BOHR International Journal of Current Research in Dentistry
2022, Vol. 1, No. 1, pp. 44–46
https://doi.org/10.54646/bijcrid.008
www.bohrpub.com

Persistence of Stapedial Artery, Our Experience – A Case Report

Snekha P. Dominic*, George Thomas, Joe Jacob and J. P. Jincy

Believers Church Medical College in Thiruvalla, Kerala, India
**Corresponding author: snekhadominic@gmail.com*

Abstract. Stapedial artery persistence is an uncommon issue to encounter in ordinary ear, nose, and throat practice. If they are, they typically show up as a pulsatile mass or as a sneaky discovery. Due to the condition's rarity, most individuals are asymptomatic, but occasionally it can induce vertigo, pulsatile tinnitus, or conductive hearing loss in certain people. We hereby present a case of incidental discovery of a persistent stapedial artery in a patient with complaints of nasal obstruction.

Keywords: Persistent stapedial artery, tinnitus, intratympanic mass.

INTRODUCTION

The stapedial artery is a simple vascular structure that develops in about the third month of fetal development in humans (1). The stapes gets its stirrup-like shape from the stapedial artery, which frequently appears throughout the development of the human embryo. The expected prevalence of this uncommon postembryonic persistence ranged from 0.02% to 0.48% (2).

CASE REPORT

A 44-year-old man who had been complaining of nasal blockage and discharge for a month came to see us at the ear, nose, and throat outpatient department. He also describes three previous episodes of meningitis, the most recent of which occurred when he was 15 years old. Afterwards, he noticed left-sided decreased hearing and preferred the right ear for telephonic conversations. He also noticed tinnitus in the left ear. It was not associated with any complaints of ear discharge or ear pain.

On examination, the patient was afebrile; vitals were stable. Anterior rhinoscopic examination revealed a mild deviated nasal septum to the left, with pale nasal mucosa. No nasal discharge or polypoidal changes are appreciated. He was evaluated and had a blood panel for allergy testing which was reported as within normal limits. He was managed as a case of allergic rhinitis and started on antihistamines. On review after 1 week, patient gave relief of his nasal obstruction but reported that his tinnitus, even though it was not affecting his routine functions, persisted. On otoscopic examination, the left ear showed an intact tympanic membrane with a retro-tympanic mass along the anterior quadrant of the middle ear which was pulsatile, the pulsation synchronous with carotid pulsations. No blanching on pressure over carotids on sigelisation was observed. The right ear showed normal, intact tympanic membrane. The rest of the findings were normal.

The pure tone audiogram shows the left ear shows profound hearing loss with a pure tone average of around 60 db with a fall in air conduction in all frequencies with an AB gap greater than 60 db. Right ear thresholds were within normal limits. On impedance an "A" type curve with ipsilateral reflexes present in the right ear, with inability to attain seal in the left ear. High-resolution computed tomography of the temporal bone was found to have diffuse bony changes, with areas of demineralization and sclerosis involving the left temporal bone, adjacent sphenoid, occipital, and left half of C1 vertebrae. Erosions of the tegmen tympani, petrous apex, adjacent carotid canal, and jugular bulb are noted. Linear soft tissue density in the left middle ear cavity's superior aspect, next to the cochlea, is suggestive of the potential presence of a persistent stapedial artery. The ear ossicles are normal in position. The mastoid air cells are not opacified.

DISCUSSION

The internal carotid artery gives birth to the stapedial artery, which enters the middle ear in the anteroinferior

