleboliths (calcifications). |
|  | - Lymphatic malformation | Cystic, macrocystic or microcystic, no blood flow on Doppler imaging. |
|  | - Arteriovenous malformation (AVM) | High-flow lesion with arterial and venous shunting, bruit/thrill, warm skin. |
|  | - Arteriovenous fistula (AVF) | Direct artery-vein connection, usually singular, high flow. |
|  | - Capillary malformation (e.g., port-wine stain) | Flat discoloration, no mass or altered flow, often congenital. |
|  | - Mixed vascular malformations | Combination of the above types (e.g., capillary-lymphatic-arteriovenous malformations, "CLAVM"). |

**EPIDEMIOLOGY**

* The overall annual incidence of extracranial vascular malformations (which include venous, capillary, arteriovenous, and lymphatic malformations) was found to be about 9.85 cases per 100,000 population in a large Korean cohort study spanning 2008–2021.
* Incidence is higher in females than males (approximately 11.37 vs. 8.33 per 100,000).
* Among vascular malformations, the most common subtype was lymphatic malformations (59%), followed by capillary malformations (23.6%), venous malformations (15%), and arteriovenous malformations (2.4%).
* Incidence rates per 100,000 per year were roughly 5.82 for lymphatic malformations, 2.31 for capillary malformations, 1.48 for venous malformations, and 0.24 for arteriovenous malformations.
* Certain malformations like venous and capillary malformations show variation in incidence peak ages; for example, venous malformations most frequently present at ages 0–4 years, particularly in females, and lymphatic malformations have incidences that tend to increase with age after adulthood.
* Prevalence estimates for slow-flow vascular malformations overall are approximately 1 case per 1,000 population in some settings.
* Vascular tumors (like infantile hemangiomas) make up a significant subset but are distinct epidemiologically from malformations.

**PREDEFINED Q & A SETS**

Q1: What are vascular anomalies?  
A1: Vascular anomalies are a group of disorders involving abnormal growth or formation of blood vessels (arteries, veins, capillaries) or lymphatic vessels. They include vascular tumors (like infantile hemangiomas) and vascular malformations (like venous, lymphatic, capillary, or arteriovenous malformations).

Q2: What causes vascular anomalies?  
A2: Most vascular anomalies are congenital (present at birth) due to errors in blood vessel development during embryogenesis. Some may become apparent later due to growth, injury, or hormonal changes. Rarely, genetic mutations can predispose to certain vascular malformations.

Q3: What are the common types of vascular anomalies?  
A3: The main types include:

* Infantile hemangiomas (common vascular tumors in infants)
* Venous malformations (abnormal veins)
* Lymphatic malformations (abnormal lymph vessels)
* Capillary malformations (e.g., port-wine stains)
* Arteriovenous malformations (fast-flow connections between arteries and veins)
* Mixed malformations with components of several vessel types

Q4: What symptoms might I notice?  
A4: Symptoms vary by type and location but can include visible birthmarks or lumps on the skin, swelling, discoloration, pain, bleeding, functional impairment, or complications from abnormal blood flow.

Q5: How are vascular anomalies diagnosed?  
A5: Diagnosis is made with a clinical exam, detailed history, and imaging studies such as ultrasound with Doppler, MRI, CT, or angiography. Biopsy is rarely needed but may be used for unclear cases.

Q6: How are vascular anomalies treated?  
A6: Treatment depends on the type and severity:

* Many vascular tumors like hemangiomas may shrink over time without treatment.
* Malformations often require interventions such as laser therapy (for port-wine stains), sclerotherapy (injecting agents to close abnormal vessels), embolization, or surgery.
* Multidisciplinary care is important for complex cases.

Q7: Are vascular anomalies dangerous?  
A7: Most are benign but some can cause pain, bleeding, infection, or impair function depending on size and location. Large arteriovenous malformations can strain the heart. Monitoring and timely treatment reduce risks.

Q8: Can vascular anomalies recur?  
A8: Yes, some malformations can recur after treatment, so ongoing follow-up is important.

Q9: Can vascular anomalies become cancerous?  
A9: Most vascular anomalies are benign and do not turn into cancer. However, rare malignant vascular tumors exist but are distinct conditions.

Q10: Should I see a specialist?  
A10: Yes, vascular anomalies are best managed by specialists familiar with these conditions, often in multidisciplinary vascular anomalies centers.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Good morning. I understand you have some concerns about a vascular anomaly. Can you tell me what symptoms or changes you've noticed?

Patient: Yes, Doctor. I have a bluish lump on my arm that has been growing slowly since childhood. Sometimes it feels tender, and I notice swelling after activity.

Doctor: Thank you for describing that. Vascular anomalies, like the one you have, can be either vascular tumors or malformations, which involve abnormal blood or lymph vessels. They often present with lumps, discoloration, swelling, or pain depending on their type and location.

Patient: How do you figure out what kind of vascular anomaly I have?

Doctor: Diagnosis starts with a thorough physical exam and detailed history, including when the lesion appeared and how it has changed. Then, we use imaging tests like ultrasound with Doppler to assess blood flow, and MRI to see the extent and characteristics of the lesion. These help us distinguish between different types like venous malformations, lymphatic malformations, or other vascular tumors.

Patient: Will I need a biopsy?

Doctor: Usually, we rely on imaging for diagnosis, and biopsies are not commonly needed unless the diagnosis is uncertain or malignancy is suspected. The goal is to avoid unnecessary procedures on these delicate lesions.

Patient: What treatments are available? Can the lump be removed?

Doctor: Treatment depends on the lesion type, size, symptoms, and impact on your daily life. Some small or asymptomatic vascular anomalies are monitored without intervention. For symptomatic or problematic lesions, options include:

* Sclerotherapy: Injecting a solution to shrink abnormal vessels, often used for venous or lymphatic malformations.
* Laser therapy: For superficial lesions like capillary malformations.
* Surgery: In some cases, removal or debulking is possible but can be complex due to involvement of nerves or vessels.
* Sometimes a combination of treatments is used.

Patient: Are there risks or side effects from these treatments?

Doctor: Yes, treatments carry risks such as swelling, pain, skin discoloration, infection, or damage to surrounding tissues. Your care team will carefully weigh the benefits and risks and discuss them with you before starting any therapy.

Patient: Who else will be involved in my care?

Doctor: Vascular anomalies often need a multidisciplinary team including dermatologists, interventional radiologists, surgeons, and sometimes geneticists or pain specialists. This team works together to design the best individualized treatment plan for you.

Patient: How often will I need follow-up?

Doctor: Regular follow-up is important to monitor your lesion’s response to treatment and detect any changes early. Frequency depends on your condition and treatment plan.

Patient: Can vascular anomalies come back after treatment?

Doctor: Some vascular malformations can recur or persist, requiring ongoing management. That’s why long-term follow-up and sometimes repeat treatments are necessary.

Patient: Are there any resources I can use to learn more?

Doctor: Absolutely. I will provide you with pamphlets and recommend trusted websites such as the Vascular Anomalies Center at UCSF and the ISSVA (International Society for the Study of Vascular Anomalies). These offer reliable, patient-friendly information.

REFERENCES:

[Vascular Malformations: Symptoms, Treatment and Outlook](https://my.clevelandclinic.org/health/diseases/23409-vascular-malformations#overview)

[Vascular Anomalies | Johns Hopkins Medicine](https://www.hopkinsmedicine.org/health/conditions-and-diseases/vascular-anomalies)

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**Velopharyngeal insufficiency**

ALTERNATIVE NAMES

**DEFINITION / DESCRIPTION**

Velopharyngeal insufficiency (VPI) occurs when the sphincter between your oral and nasal cavities doesn’t close completely. It can make your voice sound nasally or cause speech problems. In severe cases, solid foods or fluids may regurgitate (come up) through your nose.

VPI is a type of velopharyngeal dysfunction. It involves the velopharyngeal sphincter, the juncture between your:

* Nasopharynx, the upper part of your throat (pharynx) that’s behind your nose.
* Oropharynx, the middle part of your pharynx that’s behind your mouth.

A sphincter is a ring of muscle that protects or closes an opening or tube in your body. The velopharyngeal sphincter is active when you swallow or speak.

**CAUSES**

VPI occurs when there’s a structural problem in the velopharyngeal sphincter. When the sphincter’s seal isn’t complete or tight, air can escape through your nose instead of your mouth. This causes the nasal-sounding voice of VPI.

**SIGNS / SYMPTOMS**

The signs and symptoms of VPI include:

* Nasal-sounding voice.
* Problems forming certain words or sounds (for example, the consonants p, b, g, t and d).
* Unexpected sounds coming from your nose during speech.
* Rarely, regurgitation of liquid or food through your nose.

**DIAGNOSIS METHODS**

To diagnose VPI, a healthcare provider will likely:

* Feel your palate to detect any abnormalities.
* Inspect your throat and sphincter with a fiberoptic nasoendoscope (thin tube with a light and camera on the end).
* Perform speech analysis, listening for the sounds associated with VPI.
* Test with videofluoroscopy, an X-ray that uses barium liquid to show your body’s structures during swallowing and speech.
* Direct visualization of the velum during speech with a flexible endoscope.

**TREATMENT OPTIONS**

Velopharyngeal insufficiency treatment usually involves speech therapy and surgery.

Speech therapy can help your child adjust the way they speak to reduce the sounds of VPI. It’s often done before and after surgery.

Surgery aims to create a better seal between the nasal and oral cavities without blocking the airway. Surgical approaches depend on the structural problems involved. A surgeon may:

* Change the shape of the soft palate.
* Expand the pharyngeal wall to decrease the distance to the soft palate.
* Lengthen or readjust the palate muscles.
* Take a flap of muscle from the back wall of the throat and attach it to the palate, called a pharyngeal flap procedure.
* Use fat injections or other fillers to help close the palate.

Some people may wear an oral prosthetic, a custom-made device that pushes their palate higher (like a dental retainer after braces). But these are often difficult to tolerate and are usually used only in people who aren’t good candidates for surgery.

### **What are the risks of VPI surgery?**

Like any surgical procedure, surgery to correct VPI can cause possible complications, including:

* Hyponasal speech (not enough sound in your nasal cavity during speech).
* Obstruction of nasal airflow.
* Obstructive sleep apnea.
* Worsened hypernasal speech.

**PREVENTION TIPS**

There aren’t any strategies to prevent VPI. Avoiding surgery near the palate and pharynx may help reduce the risk of VPI, but those procedures are often medically necessary.

**OUTLOOK / PROGNOSIS**

Surgery corrects VPI in as many as 85% of cases. But some people may still have symptoms or require repeat surgery.

Often, a child with VPI has learned speech habits and needs speech therapy to adjust after surgery.

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

Talk to your child’s healthcare provider if you notice unusual speech patterns, habits or sounds. If you notice a strong nasal tone during speech, it could be VPI. Early treatment can help prevent long-term habits that can be harder to break.

**DIFFERENTIAL DIAGNOSIS**

**Faulty learning or dialectal influence.** Children with no anatomical or neurological disorders may present with mild hypernasality secondary to mislearning or exaggerated regional dialects emphasizing nasal characteristics. Speech therapists should consider the patients' native language and dialect when performing perceptual speech analysis. There is no distinction between nasal and oral vowel sounds in English, but distinctive nasal vowel sounds are familiar in many other languages, including French, Portuguese, and Polish.

**Speech Sound Disorder (SSD)** is a broad speech impediment where patients cannot correctly form sounds of certain words. Children commonly try to substitute, omit, or change the sounds of specific phonemes, resulting in unintelligible speech. Although this is frequently seen in young children, most kids self-correct their speech by 4 years of age. SSD can be divided into articulation disorders, which involve a deficit in the motor production of sound, and phonologic disorders, characterized by trouble learning the different speech sounds and recognizing their distinct meanings.Treatment is with speech therapy if the child does not self-correct before school age.

**Childhood apraxia of speech (CAS)** is a rare neurological condition that impedes a child’s ability to produce sound precisely and consistently. It involves a deficit in motor programming and planning, and children cannot express what they want to say in the necessary fine oral-motor movements. They also have inconsistent errors in consonant and vowel production when repeating sentences. These children need intensive and individualized treatment plans involving an experienced speech-language pathologist and the child’s caregivers.

**Tonsillar hypertrophy** can restrict velopharyngeal closure and cause VPI. Symptoms can be improved after tonsillectomy. Evaluation and treatment of tonsillar hypertrophy should occur before any surgical interventions for VPI, as pharyngoplasty in the setting of tonsillar hypertrophy can further obstruct the airway.

**EPIDEMIOLOGY**

An overt cleft palate occurs in approximately 1 in 650 to 750 children born annually and is the most common cause of VPI. Following primary cleft palate surgery, a deficiency persists in up to 20% to 30% of patients. VPI can also be a complication after oral surgery. The incidence of VPI after adenoidectomy ranges from 1 in 1,500 to 1 in 10,000. Postoperative palatal fistula and VPI occur after primary cleft palate repair at a rate of 3.4% to 15%. The most common diagnosis in patients with VPI of unknown cause is 22q11.2 deletion syndrome. The frequency of 22q11 deletion syndrome ranges from 1 in 2000 to 4000, with 27% to 92% of diagnosed children having VPI

**PREDEFINED Q & A SETS**

### **Who might develop velopharyngeal insufficiency?**

VPI is more likely to occur in children with:

* Birth defects affecting their palate (roof of the mouth), such as cleft palate or an abnormally short palate.
* Enlarged tonsils or adenoids.
* Genetic conditions such as Down syndrome or neurofibromatosis.
* Muscle weakness from neurological disorders such as cerebral palsy.
* Tumor in their palate.

The condition also may occur after certain types of surgery or cancer treatment:

* Adenoidectomy (adenoid removal).
* Tonsillectomy (tonsil removal).
* Uvulopalatopharyngoplasty (UPPP surgery, removal of extra tissue at the back of the throat to widen the airway).
* Late effect of radiation therapy to the oropharynx or nasopharynx.

Rarely, a type of “stress VPI” may occur in musicians who play brass or woodwind instruments

### **What does velopharyngeal insufficiency sound like?**

A person with VPI may sound slightly different when speaking. For example:

* Awkward stops in speech.
* Muffled speech.
* Puffs of air, squeaks or snorts as air escapes through their nose.
* Sounding like they’re speaking through their nose instead of their mouth.

Q1: What is velopharyngeal insufficiency (VPI)?  
A1: VPI occurs when the soft palate (velum) and the walls of the throat (pharynx) do not close properly during speech, allowing air to escape through the nose. This causes a nasal quality to the voice and makes speech difficult to understand.

Q2: What causes VPI?  
A2: Common causes include cleft palate or submucous cleft palate (a hidden defect), velar dysplasia (underdevelopment of the soft palate), surgical changes after palate repair or tonsil/adenoid removal, tumors or masses interfering with closure, and certain genetic syndromes like 22q11.2 deletion syndrome.

Q3: What are the symptoms of VPI?  
A3: The primary symptoms are hypernasal speech (excessive nasal resonance) and nasal air escape during speech. Some children may also have speech sound errors, weak pressure on certain consonants, and difficulty being understood. Occasionally, food or liquids might come out of the nose during swallowing.

Q4: How is VPI diagnosed?  
A4: Diagnosis involves a speech evaluation focusing on nasal airflow and speech quality, and instrumental assessments such as nasal endoscopy or videofluoroscopy to visualize the palate and throat during speech. Imaging (e.g., MRI) may be used if structural abnormalities are suspected.

Q5: How is VPI treated?  
A5: Treatment depends on the cause but typically includes speech therapy first. If structural problems persist, surgery may be needed to improve the palate's ability to close or to reposition tissues. Sometimes, oral prosthetics (speech bulbs or palatal lifts) are used when surgery is not an option.

Q6: Can VPI be cured?  
A6: Many children improve significantly with combined speech therapy and, if necessary, surgery. Long-term follow-up is important to monitor progress and address residual speech issues.

Q7: When should I see a doctor?  
A7: If your child has a nasal-sounding voice, unclear speech, or difficulties with speech sounds, especially after cleft palate repair, you should have them evaluated by a specialist (speech-language pathologist and ENT or craniofacial team).

Q8: Is VPI common after cleft palate repair?  
A8: Yes, about 10-40% of children with repaired cleft palate may have persistent VPI. Children with submucous cleft palate also commonly have VPI.

Q9: Are there any things I can do at home to help?  
A9: Encourage speech therapy exercises recommended by your speech-language pathologist and maintain regular follow-up visits. Avoiding habits like nasal air emission during speech can help.

Q10: Is VPI the same as velopharyngeal dysfunction?  
A10: VPI is a type of velopharyngeal dysfunction (VPD). VPD includes other types such as velopharyngeal incompetence (poor muscle movement) and velopharyngeal mislearning (incorrect speech patterns despite normal anatomy).

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Good morning. What brings you in today?

Patient: Hello, Doctor. I've noticed that when I speak, my voice sounds very nasal, and sometimes I feel like air escapes through my nose. People often ask me to repeat myself because they can’t understand me clearly.

Doctor: Thank you for sharing that. These symptoms could be signs of velopharyngeal insufficiency, which means the soft palate does not close properly against the back of the throat during speech, allowing air to escape through the nose. How long have you had these symptoms?

Patient: It’s been going on for a few months now, maybe longer, but it has gotten worse recently.

Doctor: Do you have a history of cleft palate, any surgeries in the throat or palate area, or other known anatomical issues?

Patient: Yes, I had repair surgery for a cleft palate when I was a child.

Doctor: That is important information. Sometimes after cleft palate repair, the muscles of the soft palate do not close tightly enough, causing what we call VPI. We will need to perform a thorough speech evaluation and some specialized tests to confirm the diagnosis and understand the severity.

Patient: What kind of tests will I need?

Doctor: We typically perform a speech assessment with a speech-language pathologist to evaluate the nasal quality of your voice and how air escapes during speech. To visualize the palate’s movement, we use flexible nasoendoscopy, which is a thin camera passed through the nose to see inside your throat during speech. Sometimes videofluoroscopy or imaging like MRI may be used. These tests help us see how well the velopharyngeal sphincter closes.

Patient: Will anything be painful or uncomfortable?

Doctor: The nasoendoscopy can cause some mild discomfort but is generally well tolerated and takes only a few minutes. The other imaging is non-invasive.

Patient: What treatments are available if I do have VPI?

Doctor: Treatment depends on the cause and severity. Often, speech therapy is the first step, especially if there is mislearning or compensatory speech patterns. If structural problems persist, surgery can improve closure by repositioning or lengthening the palate muscles or adding tissue to help close the gap. For some patients, devices called speech bulbs or palatal lifts can be used if surgery is not an option.

Patient: What should I expect from surgery?

Doctor: Surgery aims to improve the function of the soft palate, reducing nasal air escape and improving speech clarity. Recovery varies, and you will need speech therapy afterwards to maximize the benefit. Risks are low but include typical surgical risks like bleeding or infection, and sometimes temporary voice changes.

Patient: How long will it take to see improvement?

Doctor: Speech improvements may begin once healing has occurred, often within a few weeks, but full gains usually appear over several months with therapy.

Patient: Is VPI curable?

Doctor: Many patients experience significant improvement or resolution with combined surgery and speech therapy. However, some may have residual speech issues requiring ongoing management.

Patient: Thank you, Doctor. What should I do next?

Doctor: I will refer you to a speech pathologist for initial evaluation and schedule the nasoendoscopy. Once we have all the assessments, we can discuss a tailored treatment plan.

