Case Report

Middle Ear Osteoma Causing Mixed Hearing Loss: A Case Report

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Osteomas are the most common tumors of the temporal bone [1]. They mostly occur in the external auditory canal, although rare cases have been observed in the middle ear space [1, 2]. Middle ear osteomas (MEOs) are benign lesions arising from the bony structures of the middle ear and epitympanum [3]. They are often clinically silent and only discovered at otoscopy. If not, presenting symptoms depend on their specific location, such as the promontory and the epitympanum or their contact with critical structures, such as the facial nerve, the semicircular canal, the ossicles, and the oval or round windows [4]. The most commonly reported symptom is unilateral progressive conductive hearing loss induced by ossicular chain compromise [5]. This case report describes a case of an MEO causing mixed hearing loss by being in contact with the incus, stapes, and oval window.

INTRODUCTION

Osteomas are the most common tumors of the temporal bone [1]. They mostly occur in the external auditory canal, although rare cases have been observed in the middle ear space [1, 2]. Middle ear osteomas (MEOs) are benign lesions arising from the bony structures of the middle ear and epitympanum [3]. They are often clinically silent and only discovered at otoscopy. If not, presenting symptoms depend on their specific location, such as the promontory and the epitympanum or their contact with critical structures, such as the facial nerve, the semicircular canal, the ossicles, and the oval or round windows [4]. The most commonly reported symptom is unilateral progressive conductive hearing loss induced by ossicular chain compromise [5]. This case report describes a case of an MEO causing mixed hearing loss by being in contact with the incus, stapes, and oval window.

CASE PRESENTATION

Written informed consent was obtained from the patient for publication of this case report and for any accompanying images from his audiogram or computerized tomography (CT).

A 23-year-old male patient was referred for right-sided mixed hearing loss. The deafness had appeared progressively over a few years and had worsened over the last year. On otoscopy, the tympanic membrane was normal, and no tumor was visible at its contact or behind. There was no otorrhea, pain, tinnitus, facial nerve weakness, or vestibular symptoms nor history of ear infection or prior surgery. Vestibular and head and neck examination were normal. The fistula test was negative. The patient had no other disease of any kind. There was no history of noise exposure, head trauma, or familial hearing loss. At audiometry, the air conduction pure-tone average (PTA) and bone conduction PTA of the right ear were 50 and 30 dB hearing level (HL), respectively. The mean air-bone gap was 25 dB HL. A Carhart notch was observed at 2000 Hz. The speech reception threshold was 45dB. Left hearing was subnormal (PTA=12 dB HL) (Figure 1). An on-off effect at right acoustic reflex testing was observed at tympanometry. This was highly suggestive of a right-sided otosclerosis.
A middle ear high-resolution computerized tomography (HRCT) scan that was requested for confirmation revealed a hyperdense homogeneic mass of calcic tonality and bone density (1265 Hounsfield units) in the right middle ear at the level of the upper mesotympanum (Figures 2-5). Measuring 5.9×4.6×2.7 mm, it appeared irregularly shaped (Figure 4) and involved the promontory, the three ossicles (Figures 3-4), and the fallopian canal bone (Figure 5) at the level of its tympanic portion. There was a bony continuity between the latter and the lesion. There was no evidence of bony erosion or associated soft tissue mass that would have suggested the differential diagnosis of ossifying hemangioma. The CT characteristics of this mass and its connection with the facial nerve and the stapes led to the definite diagnosis of MEO. Surgical removal was denied to the very high risk of facial nerve and inner ear lesion. We advocated clinical monitoring and imaging to evaluate the progression of the disease. The patient has declined a regular hearing aid because of the importance of water sports hobby in his personal life and minor hearing discomfort. A BONEBRIDGE™ implant (MED-EL, Innsbruck, Austria) was proposed in the event of major discomfort in order to close the air-bone gap and improve bone conduction.

The 1 and 2-year CT monitoring had shown a stabilized size. Symptoms were also stable.
The main differential diagnosis is exostosis. However, exostoses, which occur only in the external auditory canal, are non-tumoral multiple, bilateral, broad-based elevations of the tympanic bone in response to repeated exposure to cold water, whereas osteomas are solitary, unilateral, pedunculated tumors of unknown origin that may invade the middle ear.

In most cases, the diagnosis is made by HRCT. If required, confirmation may be obtained histopathologically during exploratory surgery. The main differential diagnosis is exostosis. However, exostoses, which occur only in the external auditory canal, are non-tumoral multiple, bilateral, broad-based elevations of the tympanic bone in response to repeated exposure to cold water, whereas osteomas are solitary, unilateral, pedunculated tumors of unknown origin that may invade the middle ear.

In 2014, Yoon et al. conducted a literature review and found 35 cases of MEOs in the literature. Of the 38 cases of MEOs reported in the literature, only one patient did not undergo surgical resection. This is probably due to the fact that the incidence of such lesions is underestimated in the literature so the percentage of those operated on is likely overestimated. Indeed, only growing lesions necessitating surgical removal have been reported to date. Many of these lesions only invade the promontory and are monitored only otoscopically. By focusing on those MEOs contacting the stapes and facial nerve, we underline the fact that their surgical treatment is highly challenging. The surgeon must be aware that potential tumor growth threatens mid-term facial nerve and hearing function in these young subjects. Fortunately, their growth is slow, and significant clinical issues are rare. If the tumor is pedunculated and small, it seems better to remove it. If it is contiguous to the tympanic segment of the facial nerve with no preoperative facial weakness, it may be partially removed to prevent any definitive postoperative facial nerve injury.

According to Thomas, long-term monitoring of MEOs is a viable solution, especially when they are asymptomatic. A periodic evaluation rather than surgical exploration is probably preferable. Anyway, close clinical monitoring is needed throughout the patient’s life since MEOs are known to penetrate the inner ear or injure the facial nerve and cause facial palsy, vertigo, or sensorineural hearing loss, as in the case reported by Hornigold.

Even if Wegner et al. think that preoperative CT has little to add in confirming otosclerosis, and that it may not be necessary to confirm the diagnosis before surgery in case of eloquent history, stapedius reflex testing, and pure-tone audiometry. We would recommend as the official recommendations of the French ENTSociety (SFORL) a systematic preoperative CT, not only to diagnose otosclerosis but
also to eliminate alternative diagnoses that are not rare. Indeed, CT demonstrates a high rate of this alternative diagnoses in suspected otosclerosis, one-third according to Dudau et al. [13]. We think as well as Parra et al. [14] that preoperative imaging analysis of the oval window width and the facial promontory angle can predict operative difficulty in otosclerosis surgery. Every patient in our service with otosclerosis suspicion has a preoperative CT, and not only for those with suspected additional abnormalities, specific preoperative planning, or out of legal necessity as Wegner et al. [12].

CONCLUSION
It is rare for MEOs to be located like this one. Early recognition and regular clinical and CT monitoring are imperative since surgical removal seems too risky to be attempted. This case also supports the etiological theory of osteomas caused by chronic middle ear inflammation despite no previous subjective or objective otitic history, as in this patient.

Informed Consent: Written informed consent was obtained from patient who participated in this study.

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