

**DISORDERS**

**TEAR OR DEFECT**

An abnormal connection in the membranes separating the inner and middle ear can result in severe symptoms.

**ARTICLE**

047

**DID THIS ARTICLE HELP YOU? SUPPORT VEDA @ VESTIBULAR.ORG**

5018 NE 15th Ave.  
Portland, OR 97211  
1-800-837-8428  
info@vestibular.org  
vestibular.org

# Perilymph Fistula

By The Vestibular Disorders Association, with edits by Dr. Dennis Fitzgerald, MD and Jesus Gomez, AuD

A perilymph fistula (PLF) is a defect in the small, thin membranes that separate the air-filled middle ear and the fluid-filled inner ear. The symptoms of a perilymph fistula most commonly include ear fullness, fluctuating or "sensitive" hearing, dizziness, and motion intolerance. Head trauma is the most common cause of fistulas, usually involving a direct blow to the head or in some cases a "whiplash" injury.

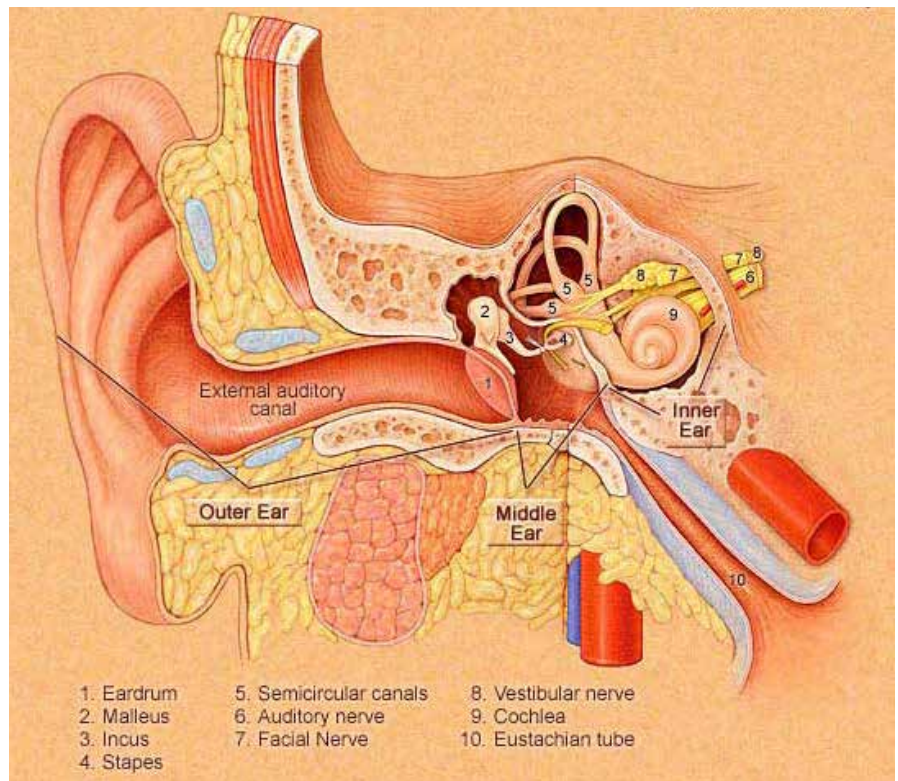


Fig. 1: Anatomy of the inner and middle ear. A fistula is an abnormal connection between the air-filled middle ear and the fluid filled inner ear. The two weakest points are membranes located at the stapes foot plate (the "oval window"), #4 here, and just below, a small niche called the "round window". There can also be fistulae at other points, such as the superior semicircular canal, as well as other semicircular canals, but most require erosion of bone, and can be seen on a temporal bone CT scan. There can also be openings in the bone that cannot be seen on CT scan (although visible on autopsy). © Vestibular Disorders Association. Image used with permission from T. C. Hain.



A perilymph fistula (PLF) refers to a hole or tear in one of the membranes that separate your middle ear and inner ear. Your middle ear is filled with air, while your inner ear is filled with fluid (perilymph). These two areas inside of your ear are separated by membranes. If the membranes rupture, then perilymphatic fluid can flow from your inner ear into your middle ear<sup>1</sup>.