REFERENCES:

[Velopharyngeal Insufficiency (VPI): Dysfunction Causes & Treatment](https://my.clevelandclinic.org/health/diseases/17935-velopharyngeal-dysfunction-vpd#overview)

<https://www.ncbi.nlm.nih.gov/books/NBK563149/#article-31052.s9>

**Vertigo**

ALTERNATIVE NAMES

**DEFINITION / DESCRIPTION**

Vertigo is a sensation that the environment around you is spinning in circles. It can make you feel dizzy and off-balance. Vertigo is a symptom of lots of health conditions rather than a disease itself, but it can occur along with other symptoms.

Other symptoms you might experience when you have vertigo include:

* Nausea and vomiting.
* Dizziness.
* Balance issues.
* Hearing loss in one or both ears.
* Tinnitus (ringing in your ears).
* Headaches.
* Motion sickness.
* A feeling of fullness in your ear.
* Nystagmus (a condition that causes your eyes to move from side to side rapidly and uncontrollably).

#### **Types of vertigo**

There are two main types of vertigo: peripheral and central.

Peripheral vertigo is the most common type. It happens when there’s an issue with your inner ear or vestibular nerve. (Both help with your sense of balance.)

Subtypes of peripheral vertigo include:

* Benign paroxysmal positional vertigo (BPPV).
* Labyrinthitis.
* Vestibular neuritis.
* Ménière’s disease.

Central vertigo is less common. It occurs when you have a condition affecting your brain, like an infection, stroke or traumatic brain injury. People with central vertigo usually have more severe symptoms like severe instability or difficulty walking.

**CAUSES**

Vertigo causes vary from person to person and may include:

* Migraine headaches.
* Certain medications, including some antibiotics, anti-inflammatories and cardiovascular drugs.
* Stroke.
* Arrhythmia.
* Diabetes.
* Head injuries.
* Prolonged bed rest.
* Shingles in or near your ear.
* Ear surgery.
* Perilymphatic fistula (when inner ear fluid leaks into your middle ear).
* Hyperventilation (rapid breathing).
* Low blood pressure (your blood pressure decreases when you stand up).
* Ataxia (muscle weakness).
* Syphilis.
* Otosclerosis (a bone growth issue affecting your middle ear).
* Brain diseases.
* Multiple sclerosis (MS).
* Acoustic neuroma.

**DIAGNOSIS METHODS**

A healthcare provider will perform a physical exam and ask questions about your vertigo symptoms. They may also recommend one or more tests to confirm your diagnosis.

#### **Vertigo diagnostic tests**

Healthcare providers may perform some tests to diagnose vertigo. These tests can include:

* Fukuda-Unterberger test. Your healthcare provider will ask you to march in place for 30 seconds with your eyes closed. If you rotate or lean to one side, it could mean that you have an issue with your inner ear labyrinth. This could cause vertigo.
* Romberg’s test. During this assessment, your provider will ask you to close your eyes while standing with your feet together and your arms to your side. If you feel unbalanced or unsteady, it could mean that you have an issue with your central nervous system (your brain or spinal cord).
* Head impulse test. For this test, your provider will gently move your head to each side while you focus your eyes on a stationary target (for example a spot on the wall or your provider’s nose). As they move your head, they’ll pay close attention to your eye movements. This can tell them if there’s an issue with the balance system in your inner ear.
* Vestibular test battery. This includes several different tests to check the vestibular portion of your inner ear system. A vestibular test battery can help determine whether your symptoms are a result of an inner ear issue or a brain issue.
* Imaging tests: These may include CT (computed tomography) scans or MRI (magnetic resonance imaging).

**TREATMENT OPTIONS**

Vertigo treatment depends on the underlying cause. Healthcare providers use a variety of treatments, which may include:

* Repositioning maneuvers.
* Vertigo medication.
* Vestibular rehabilitation therapy (vertigo exercises).
* Surgery.

#### **Repositioning maneuvers**

Benign paroxysmal positional vertigo (BPPV) occurs when tiny calcium carbonate crystals (canaliths) move out of the utricle in your inner ear (where they belong) into your semicircular canals. This can cause vertigo symptoms, especially when you change your head position.

Canalith repositioning procedures, like the Epley maneuver, can help shift the crystals out of your semicircular canals back into your utricle. These maneuvers consist of a series of specific head movements. A healthcare provider can perform a canalith repositioning procedure during an office visit. They can also teach you how to do it at home.

#### **Vertigo medication**

Medication may help in some cases of acute (sudden onset, short duration) vertigo. Healthcare providers may recommend motion sickness medications (like meclizine or dimenhydrinate) or antihistamines (like cyclizine) to ease vertigo symptoms.

#### **Vestibular rehabilitation therapy (vertigo exercises)**

Vestibular rehabilitation therapy usually involves a range of exercises to improve common vertigo symptoms like dizziness, unstable vision and balance issues. A healthcare provider will tailor your treatment according to your unique needs. Exercises may include stretching, strengthening, eye movement control and marching in place. Your provider can teach you how to do these exercises at home so you can manage your symptoms whenever you have a vertigo episode.

#### **Surgery**

It’s rare, but you might need surgery when a serious underlying health issue — like a brain tumor or neck injury — causes vertigo. Providers typically only recommend surgery when other treatments don’t work. Your provider or surgeon will tell you which type of procedure you need and what to expect.

### **How do you get vertigo to go away on its own?**

It’s not always possible to get rid of vertigo without the help of a healthcare provider. But here are some things you can try at home to ease your symptoms:

* Move slowly when standing up, turning your head or performing other triggering movements.
* Sleep with your head elevated on two pillows.
* Lie in a dark, quiet room to reduce the spinning sensation.
* Sit down as soon as you feel dizzy.
* Squat down instead of bending over at the waist when picking something up.
* Turn on the lights if you get up during the night.
* Use a cane or walking stick if you feel like you might fall.

#### **How to cure vertigo permanently**

Unfortunately, there’s no surefire way to get rid of vertigo permanently and keep it from coming back. Some people have vertigo once and never have it again. Others experience recurring (returning) episodes.

If you have severe or frequent vertigo, talk to your healthcare provider about ways to manage your symptoms and improve your quality of life.

**common drug treatments for vertigo and their typical side effects:**

1. Antihistamines
   * Examples: Meclizine, diphenhydramine, cyclizine, cinnarizine, promethazine
   * Use: These help reduce dizziness and nausea associated with vertigo by suppressing vestibular nerve activity.
   * Side effects: Drowsiness, dry mouth, blurred vision, constipation, and sometimes dizziness or confusion especially in older adults.
2. Anticholinergics
   * Example: Scopolamine (patch or oral)
   * Use: Used mainly for motion sickness and vertigo symptoms; helps reduce nausea and dizziness.
   * Side effects: Dry mouth, blurred vision, urinary retention, constipation, confusion (especially in elderly).
3. Dopamine antagonists / Antiemetics
   * Examples: Prochlorperazine, metoclopramide
   * Use: Primarily to control severe nausea and vomiting accompanying vertigo.
   * Side effects: Sedation, extrapyramidal symptoms (tremors, rigidity), dry mouth, dizziness.
4. Benzodiazepines
   * Examples: Diazepam (Valium), lorazepam
   * Use: Used as vestibular suppressants in acute vertigo to relieve anxiety and reduce vestibular input.
   * Side effects: Drowsiness, sedation, dependence risk, impaired coordination.
5. Diuretics (Water pills)
   * Use: For vertigo caused by Meniere’s disease, diuretics along with a low-salt diet can reduce fluid buildup in the inner ear and decrease vertigo episodes.
   * Side effects: Electrolyte imbalance, dehydration, dizziness, increased urination.
6. Others
   * NSAIDs and corticosteroids may be used in some inner ear inflammatory conditions.
   * Preventive migraine medications (beta blockers, calcium channel blockers) for vestibular migraine.

**OUTLOOK / PROGNOSIS**

Prognosis depends on the etiology of vertigo; generally, peripheral causes have a better prognosis while central causes have a worse prognosis. Benign paroxysmal positional vertigo recurrence rates are 50% at 5 years. There is the persistence of dizziness related to anxiety in almost a third of patients 1 year after vestibular neuritis. According to Perrez-Garrigues et al, the number of episodes of vertigo is higher in the first years of the disease and decreases in later years, regardless of whether patients receive treatment; most patients reach a "steady-state phase free of vertigo." As with vertigo, hearing loss is highest in the early years of the disease and stabilizes in later years. Usually, there is little to no recovery from hearing loss. The acute vertigo from labyrinthitis should resolve within days; milder symptoms may persist for several weeks. The prognosis is usually good if the patient has no serious neurological sequelae. However, patients with neurological complications from central causes may require further interventions

**POSSIBLE COMPLICATIONS**

Vertigo can cause falls, which may result in bone fractures (broken bones) or other injuries. Vertigo can also interfere with your quality of life and hinder your ability to drive or go to work

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

If you have severe or frequent episodes of vertigo, it’s time to call your healthcare provider. There could be an underlying health condition causing your symptoms.

Call 911 (or your local emergency services number) or go to the nearest emergency room if you develop vertigo alongside:

* Chest pain.
* Heart palpitations.
* Sudden headache.
* Difficulty walking.
* A fever over 100.4 degrees Fahrenheit (38 degrees Celsius).
* Vision changes.
* Weakness in one arm or leg.

Don’t drive when you have vertigo. Call 911 (or your local emergency services number) if a loved one isn’t available to drive you.

## **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**

Vertigo affects both men and women, but it is about 2 to 3 times more common in women than men. This condition has been associated with various comorbid conditions, including depression and cardiovascular disease. Prevalence increases with age and varies depending on the underlying diagnosis; based on a general population survey, the 1-year prevalence of vertigo is about 5%, and the annual incidence is 1.4%. Dizziness, including vertigo, affects about 15% to over 20% of adults yearly. For benign paroxysmal positional vertigo, the 1-year prevalence is about 1.6%, and is less than 1% for vestibular migraine. The impact of vertigo should not be underestimated, as nearly 80% of survey respondents reported an interruption in activities of daily living, including employment and the need for additional medical attention. The prevalence of Menière disease has been recently reported to be 0.51%, which is much higher than previous report

**PREDEFINED Q & A SETS**

Q1: What is vertigo?  
A1: Vertigo is the sensation that you or your surroundings are spinning or moving when there is no actual movement. It often causes balance problems, nausea, and dizziness.

Q2: What causes vertigo?  
A2: Vertigo can result from problems in the inner ear (peripheral vertigo) such as benign paroxysmal positional vertigo (BPPV), Meniere’s disease, vestibular neuritis, or labyrinthitis. It can also arise from issues in the brain or nervous system (central vertigo), like stroke, multiple sclerosis, or migraine. Other causes include head injury, medication side effects, or infections.

Q3: What are the symptoms of vertigo?  
A3: Typical symptoms include a spinning sensation, loss of balance, nausea or vomiting, ringing in the ears (tinnitus), hearing changes, headache, and uncontrollable eye movements (nystagmus).

Q4: How is vertigo diagnosed?  
A4: Diagnosis involves a detailed medical history focusing on the onset, duration, and triggers of vertigo. Doctors perform physical exams including specific positional tests (like the Dix-Hallpike test for BPPV), eye movement observation, and balance assessment. Imaging (MRI, CT) or hearing tests may be done if a central cause is suspected.

Q5: What treatments are available for vertigo?  
A5: Treatment depends on the cause. BPPV is often treated successfully with repositioning maneuvers (e.g., Epley maneuver). Other causes may require medications (vestibular suppressants, anti-nausea drugs), physical therapy (vestibular rehabilitation), lifestyle adjustments, or in rare cases, surgery.

Q6: Can vertigo go away on its own?  
A6: Yes, some types of vertigo like vestibular neuritis or mild BPPV can resolve spontaneously or improve with treatment. However, recurrent or severe vertigo should be evaluated and managed by a healthcare provider.

Q7: When should I seek medical help for vertigo?  
A7: You should seek urgent care if vertigo is accompanied by weakness, difficulty walking, double vision, speech problems, severe headache, chest pain, or sudden hearing loss. Otherwise, see a doctor if vertigo persists, worsens, or causes frequent falls.

Q8: Are there exercises to help with vertigo?  
A8: Yes, vestibular rehabilitation exercises can help retrain your balance system and reduce symptoms. Specific maneuvers can reposition inner ear crystals in BPPV.

Q9: Is vertigo dangerous?  
A9: Vertigo itself is a symptom, not a disease. Its severity and danger depend on the cause. While many cases are benign, some indicate serious conditions like stroke and need prompt evaluation.

Q10: Can lifestyle changes reduce vertigo symptoms?  
A10: Avoiding sudden head movements, staying hydrated, managing stress, and following your treatment plan can reduce vertigo episodes.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Good afternoon. What brings you in today?

Patient: Hi, Doctor. I've been feeling dizzy for the past few days. It sometimes feels like the room is spinning around me.

Doctor: I see. How long does the spinning last when it happens?

Patient: It usually lasts for a few seconds to a minute, especially when I turn my head or get up quickly.

Doctor: Do you notice any other symptoms like ringing in your ears, hearing loss, nausea, or vomiting?

Patient: Yes, I sometimes feel nauseous, and occasionally I hear a ringing sound in my right ear.

Doctor: Have you had any recent ear infections, head trauma, or illnesses?

Patient: No ear infections or head injury recently, but I had a bad cold about two weeks ago.

Doctor: Alright. When you experience these dizzy spells, do you have any difficulty walking or weakness in your arms or legs?

Patient: No weakness, but I do feel unsteady sometimes.

Doctor: Based on your symptoms—brief spinning episodes triggered by head movement and associated ear ringing—it sounds like benign paroxysmal positional vertigo (BPPV), which is a common inner ear problem. To confirm, I will perform a positional test called the Dix-Hallpike maneuver.

Patient: What does that involve?

Doctor: I will help move your head and body into specific positions while observing your eyes for abnormal movements called nystagmus that indicate BPPV. The test is quick and generally well tolerated.

Patient: Is there a treatment for this?

Doctor: Yes. If BPPV is confirmed, we can perform repositioning maneuvers, such as the Epley maneuver, that help move calcium crystals in your ear canals back to their proper place, usually relieving symptoms quickly.

Patient: Great. Are there other possible causes for my dizziness?

Doctor: Yes, vertigo can also be caused by vestibular neuritis, Meniere's disease, or central nervous system issues like stroke, but your symptoms and history make BPPV the most likely. If your symptoms change or worsen, or if you develop weakness, double vision, or severe headache, please seek immediate care.

Patient: Should I be doing anything at home?

Doctor: Avoid sudden head movements that trigger vertigo. If nausea occurs, take anti-nausea medications as prescribed. I'll also refer you to vestibular rehabilitation therapy if needed.

Patient: Thank you, Doctor.

Doctor: You're welcome. We'll do the test now and plan treatment accordingly.

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**Vestibular balance disorders**

ALTERNATIVE NAMES

**DEFINITION / DESCRIPTION**

Vestibular disorders involve problems with your vestibular system. This body system includes structures in your inner ear and brain that help you maintain your sense of balance.

A problem with the vestibular structures within your inner ear or the parts of your central nervous system (CNS) that process this information can lead to balance problems (vestibular dysfunction). Typically, vestibular issues cause symptoms like dizziness and vertigo.

#### **Types of vestibular disorders**

Experts classify vestibular disorders based on where the breakdown is within your vestibular system:

* Peripheral vestibular disorders (PVD): Conditions that impact your inner ear or the nerve that carries balance signals to your brain (vestibular nerve).
* Central vestibular disorders (CVD): Conditions that impact parts of your brain that process balance signals from your peripheral vestibular system.

The most common vestibular disorders are:

* Benign paroxysmal positional vertigo (BPPV).
* Ménière’s disease.
* Vestibular neuritis.
* Labyrinthitis.

Other vestibular conditions include:

* Acoustic neuroma.
* Autoimmune inner ear disease.
* Enlarged vestibular aqueducts (EVA).
* Mal de débarquement syndrome (MdDS).
* Otosclerosis.
* Perilymphatic fistula (PLF).
* Persistent postural-perceptual dizziness (PPPD).
* Presbyvestibulopathy (PVP).
* Secondary endolymphatic hydrops.
* Superior semicircular canal dehiscence syndrome.
* Vascular vertigo.
* Vertebrobasilar insufficiency.
* Vestibular ataxia.
* Vestibular migraines.
* Vestibular hypofunction.
* Vestibular paroxysmia.

**CAUSES**

Causes of vestibular dysfunction include:

* Aging: The structures within your inner ear that receive and send balance signals to your brain can deteriorate as you age.
* Head injuries: Trauma from a head injury can damage your inner ear or parts of your brain involved in your vestibular system.
* Exposure to toxins: Ototoxicity is when a medicine you’re taking damages your inner ear. It’s one of the most common causes of vestibular dysfunction. Chemicals in the environment (like lead) can also damage your inner ear.
* Inflammation: Inflammation can damage the organs and nerves in your inner ear involved in balance. Sometimes, the inflammation results from a viral or bacterial infection.
* Problems with inner ear fluid (endolymph): Fluid inside your inner ear shifts in response to your head movements. The shifting activates nerves that communicate information about your position to your brain. Problems with the fluid can disrupt the signal, causing vestibular system problems.
* Tumors: Growths, including tumors, can impact the nerves that help you maintain your balance.
* Autoimmune diseases: Although it’s rare, an autoimmune disease can cause your immune system to attack your inner ear.
* Neurological conditions: Conditions that impact your nerves and CNS can disrupt your balance. Stroke is a common cause of central vestibular dysfunction. Other causes include conditions that damage the protective covering of your nerves (demyelinating diseases).

#### **Triggers of vestibular disorders**

Some vestibular disorders involve episodes where you experience symptoms like dizziness and vertigo, followed by periods where you don’t experience symptoms at all. In these instances, “triggers” may start or worsen an episode. Triggers may include:

* Changes in your environment (like entering a “busy,” visually stimulating place).
* Sudden head movements or changes in position (like lying back in bed).
* Certain foods and drinks.
* Lack of sleep.
* Stress.

Your healthcare provider can help you identify factors that trigger or intensify symptoms.

**SIGNS / SYMPTOMS**

The most common symptoms of a vestibular issue are:

* Dizziness (feeling disoriented or “woozy”).
* Vertigo (feeling as if you’re spinning or the room is spinning around you).

Other symptoms depend on the specific condition or balance issues you’re having. They include:

* Trouble standing or sitting upright.
* Trouble walking in a steady pattern.
* Hearing loss or ringing in your ears (tinnitus).
* Uncontrollable, irregular eye movements (nystagmus).
* Blurred vision.
* Nausea and vomiting.
* Difficulty concentrating.

**DIAGNOSIS METHODS**

Your healthcare provider will perform a physical exam and a neurological exam to diagnose your condition. They’ll also ask about your symptoms. Understanding your symptoms is key to determining whether the problem is in your inner ear or CNS.

#### **What kind of doctor do you see for vestibular disorders?**

Healthcare providers that diagnose and treat vestibular disorders include:

* Otolaryngologists (ENTs).
* Vestibular audiologists.
* Neurologists.
* Physical therapists.

#### **What tests will be done to diagnose vestibular disorders?**

Tests may include:

* Vestibular tests: Vestibular testing involves several tests that can check how the vestibular organs within your inner ear are working. Many check how your eyes and inner ear are working together to help you maintain balance.
* Hearing tests: These check for signs of hearing loss or symptoms like ringing in your ear that may be related to a vestibular disorder.
* Imaging tests: You may need imaging procedures like an MRI (magnetic resonance imaging) or CT scan (computed tomography scan) to check for structural problems in your inner ear or brain.
* Blood tests: These can check for infections that may be causing inner ear issues.

