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Medico-Legal aspects of an unusual complication from an ear swab test: was the procedure necessary?

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Keywords: Ear swab, trauma, perforation, hearing loss, forensic science, complication, medical malpractice.

Summary: A 65-year-old woman affected by chronic pruritus in both ears was referred by her family physician to a private laboratory to undergo an ear swab test for microbiological and cultural examination. During the procedure on the right side, the patient experienced sudden pain, immediately followed by auricular fullness and dizziness. The clinician performing the swab did not perform an otoscopy and did not administer any topical or general medications. A few days later, purulent discharge appeared. Follow-up showed tympanic membrane perforation and mixed severe hearing loss. Indications for ear swab tests are currently unclear, and complications deriving from this apparently simple procedure are seldom reported.

Aspetti medico legali di una inusuale complicanza del tampone auricolare: quando è davvero indicato?

Parole chiave: Tampone auricolare, trauma, perforazione, perdita dell'udito, scienze forensi, complicanza, malpractice medica.

Riassunto: Una donna di 65 anni affetta da prurito cronico auricolare bilaterale, è stata indirizzata dal proprio medico di famiglia presso un laboratorio privato al fine di eseguire un tampone auricolare per l'esame microbiologico e culturale. Durante l'esecuzione della procedura sull'orecchio destro, la paziente ha manifestato un improvviso dolore, seguito immediatamente da vertigini e senso di ovattamento auricolare. Il medico che ha eseguito il tampone non ha provveduto a sottoporre la paziente ad una otoscopia né ha somministrato alcuna terapia farmacologica, topica o sistemica. A distanza di pochi giorni dalla procedura, si è verificata la fuoriuscita di materiale purulento dall'orecchio destro. Al follow-up si è documentata una perforazione della membrana timpanica unitamente ad una ipoacusia mista di grave entità. Secondo gli Autori, il caso può risultare utile nella pratica clinica in quanto allo stato attuale le indicazioni per eseguire un tampone auricolare non sono chiare e raramente vengono segnalate complicanze derivanti da tale procedura, apparentemente di semplice e routinaria esecuzione.

Introduction

The ear swab is a diagnostic test performed with a sterile swab, which is applied to the skin of the external ear to sample discharge or other pathological material in the auditory canal. The technique consists of inserting the distal portion of the swab into the suspected pathological material and applying mild pressure and a light rotational movement of the swab against the canal skin. The collected specimen is subsequently sent to the laboratory for microbiological and cultural examination, which can be integrated in an antibiogram. Although this is apparently a simple and routine procedure, the current international scientific literature fails to provide indications and guidelines for its use. In addition, the potential complications of the ear swab have not been described. For this reason, we share this particular medical case of a tympanic membrane (TM) perforation and other middle and inner ear complications experienced by an adult patient following an incorrectly performed ear swab.

Case Presentation

A 65-year-old woman was referred to a private outpatient clinic by her family physician to undergo a right ear swab with an antibiogram. The diagnosis was bilateral ear canal itching resistant to topical treatment, associated with tinnitus, for several weeks. During the procedure, the patient experienced sudden, intense ear pain, followed soon after by headache, dizziness and fever. The patient immediately complained about her symptoms to the examiner, but he reassured her and did not perform any otoscopy or recommend a specific treatment for her complaints. Over the next few days, the woman's clinical conditions did not improve: the patient felt increasing ear pain and began experiencing subjective hearing loss. Three days after the ear swab, whitish, foul-smelling ear discharge appeared. Therefore, she sought medical attention at the emergency department of a tertiary care hospital, where she was seen by an otolaryngologist. She was given a diagnosis of a TM perforation and subsequently prescribed empirical antibiotic therapy, both topical and systemic. Pure tone audiometry (PTA) was also performed, showing right-sided, pantonal mixed, mainly conductive hearing loss of a severe degree. The left ear threshold was normal, except for a mild degree of sensorineural hearing loss for frequencies ≥ 4 kHz. The patient's PTA for frequencies 250, 500, 1000, 2000 and 3000 Hz was 82 dB HL (Figure 1). Vestibular examination with Fresnel glasses had negative results. Six months later, a follow-up visit revealed total healing of the TM. Nonetheless, the severe degree of mixed-type hearing loss was still present on the affected side. At that time, the woman presented a pure tone audiogram she had undergone two years before the event, showing a normal hearing threshold bilaterally. A temporal bone CT scan performed after the six-month follow-up visit was negative for middle ear and mastoid disease.

Discussion

The international scientific literature lacks guidelines or indications concerning ear swabs and does not describe the possible complications deriving from this procedure. Nonetheless, family physicians and otolaryngologists routinely prescribe ear swabs, in most cases without the support of a rationale or a shared

indication, as in the present case.