Changes in air pressure that occur in the middle ear (for example, when your ears “pop” in an airplane) normally do not affect your inner ear. However, when a fistula is present, changes in middle ear pressure will directly affect the inner ear, stimulating the balance and/or hearing structures within and causing PLF symptoms.

The perilymphatic space of the inner ear is connected to the cerebrospinal fluid (CSF) that surrounds the brain. Perilymphatic fluid, which is high in sodium (Na<sup>+</sup>), is similar in composition to CSF. When an abnormal connection between the membranes between the middle and inner ear exists, perilymph in the inner ear escapes, driven by the hydrostatic pressure of the CSF, and is replaced by CSF. This can also result in lower-than-normal levels of CSF fluid around the brain and spinal cord, which may result in symptoms such as mild headache.

Patients with PLF often feel frustrated and depressed because, while they don't feel well, they look fine to others. PLF patients specifically and vestibular patients in general often have a challenging time explaining to friends and family what they are going through. Sometimes it is enough to ask your support network for patience and understanding while you explore diagnosis and treatment options and learn to cope with the symptoms brought on by persistent dizziness.

## HISTORY

The small amount of fluid leaking from the inner ear to the middle ear is not detectable by the patient and is not generally visible to the surgeon who sets out to patch the leak. 40 years ago, when perilymph fistula first became an item of concern, the presumption was that there was a tear in the round window membrane or the ligamentous attachment of the footplate of the stapes to the edge of the oval window. A novel idea was put forth by Dr. Robert Kohut, based on post-mortem examination of temporal bones in patients who had suffered sudden hearing loss. His pioneering work indicated that the leak sites could be micro fissures in the area just in front of the oval window or in the floor

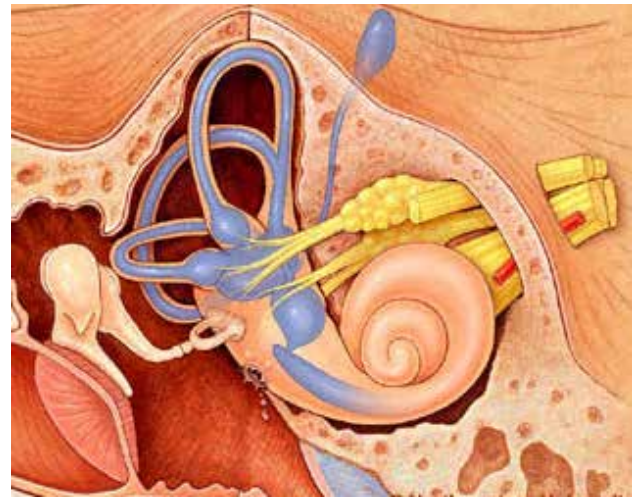


Fig. 2: Round window fistula. An opening in the round window allows perilymph to leak out into the middle ear. In this artist's depiction, for clarity, bone is not shown between the middle and inner ears. While it is difficult to be sure, it seems likely that in most cases there is only a small oozing of fluid from the perilymphatic space and the air-filled middle ear. © Vestibular Disorders Association. Image used with permission from T. C. Hain.

of the round window niche<sup>2</sup>.

## SYMPTOMS

The symptoms of a perilymph fistula most commonly include ear fullness, fluctuating or “sensitive” hearing, dizziness without true vertigo (spinning), and motion intolerance. Vertigo or sudden hearing loss can occur from a PLF. Most people with fistulas find that their symptoms get worse with changes in altitude (fast elevators, airplanes, and travel over mountain passes) or increased CSF pressure resulting from heavy lifting, bending over, and coughing or sneezing.

## CAUSES

Head trauma<sup>3</sup> is the most common cause of fistulas, usually involving a direct blow to the head or in some cases a “whiplash” injury. Other common causes include ear trauma, objects perforating the eardrum, or “ear block” on descent of an airplane or SCUBA diving. Fistulas may also develop after rapid increases in intracranial pressure, such as may occur with weightlifting or childbirth.