**TREATMENT OPTIONS**

Your treatment depends on the specific condition. Vestibular disorder treatments may include:

* Lifestyle changes: Conservative treatments, like lifestyle changes, go a long way in managing several vestibular disorders. For example, if fluid buildup in your ear is an issue, reducing salty foods (which cause you to retain water) may help. So can learning to identify and manage triggers that may cause a vertigo episode.
* Medications: You may need medicines to treat what’s causing your condition or to manage symptoms. For example, you may need antibiotics to clear bacterial infections or diuretics to reduce fluid buildup in your ear. You may need anti-nausea medications or antihistamines to manage feelings of motion sickness.
* Canalith repositioning procedure: If you have BPPV, you may work with a physical therapist to help reposition misplaced structures called canaliths in your inner ear with this procedure.
* Vestibular rehabilitation: Vestibular rehabilitation therapy involves exercise sessions that can help you manage dizziness and vertigo.
* Surgery: Surgery on your inner ear is usually a last resort for treating vestibular disorders. But you may need it to manage severe vertigo symptoms if other treatments don’t help.

**commonly used drug classes, representative medications, and their typical side effects:**

## 1. Vestibular Suppressants

These reduce abnormal vestibular input to decrease vertigo and dizziness, recommended only for short-term use due to their potential to delay central compensation.

* Antihistamines:
  + *Examples:* Meclizine, diphenhydramine, promethazine, cinnarizine, cyclizine
  + *Use:* Reduce dizziness and nausea in acute vertigo episodes.
  + *Side effects:* Drowsiness, dry mouth, blurred vision, constipation, confusion (especially in elderly).
* Anticholinergics:
  + *Example:* Scopolamine (oral or transdermal patch)
  + *Use:* Often used for motion sickness and vertigo-related nausea.
  + *Side effects:* Dry mouth, blurred vision, urinary retention, confusion (more in older adults), sometimes transient tachycardia.
* Benzodiazepines:
  + *Examples:* Diazepam, lorazepam, clonazepam
  + *Use:* Short-term vestibular suppressant and anxiolytic effect.
  + *Side effects:* Sedation, dizziness, risk of dependence, impaired coordination.

## 2. Antiemetic Medications

Used to control nausea and vomiting associated with vestibular crises, sometimes overlapping with vestibular suppressants.

* *Examples:* Prochlorperazine, metoclopramide, promethazine
* *Side effects:* Sedation, dry mouth, extrapyramidal symptoms (tremors, rigidity), dizziness.

## 3. Antiviral or Antibiotic Agents

If an infectious cause (e.g., vestibular neuritis due to herpes virus or bacterial labyrinthitis) is suspected or confirmed, targeted antiviral or antibiotic therapy may be used.

* *Example:* Acyclovir for herpes virus
* *Side effects:* Depends on specific drug; e.g., acyclovir may cause gastrointestinal upset, headache, or renal issues rarely.

## 4. Calcium Channel Blockers and Other Agents

Some calcium channel blockers and antihistaminic agents with calcium channel blocking properties have been used, especially in vestibular migraine or certain vestibular disorders.

* *Examples:* Nimodipine, verapamil, cinnarizine, flunarizine
* *Side effects:* Headache, hypotension, fatigue, gastrointestinal upset, weight gain (flunarizine).

## 5. Diuretics

Used mainly in Meniere’s disease to reduce inner ear fluid buildup and frequency of vertigo episodes.

* *Examples:* Hydrochlorothiazide
* *Side effects:* Electrolyte imbalance, dizziness, increased urination.

**PREVENTION TIPS**

It depends on the cause of the vestibular disorder, but typically, vestibular disorders aren’t preventable.

But there are things you can do to care for yourself. For example, you can get treated as early as possible to prevent long-term damage from causes like infections. If you’re living with a chronic (long-lasting) condition, you can take steps to reduce your risk of falls.

**OUTLOOK / PROGNOSIS**

Your situation depends on the specific vestibular disorder. In some cases, vestibular issues go away. For example, vestibular problems related to infections usually improve once the virus or bacteria are gone. Still, it’s important to get treated as soon as possible to prevent long-term inner ear damage.

Other vestibular disorders require lifelong management. Symptoms may come and go unpredictably or in response to triggers that you learn to identify. If this sounds like you, you’ll work with a healthcare provider (or care team) to manage your condition.

**POSSIBLE COMPLICATIONS**

Vestibular dysfunction doesn’t just impact your balance. Untreated vestibular conditions can lead to other things, too, like:

* Falls: Trouble balancing can lead to dangerous falls. According to the World Health Organization, about 20% to 30% of older people in the U.S. who fall experience serious head injuries, bruises or hip fractures. The risk of life-threatening falls is greatest in people over 60 years old.
* Long-term hearing loss: Some vestibular disorders are also associated with long-term hearing loss. Early diagnosis and treatment can often prevent this from happening.
* Mental health conditions: Symptoms of vestibular dysfunction can keep you from doing everyday activities like driving or even walking. Vestibular issues can cause you to avoid social interactions if you’re concerned something might trigger dizziness or a vertigo episode. The effects can lead to anxiety and depression.

It’s important to get checked and treated so you don’t increase your risk of additional health issues.

### **How do I take care of myself?**

Often, it takes a combination of lifestyle adjustments, medications and vestibular rehabilitation to treat or manage a vestibular disorder. But most people find a treatment plan that works for them. In the meantime, you can care for yourself by:

* Always having your medications handy.
* Taking time out to rest if you’re starting to experience symptoms.
* Avoiding high-risk activities unless you’re sure they’re safe.
* Avoiding (or quitting) smoking, which can cause symptom flare-ups.
* Reducing caffeine and alcohol, which are common symptom flare-up triggers.

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

Most people have felt lightheaded or dizzy once in a while. But call your healthcare provider if these sensations get worse, happen often, or affect your quality of life.

**DIFFERENTIAL DIAGNOSIS**

## Peripheral Vestibular Disorders

These originate from the inner ear or vestibular nerve and commonly cause vertigo and imbalance:

* Benign Paroxysmal Positional Vertigo (BPPV):  
  Brief episodes of vertigo (seconds to a minute), triggered by head position changes. Caused by displaced otoliths in semicircular canals.
* Vestibular Neuritis / Labyrinthitis:  
  Acute onset of prolonged vertigo lasting days, often viral in origin. Vestibular neuritis mainly affects balance with no hearing loss; labyrinthitis involves hearing loss and tinnitus.
* Menière’s Disease:  
  Episodic vertigo (20 minutes to 12 hours) with fluctuating hearing loss, tinnitus, and ear fullness caused by abnormal fluid dynamics in the inner ear.
* Bilateral Vestibulopathy:  
  Chronic imbalance and oscillopsia without vertigo, often related to ototoxicity, autoimmune processes, or degeneration.
* Superior Canal Dehiscence Syndrome:  
  Abnormal thinning of the bone overlying the superior semicircular canal causing vertigo induced by loud sounds or pressure changes.
* Vestibular Schwannoma (Acoustic Neuroma):  
  Slow-growing benign tumor of vestibular nerve causing progressive imbalance, hearing loss, tinnitus.

## Central Vestibular Disorders

These stem from brainstem or cerebellar pathology and often have associated neurological signs:

* Stroke or Transient Ischemic Attack (TIA) in Brainstem or Cerebellum:  
  Sudden vertigo with additional symptoms like diplopia, dysarthria, weakness, ataxia.
* Multiple Sclerosis:  
  Demyelinating lesions affecting vestibular pathways causing episodic or progressive balance issues.
* Vestibular Migraine:  
  Episodes lasting minutes to days associated with migraine symptoms like headache, photophobia, phonophobia.
* Tumors or Mass Lesions (e.g., Cerebellar Tumors):  
  Progressive imbalance and vertigo with neurological deficits.
* Degenerative and Neurodegenerative Disorders:  
  Parkinson’s disease, spinocerebellar ataxias, multiple system atrophy involving gait and balance.

## Other Causes

* Functional Dizziness (Persistent Postural-Perceptual Dizziness):  
  Chronic subjective dizziness without clear vestibular impairment; related to anxiety or maladaptation.
* Systemic Causes:  
  Orthostatic hypotension, vitamin deficiencies (B1/thiamine), medication side effects, alcohol toxicity.
* Third Mobile Window Syndromes:  
  Including perilymph fistula causing position- and pressure-induced vertigo.

**RECENT GUIDELINES OR UPDATES**

The third Guideline for Reasonable and Appropriate Care in the Emergency Department (GRACE-3) from the Society for Academic Emergency Medicine provides recommendations for adult patients with acute dizziness and vertigo in the emergency department (ED).

To distinguish central from peripheral causes with acute vestibular syndrome, the guideline recommends trained clinicians utilize Head Impulse-Nystagmus-Test of Skew (HINTS) and finger rub to exclude stroke in patients with nystagmus. In patients without nystagmus, clinicians are recommended to use severity of gait unsteadiness. It is not recommended to use CT or MRI (if a clinician trained in HINTS is available).

In patients diagnosed with vestibular neuritis, clinicians should consider short-term steroids for treatment. In patients diagnosed with posterior canal benign paroxysmal positional vertigo (pc-BPPV), treat with the Epley maneuver.

**EPIDEMIOLOGY**

Dizziness, including vertigo, affects about 15% to more than 20% of adults yearly in large population-based studies. The overall incidence of dizziness, vertigo, and imbalance is 5–10%, and it reaches 40% in patients older than 40 years. The incidence of falling is 25% in subjects older than 65 years. A report reviewing presentation 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.

**PREDEFINED Q & A SETS**

Q1: What is a vestibular balance disorder?  
A1: Vestibular balance disorders are conditions that affect the inner ear or the brain areas that control balance, causing symptoms such as dizziness, vertigo (a spinning sensation), unsteadiness, and problems with coordination and spatial orientation.

Q2: What causes vestibular balance disorders?  
A2: Common causes include inner ear problems like benign paroxysmal positional vertigo (BPPV), vestibular neuritis, Meniere’s disease, labyrinthitis, or damage to the vestibular nerve. Brain-related causes include stroke, migraine, multiple sclerosis, or tumors affecting balance centers. Medications, infections, head injury, and aging can also contribute.

Q3: What are the typical symptoms?  
A3: Symptoms can include vertigo (spinning sensation), dizziness, nausea, vomiting, imbalance, difficulty walking, and sometimes hearing changes like tinnitus or hearing loss.

Q4: How are vestibular balance disorders diagnosed?  
A4: Diagnosis involves medical history, a physical exam, specialized tests such as the Dix-Hallpike maneuver (for BPPV), imaging (MRI or CT scans), hearing tests, and balance assessments by specialists such as neurologists or otolaryngologists.

Q5: What treatments are available?  
A5: Treatments depend on the cause. For BPPV, repositioning maneuvers (like the Epley maneuver) can often resolve symptoms. Other causes may be treated with medications (vestibular suppressants, anti-nausea drugs), vestibular rehabilitation therapy (balance exercises), lifestyle changes, or sometimes surgery.

Q6: Are medications helpful?  
A6: Yes, medications like antihistamines, antiemetics, benzodiazepines, and diuretics (for Meniere’s) can relieve symptoms. However, vestibular suppressants are usually recommended only for short-term use as prolonged use can slow recovery.

Q7: Can vestibular balance disorders be cured?  
A7: Some conditions like BPPV are often fully curable with treatment. Others, such as Meniere’s disease or vestibular migraine, may require long-term management but symptoms can often be controlled.

Q8: What lifestyle changes can help?  
A8: Avoiding sudden head movements, managing stress, staying hydrated, and following therapy exercises can improve symptoms and reduce episodes.

Q9: When should I see a doctor?  
A9: Seek medical attention if you experience sudden, severe vertigo, imbalance causing falls, hearing loss, weakness, numbness, difficulty speaking, or vision problems. Persistent or worsening symptoms also warrant evaluation.

Q10: Can vestibular balance disorders affect daily life?  
A10: Yes, they can impact mobility, increase risk of falls especially in older adults, and affect quality of life. Early diagnosis and treatment improve outcomes and reduce complications.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Good afternoon. What brings you in today?

Patient: Hello, Doctor. I've been having episodes where I feel dizzy and unsteady, sometimes with a spinning sensation like the room is moving around me.

Doctor: I see. How often do you get these episodes, and how long do they last?

Patient: The dizziness comes and goes — sometimes it lasts just a few seconds, other times it can last for a couple of minutes. It especially happens when I turn my head quickly or get up from sitting or lying down.

Doctor: Thank you for sharing that. Do you notice any other symptoms, like ringing in your ears, hearing loss, nausea, vomiting, or headaches?

Patient: Yes, sometimes I have nausea and occasionally hear a ringing sound in one ear, but I haven’t noticed any hearing loss.

Doctor: Have you had any recent ear infections, head injuries, or illnesses?

Patient: No recent infections or injuries, but I did have a bad cold a couple of weeks ago.

Doctor: Based on what you describe, the most common cause may be benign paroxysmal positional vertigo, or BPPV, which happens when small crystals in the inner ear become dislodged and disrupt your balance. To investigate this, I will perform a simple positional test called the Dix-Hallpike maneuver. Does that sound okay?

Patient: Yes, that sounds good. What does that test involve?

Doctor: I will guide you through specific head and body movements while observing your eye movements to see if there is a characteristic type of nystagmus, or involuntary eye movement, that indicates BPPV. It's usually quick and generally well tolerated.

Patient: And if it turns out to be BPPV, what treatment can help?

Doctor: There are repositioning maneuvers, like the Epley maneuver, which can help move the crystals back to their normal location in your inner ear. These maneuvers often provide quick relief and can be done in the clinic or taught to you to do at home.

Patient: What if my symptoms are not due to BPPV?

Doctor: Other possible causes include vestibular neuritis, Meniere’s disease, or even central nervous system issues like migraine or stroke, although those usually have additional symptoms. If tests don’t confirm BPPV, we may order further evaluations, such as hearing tests or MRI scans, and tailor treatment accordingly.

Patient: Are there medications for dizziness?

Doctor: Yes, medications like antihistamines or anti-nausea drugs can help relieve symptoms during acute episodes. However, we usually recommend using these short-term, because long-term use can slow your brain’s natural adaptation and recovery process.

Patient: Will I need physical therapy?

Doctor: Vestibular rehabilitation therapy can be very helpful, especially if symptoms persist. It involves exercises to improve your balance and encourage recalibration of your brain’s balance system.

Patient: What should I watch out for that would need urgent attention?

Doctor: If you develop sudden weakness, numbness, difficulty speaking, double vision, severe headache, or lose coordination, please seek emergency care immediately, as these could indicate a serious neurological problem.

Patient: Thank you, Doctor. This helps me understand what to expect.

Doctor: You’re welcome. We’ll start with the Dix-Hallpike test today and take it from there. Please let me know if you have more questions.

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**Vocal cord cysts, nodules, polyps**

ALTERNATIVE NAMES

**DEFINITION / DESCRIPTION**

Vocal cord lesions, also known as vocal fold lesions, can be benign (noncancerous) or malignant (cancerous) growths that can form on your vocal cords. This article focuses on benign vocal cord lesions.

Your vocal cords are two bands of muscle and vibratory tissue inside your larynx (voice box). They come together and vibrate to produce sound when you speak, sing or use your voice in other ways.

Lesions on your vocal cords can change your voice, making it difficult or even painful to talk or sing.

#### **Types of vocal cord lesions**

Benign lesions include vocal cord nodules, polyps and cysts.

##### **Vocal cord nodules**

Vocal cord nodules, sometimes called singer’s or screamer’s nodes, can form if you’re repeatedly misusing or overusing your voice. These callus-like growths develop in the midpoint of your vocal cords. This part of the vocal cords gets used most often when you’re using your voice. Often, nodules develop on both vocal cords.

Anyone can get them, but they’re most common in children, heavy voice users such as teachers, trainers and coaches, and professional voice users such as singers and speakers.

##### **Vocal cord polyps**

Vocal cord polyps, like nodules, can result from repeatedly overusing or misusing your voice. They can also form after a single episode of vocal abuse (like yelling at a sports event). Polyps can vary in size and shape, but they’re usually larger than nodules. They typically form on one vocal cord, but the friction from a single polyp rubbing against the other vocal cord may cause an additional polyp to form.

A specific type of vocal cord polyp, polypoid corditis (Reinke’s edema), is associated almost exclusively with smoking. If you smoke and become hoarse, you should see a provider to evaluate you for this condition, as well as malignant growths.

Anyone can develop vocal cord polyps, but they’re more common after an episode of voice overuse such as yelling or a sudden loss of voice.

##### **Vocal cord cysts**

Vocal cord cysts are growths that have a sac around a fluid-filled or semisolid center. There are two types of vocal cord cysts: mucus retention cysts and epidermoid (sebaceous) cysts. Vocal cord cysts are less common than vocal cord nodules and polyps but can cause many of the same symptoms. They’re not necessarily associated with voice overuse.

**CAUSES**

Nodules and polyps form over long periods of overusing your voice or using your vocal cords incorrectly. Speaking or singing for extended periods, yelling or straining your voice can all cause your vocal cords to become irritated and inflamed, eventually causing lesions. Singing (particularly in professional singers), screaming and frequent talking (for instance, if you’re a teacher, coach or salesperson) can all lead to nodules or polyps.

Other factors can make you susceptible to lesions or worsen them. These include:

* Smoking.
* Sinusitis.
* Allergies.
* Hypothyroidism.
* Chronic acid reflux (GERD).
* Consuming excessive alcohol or caffeine.
* Using your voice when you’re sick with a cold or upper respiratory infection.

Vocal cord cysts can form if a gland in your vocal cord gets blocked or fragments of cell debris get trapped inside vocal cord tissue.

**SIGNS / SYMPTOMS**

The most common symptom of a vocal cord lesion is hoarseness or a raspy voice. Still, symptoms depend on the lesion’s size and how much it interferes with your vocal cords opening, closing and vibrating together.

Symptoms include:

* Hoarseness.
* Breathiness.
* Vocal fatigue.
* Loss of your voice.
* Loss of your vocal range.
* A voice that breaks easily.
* A harsh, raspy or scratchy voice.
* Frequent coughing, throat clearing or general fatigue.
* General neck pain or a shooting pain that travels from ear to ear.

**DIAGNOSIS METHODS**

A healthcare provider will examine your head and neck and ask how you’ve been using your voice. They may perform tests to examine your vocal cords directly, including:

* Laryngoscopy: Healthcare providers perform this test to examine your voice box. They insert a thin tube through your nose and mouth with special lights and a video camera that allows them to see your voice box.
* Stroboscopy: Healthcare providers perform this test to see how your vocal cords vibrate. They insert a small scope into your nose or throat, above your vocal cords. The scope connects to a special strobe light that flashes when your vocal cords vibrate. This test is the gold standard for evaluating hoarseness. Laryngologists or speech-language pathologists with specialization in voice typically perform and interpret this procedure.

**TREATMENT OPTIONS**

Therapy can range from conservative behavioral, medical and dietary treatments to more invasive treatments like surgery.

* Voice therapy: A specialist called a speech-language pathologist might work with you during voice therapy sessions. Voice therapy teaches how to use your vocal cords so they can heal. It can also teach you how to prevent lesions or voice injuries in the future. Nodules are typically treated conservatively with voice therapy under the guidance of a speech therapist.
* Behavioral modifications: Behavioral interventions can help you make lifestyle adjustments to help care for your voice. Quitting smoking, reducing stress and improving your diet can complement voice therapy to ease your symptoms and heal vocal cord lesions.
* Treatments for underlying medical problems: Treatments that address underlying issues that cause vocal cord inflammation, such as reflux, allergies and sinusitis, can help heal lesions and lessen symptoms.
* Surgery: You may need surgery for nodules that don’t improve with more conservative treatments, like voice therapy. You’ll likely need surgery if you have a polyp or cyst. Unlike nodules, polyps and cysts don’t typically improve with voice therapy. Still, you may need voice therapy after surgery to reduce your risk of irritating your vocal cords and developing new lesions.

