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SHORTENED STAPEDIUS TENDON: A RARE CAUSE OF CONDUCTIVE HEARING LOSS – A CASE REPORT

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Abstract
Introduction: Anomalies of the stapedius tendon have been reported to cause conductive hearing loss, as such anomalies theoretically limit the movement of the stapes.
Objectives: To present a rare cause of conductive hearing loss due to an anomaly of the stapedius tendon and compare the clinical findings of this case with other reported stapedius tendon anomalies in the literature.
Method: This is a case report of a patient with a shortened stapedius tendon, accompanied by a review of the relevant literature on stapedius tendon anomalies.
Results: A 13-year-old boy with a shortened stapedius tendon, leading to unilateral hearing loss, is presented. Unlike other reported cases, this patient did not have an ossified tendon, but rather an extremely short one. The patient regained normal hearing following excision of the stapedius tendon.
Conclusion: A shortened stapedius tendon is an exceptionally rare diagnosis, but it should be considered as a potential cause of conductive hearing loss.
Keywords: Conductive Hearing Loss, Stapedius, Tendons, Anatomy, Middle Ear, Embryology.

Background

Conductive hearing loss is a common condition in both the adult and pediatric populations. The most common causes of conductive hearing loss in children are cerumen impaction and middle ear effusion.

Ossification of the stapedius tendon has been reported to cause conductive hearing loss. Additionally, the possibility of familial inheritance has been described. Ossification leads to an immobilized stapes, resulting in conductive hearing loss. In theory, a shortened stapedius tendon can cause conductive hearing loss by the same mechanism as an ossified stapedius tendon, by limiting the movement of the stapedius.

We present the case of a 13-year-old boy who was diagnosed with a shortened stapedius tendon intraoperatively. The patient benefited from a surgical release of the shortened stapedius tendon, resulting in significant hearing improvement. Since no identifiable images were obtained, and in accordance with our institution's review board, consent from the patient or his family was not required.

The patient had previously undergone several sets of pressure-equalizing tube insertions in the ear without any improvement in hearing. There was no family history of hearing loss.

On otoscopic examination, both tympanic membranes appeared normal. An audiogram revealed a unilateral, left-sided mixed hearing loss of up to 50 dB HL at low frequencies, with normal hearing in the right ear (Figure 1). Stapedial reflexes were absent on the left side. Tympanometry was normal bilaterally. After discussing the advantages and disadvantages of imaging techniques with the patient and his family, it was decided not to perform a computed tomography (CT) scan. The patient was scheduled for a middle-ear exploratory tympanotomy.

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Intraoperatively, the left tympanic membrane appeared normal, and the middle ear looked normal. The malleus was palpated to assess the mobility of the ossicular chain. Although the malleus was mobile, transmission through the incus and stapes was poor, with limited movement at the stapes. Further assessment revealed a normal-looking incus and stapes but an extremely short stapedius tendon. To improve the mobility of the ossicular chain, the stapedius tendon was severed.

Postoperatively, the patient reported significant improvement in hearing in the left ear, which was confirmed by normal audiometric testing (Figure 1). This confirmed the intraoperative diagnosis of a shortened stapedius tendon as the cause of ossicular chain immobility. The patient was followed up in the otology clinic for another year with no deterioration in hearing.

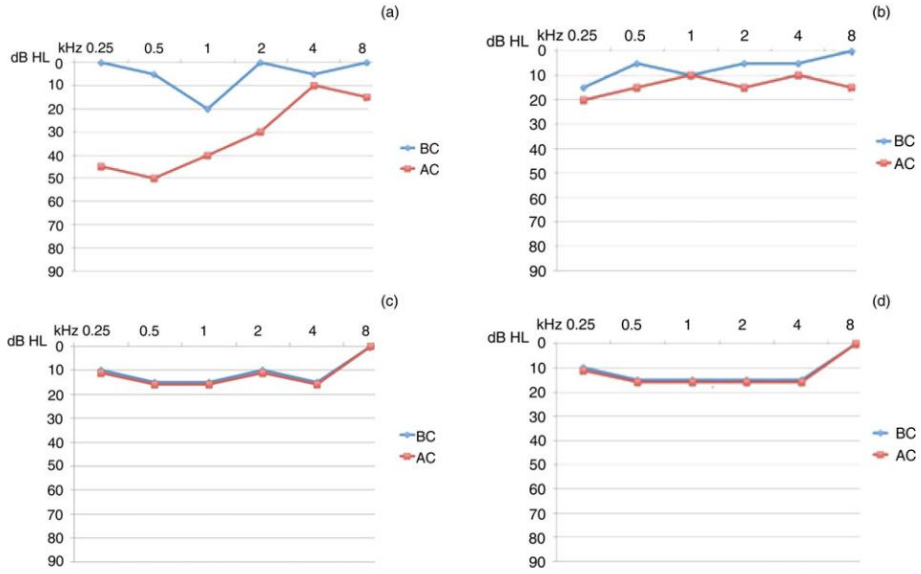

FIG. 1Results of the pre- and post-operative audiograms: (a) pre-operative audiogram of the left ear; (b) post-operative audiogram of the left ear; (c) pre-operative audiogram of the right ear; (d) post-operative audiogram of the right ear. BC = bone conduction; AC = air conduction.

Discussion

The first reported case of an ossified stapedius tendon was documented by Schuknecht and Trupiano. They described a bony bridge emerging from the apex of the pyramidal eminence and inserting into the neck of the stapes, which caused conductive hearing loss. Following this report, seven similar cases have been documented. In all of these reports, an ossified stapedius tendon was the cause of the conductive hearing loss.

The musculature of the second pharyngeal arch forms the stapedius muscle, the stylohyoid muscle, the posterior belly of the digastric muscle, and the muscles of facial expression. The interhyale is the internal part of the second branchial arch that forms the tendon of the stapedius muscle during embryonic development. A congenital absence or deformity of the tendon is a known anomaly of the middle ear.

- Anomalies of the stapedius tendon are documented causes of conductive hearing loss.
- A shortened stapedius tendon can cause conductive hearing loss by limiting the movement of the stapes.

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- Pre-operative testing can aid in the diagnosis, but middle-ear exploration is usually necessary.
- A shortened stapedius tendon can be surgically managed by severing the tendon, thus allowing adequate movement of the stapes.

In contrast to the cases reported in the literature, our patient did not have an ossified tendon but rather a shortened tendon. In theory, both ossified and shortened stapedius tendons can cause conductive hearing loss by limiting the movement of the stapes.

An ossified stapedius tendon can sometimes be visualized on a high-resolution CT scan. In our case, a CT scan was not performed. Instead, we opted to conduct an exploratory tympanotomy.

In this case, because the tympanogram was normal, differentiating between ossicular chain disruption and fixation was not straightforward. Intraoperatively, it became clear that the ossicles were well-positioned and mobile, except for the stapes. Unlike other reported cases, this patient did not have an ossified stapedius tendon. The tendon was clearly visible and was simply too short for adequate stapes movement. Normal stapes movement was achieved by severing the stapedius tendon, resulting in normalized hearing postoperatively.

To our knowledge, this is the only case in the literature that discusses a shortened, non-ossified stapedius tendon as the cause of conductive hearing loss.

Conclusion

Various anomalies of the middle ear, including a shortened stapedius tendon, should be considered as potential causes of conductive hearing loss. While pre-operative investigations can provide useful diagnostic insights, middle-ear exploration may be necessary for confirmation.

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