Fistulas are infrequently present from birth. A long-running controversy has surrounded the idea of a “spontaneous PLF.” Instead, what may occur is that a patient has a causative event but does not see an ear specialist right away. The passage of time blurs the memory of such an event so that the PLF might seem to have been spontaneous. Rarely, PLF's occur in both ears, and only after a severe head injury.



## DIAGNOSIS

There is no positive way to diagnosis a PLF. For many years it was thought that it could be confirmed by performing a tympanotomy (surgical exploration of the middle ear) and directly viewing the area of the suspected fistula to detect a fluid leak. However, since the leak would be only a few microliters of clear fluid, visual detection has been found to be virtually impossible. Larger amounts of fluid leakage may indicate a CSF leak due to a congenital defect in the inner ear.

A physician can arrive at a presumptive diagnosis through a thorough probing for events close in time to the onset of symptoms, along with a variety of tests. These tests can include<sup>1</sup>:

- Hearing tests
- Balance tests
- Electrocochleography a test that measures the fluid pressure inside of your inner ear.
- A perilymphatic fistula test, which tracks your eye movements while pressure is applied to your ear canal.
- A CT scan, which produces a 3D X-ray image of the structures inside of your body.
- MRI, which captures images inside of your body using powerful magnets and radio waves.

In the end, a physician must present the possibility of a PLF to the patient based on history, test results, and the lack of spontaneous resolution of symptoms. Together the physician and patient (or guardian) must decide whether to undertake an operation to patch the oval and round window areas. Immediately following surgery there is a period of bed rest, followed by a period of restricted activity. Four to six weeks later a reassessment of the patient's symptoms is done to determine if the patching successfully corrected the PLF.

## TREATMENT

When a traumatic event results in sudden onset of hearing loss or dizziness, the patient is advised to severely restrict physical activity for 7-14 days. If rest does not alleviate symptoms, a new method of treatment called blood patches, may be considered. During this procedure, your healthcare provider injects your own blood into your middle ear. This helps regenerate the damaged membrane. Although promising, experts are still researching this treatment option<sup>1</sup>. If the symptoms do not improve or they plateau, a surgical intervention may be

considered. Persons with diagnosed fistulas who are awaiting surgery should avoid lifting, straining, and bending over as these activities can cause a worsening of the symptoms.

A PLF repair involves an operation, often under general anesthesia, working through the ear canal. During this procedure, your eardrum is gently lifted, and tissue grafts are placed over the damaged membranes between your middle and inner ear<sup>1</sup>. The operation usually takes about 45-60 minutes to complete. There is very little, if any, pain. Some patients are kept overnight to restrict activity. Once discharged the patient is advised to spend three days at home with limited activity. After three days the patient may return to sedentary work activities. The patient is advised to avoid lifting more than 10 lbs. for one month and avoid sporting activities. After one month there are additional restrictions suggested on activities such as contact sports, diving, weightlifting, and roller coasters. All of these activities have resulted in recurrent PLF's after an initial successful repair.

## References:

1. Perilymphatic fistula (PLF): Radiology, symptoms & treatment. Cleveland Clinic. February 4, 2022. Accessed May 28, 2024. <https://my.clevelandclinic.org/health/diseases/22383-perilymphatic-fistula>.
2. Kohut RI, Hinojosa R, Ryu JH. Perilymphatic fistula: a single-blind clinica; jistopathologic study. *Adv. Otorhinolaryngol* 1988; 42:148.
3. Sarna B, Abouzari M, Merna C, Jamshidi S, Saber T, Djalilian HR. Perilymphatic Fistula: A Review of Classification, Etiology, Diagnosis, and Treatment. *Front Neurol*. 2020 Sep 15;11:1046. doi: 10.3389/fneur.2020.01046. PMID: 33041986; PMCID: PMC7522398.

---

©2024 Vestibular Disorders Association  
VeDA's publications are protected under copyright.  
For more information, see our permissions guide at [vestibular.org](http://vestibular.org). ***This document is not intended as a substitute for professional health care.***