**PREVENTION TIPS**

To reduce your risk of developing a vocal cord lesion, you should avoid:

* Singing or talking excessively if you have an upper respiratory infection.
* Talking excessively or speaking loudly without adequately resting your voice.
* Drinking alcohol excessively and consuming too much caffeine (which dry out your vocal cords).
* Smoking or being in smoke-filled rooms.

You can also put healthy habits into place to care for your vocal cords and reduce your risk of getting sick.

* Drink plenty of water.
* Wash your hands often.
* Get a good night’s sleep.
* Use a microphone if you need to project your voice.
* Warm up your voice before singing or prolonged speaking.
* Rest your voice in anticipation of future speaking obligations.
* Use a humidifier in your home to keep your vocal cords hydrated.
* Use stress reduction techniques, cognitive therapy or yoga to lessen muscle tension.

Get treatment for conditions associated with vocal cord lesions, like GERD, sinusitis, allergies and hypothyroidism. See a provider who specializes in voice if you’re concerned you may be developing a voice problem. Early interventions can often prevent invasive treatments such as surgery.

**OUTLOOK / PROGNOSIS**

Your outlook depends on your lesion type and how severely it’s impacting your vocal cords. Untreated nodules, polyps and cysts can cause long-term damage to your vocal cords. Untreated cysts may potentially burst, causing complications.

With treatment, your outlook is excellent. Nodules usually improve within two to six months with voice therapy or vocal rest. Surgery to remove polyps or cysts, alongside voice therapy and vocal rest, can help return your voice to norma

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

If you’re hoarse or have other symptoms of a vocal cord lesion for more than two to three weeks, see an otolaryngologist (ear, nose and throat doctor). Or visit a subspecialized laryngologist with extra training in caring for voice disorders.

## **Diagnostic Consideration**s

Vocal cord cysts have a fluid-filled or semisolid center surrounded by a capsule. Occurring much less frequently than vocal fold nodules (VFNs) and vocal fold polyps (VFPs), two types exist: mucous retention cysts and epidermoid cysts. Cysts are typically not associated with phonotrauma and are unlikely to resolve with voice therapy alone.

Vocal fold cancer (laryngeal cancer) should also be included in the differential if there are worsening symptoms, known risk factors (ie, tobacco use), or suspicious findings on videostroboscopy.

Vocal fold papillomas are small wartlike growths caused by the human papilloma virus (HPV). Papillomas also present with voice changes but when large can also cause shortness of breath. Treatment of papillomas typically requires surgical removal.

**EPIDEMIOLOGY**

* Vocal nodules are generally the most common benign vocal fold lesion, with prevalence rates reported around 1% to 4.42% in various populations. They occur frequently in children and adults who use their voice heavily, especially women aged 20-50 years and professional voice users.
* Vocal polyps tend to be the second most prevalent lesion, with reported prevalence generally ranging from 0.3% to 1.26% depending on the population studied. Polyps are often unilateral, and epidemiological studies show mixed gender predominance; some indicate a male predominance, others find no significant difference or slight female predominance.
* Vocal fold cysts are less common than nodules and polyps but still represent a significant portion, with prevalence estimates around 0.6% to 2.31% in studied groups. Cysts account for roughly 6–13% of benign laryngeal lesions, often seen predominantly in females.

## Age and Gender Patterns

* Nodules and polyps are more common in younger to middle-aged adults. Nodules show a peak incidence in ages 20-50 years, and are also seen frequently in children, more in boys than girls.
* Polyps can occur across age groups but are often associated with vocal trauma or abuse in younger adults.
* Vocal cysts also occur more commonly in females, with some studies noting female predominance for cysts.
* Most benign lesions commonly appear in the productive years (20-59 years), which corresponds with active voice use.

## Risk Factors and Associations

* Vocal abuse or misuse (such as in teachers, singers, or frequent voice users) is a key etiological factor for both nodules and polyps.
* Smoking has been frequently linked as a risk factor, especially for vocal polyps, due to its inflammatory and tissue damaging effects.
* Occupational voice use and voice strain significantly correlate with nodule prevalence.
* Minimal structural alterations and vocal fold paresis have been implicated as precursors or contributory factors for polyps.

**PREDEFINED Q & A SETS**

Your outlook depends on your lesion type and how severely it’s impacting your vocal cords. Untreated nodules, polyps and cysts can cause long-term damage to your vocal cords. Untreated cysts may potentially burst, causing complications.

With treatment, your outlook is excellent. Nodules usually improve within two to six months with voice therapy or vocal rest. Surgery to remove polyps or cysts, alongside voice therapy and vocal rest, can help return your voice to normal.

### **What happens to untreated vocal cord nodules?**

Untreated vocal nodules can cause you to further strain your voice and injure your vocal cords. Often, nodules improve with voice therapy and behavior modifications alone. Most people don’t need surgery. Still, you’ll need to learn ways to care for your vocal cords as they heal. Healthcare providers, like speech-language pathologists, can teach you how to use your voice so your nodes shrink or go away.

### **Are vocal cord nodules serious?**

Vocal nodules are benign, which means they won’t cause damage throughout your body like a malignant (cancerous) growth can. Still, they can feel painful and affect your ability to communicate. If vocal health is an important part of your career and well-being (for example, if you’re a singer, salesperson, teacher, etc.), having vocal nodules can feel very serious.

The good news is that most vocal nodules are treatable without surgery. They’re also usually preventable if you’re taking steps to care for your voice.

### **Do nodules on vocal cords go away?**

Most nodules go away once you stop misusing your voice. Getting treated for underlying conditions that may cause vocal cord irritation can help, too. Working with a speech-language pathologist can help you identify what you’re doing that caused vocal nodules and what may be worsening them. Once you’re informed, you’ll know what behavior to change.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello. What brings you in today?

Patient: Hi, Doctor. I’ve noticed my voice has become hoarser over the last few months. It feels tired after talking, and sometimes it breaks or sounds breathy.

Doctor: Thank you for sharing that. Hoarseness and vocal fatigue can be caused by several things, including benign vocal fold lesions like nodules, polyps, or cysts. Have you had any recent history of heavy voice use, shouting, or any voice strain?

Patient: Yes, I’m a teacher, and I often speak loudly in noisy classrooms. I’ve also been under a lot of stress lately.

Doctor: That vocal overuse can definitely contribute to these kinds of voice problems. To understand what’s going on, I will examine your vocal cords with a flexible laryngoscope — a small camera passed through your nose to see your vocal folds.

Patient: Will that be uncomfortable?

Doctor: It might feel a little strange or ticklish, but it’s quick and usually well tolerated. This exam helps us see if nodules, polyps, or cysts are present and how they affect your vocal cords’ vibration.

Patient: What’s the difference between those lesions?

Doctor: Good question. Vocal nodules are usually small, bilateral, and develop due to chronic vocal strain. Polyps are often larger and unilateral, sometimes from acute vocal trauma. Cysts are fluid-filled sacs that usually require surgical removal because they don’t respond well to voice therapy alone.

Patient: How are these treated?

Doctor: For nodules, voice therapy with a speech-language pathologist is the first line of treatment. It helps you learn techniques to reduce strain and heal your vocal cords. Polyps and cysts may require surgery to remove the lesions, followed by voice therapy to optimize healing and prevent recurrence.

Patient: Will my voice get better?

Doctor: With appropriate treatment, especially early on, most patients see significant improvement. Nodules often improve with voice therapy alone over a few months. Polyps and cysts usually need surgery but have good outcomes with proper postoperative voice care.

Patient: What should I do to protect my voice?

Doctor: Avoid yelling or whispering, stay hydrated, limit throat clearing, and follow your speech therapist’s recommendations. Vocal rest after surgery is important but should not be prolonged unnecessarily.

Patient: If I don’t get treatment, what happens?

Doctor: Untreated lesions can cause persistent hoarseness, vocal fatigue, and possibly worsen, leading to permanent vocal cord damage. Early management helps preserve your voice, especially important for your profession.

Patient: Thank you. I’d like to proceed with the examination and get help for my voice.

Doctor: Excellent. I’ll arrange the laryngoscopy and refer you to a voice therapist as needed.

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### **vocal cord paralysis (vocal fold paralysis)**

**DEFINITION AND DESCRIPTION**

Vocal cord paralysis involves one or both vocal cords (vocal folds) not moving as they should. Your vocal cords are two bands of muscle inside your voice box (larynx) located atop your windpipe (trachea). They open when you breathe so air can pass through. They close when you swallow to prevent food and drink from slipping into your windpipe. When you speak or sing, your vocal cords touch. Your lungs send air through them, causing them to vibrate and make sounds.

With vocal cord paralysis, nerve damage prevents the muscles inside your vocal cords from opening and closing properly. As a result, you may have trouble speaking, swallowing or even breathing — all functions that depend on your vocal cords moving.

#### **Types of vocal cord paralysis**

Vocal cord paralysis can affect one vocal cord (unilateral) or both vocal cords (bilateral):

* Unilateral vocal cord paralysis: Only one vocal cord is paralyzed. When one vocal cord isn’t moving as it should, you may have trouble speaking or (in more serious cases) swallowing. Breathing problems don’t usually happen when only one vocal cord is paralyzed.
* Bilateral vocal cord paralysis: Both vocal cords are paralyzed. When both cords are paralyzed, they usually end up very close together, causing a dangerously narrow airway. You may have trouble breathing, which may be life-threatening without treatment.

#### **How common is vocal cord paralysis?**

Unilateral vocal cord paralysis is much more common than bilateral vocal cord paralysis. It’s rare for both vocal cords to become paralyzed. Still, both types can affect anyone of any age.

#### **How serious is vocal cord paralysis?**

Unilateral vocal cord paralysis ranges in severity from mild to severe. For instance, mild cases may make speaking difficult. In more severe cases, you may experience shortness of breath when speaking. You may cough or choke when eating or drinking.

With bilateral vocal cord paralysis, your vocal cords may get too close together, making it difficult to breathe. Your swallowing can also be affected. Food or drink can slip into your windpipe and lungs, causing aspiration pneumonia.

See a healthcare provider immediately if you’re having trouble breathing or swallowing.

### **symptoms of vocal cord paralysis**

Symptoms depend on the extent of the paralysis and the position of your vocal cords in relation to each other.

Symptoms may include:

* A voice that sounds hoarse, weak, scratchy or breathy.
* Changes in your vocal pitch (how high or low your voice sounds).
* Changes in your vocal volume (how loud or soft your voice sounds).
* Shortness of breath (dyspnea) or losing your voice.
* Noisy breathing (wheezing or a raspy sound).
* Trouble swallowing (dysphagia).
* Inability to clear your throat by coughing.
* Choking when you try to swallow.

### **causes vocal cord paralysis**

Multiple conditions can damage the nerves that control how your vocal cords move, including:

* Autoimmune diseases: Diseases that interfere with how nerves communicate with muscles, such as myasthenia gravis (MG), can lead to vocal cord paralysis.
* Infections: Lyme disease, herpes, the Epstein-Barr virus and COVID-19 can cause inflammation that damages the nerves that control vocal cord movement.
* Injury: Trauma to your neck, head and chest can cause nerve damage.
* Neurological diseases: Conditions that involve nerve deterioration and damage, including multiple sclerosis (MS), Parkinson’s disease and stroke, can impact the nerves that control your vocal cords.
* Poisonous substances: Toxins, including lead, mercury and arsenic, can harm nerve tissue.
* Surgery: Surgeries in your head and neck, including thyroid gland removal (thyroidectomy), parathyroid surgery, heart surgery and cervical spine surgery, can lead to complications, like nerve injury. Using a breathing tube during surgery can sometimes damage the nerves in your voice box.
* Tumors: Cancerous (malignant) tumors and noncancerous (benign) tumors can push on the nerves in your voice box, causing damage. Both thyroid cancer and thyroid nodules can damage these nerves.

Sometimes, a vocal cord can get paralyzed after a cold or upper respiratory infection. Healthcare providers can’t always determine the exact cause. These cases of vocal cord paralysis are called idiopathic, or post viral.

## **Diagnosis and Tests**

Medical experts in ear, nose and throat conditions (otolaryngologists), including providers who specialize in conditions involving your throat and voice box (laryngologists), often diagnose and treat vocal cord paralysis. First, they’ll ask about your symptoms and health history. To confirm a diagnosis, your provider may order the following:

* Imaging studies: An MRI or CT scan shows detailed images of your brain, throat, vocal cords, voice box, thyroid gland and chest. They can help providers identify growths that may damage nerves in your voice box. Your provider may also order an X-ray of your esophagus or chest.
* Laryngoscopy: A laryngoscopy allows healthcare providers to view your voice box and vocal cords directly. Your provider will insert a long, thin tube called a laryngoscope into your nose to examine your throat. The flexible tube has a camera that takes images of your voice box and vocal cords. Images from the camera appear on a monitor your provider can view.
* Videostroboscopy: A videostroboscopy allows healthcare providers to view how your vocal cords vibrate and how much they come together when you’re talking. The procedure is similar to a laryngoscopy. Often, laryngoscopy and videostroboscopy happen together. Videostroboscopy uses a special camera to show your vocal cords moving in slow motion when you make sounds. It allows your provider to see problem areas.
* Laryngeal electromyography (LEMG): This test measures how your nerves control the muscles in your voice box. It evaluates and records the electrical impulses of these muscles.
* Blood tests: Your provider may order blood work if they suspect your vocal cord paralysis is related to an infection or an autoimmune disease.

## **Management and Treatment**

Treatment depends on the severity of the paralysis and your symptoms. If paralysis is mild, you may need voice therapy to improve how your vocal cords work. During therapy, you do special exercises that strengthen your vocal cords, help you control muscles that help you speak and improve how you breathe when speaking.

More severe vocal cord paralysis may require surgery.

#### **Unilateral vocal cord paralysis treatment**

With unilateral vocal cord paralysis, providers often choose to delay surgery for up to a year to allow time for the condition to improve. Sometimes, the vocal cord is just bruised or strained and needs time to repair itself. This can take months. Voice therapy administered by a speech-language pathologist with expertise in voice care can sometimes be very effective and help strengthen your voice if the problem is mild/moderate.

A laryngologist may recommend surgery or a vocal fold injection to help improve voice, swallowing and breathing problems. The options include:

* Inject a filler (vocal cord injection): Your provider may inject a filler material through a needle. There are several types of safe filler materials. The filler closes the gap between your vocal cords.
* Insert a voice box implant (laryngeal framework surgery): Your provider places an implant into your voice box. Most implants are silicone. The implant holds the paralyzed vocal cord in place and helps both vocal cords close. Procedures include medialization laryngoplasty (thyroplasty).
* Perform nerve (reinnervation) surgery: Your provider takes a nerve that connects to other muscles in your neck and reattaches it to the nerve that moves your vocal cords. This procedure doesn’t cause any problems with the other muscles in your neck.

#### **Bilateral vocal cord paralysis treatment**

People with two paralyzed vocal cords can have a dangerously narrow airway. They’ll often need a tracheostomy (tracheotomy or “trach”) to open their airway and help with breathing.

During this procedure, a healthcare provider makes an incision and inserts a tube into your neck. The tube opens the airway and helps you breathe. Sometimes, your provider may remove a portion in the back of one or both vocal cords with a laser to widen the airway, creating more space to breathe through. Another procedure to help you breathe long term if you have a trach, is a tube-free tracheostomy.

### **Can a paralyzed vocal cord be repaired?**

Sometimes, the vocal cords repair themselves. This may take months. With voice therapy, vocal cord injections or implants, your voice may get stronger and allow people to hear you better when you talk. You may also feel that treatment improves your swallowing and breathing. Ask your healthcare provider how much of your vocal cord function you’ll likely regain with treatment.

## **Outlook / Prognosis**

Many cases of vocal cord paralysis can improve by themselves with time. Voice therapy and sometimes filler injections can help make your symptoms better while waiting for your vocal cords to recover. If your vocal cord is permanently paralyzed, an implant to keep your vocal cord in place is the treatment of choice. Rarely, your provider may need to readjust the implant if it moves out of place.

With treatment, many people regain the ability to talk and swallow after vocal cord paralysis. Your prognosis depends on several factors, including whether the paralysis affected one or both vocal cords and if it’s mild or severe.

## **Prevention**

You can’t always prevent vocal cord paralysis. Talk to your healthcare provider if you have a condition that increases your risk. They may recommend regular checkups to test your vocal cords. You may need voice therapy to improve how your vocal cords work.

### **When should I see my healthcare provider about vocal cord paralysis?**

Talk to a healthcare provider if you have signs of vocal cord paralysis. Voice changes, unexplained hoarseness, noisy breathing, shortness of breath when talking, or coughing and choking with food or liquids aren’t normal. Starting treatments early can prevent your condition from worsening. In some cases, noninvasive treatments, like voice therapy, can prevent you from having surgery.

Seek care immediately if you’re having trouble breathing or swallowing. Not getting enough air is a sign of bilateral vocal cord paralysis, the most serious type. Inhaling food or drink because your vocal cords aren’t closing properly can lead to aspiration pneumonia, which is fatal without treatment.

**DIFFERENTIAL DIAGNOSIS**

1. Neurological Causes (most common)
   * Iatrogenic/traumatic nerve injury: Commonly after surgeries in the head, neck, chest (thyroidectomy, carotid surgery, thoracic procedures) or intubation trauma.
   * Neoplasms: Tumors compressing or invading the vagus nerve or recurrent laryngeal nerve, including thyroid cancer, lung cancer, laryngeal cancer, jugular foramen tumors, carotid body tumors.
   * Infections/viral neuropathies: Herpes viruses (Epstein-Barr), Lyme disease.
   * Central nervous system issues: Stroke, multiple sclerosis, Parkinson’s disease, multiple system atrophy, Alexander disease.
   * Congenital anomalies: Arnold-Chiari malformation, meningomyelocele, Möbius syndrome, hydrocephalus.
   * Systemic neuromuscular disorders: Myasthenia gravis, amyotrophic lateral sclerosis, diabetes mellitus related neuropathy.
2. Mechanical/Structural Causes
   * Cricoarytenoid joint fixation/fibrosis: Often due to arthritis (rheumatoid arthritis), blunt trauma, prolonged intubation leading to arytenoid subluxation or joint immobility mimicking paralysis.
   * Interarytenoid scarring or adhesions.
   * Laryngeal carcinoma causing fixation of vocal folds.
3. Idiopathic Causes
   * Up to 50% of cases have no identifiable cause after thorough evaluation.

## Other Conditions to Differentiate From Vocal Cord Paralysis

* Vocal fold fixation due to cricoarytenoid arthritis or joint ankylosis.
* Vocal fold immobility from mechanical fixation by tumors or scarring.
* Superior laryngeal nerve injury causes subtle voice changes but not frank paralysis.

**EPIDEMIOLOGY**

* The overall incidence of vocal cord paralysis has been reported as 0.42% (or 42 per ten thousand new patients seen) in one study .
* Unilateral vocal fold paralysis (UVFP) is more common than bilateral. Its incidence among individuals with voice disorders has been calculated at 1.2% .
* Bilateral vocal fold paralysis (BVFP) is rare, with an approximate incidence of 0.95 cases per 100,000 persons .
* Unexpected complete paralysis after surgery occurred in about 1.6% of monitored and unmonitored patients in one study .

## Age and Gender Patterns

* Most patients with vocal cord paralysis present in their 5th and 6th decades (77.2%) .
* Males may outnumber females in some studies, with a ratio of 3:1 reported in one instance .
* For BVFP, the median age in a registry study was 61 years, with 70% being female .

## Laterality

* The left vocal cord is involved almost twice as commonly (61.9%) as the right (38.1%) . This is often due to the longer and more convoluted course of the left recurrent laryngeal nerve, making it more susceptible to injury .