Recent international guidelines on otitis externa, issued by Rosenfeld et al. [1], do not consider acute external otitis, defined as signs and symptoms of acute inflammation of the external auditory canal with onset < 48 hours, as an indication for performing an ear swab. Chronic external otitis, defined as a single episode lasting longer than four weeks or four or more episodes in one year [2], is also not included among indications. Chronic external otitis can be distinguished as infectious and non-infectious: the former type generally results from close recurrences of acute otitis externa sustained by antibiotic-resistant bacteria, while the latter type is a skin disease occurring more often in subjects affected by chronic dermatologic illnesses and/or diabetes mellitus. According to the scant literature on the topic, the indications for an ear swab should be limited to infectious otitis externa that fails to respond to local antibiotic therapy or to suspicion of fungal or mycobacterial infection [3]. In the reported case, the patient's family physician provided no definite written indication for the ear swab and failed to describe otoscopic findings or prescribe hearing tests, which might have helped to explain the origin of the coexisting tinnitus. Thus, the presence of secretions or other material in the woman's external ear at her first visit is unknown.

Possible acute complications during an ear swab include local foreign body injuries:

1. Trauma of the external auditory canal, causing skin laceration and subsequent bleeding;
2. Trauma of the middle ear with several consequences. These, depending on the intensity and depth of the trauma itself, include TM perforation, ossicular chain lesions, and oval and round window lesions. In this last case, trauma causes symptoms related to inner ear injury, such as hearing loss, tinnitus and dizziness. Actually, only malpractice by the examiner can cause these complications, which therefore can only be iatrogenic.
3. Possible late complications of an ear swab may include the following:
4. Infectious: otitis externa or otitis media, secondary to trauma;
5. Non-infectious: in the case of a middle ear injury, residual perforation with secondary conductive hearing loss or ossicular dysfunction arising from fibrous adhesions between ossicular elements themselves or from ossicular disarticulation. In the case of an inner ear lesion, sensorineural hearing loss, tinnitus and dizziness.

The case reported here includes several of these uncommon and seldom described complications. An a posteriori reconstruction of the sequence of events might be as follows: First, TM perforation occurred, due to improper execution of the ear swab. This caused the subsequent intense ear pain, headache and dizziness, which were all symptoms reported by the patient during and immediately after the procedure. A perforation of the TM was, in fact, subsequently diagnosed through otoscopy. Beyond the TM perforation, the patient's subsequent symptoms are possibly explained by a traumatic ossicular lesion, with consequent sudden vibrational energy transmission to the inner ear through the oval window. Trauma propagation to the fragile inner ear structures could explain the acute onset of tinnitus and dizziness. An early diagnosis and a consequent appropriate therapy could have relieved her early symptoms (ear pain and bleeding) and avoided at least part of the complications (otorrhoea). In particular, local and systemic therapy with corticosteroids and antibiotics [4], together with abstaining from bathing the ear in water,

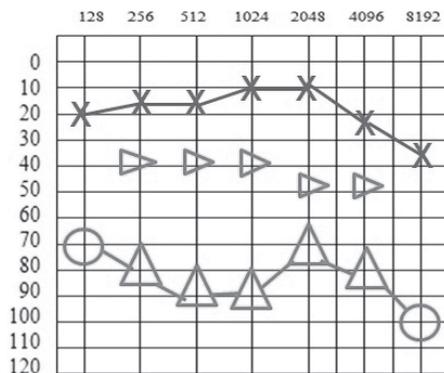
could have confined the TM perforation and supported faster healing.

Persistence of conductive hearing loss after ear trauma, even when complete reparation of the TM is observed, is documented in the literature and generally unanimously attributed to dislocation of the incus [5]. In the present case, stapes dislocation can also be hypothesised, owing to the severe degree of hearing loss and effects on the sensorineural components. However, only surgery, consisting of middle ear exploration, could clarify the type and extent of any ossicular injury.

In previous literature, TM perforation has been reported as a complication of cerumen impaction treatment. The important recent update of the 2008 American Academy of Otolaryngology–Head and Neck Surgery Foundation cerumen impaction clinical practice guideline [6] reports that manual removal of cerumen may be performed with a curette, probe, hook, forceps or suction under direct visualization with headlight, otoscope or microscope. The training, skill, and experience of the clinician play a significant role in the treatment option selected [7]. Though generally safe, manual treatment of a cerumen impaction can result in significant complications. TM perforation, ear canal laceration, infection of the ear, bleeding, or hearing loss occurs at a rate of about 1 in 1000 ear irrigations [8-9-10]. In the United States, about 8000 complications occur annually and likely require further medical services. Other complications that have been reported include otitis externa (sometimes secondary to external auditory canal trauma), pain, dizziness and syncope. Specific measures used to clean the ears range from washing the outer ear with soap and water to inserting objects into the ear canal (e.g., bobby pins, cotton-tipped swabs, paper clips). Approximately 9% of reported injuries to the ears are a result of cleaning, including skin abrasions, eardrum perforation and cerumen impaction [11].

In conclusion, although the ear swab is an apparently simple and routine procedure, it is often prescribed and performed by clinicians in the absence of any real indications. Complications are rare, but can include TM perforation caused by a wrong procedure, even by a professional. In these cases, a prompt diagnosis is crucial if the patient is to receive the most appropriate medical treatment.

Figure 1. Pure tone audiogram of the patient.



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