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Tympanic Membrane Perforation Article Review

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ABSTRACT:

The tympanic membrane, commonly referred to as the TM, consists of a cartilage layer, with skin on its exterior and a mucosal lining on its interior. Upon encountering sound waves, the TM vibrates, transmitting these vibrations to the inner ear, which facilitates hearing. A perforation in the tympanic membrane occurs when it sustains a tear, creating a pathway between the middle ear and the external auditory canal. When the tympanic membrane is perforated, it may not generate adequate vibrations, which can lead to hearing impairment. Symptoms of this condition may include abrupt ear pain, discharge, tinnitus, and dizziness, arising from infection, trauma, or rapid fluctuations in pressure. Most perforations are capable of healing spontaneously without further complications, although some may result in persistent problems such as mastoiditis, cholesteatoma, difficulties in hearing, and chronic otitis media. This article explores the causes of tympanic membrane perforations, diagnostic approaches for assessing affected patients, and available treatment alternatives for tympanic membrane perforations.

Keywords: Tympanic Membrane, Perforation, Chronic Otitis Media

Introduction:

A tear in the tympanic membrane (TM), which is a type of connective tissue that divides the middle ear and ossicles from the outer ear canal, is known as tympanic membrane perforation. The TM vibrates when it encounters sound waves, playing a role in our ability to hear. Sometimes, the TM can rupture, leading to a loss of hearing. Although anyone can experience TM perforation, it is more common in younger individuals and men. Typical signs include dizziness, discharge from the ear, ringing in the ears, relief from pressure, and sudden pain. TM perforation generally has a positive outcome, with a minimal chance of complications, and it typically heals by itself without needing medical intervention. However, it is important to seek early medical advice based on location, the size of the tear, and other related symptoms. (1)

Etiology:

Various causes can lead to TM perforations, such as complications from infections, head injuries, trauma from loud sounds, insertion of objects, and forceful cleaning. The likelihood of a spontaneous perforation rises with repeated episodes of acute otitis media and infections from nontypeable Hemophilus influenzae. Lightning strikes are rare, and most perforations result from trauma or otitis media with effusion (OME). The risk of TM collapse increases with chronic external ear conditions, severe otitis externa, otitis media, and previous surgeries on the ear. Untreated sinusitis can result in ear congestion, holes in the eardrum, and tears in the tympanic membrane. (2)

Pathophysiology:

While perforations in the tympanic membrane may close on their own, they can occasionally lead to the formation of a thin neomembrane that retracts into the middle ear, which might result in damage to the ossicles or cause cholesteatoma development. Examining the area under an operating microscope provides clarity on the situation. If water contaminated with bacteria enters the ear through a perforation, the chance of infection increases; thus, precautions such as using earplugs are essential. The size of the perforation and the level of pneumatization influence conductive hearing loss; larger perforations and reduced air space can cause greater loss at lower frequencies. Conductive and sensorineural hearing loss may occur from perforations caused by explosion injuries. (3)

Diagnosis:

Determining a traumatic TM perforation typically requires audiometry and otoscopy. Otoscopy often reveals these perforations; blood may be cleared using lowpressure suction. It is important to avoid irrigation and pneumatic otoscopy. For smaller perforations, otomicroscopy or impedance testing could

be essential. Audiometric tests are performed both prior to and following treatment to prevent mixing up hearing loss resulting from trauma with that caused by the treatment itself. (4)

Prevention:

- Indicators of infections in the middle ear encompass diminished hearing, stuffed nasal passages, elevated temperature, and discomfort in the ear.
- Protect your ears while flying. In case you are experiencing a cold or allergies that lead to nasal or ear blockage, it is wise to avoid flying.
- You can also manage ear pressure by chewing gum, yawning, or using earplugs. Prevent objects from entering your ears.
- Typically, daily showering helps maintain earwax levels, so refrain from cleaning your ears or attempting to remove earwax with cotton swabs, paper clips, or hairpins.
- Shield your ears from excessive loudness.
- Avoid situations that could result in your ears facing harmful blasts, such as discharging firearms.
- Safeguard your ears from prolonged noise exposure. Whether during recreational pursuits or professional tasks, utilize earplugs or earmuffs when confronted with loud sounds.
- Ensure your ear remains clean.
- Refrain from swimming until your ear has completely healed; otherwise, when cleaning, consider using waterproof earplugs or a cotton ball smeared with petroleum jelly.
- During showering, gently insert cotton into your ears to prevent water from entering the ear canal. (5)

Prognosis:

Perforations of the tympanic membrane typically repair themselves, with minor tears usually healing within six weeks. If healing is slow or does not occur, it is often linked to larger tears or infections. In such cases, surgery may be needed, which has a reperforation rate between 7 and 27 percent. Skilled clinical management and aftercare are essential for the best results.

Complications:

- Chronic otitis media, characterized by a ruptured tympanic membrane, can result in the erosion of the ossicles and irreversible sensorineural hearing impairment.
- Among the 529 individuals studied, 52.6 percent experienced hearing loss, which ranged from mild to moderate.
- In addition to worsening vertigo and further harming auditory function, prolonged infections may give rise to conditions such as meningitis, brain abscesses, cholesteatomas, mastoiditis, and facial paralysis.
- Surgical intervention is often necessary for most patients, so it is vital to consult an otolaryngologist without delay.

Treatment:

- In many cases, traumatic perforations tend to heal independently, making supportive treatment the preferred approach.
- To avoid infection, it is crucial to keep the ear dry.
- While Qtic drops that contain ofloxacin can enhance the speed and likelihood of closure, they do not influence rates of acute otitis media or hearing outcomes.
- Routine use of antibiotics is not always necessary. For perforations resulting from injuries, particularly in the posterosuperior quadrant or those lasting less than two months, surgical intervention is advised. Various methods for this procedure include: utilizing a small graft in a myringoplasty to repair the eardrum, conducting tympanoplasty, which serves as a more extensive replacement of the eardrum.
- Patients experiencing hearing loss should be referred early to audiology and otolaryngology specialists. (6)

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