## Etiology and Risk Factors

* A significant proportion of cases (up to 38.18%) are idiopathic (no identifiable cause) .
* Neoplastic diseases (tumors) account for a substantial percentage (29.09%) of cases .
* Iatrogenic injury (injury caused by medical intervention) is the most common cause of UVFP, particularly injuries to the recurrent laryngeal nerve from cardiothoracic surgery (especially patent ductus arteriosus ligation), thyroid surgery, esophageal surgery, and other thoracic procedures .
* For BVFP, thyroid surgery is a common cause, accounting for 60% of cases in one study .
* Cancer-related etiology and alcohol consumption were identified as independent factors for higher revision risk in BVFP treatment .

**PREDEFINED Q AND A**

### **What does a paralyzed vocal cord feel like?**

You may not feel sensations from the vocal cord directly. Instead, you’ll feel the symptoms resulting from a paralyzed vocal cord. The sensation may feel like fatigue as you exhaust your energy, trying to draw more air into your lungs or get your voice to sound as you’d like. It may feel like choking if food or drink slips into your windpipe. Some people with paralyzed vocal cords feel like they always have mucus in their throats that they can’t clear.

#### **Can you speak with vocal cord paralysis?**

Many people with vocal cord paralysis can still speak, but it may require more effort. You may notice changes in how your voice sounds. You may get winded when you talk. If your paralysis is more severe, you may lose your voice.

Q1: What is vocal cord paralysis?  
A1: Vocal cord paralysis occurs when one or both vocal cords cannot move properly due to nerve damage or injury. This affects your voice, breathing, and swallowing because the vocal cords cannot open and close as they should.

Q2: What causes vocal cord paralysis?  
A2: Causes include nerve injury during surgery (thyroid, chest, or neck surgery), tumors pressing on nerves, viral infections, stroke, trauma, or sometimes no clear cause (called idiopathic). It can also result from neurological diseases.

Q3: What are the symptoms of vocal cord paralysis?  
A3: Symptoms vary depending on if one or both cords are affected and their position. Common symptoms include hoarseness, breathy or weak voice, vocal fatigue, difficulty swallowing, throat pain, choking when eating or drinking, and sometimes difficulty breathing or noisy breathing.

Q4: How is vocal cord paralysis diagnosed?  
A4: Diagnosis involves an examination of your vocal cords using a flexible scope (laryngoscopy) to see if the cords move properly. Additional tests such as imaging (CT/MRI) and laryngeal electromyography (EMG) might be done to find the cause and assess nerve function.

Q5: How is vocal cord paralysis treated?  
A5: Treatment depends on severity and cause. Mild cases may improve on their own within a year. Voice therapy with a speech-language pathologist helps you strengthen your voice and learn better voice use. If paralysis is severe or does not improve, surgeries like injection laryngoplasty (to add bulk), medialization thyroplasty (to reposition cords), or arytenoid adduction may be done to improve voice and airway protection. In rare cases, tracheotomy may be needed to support breathing.

Q6: Can vocal cord paralysis get better on its own?  
A6: Yes, especially if caused by nerve bruising or viral injury, many patients experience partial or full recovery within several months to a year.

Q7: What can I do to help my voice?  
A7: Follow your speech therapist’s advice closely, avoid straining your voice, stay hydrated, and rest your voice when needed. Proper voice care helps prevent further injury.

Q8: What are the risks if left untreated?  
A8: Untreated vocal cord paralysis can lead to permanent voice problems, swallowing difficulties with risk of aspiration, and breathing issues. Early diagnosis and treatment improve outcomes.

Q9: When should I see a doctor urgently?  
A9: Seek immediate medical help if you experience severe trouble breathing, choking, or sudden loss of voice.

Q10: How long will treatment take?  
A10: Recovery times vary. Voice therapy might last weeks to months. Surgical benefits are usually noticed soon after healing, followed by further voice improvement with therapy.

**DOCTOR PATIENT CONVERSATION**

Doctor: Good morning. What brings you in today?

Patient: Hello, Doctor. I’ve been noticing hoarseness in my voice for a few weeks now. It sounds weak, and sometimes I get tired after talking for a short while.

Doctor: I see. Have you experienced any difficulty swallowing, choking on liquids, or shortness of breath?

Patient: I sometimes cough when drinking water, and I feel like my voice gets breathy. Breathing is okay though.

Doctor: These symptoms can occur when one of the vocal cords isn’t moving properly, a condition called vocal cord paralysis. It means that the nerve controlling your vocal cord has some issue. Do you have any recent history of surgery, trauma, or infections around your neck, chest, or head?

Patient: I had thyroid surgery about three months ago.

Doctor: Thyroid surgery is a common cause because it can affect the nerve that controls the vocal cord. To confirm the diagnosis, I will examine your vocal cords using a flexible scope to see the movement during speech and breathing. We may also order imaging like a CT scan to check for other causes pressing on the nerve.

Patient: Will this examination hurt?

Doctor: It might feel a little uncomfortable or ticklish but is quick and usually well tolerated.

Patient: What treatments are available if I do have paralysis?

Doctor: Treatment depends on severity and cause. Sometimes the nerve recovers on its own over several months. We usually start with voice therapy to help you strengthen your voice and improve breath support. If your voice remains weak or you have swallowing problems, surgical options can help by repositioning or adding bulk to the paralyzed vocal cord, improving closure.

Patient: Will my voice get normal again?

Doctor: Many patients see significant improvement with therapy and, if needed, surgery. Recovery can take months, and some may have residual weakness, but goal is to improve voice and swallowing function.

Patient: Is there anything I can do at home?

Doctor: Yes, avoid straining your voice, stay well hydrated, and follow your speech therapist’s exercises. Rest your voice when it feels tired.

Patient: When should I come back or seek urgent help?

Doctor: If you develop sudden breathing difficulty, severe swallowing issues with choking, or lose your voice suddenly, seek medical care promptly. Otherwise, we will monitor your progress regularly.

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**VOCAL TREMOR**

**DEFINITION AND DESCRIPTION**

Vocal tremor is a rhythmic, involuntary vibration of the larynx (voice box) that causes the vocal cords to open and shut during speech. Although the condition is primarily known to impact the intrinsic muscles of the larynx, vocal tremors can also affect the extrinsic larynx muscles as well as the diaphragm, chest wall, mouth, throat and abdomen.

## **Causes Vocal Tremor**

There is no known cause that triggers vocal tremors. Although patients of any age can experience the condition, it is more prevalent in older people.

## **What Symptoms Are Associated with Vocal Tremor?**

Symptoms of vocal tremors can range from being mild (infrequent) to severe (affecting all forms of speech and even singing) and can include:

* Involuntary changes in sound or pitch
* Interruptions in a patient’s ability to produce sound
* Shaky voice

Individuals who experience vocal tremors may adopt whispering as a regular manner of communication, as it masks these symptoms. It’s also worth noting that, due to similarities in symptoms, patients are often misdiagnosed as having vocal tremors when instead they actually suffer from spasmodic dysphonia—a neurological disorder in which the larynx experiences involuntary spasms.

## **How is Vocal Tremor Diagnosed?**

There is no specific procedure used to diagnose vocal tremor. Instead, the condition can be detected by:

* Observing the regular movement of the vocal cords during speech
* Videostroboscopy, which provides a slow-motion perspective for a laryngologist to examine the larynx

The presence of an essential tremor in other parts of the body, such as the hands or head, may also be an indicator that a vocal tremor exists.

## **How is Vocal Tremor Treated?**

Although there is no cure for vocal tremor, the experienced otolaryngologists at Tampa General Hospital can provide patients with treatment that can help alleviate symptoms.

Treatment options include:

* Botulinum toxin (Botox) injection administered into the vocal folds through the neck every three to four months
* Voice therapy intended to provide patients with exercises and guidance that may help with vocal tremors
* Medications designed to control the tremor, allowing for smoother speech

## **Differential Diagnoses of Vocal Tremor:**

1. Essential Vocal Tremor
   * The most common cause of vocal tremor.
   * Characterized by rhythmic, bilateral tremor affecting the voice during sustained phonation and speech.
   * May occur in isolation (*isolated essential vocal tremor*) or as part of *essential tremor* involving other body parts (hands, head).
   * Typically a postural or kinetic tremor with a frequency usually between 4-8 Hz.
   * Family history is often positive.
   * Voice task tests and clinical observation help confirm diagnosis.
2. Spasmodic Dysphonia (Laryngeal Dystonia)
   * A focal dystonia causing involuntary spasms of the vocal folds.
   * Voice breaks and strain are common, but tremor-like oscillations are usually irregular, not rhythmic.
   * Two types: Adductor spasmodic dysphonia (strained, strangled voice) and abductor type (breathy voice).
   * Tremor differs in that spasmodic dysphonia spasms are task-specific and may not appear during breathing or certain sounds like singing.
   * Often misdiagnosed as vocal tremor but distinguished by clinical features and laryngoscopy.
3. Parkinsonian Tremor (Rest Tremor)
   * Occurs at rest, often asymmetric, affecting limbs and sometimes voice.
   * Voice may be hypophonic, monotone, with reduced volume rather than rhythmic tremor.
   * Accompanied by other signs of Parkinsonism (rigidity, bradykinesia).
4. Dystonic or Other Neurological Tremors
   * Dystonic tremors associated with dystonia syndromes often involve irregular tremor or tremulousness during specific tasks.
   * Cerebellar tremors (intention tremor) usually worsen with goal-directed movement and may affect speech articulation but are less commonly rhythmic vocal tremors.
5. Enhanced Physiologic Tremor
   * Mild, generally high-frequency tremor that can become more pronounced under stress, fatigue, or medications.
   * Usually does not cause significant voice impairment but can mimic mild vocal tremor.
6. Other Movement Disorders
   * Multiple system atrophy, Huntington’s disease, amyotrophic lateral sclerosis can have associated voice tremor with other neurological signs.
   * Tremor character and distribution help differentiation.

**EPIDEMIOLOGY**

* In populations with spasmodic dysphonia, vocal tremor prevalence ranges roughly from 23% to 32%, with some studies reporting up to 54.5% in specific cohorts. The prevalence appears similar between females and males, around 22–23% in one large study.
* More broadly, essential tremor, the most common neurological disorder causing action tremors, has a general prevalence up to about 4-5% in the general population, and about 25% of essential tremor patients have vocal tract involvement, which includes vocal tremor.
* Among elderly populations, the prevalence of vocal tremor varies widely in estimates, ranging approximately from 4.8% to 29.1%, reflecting differences in study populations and diagnostic criteria.
* Vocal tremor can also occur in Parkinson's disease, with reported voice tremor prevalence between 13% and 68% in auditory perceptual studies, although this varies widely.

## **Predefined Q&A**

Q1: What is vocal tremor?  
A1: Vocal tremor is an involuntary, rhythmic shaking or quivering of the voice during speech caused by repetitive muscle contractions affecting the vocal cords. It leads to fluctuations in pitch and volume and can make the voice sound shaky or wobbly.

Q2: What causes vocal tremor?  
A2: Vocal tremor is most commonly associated with essential tremor, a neurological movement disorder. It can also occur with conditions like Parkinson’s disease, spasmodic dysphonia, or other movement disorders. Stress, fatigue, and aging may worsen symptoms.

Q3: What are the symptoms of vocal tremor?  
A3: Symptoms include a shaky or quivering voice, voice breaks, fluctuating pitch and loudness, difficulty controlling voice during speech, and vocal fatigue. Tremors may be present in other body parts such as hands and head.

Q4: How is vocal tremor diagnosed?  
A4: Diagnosis is usually clinical, based on voice assessment and neurological examination. Specialist evaluation includes laryngoscopy or videostroboscopy to observe vocal fold movement and differentiate from other voice disorders like spasmodic dysphonia.

Q5: Is vocal tremor the same as spasmodic dysphonia?  
A5: No. Vocal tremor involves rhythmic and regular oscillations of the voice, while spasmodic dysphonia is a disorder of involuntary spasms with irregular interruptions. The two conditions require different treatments.

Q6: What treatments are available for vocal tremor?  
A6: Treatments include botulinum toxin (Botox) injections into the vocal cords to reduce muscle overactivity, medications such as beta-blockers (propranolol) or anti-seizure drugs (primidone), voice therapy to improve vocal control, and in rare severe cases, surgical options like deep brain stimulation.

Q7: Can vocal tremor be cured?  
A7: Vocal tremor cannot be cured, but symptoms can be managed effectively with treatment to improve voice quality and reduce shaking.

Q8: Are there lifestyle changes that can help with vocal tremor?  
A8: Yes, managing stress, avoiding caffeine or stimulants, getting adequate rest, and practicing voice exercises can help reduce symptom severity.

Q9: Who is most affected by vocal tremor?  
A9: Vocal tremor most commonly affects middle-aged and older adults and people with essential tremor or related neurological conditions. It can also occur in younger adults but is less common.

Q10: When should I see a doctor about vocal tremor?  
A10: If you notice persistent shaking or quivering in your voice that affects communication or worsens over time, it is important to see a specialist for evaluation and management.

**DOCTOR PATIENT CONVERSATION**

Doctor: Good morning. What brings you in today?

Patient: Hello, Doctor. I’ve noticed that my voice sounds shaky or wobbly, especially when I try to speak for a long time. Sometimes people ask me to repeat myself because my voice isn’t clear.

Doctor: I see. How long have you been experiencing this quivering or shaking in your voice?

Patient: It’s been going on for several months, and it seems to get worse when I’m tired or stressed.

Doctor: Do you notice if other parts of your body shake or tremble, like your hands or head?

Patient: Yes, actually. My hands do shake a bit, especially when I try to hold something still.

Doctor: That’s helpful to know. Your symptoms sound like a vocal tremor, which is an involuntary rhythmic shaking of the voice caused by muscle contractions in your vocal cords. It often occurs along with tremors in other body parts, like in a condition called essential tremor.

Patient: What causes vocal tremor?

Doctor: Vocal tremor is usually linked to neurological conditions like essential tremor, and it often begins in middle age or later. Stress and fatigue can make it worse. The exact cause isn’t fully understood, but it involves abnormal nerve signals affecting the muscles controlling your voice.

Patient: How is vocal tremor diagnosed?

Doctor: We’ll do a thorough voice and neurological examination, including observing your voice during speaking and sustained sounds. We will also use a small camera inserted through your nose or mouth to look directly at your vocal cords and see how they move. This is called laryngoscopy or videostroboscopy.

Patient: Are there treatments that can help?

Doctor: Yes. While there’s no cure, several treatments can improve your voice quality. Botox (botulinum toxin) injections into your vocal cords can relax the muscles and reduce the shakiness. This usually lasts for a few months and needs to be repeated. Sometimes oral medications like beta-blockers or anti-seizure drugs help, although vocal tremor can be resistant to these. Speech therapy can also help you improve your vocal control and reduce strain.

Patient: Are these treatments safe?

Doctor: Botox injections are generally safe but may cause temporary voice weakness or breathiness. Medications can have side effects depending on the type and dose. Speech therapy has no side effects and can be very beneficial.

Patient: Will my voice get back to normal?

Doctor: With treatment, many patients notice significant improvement, but the tremor may not completely go away. The goal is to make your voice clearer and reduce the effort involved in speaking.

Patient: What can I do at home to help?

Doctor: Managing stress, avoiding caffeine or stimulants, staying well rested, and practicing voice exercises your speech therapist recommends can all help reduce symptoms.

Patient: Thank you, Doctor. I understand better now.

Doctor: You’re welcome. We’ll start with an evaluation and discuss the best treatment plan for you.

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**VOCAL FOLD SCARRING**

**DEFINITION AND DESCRIPTION**

Vocal fold scarring is a condition where normal, flexible vocal fold tissue is replaced by stiff, fibrous scar tissue, resulting in impaired vibration and voice problems such as hoarseness, breathiness, vocal fatigue, and reduced vocal control.

## **Causes**

* Surgical or traumatic injury to vocal folds
* Vocal misuse or strain
* Intubation-related trauma
* Chronic inflammation or infections
* Age-related changes
* Radiation therapy

## **Symptoms**

* Hoarseness or rough voice quality
* Breathiness and weak voice
* Vocal fatigue and reduced endurance
* Occasional voice breaks or instability

## **Diagnosis**

* Visualization with laryngoscopy or videostroboscopy to assess vocal fold vibration and scarring
* Perceptual and acoustic voice assessments by speech pathologists
* Detailed history of voice use, trauma, or surgery

**Treatment options for vocal fold scarring**

Currently, no treatment can eliminate formed scars or reverse scar formation. Rather, interventions are aimed at preventing continued scarring and/or improving voice.

**Prevention Is the Best Treatment**

The best treatment for vocal fold scarring is, of course, prevention.

Healthy and appropriate voice use can effectively prevent vocal fold scar.

Excessive scarring from surgical treatment can be prevented by:

* Using careful and precise laryngeal and phonomicrosurgical techniques (For more information, see Prevention and Phonomicrosurgery.)
* Ensuring full patient compliance with voice rest after surgery
* Treating other associated medical conditions, such as laryngopharyngeal reflux, aggressively especially during surgical recovery
* Minimizing use of the CO2 lasers
* Appropriately managing breathing tubes when a breathing tube is necessary

**Non-Surgical Treatment Options for Vocal Fold Scarring**

**Other medical problems:** The first line of intervention for vocal fold scarring should be to treat any associated medical problems that could be compounding the voice disorder associated with vocal fold scarring. The two most common such problems are allergic conditions and laryngopharyngeal reflux disease.

**Allergies:** Allergies of the sinus and nasal regions can often have a detrimental effect on voice quality and worsen voice symptoms associated with vocal fold scarring. This problem can be successfully treated with a variety of options such as medication, allergy shots, and avoidance of specific allergens.

**Voice therapy:** Voice therapy is another important preliminary (and sometimes the only) step in the treatment of patients with vocal fold scarring. Voice therapy will not directly change the nature of the vocal fold scar; however, it will assist the patient in compensating for the voice problems. The body can develop poor singing/speaking adaptive behaviors when scar tissue forms on the vocal folds. High quality voice therapy will address these issues and teach alternative techniques to maximize voice efficiency and quality. Voice therapy is especially helpful for patients with symptoms of vocal fatigue and instability of the voice. Often, voice therapy is extremely helpful, but will not directly affect the actual quality of the voice. (For more information, seeVoice Therapy.)

**Singing voice therapy:** Singing voice therapy is another technique often employed in the early stages of treating patients with vocal fold scarring. Singing voice therapy involves using a variety of singing exercises to optimize both spoken voice and singing voice production in the face of some underlying vocal pathology such as vocal fold scarring.

**Surgical Options for the Treatment of Vocal Fold Scarring**

Multiple options exist for the surgical treatment of vocal fold scarring. The selection of a surgical option depends upon the severity of the voice problem and the patient’s specific symptoms and voice demands.

* **Removal of associated lesions:** Patients with vocal fold scarring often have associated lesions, such as cysts or polyps. These lesions should be removed via phonomicrosurgical techniques. (For more information, see Phonomicrosurgery.)
* **Augmentation of vocal fold closure:** When vocal fold scarring causes poor or no vocal fold closure during voice production, the voice is often extremely weak and breathy. A successful surgical approach to this problem is called vocal fold augmentation. The procedure is aimed at increasing the size or bulk of the vocal folds to improve vocal cord closure by medializing or pushing each vocal fold toward each other (the midline). This enables the vocal folds to close and subsequently vibrate better, despite still having scar tissue within the lamina propria. This type of surgical augmentation of the vocal folds can be done either with fat injection (lipoinjection) of the vocal folds or with bilateral thyroplasty.
* **Dealing with the scar:** Surgical options for the direct problem of scar tissue within the all-important lamina propria of the vocal fold are currently not proven and remain under intense study. (For more information, see Frontiers.)