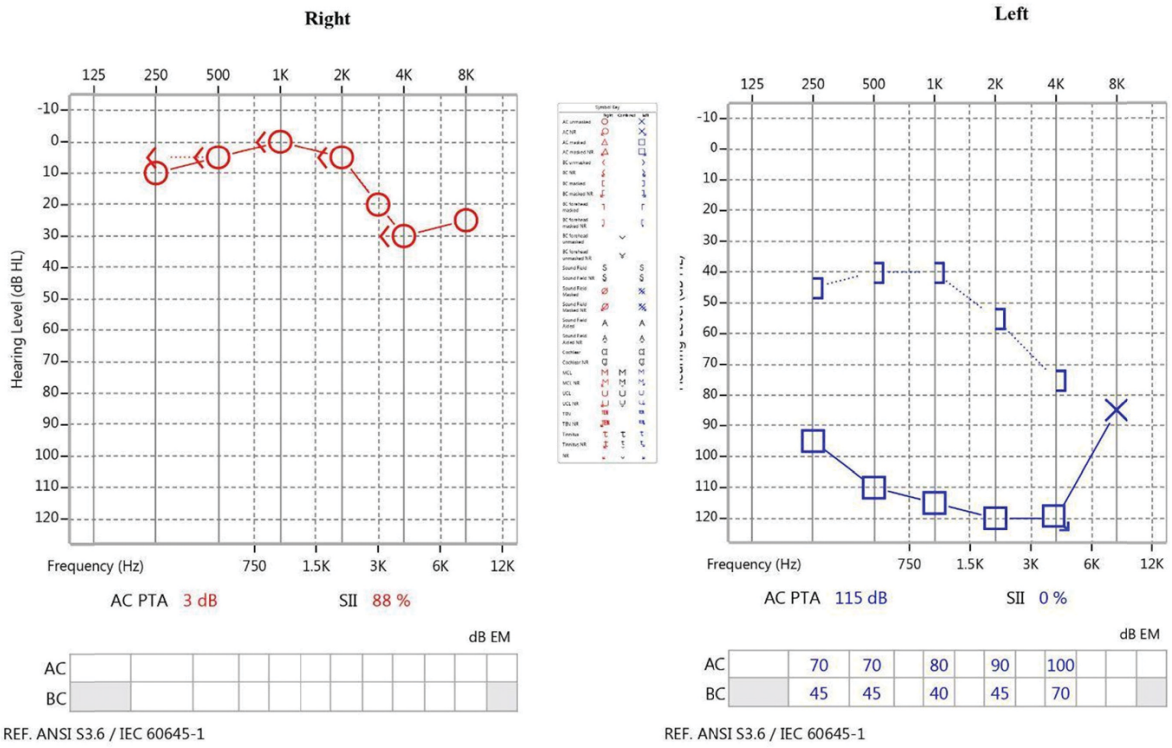

Figure 1. Showing left profound hearing loss.

quadrant, proceeds forward through the stapes' obturator foramen, and then turns anteriorly into the horizontal segment of the bone canal by a dehiscence. They later enter through the middle cerebral fossa, where they end up in the middle meningeal artery. The stapedial artery's two main divisions are maxillomandibular and supraorbital divisions. The anterior branch of the middle meningeal artery eventually divides from the supraorbital branch, which anastomoses with the ophthalmic artery. The internal maxillary artery, which serves the lower face, infraorbital, and inferior alveolar areas, anastomoses with the maxillo-mandibular division. As the stapedial artery stem atrophys, the external carotid artery anastomosis frequently replaces both of these divisions. When this transition fails, the ocular artery or persistent stapedial artery supplies the middle meningeal artery.

Various series have different incidences of stapedial artery persistence. According to Moreano et al.'s study on dissections, it accounts for 0.01% to 0.02% of procedures for otosclerosis (4) (5). The persistent stapedial artery has four different anatomical types, each of which is

- Aorta hyodo-stapedial

The internal carotid artery of the intrapetrous region instantly gives way to the persistent stapedial artery, which proceeds down the promontory, begins by the floor of the tympanic cavity, and eventually travels between the two branches of the stapes. The second portion of the artery, which connects to the fallopian canal before traversing

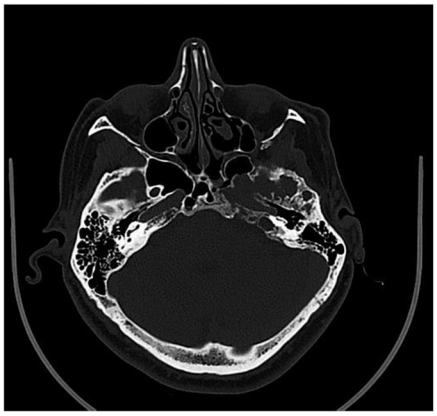

Figure 2. Shows diffuse bony changes with areas of demineralization and sclerosis noted involving left temporal bone, adjacent sphenoid, occipital.

the base of the skull at the level of the geniculate ganglion, forms the middle meningeal artery. This sample has the inferior branch of the stapedial artery since it was still growing at 6 weeks. Here, the internal carotid artery divides into the middle meningeal artery.

- Aorta, pharynx, and spine

The external carotid artery or, more often, the middle cerebral artery may be the source of the pharyngeal artery. In this instance, the internal carotid artery after passing through the stapes branches and the Jacobson nerve to reach the tympanic cavity, the middle meningeal artery

