

Introduction

Myringotomy with tympanostomy tube insertion is the most common ambulatory procedure performed on children in the United States with nearly 700,000 cases annually.¹ While the middle ear is routinely entered during these procedures without consequence, many vascular structures reside in close relation to the middle ear. Rarely, these vessels may violate the middle ear space placing them at risk during otologic procedures. Most commonly this includes a high riding jugular bulb, but may also include persistent stapedia artery, aberrant branching from internal carotid artery, or the internal carotid itself.²

Temporal bone studies estimate the thickness of the carotid canal wall to be ~ 0.5 mm, at a distance of only 2-8 mm from the tympanic annulus.² Prevalence of carotid canal dehiscence based on cadaver and CT studies has been shown to be between 1 – 7%^{3,4}.

We present the case of a patient from our institution with an incidentally noted aberrant internal carotid artery (ICA) coursing through the middle ear.

Patient

A 15 year old female with no past medical history was referred to our institution after a vascular lesion was visualized in the left middle ear during routine physical exam by her pediatrician. She had mild left-sided conductive hearing loss at 250 Hz on audiologic testing and was otherwise asymptomatic.

CT angiography demonstrated an aberrant left internal carotid entering the skull base through an enlarged tympanic foramen and coursing within the inferior aspect of the middle ear cavity. There was an associated absence of the foramen spinosum on the left. In the neck, there was an anomalous origin of the occipital artery from the left internal carotid artery. Presence of a persistent stapedia artery could not be determined due to lack of detail on the study. The patient has been observed and is doing well at her six month follow-up appointment.



Figure 1. Otoscopic view showing the vascular lesion visualized in the posteroinferior quadrant of the tympanic membrane.



Figure 2. CT angiography demonstrating aberrant course of the internal carotid artery within the left middle ear space (black arrow).

Discussion

Multiple theories exist to explain the etiology of an aberrant ICA course into the middle ear. The alternate blood flow theory proposes that the C1 portion of the ICA involutes due to persistence of the pharyngeal artery system with resultant blood flow to an enlarged inferior tympanic artery and retrograde flow via caroticotympanic vessels into the horizontal segment of ICA. This is associated with an enlarged tympanic foramen, which was noted in our patient. Alternative theories propose that persistence of embryologic vessels (e.g., stapedia artery) may pull the ICA into the middle ear.⁵ The presence of a persistent stapedia artery could not be determined in our patient.

Patients may present with nonspecific symptoms such as hearing loss, aural fullness, or tinnitus. Frequently, they are asymptomatic. Imaging with CT angiography is often required for accurate diagnosis once there is suspicion..

Conservative treatment with observation is recommended for patients with incidentally diagnosed lesions. In the event of injury or bleeding, the ear should be immediately packed and evaluated by angiography in the event that endovascular control is warranted..

Conclusion

- The internal carotid artery may take an aberrant course through the middle ear placing it at risk during otologic surgery.
- Suspicious lesions noted on otoscopy should be further evaluated with CT angiographic imaging prior to further intervention.

References

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