Treatment of vocal fold scarring is one of the most difficult areas of vocal fold surgery and should be performed by surgeons with significant expertise and experience in this area.

**Currently, what can patients reasonably expect from vocal fold scar treatment?**

* The success of treatment depends on the initial severity of the vocal fold scar, the nature of the patient’s voice demands, and the patient’s response to a particular treatment technique.
* There is no one single treatment option that works for all patients with vocal fold scars. Thus, preventing vocal fold scarring and attempting all non-surgical treatment options prior to surgery are crucial.
* For **severe vocal fold scarring**, substantive improvement can be attained through treatment, but generally there will not be a complete return to function, especially with regard to singing. It is not known if one surgery treatment is superior to another.
* For **minor vocal fold scarring**, non-surgical treatments (medications, voice therapy, and singing voice therapy) will often allow the patient to resume all or almost all vocal function.
* Vocal fold augmentation can also result in noticeable voice improvement.

**DIFFERENTIAL DIAGNOSIS**

1. Sulcus Vocalis
   * A furrow or groove along the margin of the vocal fold caused by thinning or loss of the superficial lamina propria.
   * Can be congenital or acquired and leads to voice roughness, breathiness, and vocal fatigue.
   * May coexist with or be mistaken for scarring because both cause decreased mucosal wave and stiffness.
2. Vocal Fold Cysts
   * Fluid- or mucus-filled sacs within the vocal fold.
   * Typically unilateral, cause persistent hoarseness, and do not respond well to voice therapy alone.
   * Different than scar because cysts are encapsulated lesions rather than fibrous tissue.
3. Vocal Fold Nodules/Polyps
   * Nodules: Bilateral callous-like lesions from chronic vocal abuse.
   * Polyps: Unilateral swellings often from acute trauma or hemorrhage.
   * These are soft tissue masses rather than stiff scar tissue, and respond differently to treatment.
4. Laryngeal Mucosal Atrophy
   * Thinning and loss of mucosal tissue without discrete scarring, often age-related or post-inflammatory.
   * Can cause glottic insufficiency similar to scarring.
5. Chronic Laryngitis or Inflammation
   * Inflammation with edema, redness, and sometimes mild fibrosis but generally reversible.
   * Unlike scar, inflammation does not typically show fixed stiffness or permanent mucosal wave loss.
6. Reinke’s Edema
   * Swelling of the superficial lamina propria due to fluid accumulation, often from smoking.
   * Usually results in a floppy, swollen appearance, opposite of stiff scar.
7. Vocal Fold Paralysis or Paresis
   * Neurological immobility or weakness of vocal folds causing incomplete closure and breathy voice—not a tissue scarring issue.
8. Granulomas or Contact Ulcers
   * Localized lesions caused by irritation or trauma to the vocal processes, often with inflammation rather than scarring.

**EPIDEMIOLOGY**

* Prevalence after surgery:  
  Vocal fold scarring is often seen as a postoperative complication following surgery on the vocal folds for benign lesions such as polyps, cysts, nodules, or Reinke’s edema. Studies show that approximately 1-2% of patients undergoing delicate microlaryngeal vocal fold surgery develop significant vocal fold scarring with symptomatic fibrosis and reduced mucosal wave.
* Risk factors:  
  Patients with fibrous masses and lesions attached to the vocal ligament, longer surgical duration (>60 minutes), or symptoms persisting longer than 12 months before surgery have a significantly higher risk of developing vocal fold fibrosis/scarring. This indicates that lesion type and chronicity contribute to the epidemiology of scarring.
* Occurrence relative to benign vocal fold lesions:  
  While precise overall prevalence of vocal fold scarring in the general population is not well established, it is recognized that scarring frequently develops following surgery to remove larger benign lesions. For example, extensive excisions for vocal fold polyps or cysts often lead to postoperative scarring due to tissue trauma and repair processes.
* Vocal fold scarring as a spectrum:  
  The severity of scarring varies widely from mild focal fibrosis to severe diffuse scar along the vocal fold and correlates with the degree of voice disturbance. Scarring due to chronic vocal misuse or aging (wear and tear) is also recognized but is less well quantified epidemiologically.

## **Predefined Q&A**

Q1: What is vocal fold scarring?  
A1: Vocal fold scarring is a condition where normal, flexible tissue of the vocal cords is replaced by stiff, fibrous tissue (scar), making it harder for the vocal folds to vibrate properly. This leads to problems with voice quality and control.

Q2: What causes vocal fold scarring?  
A2: Common causes include injury to the vocal folds from surgery, trauma (such as intubation injury), chronic vocal strain or misuse, inflammation, infections, radiation therapy, or aging changes.

Q3: What symptoms does vocal fold scarring cause?  
A3: It usually causes hoarseness, breathiness, a rough or strained voice, vocal fatigue, and sometimes a decreased vocal range or voice breaks. The voice may sound tired and weak.

Q4: How is vocal fold scarring diagnosed?  
A4: Diagnosis is made by examining the vocal cords with a special flexible or rigid scope (laryngoscopy) and using videostroboscopy to observe how well the vocal folds vibrate. Scarring shows reduced or absent mucosal wave vibration. Voice assessments and patient history also help.

Q5: Can vocal fold scarring be cured?  
A5: Vocal fold scarring is often permanent since scar tissue does not regain normal flexibility. However, treatments can help improve voice quality and manage symptoms.

Q6: What treatment options are available?  
A6:

* Voice therapy: Speech-language therapy can improve vocal technique and reduce strain.
* Medical treatments: Steroid injections may reduce inflammation and fibrosis in some cases; anti-reflux medication if acid reflux contributes to irritation.
* Surgery: Procedures like vocal fold augmentation (injecting filler materials to bulk up the folds) or scar revision surgeries may improve vocal fold closure and vibration.
* Treatments are usually multidisciplinary and individualized.

Q7: How long does treatment take and what is the outlook?  
A7: Treatment duration varies by approach but voice therapy typically lasts weeks to months. Surgery recovery depends on the procedure and postoperative care. While complete reversal of scarring is rare, many patients experience noticeable voice improvement.

Q8: Can vocal fold scarring be prevented?  
A8: Prevention includes careful surgical techniques, avoiding unnecessary trauma (such as gentle intubation), voice rest and proper vocal hygiene, and treating inflammation or reflux promptly.

Q9: Should I see a specialist if I have voice problems?  
A9: Yes, if you experience persistent hoarseness, vocal fatigue, or voice changes lasting more than a few weeks, especially after surgery or injury, you should see an ENT specialist or a voice therapist for evaluation.

Q10: What lifestyle changes can help my vocal fold scarring?  
A10: Avoid vocal strain and shouting, stay well hydrated, avoid smoking and irritants, manage acid reflux if present, and follow speech therapy recommendations.

**DOCTOR PATIENT CONVERSATION**

Doctor: Hello, what brings you in today?

Patient: Hi Doctor, I’ve been having a hoarse, rough voice that feels tired when I speak, especially after talking for a while. My voice sometimes breaks or sounds breathy.

Doctor: I understand. Those symptoms can occur due to vocal fold scarring, which is when the normally flexible vocal fold tissue gets replaced by stiff scar tissue. This stiff tissue vibrates less effectively, causing the voice changes you’re experiencing.

Patient: How does vocal fold scarring happen?

Doctor: It often results from injury to the vocal folds, such as surgery, trauma (like from intubation during anesthesia), chronic vocal strain or misuse, infections, or even radiation therapy. Sometimes repeated stress from heavy voice use can cause scarring over time.

Patient: How do you know if I have vocal fold scarring?

Doctor: We use a special camera called a laryngoscope to examine your vocal cords, often with a technique called videostroboscopy, which helps us see how well your vocal folds vibrate. Scarring shows as areas where the mucosal wave is reduced or absent. We’ll also review your medical history and symptoms carefully.

Patient: Can vocal fold scarring be fixed?

Doctor: While scar tissue itself often does not completely go away, treatments can help improve your voice function. Voice therapy with a speech-language pathologist can teach you techniques to reduce strain and improve vocal efficiency, which often helps reduce symptoms and prevent worsening. In some cases, surgery or injections may be considered to improve vocal fold closure or vibratory function.

Patient: What does voice therapy involve?

Doctor: Voice therapy includes exercises to promote healthy voice use, reduce tension, and optimize breath support. It can help your vocal cords work better despite the scar. It may take weeks to months of regular therapy sessions.

Patient: Is surgery risky? Will it make the scar worse?

Doctor: Surgery is carefully considered because interventions on scarred vocal folds can sometimes worsen scarring if not done properly. Techniques like vocal fold augmentation, steroid injections, or scar revision may improve voice quality, but complete reversal of scarring isn’t guaranteed. That’s why a multidisciplinary approach with careful planning is important.

Patient: What can I do to protect my voice?

Doctor: Avoid yelling, shouting, and other vocal strain. Stay well hydrated, avoid smoking and irritants, and treat any acid reflux if present. Following your speech therapist’s guidance and taking voice breaks when needed also help preserve your vocal health.

Patient: How long does treatment usually take?

Doctor: Voice therapy programs typically last from a few weeks to several months depending on severity, and surgical recovery varies but often includes postoperative voice rest and ongoing therapy. Improvement is often gradual, and managing expectations is important.

Patient: Thank you, Doctor. This helps me understand what’s going on and what to do next.

Doctor: You’re welcome. We’ll start with a thorough voice evaluation and laryngoscopy to see the vocal folds, and then tailor your treatment plan. Please feel free to ask questions any time.

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**Voice disorders**

**DEFINITION / DESCRIPTION**

Voice disorders affect your ability to speak. They may change the quality, pitch or loudness of your voice. Normally, when you speak, air moves through your lungs, up into your windpipe (trachea) and through your voice box (larynx). You have two vocal cords at the top of your windpipe inside your larynx. They’re in an open position when you breathe. They touch and vibrate as air moves through them, producing the sound of your voice.

But with a voice disorder, something interferes with this process and makes your voice sound different.

Voice disorders may be:

* Organic. There are problems with the structure of your voice box, vocal cords or lungs. Organic disorders are usually structural (like abnormal growths on your larynx).
* Neurological. A disorder affects the nerves that control your larynx.
* Functional. The structures that produce vocal sounds — your voice box, vocal cords and lungs — are normal, but you have problems using them. Usually, this happens when you have difficulty using your vocal cord muscles. Additionally, it’s possible for stress, emotion and changes to your psychological state to influence your voice.

Some voice disorders may involve more than one category. For example, you could have a vocal fold paralysis — when one vocal cord doesn’t move the way it should (neurological). In response, the other vocal cord may overcompensate for the paralyzed one, causing you to develop tension in your throat (functional). Or excessive tension (functional) in the throat could lead to the development of vocal fold nodules (organic).

A voice disorder can prevent you from communicating with others or expressing yourself. This can have a serious impact on your quality of life. But there are treatments that can help.

#### **Types of voice disorders**

There are many types of disorders that can change your voice. Some of the most common ones include:

* Laryngitis. Irritation or swelling of your vocal cords. It’s usually temporary and results from allergies or an upper respiratory infection.
* Muscle tension dysphonia. When the muscles inside and/or around your voice box get too tight. This can also involve the muscles your neck, shoulders and upper back.
* Spasmodic dysphonia (laryngeal dystonia). A neurological disorder that causes spasms in your vocal cords.
* Vocal cord lesions. Benign (noncancerous) growths — like nodules, polyps or cysts — that can affect your voice.
* Vocal cord paralysis. When your vocal cords aren’t moving as they should. This prevents you from controlling your voice box muscles.

There are also disorders of your upper airway. They don’t involve using your voice, but they do involve your larynx and vocal cords. They include:

* Inducible laryngeal obstruction (ILO), also known as paradoxical vocal fold motion disorder (PVFM) or vocal cord dysfunction
* Exercise-induced laryngeal obstruction (EILO)

If you have ILO or EILO, your vocal cords or other structures in your throat may be moving the wrong way when you breathe. This can keep you from taking in full breaths.

**CAUSES**

Overusing your voice is the most common cause of voice disorders. You can overuse your voice by yelling, singing or just talking too much.

Sometimes, voice disorders are the result of a short-term (acute) illness like a cold, allergies or sinus infection (sinusitis). They cause inflammation in your throat that changes the way air flows through. Once you recover, your voice usually returns to normal within a few days or weeks.

More complex voice disorders occur when there’s a problem with the structure, muscles or nerves in your voice box or vocal cords.

#### **Risk factors**

Anyone can develop a voice disorder, but certain factors increase your risk:

* Age and sex. Being a female over 60
* Job. Teachers, singers, telemarketers and other people with professions that require a lot of speaking or voice use (in one study of nearly 1,000 teachers, more than half had a voice disorder)
* Behaviors. Drinking alcohol and smoking
* Surgery. A past surgery involving your throat (like a thyroidectomy) or using a breathing tube
* Hormonal disorders. Having diabetes, thyroid disease or polycystic ovary syndrome (PCOS)
* Other medical conditions. Having a neurological disorder, autoimmune disease, chronic acid reflux (GERD), laryngopharyngeal acid reflux (LPR), laryngeal cancer, substance use disorder or alcohol use disorder

**SIGNS / SYMPTOMS**

Symptoms of voice disorders vary depending on the cause. Your voice may sound:

* Strained
* Raspy or hoarse
* Breathy or airy
* Gurgly or wet
* Weak and hard to project
* Too high or too low
* Too loud or too soft
* Uneven or shaky, with breaks or gaps in sound

Speaking may hurt or take a lot of effort. It may feel like you have a lump in your throat.

**DIAGNOSIS METHODS**

Your primary healthcare provider may diagnose a voice disorder. They may refer you to a speech-language pathologist (SLP) or laryngologist (an ear, nose and throat doctor who specializes in voice box disorders). They’ll ask questions about your symptoms and medical history. Your provider may also ask about how your voice challenges are affecting your life at home, work or school.

Your provider will listen closely while you’re speaking. They’ll look closely at your face, head, neck and throat while you speak and breathe. They may ask you to use your voice to say certain phrases or hold out certain sounds with your voice and go high and low in pitch.

Report any symptoms you feel during these exercises. Tell your provider if you have pain, scratchiness or difficulty breathing.

#### **What tests will be done to diagnose this condition?**

To see how well your voice box and vocal cords are working, you may need imaging tests:

* Laryngoscopy. Uses a thin, flexible tube (scope) with a video camera attached to examine the back of your throat. Your healthcare provider may take samples from nodules, polyps or cysts and check for diseases (biopsy).
* Videostroboscopy. Uses a scope attached to a special camera that shows your vocal cords moving in slow motion when you make sounds.
* Laryngeal electromyography (LEMG). Uses an electrode to measure the nerve signals produced when you use your voice box muscles.
* An MRI or CT scan. Shows detailed images of your vocal cords and voice box that allow your provider to check for growths.

**TREATMENT OPTIONS**

Some short-term voice disorders might improve by resting your voice. Your healthcare provider may advise you to avoid shouting, singing or straining your voice for several days. They may tell you to try to talk as little as possible.

Other treatments include:

* Voice therapy. Speech-language pathologists teach techniques and exercises to help you find the most efficient way to use your voice so you can communicate more clearly. They can teach you how to care for your voice to maintain your vocal health.
* Medications. Proton pump inhibitors (PPIs) or other medications can help if LPR or GERD is causing your voice issues. Sometimes, steroids or antibiotics are necessary for certain voice problems.
* Medical procedures or surgery. You may need surgery to remove a lesion on your vocal cords. You may need botulin toxin injections to relax tight voice box muscles. For paralyzed vocal cords, your provider may inject a filler to help close the gap between your vocal cords. They may place an implant to help your vocal cords close (medialization laryngoplasty).

### **Procedures**

* **Removal of growths.** Growths on the vocal cords, even growths that aren't cancer, may need to be removed during surgery. A surgeon can remove growths using microsurgery, carbon-dioxide laser surgery, and when appropriate, other laser treatments, including potassium titanyl phosphate (KTP) laser treatment.  
  KTP laser treatment is a state-of-the-art therapy that treats lesions on the vocal cords by cutting off the blood supply to the growth. This allows removal of the growth while leaving intact the most underlying tissue.
* **Injections.** Shots of tiny amounts of purified botulinum toxin into the skin of the neck can help stop muscle spasms or unusual movements. This drug treats a movement issue related to the brain and nervous system. This condition, called spasmodic dysphonia, affects the vocal muscles of the larynx.

Sometimes one vocal cord can't move. One paralyzed vocal cord can cause hoarseness. It also can cause choking when drinking liquids. But it rarely causes trouble when swallowing solid foods. Sometimes the problem goes away with time.

If the problem doesn't go away, one of two procedures can push the paralyzed vocal cord closer to the middle of the windpipe. Either procedure allows the vocal cords to meet and vibrate closer together. This improves the voice and allows the larynx to close when swallowing. Treatments include:

* **Fat or collagen injection.** Injecting body fat or human-made collagen, either through the mouth or the skin on the neck, adds bulk to the paralyzed vocal cord. It also treats vocal cord weakness.
* **Thyroplasty.** A small opening created in the tissue, also called cartilage, from the outside of the voice box. A surgeon puts an implant into the opening and pushes it against the paralyzed vocal cord.

**PREVENTION TIPS**

Although some voice disorders related to overuse are preventable, many aren’t. Still, you can reduce your risk by taking care of your voice. You can:

* Avoid smoking, recreational drugs and alcohol
* Drink plenty of water to keep your vocal cords hydrated (when you drink water, it’s absorbed by your body and helps keep your vocal cords sliding past each other with ease)
* Take steps to avoid getting sick, like washing your hands often
* Rest your voice frequently if you have a job that requires a lot of speaking
* Learn healthy limits of voice use

If you do have to talk or sing a lot, make sure your body is conditioned for it. Sudden changes in the amount of voice use without enough preparation can cause fatigue and injury.

**OUTLOOK / PROGNOSIS**

Voice disorders associated with overuse or acute illnesses are usually temporary and don’t cause permanent damage. If your voice disorder is more complex, it may take a bit of work to cure or manage your condition. You may need surgery or several sessions of voice therapy. But most people overcome voice challenges with treatment.

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

You should see a doctor for a voice disorder if you notice changes in your voice that last longer than two to three weeks, especially if these changes are unexplained and do not improve after a cold, allergies, or voice overuse.