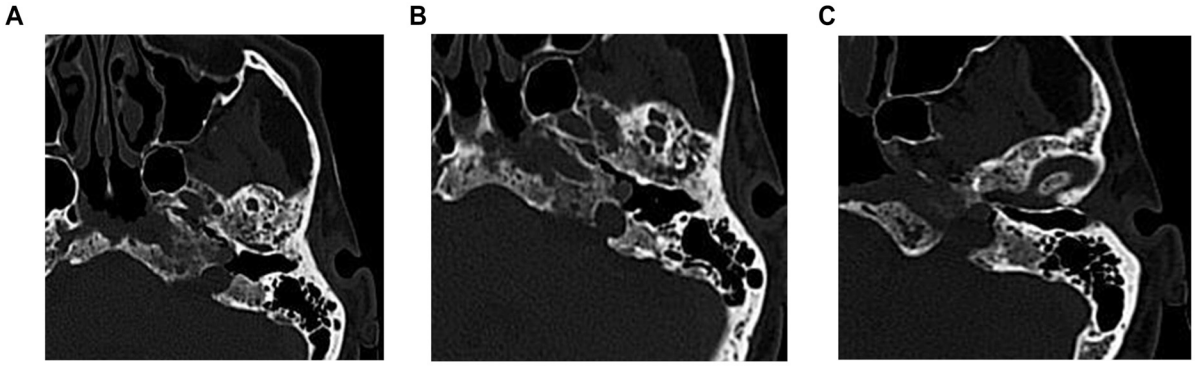

Figure 3. (A–C) shows linear soft tissue density in superior aspect of left middle ear cavity, abutting anterior aspect of Cochlea suggestive of persistent stapedial artery.

travels along the promontory until emerging from the center of the base of the skull at the level of the geniculate ganglion and returning to the fallopian tube the way it was. In this instance, the ascending pharyngeal artery gives birth to the middle meningeal artery.

- The pharyngo-hyo-stapedial artery

The ascending pharyngeal artery and the hyoid artery are the sources of the stapedial artery in the situation under discussion, a straight internal carotid artery branch. The hyoid artery and the stapedial artery showed no signs of resorption. Thus, this vascularization type resembles the embryological seventh week the most. This form is unique since just one example has been recorded up until this point. (6)

- Both the stapedial and internal carotid arteries are permanent.

Stapes artery persistence is mostly asymptomatic or undiscovered. The occlusion of the stapes footplate, pulsatile tinnitus, or vertigo, however, can occasionally cause conductive hearing loss. As a result, imaging must be routinely carried out when there is conductive hearing loss or pulsatile tinnitus with normal otoscopy (4). Understanding the stapedial artery's path, which leaves a dehiscence for organism access to the meninges, can also help explain the very high prevalence of meningitis.

The typical approach relies on the size of the vessel in cases of unexpected findings during surgery, especially for otosclerosis surgery: if the artery is tiny and the footplate is visible, the footplate can be fenestrated. To prevent unintentional bleeding during fenestration, abstinence is the rule in other situations. Additionally, instances of paralysis or facial paresis following deliberate stapedial artery coagulation have been recorded. Four examples of straightforward coagulation have been described by other writers. (3)

CONCLUSION

Persistence of the stapedial artery is a very rare anatomic variant. Its existence, which has mostly gone unnoticed due to its benign nature, could be detected as an insidious finding by a high resolution CT scan. The absence of the foramen spinosum on plain radiographs or CT scans can be a clue to the diagnosis, but this appearance is general and can also occur when the middle meningeal artery originates from the ophthalmic artery. The imaging discovery of this change may suggest using considerable caution to prevent injury to the artery. It is frequently suggested to halt the operation.

REFERENCES

[1] Tien, Hui-chi; Linthicum, F. H. Jr. Persistent Stapedial Artery, Otology & Neurotology: November 2001 – Volume 22 – Issue 6 – pp. 975–976.

[2] Sanjuan M, Chapon F, Magnan J. An atypical stapedial artery. J Int Adv Otol. 2020 Aug;16(2):274–277.

[3] Hitier M, Zhang M, Labrousse M, Barbier C, Patron V, Moreau S. Persistent stapedial arteries in human: from phylogeny to surgical consequences. Surg Radiol Anat. 2013 Dec;35(10):883–891. doi: 10.1007/s00276-013-1127-z. Epub 2013 May 3. PMID: 23640742.

[4] Govaerts PJ, Marquet TF, Cremers C, Offeciers FE. Persistent stapedial artery: does it prevent successful surgery? *Ann Otol Rhinol Laryngol.* 1993;102:724–8. doi: 10.1177/000348949310200914. [PubMed] [CrossRef] [Google Scholar]

[5] Moreano EH, Puparella MM, Zelterman D, Goycoolea MV. Prevalence of facial canal dehiscence and of persistent stapedial artery in the human middle ear: a report of 1000 temporal bones. *Laryngoscope.* 1994;104:309–20. doi: 10.1288/00005537-199403000-00012. [PubMed] [CrossRef] [Google Scholar].

[6] Lefournier V, Vasdev A, Bessou P, Boubagra K. A persistent pharyngohyostapedial artery: embryologic implications. *AJNR Am J Neuroradiol.* 1999;20:271–4. [PMC free article] [PubMed] [Google Scholar].