Additional signs and symptoms that warrant prompt medical evaluation include:

* Persistent hoarseness or voice changes beyond 2-3 weeks
* Pain when speaking or swallowing
* Difficulty swallowing or breathing
* Coughing up blood
* A lump or swelling in the neck
* Complete loss of voice lasting more than a few days
* Voice changes accompanied by coughing, throat clearing, or stridor
* Being a professional voice user (singer, teacher, actor) with any persistent voice issue

**DIFFERENTIAL DIAGNOSIS**

| **Category** | **Example Conditions** | **Key Features** |
| --- | --- | --- |
| Structural Lesions | Vocal fold nodules, polyps, cysts, granulomas, Reinke’s edema, vocal fold scarring, leukoplakia, papillomas, laryngeal cancer | Hoarseness, localized masses on vocal folds, breathiness, roughness, possible airway obstruction |
| Inflammatory Disorders | Acute laryngitis, chronic laryngitis, reflux laryngitis | Recent URI or reflux symptoms, swelling, redness of vocal folds |
| Neurological Disorders | Vocal fold paralysis or paresis, spasmodic dysphonia (adductor and abductor types), essential vocal tremor, Parkinson’s disease-related dysphonia, muscle tension dysphonia (functional) | Voice breaks, breathy or strained voice, tremor, impaired vocal fold mobility |
| Functional Voice Disorders | Muscle tension dysphonia, psychogenic/functional dysphonia, puberphonia | Voice symptoms without structural abnormalities, related to muscle misuse or psychological factors |
| Systemic and Other | Allergies, hypothyroidism, stroke, neoplasms (compressing recurrent laryngeal nerve), acid reflux (laryngopharyngeal reflux) | Variable symptoms, often systemic signs alongside voice changes |

## Important Specific Diagnoses Often Included in Voice Disorder DDx:

* Vocal Fold Nodules and Polyps: Benign lesions from vocal abuse with gradual hoarseness.
* Vocal Fold Cysts: Fluid-filled lesions causing persistent hoarseness, often needing surgery.
* Vocal Fold Scarring: Stiff scar tissue affecting voice vibration and quality post injury or surgery.
* Vocal Fold Paralysis: Immobility due to nerve damage leading to breathiness and hoarseness.
* Spasmodic Dysphonia: Focal dystonia causing involuntary vocal cord spasms.
* Essential Vocal Tremor: Rhythmic shaking of voice often with tremor elsewhere.
* Muscle Tension Dysphonia: Excessive laryngeal muscle tension without lesion.
* Laryngitis: Inflammation causing hoarseness, often viral or reflux-related.
* Laryngeal Cancer: Persistent hoarseness with mass lesion and possible airway obstruction.
* Reflux Laryngitis: Acid irritation causing symptoms similar to laryngitis.
* Vocal Cord Dysfunction (VCD) or Paradoxical Vocal Fold Movement: Episodic inspiratory vocal fold closure causing breathing difficulty.

**EPIDEMIOLOGY**

* The lifetime prevalence of voice problems in adolescents is around 24.3%, with a current prevalence of 7.4% in that age group. Voice problems in adolescents were associated with activities such as loud voice use, singing, and exposure to irritants like secondhand smoke and vaping.
* Among adults in the U.S., approximately 20.6% report having had a voice disorder at some point in their life, with about 12.6% currently experiencing voice problems. The prevalence is notably higher among those with high vocal demands such as teachers, singers, and individuals who frequently use teleconferencing or voice-assistant technologies.
* Children aged 3-17 have a reported prevalence of about 7.2% for voice, speech, or language disorders, with the highest rates (around 10.8%) in the youngest children aged 3-6 years. Boys are more affected than girls, and interventions vary by demographic group.
* Specific occupational groups with high vocal load show even higher prevalence rates. Studies report that teachers may have voice disorder prevalence rates from 30% to over 50%, and call center employees have a reported prevalence as high as 57.6%, with risk factors including long hours of voice use, stress, and poor voice care habits.
* Prevalence tends to increase with age, particularly over 60 years old, with estimates ranging from 4.8% to 29.1% in older adults. Common voice disorders in this group include presbyphonia (age-related voice changes), reflux-related laryngitis, vocal fold paralysis, and Reinke’s edema

**PREDEFINED Q & A SETS**

### **How do I take care of myself?**

The best way to care for your voice is to stick to your treatment plan. But it’s important to attend to your mental health, too. Having trouble speaking can lead people to feel that they can’t express themselves freely. In children, it can cause poor self-esteem. After all, it can be incredibly frustrating and isolating to have to use a lot of effort to get your voice out.

Talk to your healthcare provider if you’re dealing with these issues. Ask them to recommend resources that can help.

### **When should I seek care?**

Schedule a visit with your healthcare provider if you’re noticing unexplained changes in your voice that don’t get better within a few weeks. Early treatment can prevent worsening symptoms. Often, it can prevent long-term damage to your vocal cords that requires more invasive treatments, like surgery.

Q1: What is a voice disorder?  
A1: A voice disorder is any problem with how your voice sounds or functions. It can involve changes in voice quality, pitch, loudness, or the ability to produce sound, often making talking difficult or tiring.

Q2: What causes voice disorders?  
A2: Voice disorders have many causes, including injury or lesions to the vocal folds (nodules, polyps, cysts, scarring), inflammation (laryngitis, acid reflux), nerve problems or neurological conditions (vocal fold paralysis, spasmodic dysphonia, vocal tremor), misuse or overuse of the voice (muscle tension dysphonia), or systemic illnesses.

Q3: What are the common symptoms of voice disorders?  
A3: Symptoms include hoarseness, breathy or weak voice, strained or shaky voice, reduced vocal range or volume, voice breaks, vocal fatigue, pain or discomfort while speaking, and sometimes difficulty speaking loudly or clearly.

Q4: How is a voice disorder diagnosed?  
A4: Diagnosis involves a medical history and voice symptom review, a physical exam including visualization of the vocal folds by laryngoscopy or videostroboscopy, voice quality assessment by a speech-language pathologist, and sometimes imaging or nerve studies to identify underlying causes.

Q5: Can voice disorders be treated?  
A5: Yes, many voice disorders can be successfully treated. Treatment depends on the cause and may include voice therapy with a speech-language pathologist, medical treatment for inflammation or reflux, surgical removal of lesions, vocal fold injections or procedures for paralysis, or Botox injections for spasmodic dysphonia.

Q6: How long does treatment take?  
A6: Treatment duration varies widely from a few weeks of voice therapy to months for neurological or structural problems. Surgical recovery times depend on the procedure and follow-up therapy. Many patients improve significantly with appropriate care.

Q7: Can voice disorders resolve on their own?  
A7: Some mild voice problems, such as those caused by viral laryngitis or minor vocal strain, may improve without treatment. However, persistent or worsening voice problems should be evaluated to prevent permanent damage.

Q8: What can I do to protect and maintain a healthy voice?  
A8: Avoid yelling or shouting, stay hydrated, manage acid reflux, avoid smoking and irritants, rest your voice when tired, and practice good vocal techniques. If you use your voice professionally, regular voice care and therapy may be helpful.

Q9: When should I see a doctor about a voice problem?  
A9: See a healthcare provider if your hoarseness or voice change lasts more than two weeks, worsens, causes difficulty communicating, or if you have pain, coughing up blood, difficulty breathing, or a lump in your neck.

Q10: Are voice disorders common?  
A10: Yes, voice disorders affect many people across all ages. Approximately 7-25% of the general population experience voice problems at some point, with higher rates in vocally demanding professions like teachers and singers.

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Good morning. What brings you in today?

Patient: Hi Doctor. I’ve been having issues with my voice. It sounds hoarse and sometimes shaky, especially after talking for a while. It also feels like my voice gets tired quickly.

Doctor: I see. How long have you been noticing these changes?

Patient: It’s been about two months now, and it doesn’t seem to be getting better on its own.

Doctor: Have you experienced any pain, difficulty swallowing, coughing, or breathing problems?

Patient: No pain or swallowing problems, but sometimes my voice breaks and I feel a bit of strain when I talk.

Doctor: Thank you for telling me. Voice changes like hoarseness and strain can be caused by various factors including overuse, inflammation, or issues with your vocal cords. We’ll need to examine your voice box to see how your vocal cords are moving and if there are any lesions or swelling.

Patient: How do you examine that?

Doctor: We use a small flexible scope that we gently pass through your nose to look down at your vocal cords while you speak. It’s quick and usually just a little uncomfortable. Sometimes we also use specialized video techniques to see how your vocal cords vibrate during speech.

Patient: Will this tell you what’s wrong?

Doctor: Yes, it will help us diagnose if you have conditions like vocal cord nodules, paralysis, inflammation from reflux, or functional problems like muscle tension. Depending on the findings, we might also refer you to a speech therapist.

Patient: What kind of treatments are available?

Doctor: Treatment depends on the cause. For inflammation, we might recommend medication or lifestyle changes like avoiding irritants and voice rest. Voice therapy can help you learn techniques to reduce strain. If there are structural lesions like nodules or polyps, surgery might be considered in some cases. For neurological issues, other specialized treatments may be needed.

Patient: Will my voice get better?

Doctor: Many patients improve significantly with proper treatment and voice care. It’s important to follow through with therapy and avoid voice misuse while your vocal cords heal.

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

Doctor: Yes. Stay well hydrated, avoid yelling or whispering, take frequent voice breaks, and avoid smoking or irritants. If you smoke, quitting greatly helps voice recovery.

Patient: When should I come back?

Doctor: We’ll schedule a follow-up after your examination. If you develop sudden breathing difficulty, severe pain, or your voice worsens quickly, please seek medical care immediately.

REFERENCES:

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**Wrinkles (related to facial aging and skin)**

**DEFINITION / DESCRIPTION**

Wrinkles are lines that form on your skin. They're a natural part of your body’s aging process. Wrinkles on your skin look similar to the wrinkles you get on a shirt that needs ironed. They appear as folds, creases or ridges. They're most often found on your face, neck and arms, but wrinkles can appear anywhere on your body.

### **Who do wrinkles affect?**

Everyone who ages experiences wrinkles. You may be more at risk of getting wrinkles early in life if:

* You have sun-damaged skin or your skin is frequently exposed to the sun.
* You smoke tobacco products.
* Your body loses collagen, which gives your skin elasticity and support.

### **What age do I start getting wrinkles on my body?**

As your body ages, you’ll notice fine lines start to appear on your body. This can start after age 25. The most common age group for people who look for wrinkle treatment is between ages 40 to 55. Wrinkles become more prominent after age 65.

**CAUSES**

Slow skin cell production, thinning skin layers and a lack of collagen proteins causes wrinkles to form on your skin.

Collagen is a protein within your body that gives your skin structure. It provides stretchiness or elasticity so you can move easily. Your skin is similar to a rubber band. If that rubber band stretches or moves too much, the rubber band becomes loose and loses its ability to snap back to its normal size and shape. When your body’s cells age, their ability to produce proteins slows down. This makes it more difficult for your rubber band to snap back to its original shape, which causes wrinkles.

There are several factors that cause your skin to wrinkle.

#### **Aging**

Wrinkles are a by-product of the aging process. As people age, skin cells divide more slowly, and the middle layer of your skin — the dermis — begins to thin. The dermis has a network of elastin and collagen fibers, which offer support and elasticity. As this network loosens and unravels with time, depressions form on your skin’s surface. Aging skin is also less able to retain moisture, less efficient in secreting oil and slower to heal. All of these factors contribute to the development of wrinkles.

#### **Facial muscle contractions**

Lines on your forehead, between your eyebrows (frown lines) and jutting from the corners of your eyes (crow's feet) develop because of small muscle contractions. Smiling, frowning, squinting and other habitual facial expressions cause wrinkles to become more prominent. Over time, these expressions coupled with gravity contribute to the formation of wrinkles.

#### **Sun damage**

Excessive exposure to ultraviolet (UV) radiation from the sun can result in premature aging of your skin, also known as photoaging. Exposure to UV light breaks down collagen fibers and leads to the production of abnormal elastin. When ultraviolet light damages skin tissue, your body produces an enzyme called metalloproteinase. This enzyme creates and reforms collagen. During the process, however, some healthy collagen fibers receive damage, resulting in solar elastosis — the disorganized formation of fibers. Wrinkles develop when the rebuilding process occurs over and over, less efficiently each time.

#### **Smoking**

Healthy skin constantly regenerates. Old collagen breaks down and removes itself from your body, which makes room for new collagen. Researchers found that smoking causes a reduction in the production of new collagen. Decreased collagen results in the development of wrinkles.

#### **Environmental factors**

Pollutants in the air in your environment can cause your body’s collagen to break down as pollution enters your pores. The most common pollutants in your environment that cause wrinkles include:

* Particulate matter: Particulate matter is a mixture of microscopic solids and liquids in the air which includes dirt, dust and smoke.
* Soot: Soot is a carbon-based microscopic, solid material that forms when something burns. Soot occurs in the environment from vehicle exhaust and manufacturing facilities.
* Nitrogen dioxide: Nitrogen dioxide is a gas that exists in the environment. It’s most common near vehicles, industrial manufacturing facilities, construction sites and in some lawn and garden equipment.

### **Does makeup cause wrinkles?**

If you don’t remove makeup, it can clog your pores, which restricts your body’s ability to produce collagen proteins. This could cause premature aging and wrinkles if you never remove your makeup. It’s important to remove makeup at the end of the day with a cleanser to make sure your pores are clean to prevent wrinkles. If you forget to take off your makeup a few times before you go to bed, it’s OK, but habitually leaving makeup on can damage your skin by clogging your pores.

### **Does caffeine cause wrinkles?**

While research is still ongoing to understand more about how caffeine — including coffee — affects your skin, caffeine has some benefits to your skincare routine that are short term. This means that caffeine can temporarily change the appearance of wrinkles, but long-term use of caffeine products doesn’t cure wrinkles. Caffeine is an antioxidant, which can protect your skin from elements that damage the collagen in your skin that causes wrinkles.

**SIGNS / SYMPTOMS**

If you look at the palm of your hand, you have lines in your skin. As you age, lines like those in your palm will form on other parts of your body’s skin.

Symptoms of wrinkles include:

* Lines, creases or folds on your skin.
* Loose or droopy skin.

Wrinkles are apparent when you’re at rest, but they may become more noticeable when you move your facial muscles by smiling or frowning.

#### **Where on my body will I have wrinkles?**

Wrinkles can appear anywhere on your skin but are most common on your:

* Face.
* Hands.
* Neck.
* Arms.
* Legs.

**DIAGNOSIS METHODS**

A visual examination of your skin diagnoses wrinkles. You don’t need to visit your healthcare provider to diagnose wrinkles on your skin since they are visibly noticeable. If you want treatment to reverse the effects of wrinkles on your skin, you can talk to your provider or a dermatologist who specializes in skincare.

**TREATMENT OPTIONS**

Wrinkles are part of your body’s aging process and they don’t need treatment. If you don’t like how wrinkles look on your skin, you can talk to your healthcare provider or a dermatologist about treatment options that may include:

* Anti-wrinkle creams with retinoids or over-the-counter skin care products to improve hydration and texture and support the production of collagen proteins in your body.
* Skin resurfacing techniques like microdermabrasion (sanding away layers of skin), dermabrasion (scraping layers of skin away) and chemical peels (dissolving skin away) to repair prematurely aging skin.
* Laser skin resurfacing to reduce facial wrinkles and skin irregularities caused by sun damage or acne.
* Botulinum toxin type A (Botox®) injection therapy, which is a medicine that blocks the chemical signals that cause muscles to contract and cause wrinkles.
* Fillers made of hyaluronic acid to fill in or lift up folds or deep wrinkles.
* Facelift surgery to remove excess skin and fat from your face and tighten tissue layers to give your skin a youthful look.

#### **Side effects of the treatment**

There are potential side effects and complications that could arise with any treatment for wrinkles. Talk to your healthcare provider about the side effects before starting treatment, and discuss any skin care routines, medicines or supplements that you currently use or take to make sure the treatment doesn’t interact with it.

Some of the most common side effects of wrinkle treatment includes:

* An allergic reaction to the medicine.
* Swelling.
* Scarring.
* Pain.
* Bruising.

#### **Do I need multiple treatments to get rid of wrinkles?**

Some wrinkle treatments are permanent and other treatments need multiple procedures to maintain your results. Your healthcare provider will discuss options to help you meet your goals for treatment and help you choose the right treatment for your skin.

### **What foods and drinks help reduce wrinkles?**

The nutrients you eat and drink help your skin stay healthy. Keeping your skin healthy prevents wrinkles. Add the following to your well-balanced diet to keep your skin healthy and minimize wrinkles:

* Water.
* Vitamins A and C.
* Protein (poultry, fish, eggs and lean meats).

While they may be tempting and delicious, avoid eating foods that are high in fat and sugar as they could damage collagen in your skin.

**PREVENTION TIPS**

Your body naturally produces wrinkles as you age. While you can’t prevent wrinkles, you can reduce your risk of getting wrinkles early by:

* Wearing sunscreen daily to prevent sun damage.
* Not using tanning beds.
* Moisturizing your skin daily.
* Washing your face or using a cleanser to remove makeup.
* Not smoking.
* Staying hydrated.
* Eating a healthy, well-balanced diet.

**OUTLOOK / PROGNOSIS**

Wrinkles are a sign that your body is aging normally. They don’t need treatment, but you can choose to get treatment for wrinkles if you don’t like how they look or if you want to make wrinkles less noticeable. While treatment can temporarily stop signs of wrinkles, there's no way to entirely prevent wrinkles from forming on your skin.

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

Visit your healthcare provider if you want to start a wrinkle treatment plan. Your provider will help you reach your goals and find a treatment that is unique for you and your skin needs. If you receive a wrinkle treatment procedure and your skin isn’t healing, becomes infected, or you have severe pain, swelling, bruising or discomfort, contact your provider.

**DIFFERENTIAL DIAGNOSIS**

1. Normal (Physiological) Aging Wrinkles
   * Gradual development due to natural aging: thinning of the dermis, loss of collagen and elastin, diminished skin hydration, slowed cell turnover.
   * Typically appear as fine lines progressing to deeper furrows on sun-exposed areas: forehead lines, crow’s feet, nasolabial folds, neck lines.
   * Often influenced by genetic predisposition, sun exposure, smoking, and environmental damage.
2. Photoaging Wrinkles (Actinic Damage)
   * Wrinkles caused or accelerated by chronic ultraviolet (UV) radiation exposure.
   * Characterized by coarse, deep wrinkles; irregular pigmentation; rough, leathery skin texture; and sometimes telangiectasias or actinic keratoses.
   * Usually affect sun-exposed areas (face, neck, hands).
3. Dynamic Wrinkles
   * Lines caused by repeated facial muscle movements (expression lines) like frown lines (glabellar), forehead lines, or around the eyes (crow’s feet).
   * These may become static (visible at rest) as skin ages or loses elasticity.
4. Wrinkle Mimickers / Other Skin Conditions
   * Cutis rhomboidalis nuchae: Thickened, leathery, deeply furrowed skin on the neck due to sun damage.
   * Dehydration or xerosis: Dry skin can accentuate fine lines and create an appearance similar to wrinkles.
   * Skin laxity or sagging (ptosis): Loss of skin tone may cause folds that resemble deep wrinkles.
   * Dermatological diseases: Conditions like eczema, psoriasis, or lichen planus can cause skin changes that might mimic wrinkling or alter skin texture.
   * Post-inflammatory changes or scars: Prior injury or inflammation may produce lines or creases that mimic wrinkle patterns.
5. Systemic or Cutaneous Disorders with Wrinkle-like Changes
   * Ehlers-Danlos syndrome: Skin hyperextensibility and fragility, which may cause unusual skin folds.
   * Cutis laxa: A rare disorder characterized by loose, sagging skin that can look wrinkled.
   * Scleroderma: Can cause skin tightening and abnormal skin texture but differs from normal wrinkles.

**EPIDEMIOLOGY**

* Age is the strongest predictor of wrinkle development and severity, with facial wrinkles increasing progressively as people get older. Studies show that even in young adults (early 20s), early signs of wrinkles such as crow’s feet and forehead lines begin to appear and become increasingly pronounced through decades of life.
* Gender differences exist, with some studies indicating that wrinkle variation explained by age can be higher in women compared to men, and hormonal factors (such as menopause and estrogen deficiency) contribute to worsened wrinkling in postmenopausal women.
* Ethnicity and skin type are significant factors: darker-skinned individuals (e.g., Black and Asian populations) tend to have thicker dermis and more melanin, offering some protection from wrinkle formation compared to Caucasian skin, which generally shows more photoaging-related wrinkles.
* Environmental exposures play a major role:
  + Ultraviolet (UV) radiation exposure (sunlight) is a primary extrinsic factor accelerating wrinkle formation (photoaging) through collagen degradation and skin damage. Chronic sun exposure leads to coarser, deeper wrinkles and textural skin changes.
  + Other environmental risks include air pollution and smoking, both associated with increased wrinkle prevalence and severity. Smoking more than doubles the risk of moderate to severe facial wrinkles compared to nonsmokers, as demonstrated across multiple observational studies.
* Lifestyle factors such as nutrition, alcohol consumption, and skin care habits also influence wrinkle development, though with less quantification compared to UV exposure and smoking.
* Reproductive and hormonal factors affect wrinkling in women: Higher number of full-term pregnancies and increased years since menopause correlate with more severe facial wrinkles, while hormone replacement therapy (HRT) appears to reduce wrinkle severity among postmenopausal women.

**PREDEFINED Q & A SETS**

### **What's the difference between fine lines and wrinkles?**

Fine lines are the start of wrinkles and look like small creases on your skin. They're closer to the surface of your skin, whereas wrinkles are deeper into your skin. You’ll notice fine lines on your face where you make repetitive movements, like around your eyes and your mouth when you smile or squint. Fine lines met with age and gravity form wrinkles. Wrinkles are deeper creases or folds within your skin that can form anywhere on your body.

Q1: What are wrinkles?  
A1: Wrinkles are lines, creases, or folds in the skin that commonly develop as a natural part of aging. They result primarily from a loss of collagen and elastin, which provide skin with strength and elasticity, causing the skin to become thinner and less supple over time.

Q2: What causes wrinkles?  
A2: Wrinkles form due to several factors, including:

* Natural aging leading to slower collagen and elastin production
* Repetitive facial movements (smiling, frowning) that create expression lines (dynamic wrinkles)
* Chronic sun exposure causing photoaging and breakdown of skin fibers
* Lifestyle factors like smoking, pollution, and poor skin care
* Genetic predisposition and skin type.

Q3: What are the common types of wrinkles?  
A3:

* *Dynamic wrinkles:* Appear with facial expressions and may become permanent with age (e.g., crow’s feet, forehead lines).
* *Static wrinkles:* Visible even when the face is at rest, caused by skin thinning and loss of elasticity.
* *Photoaging wrinkles:* Caused by UV damage, appearing coarser and accompanied by skin texture changes.

Q4: How can wrinkles be prevented?  
A4: Prevention strategies include:

* Regular use of broad-spectrum sunscreen to protect from UV damage
* Avoiding smoking and minimizing exposure to pollution
* Maintaining good hydration and skin moisturization
* Healthy diet and avoiding excessive alcohol
* Gentle skin care avoiding harsh treatments.

Q5: What treatment options are available for wrinkles?  
A5: Treatments range from non-invasive to procedural and surgical, including:

* Topical retinoids (prescription vitamin A derivatives) to boost collagen and improve fine lines
* Botox injections to relax muscles causing dynamic wrinkles
* Dermal fillers to restore lost volume and smooth deep creases
* Chemical peels, laser resurfacing, microneedling to promote skin renewal
* Maintaining a healthy skin care routine.

Q6: Are treatments safe and effective?  
A6: Most treatments are safe when performed by qualified specialists. Retinoid creams may cause irritation initially. Botox and fillers have possible temporary side effects like bruising or swelling. Results vary by treatment type, skin condition, and adherence to follow-up care.

Q7: When should I see a dermatologist about my wrinkles?  
A7: You should consider seeing a dermatologist if:

* Your wrinkles cause distress or impact confidence
* You want advice on prevention or treatment options
* You suspect underlying skin damage such as sunspots or precancerous changes
* You desire professional assessment of product choices or procedural treatments.

Q8: Can lifestyle changes reduce wrinkles?  
A8: Yes, avoiding smoking, protecting skin from sun, staying hydrated, managing stress, and following a good skincare regimen can slow wrinkle progression and improve skin appearance.

Q9: Do wrinkles only occur on the face?  
A9: Wrinkles commonly appear on sun-exposed areas such as the face, neck, hands, and forearms but can occur anywhere the skin ages or is damaged.

Q10: Are some people more prone to wrinkles than others?  
A10: Yes, factors such as genetics, skin type, ethnicity (darker skin tends to wrinkle less due to more melanin), and environmental exposure influence wrinkle susceptibility and severity

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Hello, what brings you in today?

Patient: Hi Doctor, I've noticed more wrinkles and fine lines on my face lately, especially around my eyes and forehead, and I’m wondering what I can do about them.

Doctor: I understand. Wrinkles are a natural part of aging, caused by a combination of factors like loss of collagen and elastin, sun exposure, and repeated facial movements. Could you tell me about your sun exposure habits or if you’ve smoked or used tanning beds?

Patient: I spent a lot of time outdoors without sunscreen in my younger years, and I did smoke for several years but quit a few years ago.

Doctor: Those factors can definitely contribute to earlier or more pronounced wrinkles. We call this photoaging when UV exposure accelerates skin aging. Smoking also damages collagen and worsens wrinkle formation.

Patient: Is there anything I can do to reduce the wrinkles or prevent them from getting worse?

Doctor: Yes, there are several effective strategies and treatments. First, protecting your skin from the sun by using broad-spectrum sunscreen daily is very important to prevent further damage. Maintaining hydration and a good skincare routine with moisturizers helps your skin stay healthy. We can also discuss topical treatments like retinoids, which boost collagen production and improve skin texture over time.

Patient: What about cosmetic procedures? Are they safe?

Doctor: Many procedures, when done by a qualified dermatologist, are safe and can give good results. Options include Botox injections to relax muscles causing dynamic lines, dermal fillers to restore volume and smooth deeper wrinkles, chemical peels, laser resurfacing, and microneedling, which promote skin renewal. We will tailor treatments depending on your skin type, wrinkle severity, and goals.

Patient: Are there any side effects I should be worried about?

Doctor: Most side effects are mild and temporary, like redness or swelling after injections or laser. It’s important to follow post-treatment care instructions closely. Also, some topical treatments like retinoids can cause initial irritation that usually improves with continued use.

Patient: How long before I see results?

Doctor: It depends on the treatment. Topical retinoids may take several weeks to months to show improvement. Injectable treatments can have quicker visible effects, often within days to weeks. Combination treatment plans usually provide the best outcomes.

Patient: Is there anything I should avoid?

Doctor: Avoid excessive sun exposure and tanning beds, smoking, and harsh skin care products that can irritate your skin. Also, avoid DIY cosmetic procedures, which can be risky.

Patient: Thank you, Doctor. How often should I follow up with you?

Doctor: We can start with an initial treatment plan and schedule follow-ups every few months to monitor progress, adjust treatment if needed, and offer ongoing skin care advice.

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<https://my.clevelandclinic.org/health/diseases/10984-wrinkles>

<https://www.mayoclinic.org/diseases-conditions/wrinkles/diagnosis-treatment/drc-20354931>

<https://www.aad.org/public/cosmetic/wrinkles>

**Zenker's diverticulum**

**DEFINITION / DESCRIPTION**

Zenker’s diverticulum is a pouch that develops in your throat. It can make swallowing difficult. The pouch forms when your cricopharyngeus muscle, which is the upper sphincter muscle of the esophagus, doesn’t work like it should. Constant pressure from this muscle creates back pressure on the wall of your throat.

Over time, that pressure may push tissue through the throat wall to make a pouch or outpouching. The pouch may cause issues like difficulty swallowing, regurgitating food or bad breath. Medical treatment is surgery to remove or open the diverticulum. Changing how you eat may ease Zenker’s diverticulum symptoms.

**CAUSES**

Zenker’s diverticulum happens when your cricopharyngeus muscle doesn’t relax like it should. Normally, this muscle constantly squeezes your upper esophageal muscle to close off your esophagus. It relaxes when you swallow food so that food can move from your throat into your esophagus. When this muscle doesn’t relax, your upper esophageal sphincter doesn’t open as much as it normally does.

At the same time, powerful muscles in your throat push food down toward your cricopharyngeus muscle. The combination puts pressure on the walls of your throat.

In Zenker’s diverticulum, that pressure can push tissue through a weak spot in your throat to make a pouch or outpouching (diverticulum). The pouch affects how food moves from your throat into your esophagus.

Experts don’t know what causes the cricopharyngeus muscle to tighten when it should relax.

#### **Risk factors**

Risk factors for developing Zenker’s diverticulum include:

* Age. The condition typically affects people ages 70 to 90.
* Sex. Males are more likely to develop it.
* Esophageal dysmotility. These are conditions that affect how your esophagus works.

**SIGNS / SYMPTOMS**

Symptoms may vary depending on the size and location of the pouch (diverticulum). For example, you may not have symptoms unless the pouch gets big enough to affect your ability to swallow food. Symptoms may include:

* Aspiration pneumonia. Some of the food or phlegm may go down your windpipe and cause an infection.
* Bad breath (halitosis). Food trapped in the pouch can start to decay, so your breath smells bad.
* Bringing up food/phlegm. You may bring up (regurgitate) swallowed food. This can happen if the pouch fills up with food that then spills back into your throat.
* Difficulty swallowing (dysphagia). This may happen if the pouch grows large enough to partially block your throat.
* Globus sensation. This is the feeling that there’s something stuck in your throat. It may happen if the pouch grows large enough to push on your cricopharyngeus muscle, your upper esophageal sphincter or tissues in your throat.
* Hoarseness (dysphonia). This can happen if a pouch pushes on your recurrent pharyngeal nerve. This nerve controls your larynx and voice box. Pressure on the nerve can cause hoarseness.
* Unintended weight loss. You may lose weight because you can’t swallow food.

**DIAGNOSIS METHODS**

A healthcare provider will do a physical exam. They’ll ask about your symptoms. They may ask if you have a type of esophageal dysmotility. They may refer you to a gastroenterologist for tests, including:

* Esophageal manometry test to check how your esophagus works
* Esophagram (barium swallow) so your provider can see your esophagus in action when you swallow
* Upper endoscopy so your provider can look at the inside of your esophagus

**TREATMENT OPTIONS**

Treatment is usually surgery to remove or fix the pouch so you can swallow. Your gastroenterologist may recommend surgery if the pouch causes serious complications like malnutrition or aspiration pneumonia. But not everyone who has Zenker’s diverticulum will need surgery. There are different types of surgery to treat it:

* Open surgery. This procedure involves making cuts in your throat.
* Endoscopic surgery. In this procedure, your provider inserts small instruments into your mouth. They use the instruments to fix or remove the pouch.
* ZPOEM. POEM refers to peroral endoscopic myotomy. This procedure treats Zenker’s diverticulum by stretching your cricopharyngeus muscle.

Your gastroenterologist will discuss surgery options so you can both decide on what makes sense in your situation.

#### **Recovery time**

Your recovery time will be different depending on the type of surgery you have. In general, it takes longer to recover from open surgery than endoscopic or ZPOEM surgery. Your gastroenterologist will explain what you can expect, but the recovery process typically includes:

* Staying in the hospital for at least a day, up to several days
* Being on a liquid or soft diet for two days up to two weeks after your surgery
* Temporarily needing a feeding tube in your nose if you had open surgery, so the surgical wound can heal

#### **What are surgery complications?**

Open and endoscopic surgery have similar potential complications:

* Bleeding
* A leak or hole in your esophagus (esophageal rupture)
* Infection in your neck or chest (mediastinitis)
* Injury to your lips, teeth, tongue or gums from endoscopic surgery
* Hoarseness if open surgery damages the nerve in your larynx (voice box)

**OUTLOOK / PROGNOSIS**

Zenker’s diverticulum can make it hard for you to swallow food. You may feel like food is getting caught in your throat. Here are some steps that may help move food past the pouch:

* Take small bites of food
* Chew each bite very thoroughly
* Sip water between bites of food
* Avoid foods that could get caught in the pouch, like seeds and nuts, or food with skin, like apples and tomatoes

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

You should talk to a healthcare provider if you have swallowing issues that don’t go away. If you have surgery for Zenker’s diverticulum, contact your gastroenterologist if you have infection symptoms like fever or pus coming from the incision.

Treatment may cure this condition. But Zenker’s diverticulum can come back. Ask your gastroenterologist about which symptoms may mean that there’s a new pouch in your throat

**DIFFERENTIAL DIAGNOSIS**

* Oropharyngeal and esophageal causes of dysphagia such as:
  + Plummer-Vinson syndrome (esophageal webs causing dysphagia)
  + Reflux esophagitis (inflammation due to acid reflux)
  + Esophageal carcinoma (cancer causing obstructive symptoms)
  + Systemic sclerosis (esophageal motility disorder due to connective tissue disease)
  + Achalasia and pseudoachalasia (motility disorders with impaired esophageal relaxation)
  + Chagas disease (causing esophageal motility issues similar to achalasia)
  + Esophageal candidiasis (infection causing dysphagia and odynophagia)
  + Pharyngitis and neurologic conditions like stroke which can cause oropharyngeal dysphagia
  + Others: esophageal spasm, pill esophagitis, caustic injury, strictures
* Other esophageal or hypopharyngeal diverticula-like lesions:
  + Laimer’s diverticulum (rarer, herniates below the cricopharyngeus muscle, with similar imaging features)

**STAGING**

The Lahey, Mortons, and Van Overbeek staging systems are used for evaluation of a Zenker's diverticulum. These staging systems are used to describe the degree of the Zenker's diverticulum, usually in the sense of pouch size. Barium swallow with videofluoroscopy is the radiographic methods used for staging.

The Lahey classification is often used to stage Zenker diverticulum and includes the following:

1. Stage 1: Small mucosal protrusion is visible
2. Stage ll: A definite sac is seen bu the esophagus and hypopharynx are in line
3. Stage lll: The hypopharynx is seen in line with the diverticulum and the esophagus is pushed anteriorly and appears indented.

**EPIDEMIOLOGY**

It is a rare disorder of the esophagus, primarily seen in elderly individuals, peaking between the seventh and ninth decades of life. Occurs rates range from 0.01% to 0.11% of the population. It is more common in men than in women. Zenker diverticulum rate varies in different parts of the world being more common in northern Europe, the United States of America, and Canada and rarely occurs in Japan and Indonesia. However, the true incidence is difficult to ascertain due to a significant number of patients who do not seek treatment. Zenker diverticulum is rare before the age of 40

**PREDEFINED Q & A SETS**

Q1: What is Zenker's diverticulum?  
A1: Zenker's diverticulum is a pouch or bulge that forms at the top of the esophagus, where the throat meets the food pipe. It occurs when a muscle in the throat, called the cricopharyngeus muscle, doesn't relax properly during swallowing, causing pressure to build and push tissue outward through a weak spot .

Q2: What causes Zenker's diverticulum?  
A2: The exact cause isn't fully known, but it's believed to be related to the cricopharyngeus muscle not relaxing as it should, leading to increased pressure in the throat. This pressure can cause the tissue to bulge outward . Age is a primary risk factor, and it's most common in older adults .

Q3: What are the common symptoms of Zenker's diverticulum?  
A3: Symptoms often include difficulty swallowing (dysphagia), regurgitation of undigested food (sometimes hours after eating), bad breath (halitosis) due to trapped food, chronic cough, a feeling of a lump in the throat, and gurgling noises when swallowing . Choking and aspiration (food or liquid entering the lungs) are also possible, which can lead to pneumonia .

Q4: How is Zenker's diverticulum diagnosed?  
A4: Diagnosis typically involves a physical exam and review of symptoms. The primary diagnostic tool is a barium swallow videofluoroscopy, which clearly shows the pouch . Endoscopy and esophageal manometry may also be used to further evaluate the condition or check for other issues .

Q5: What are the treatment options for Zenker's diverticulum?  
A5: Treatment depends on the size of the pouch and the severity of symptoms. For mild cases, dietary changes like chewing food thoroughly and drinking water after meals may suffice. More moderate to severe cases usually require surgical intervention. Surgical options include:

* Cricopharyngeal myotomy: Cutting the muscle to ease swallowing, often used for smaller diverticula .
* Diverticulectomy: Removing the pouch entirely, often combined with a myotomy .
* Endoscopic diverticulotomy: A common procedure where the wall separating the pouch from the esophagus is split, allowing food to pass into the esophagus .

Q6: Can Zenker's diverticulum lead to complications if left untreated?  
A6: Yes, if left untreated, Zenker's diverticulum can worsen over time. Complications can include aspiration pneumonia, malnutrition due to difficulty eating, significant weight loss, and severe choking episodes .

Q7: How does Zenker's diverticulum differ from other swallowing problems?  
A7: Zenker's diverticulum is distinct because it involves a specific pouch formation at the top of the esophagus due to muscle dysfunction. Other swallowing problems might be caused by esophageal webs, reflux, tumors, or nerve issues, which generally don't present with this characteristic pouching and regurgitation of undigested food .

Q8: Who is most commonly affected by Zenker's diverticulum?  
A8: Zenker's diverticulum primarily affects older adults, most commonly individuals in their 70s and 80s .

Q9: Will I need to make lifestyle changes after treatment?  
A9: After treatment, especially surgery, you will likely receive guidance on diet and swallowing techniques to optimize recovery and prevent recurrence. Chewing well, drinking plenty of fluids, and avoiding certain foods might be recommended .

Q10: When should I seek medical attention for swallowing difficulties?  
A10: If you experience persistent difficulty swallowing, regurgitation of food, bad breath, chronic coughing, or any feeling of a lump in your throat, it is important to see a healthcare provider for evaluation

**DOCTOR-PATIENT CONVERSATIONS**

Doctor: Good morning. What brings you in today?

Patient: Hello, Doctor. I’ve been having trouble swallowing for a while. Sometimes food feels like it gets stuck, and I’ve noticed regurgitating undigested food and bad breath.

Doctor: Those symptoms are concerning. They can be caused by a condition called Zenker’s diverticulum, which is a pouch that forms at the top of your esophagus. It happens when a muscle called the cricopharyngeus doesn’t relax properly during swallowing, causing pressure that pushes out a pouch where food can get trapped.

Patient: Is this a serious condition?

Doctor: It can significantly affect your quality of life. The trapped food can cause bad breath, coughing, or even aspiration into the lungs, leading to pneumonia. But the good news is there are effective treatments.

Patient: How do you confirm if I have this pouch?

Doctor: We usually do a barium swallow study, where you drink a special liquid and we take X-ray videos that show the pouch clearly. Sometimes, we also perform an endoscopy to look directly inside your throat and esophagus.

Patient: What treatment options do I have?

Doctor: Treatment depends on the size of the pouch and your symptoms. For smaller pouches with mild symptoms, changes in diet—like chewing well and drinking water after meals—may help. For larger or symptomatic pouches, surgery is often recommended.

Patient: What kind of surgery?

Doctor: There are two main approaches. One is an open surgery through your neck to remove or fix the pouch. The other is an endoscopic approach where we go through your mouth and use instruments or a laser to cut the muscle and open the pouch. Most patients prefer the endoscopic method because it tends to have a quicker recovery.

Patient: Are there risks with surgery?

Doctor: Like any surgery, there are risks such as bleeding, infection, or leakage from the treatment site, but these are uncommon. Your surgeon will explain the risks and benefits in detail before proceeding.

Patient: What can I do to prepare and recover?

Doctor: Before surgery, it’s good to follow any instructions about fasting or medications. After surgery, you'll need to follow a swallowing diet and have follow-up visits. It’s very helpful to have someone accompany you on the day of surgery since you won’t be able to drive.

Patient: If I decide not to have surgery, what happens?

Doctor: If untreated, the pouch can grow, symptoms can worsen, and the risk of complications like aspiration pneumonia increases. However, if your symptoms are mild, we can monitor you, ensuring you seek help if things change.

Patient: Thank you, Doctor. This helps me understand what’s going on and what to expect.

Doctor: You’re welcome. We’ll arrange the appropriate tests and discuss the best treatment plan customized for your situation.

REFERENCES:

[Zenker’s Diverticulum: Symptoms, Causes & Treatment](https://my.clevelandclinic.org/health/diseases/zenkers-diverticulum#symptoms-and-causes)

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