Pulsatile tinnitus relieved by ear pressure case report

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Short Report

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Abstract

This study presents a rare case of pulsatile tinnitus. A middle-aged woman presented with new-onset pulsatile tinnitus that resolves upon applying pressure anterior to the helix root. Upon detailed physical exam, we observed congestion and hyperemia on the affected side. CT angiography of the head and neck revealed an arteriovascular malformation along the temporal artery. The patient underwent successful treatment with endovascular embolization.

Introduction

Pulsatile tinnitus is a subtype of objective tinnitus that requires assessment with imaging\(^1\). It can be categorized into arterial, arteriovenous, and venous subtypes\(^2\). There are also nonvascular causes of pulsatile tinnitus, like paraganglioma, otosclerosis and systemic disorders like anemia\(^3\).

Arteriovenous malformation (AVM) in the head and neck and dural arteriovenous fistula (dAVF) can both cause pulsatile tinnitus. The former is a less common etiology in pulsatile tinnitus, and consists of dilated arteries and veins (nidus), through which shunting occurs without an intervening capillary bed. It typically develops in adolescence or early adulthood but can remain asymptomatic beyond that period. On the other hand, dAVF is usually acquired and consists of an abnormal connection between an artery and vein without a nidus. AVM can easily be detected by magnetic resonance imaging (MRI), magnetic resonance angiography (MRA) or computed tomography angiography (CTA). On the other hand, 4D-CTA might be needed for dAVF diagnosis\(^3\).

Case Presentation

A 48-year-old woman presented to the clinic with mild right-sided pulsatile tinnitus. The symptoms began two years ago, with no associated otovestibular signs and symptoms such as hearing loss, otalgia, or vertigo. There is no history of head trauma. The patient is usually aware of it during periods of extreme quiet, such as when sleeping. She managed her symptoms by applying pressure anterior to the helix root, such as sleeping on the affected side or using digital pressure. Physical examination revealed a hyperemic and congested right ear compared to the opposite side (figure 1). An angio CT of the brain revealed an arteriovascular malformation (figure 2) supplied from the right external carotid artery mainly the temporal artery at the origin (figure 3). The vessels extend superficially and superior to the mastoid as well as around the lateral aspect of the temporomandibular joint (figure 4). No intracranial component of the vascular lesion is seen. Large superficial drainage veins are seen (figures 5). The middle ear cavity is clear, the middle meningeal and occipital arteries are symmetrical and not dilated, and the jugular foramen are patent. After undergoing endovascular embolization of the arteriovenous malformation, the patient reported symptom disappearance.

Methods
The ethics committee named “Ethics committee of the Eye and Ear Hospital University” approved this study protocol. The ethics approval number is 147.

**Discussion and conclusions**

Pulsatile tinnitus is identifiable in 70% of cases, often with an underlying cause. A thorough otologic and neurological examination is necessary, including an assessment of the tympanic cavity for masses. Audiometric evaluation can help identify potential causes such as otosclerosis. The choice of imaging depends on the clinical evaluation\(^3\).

Nolitha et al. reported a rare case of AVM, a congenital malformation that can also result from trauma. They presented a case of a pulsatile scalp mass originating from a superficial temporal artery AVM, which developed four years after head trauma. Surgical resection was performed\(^4\).

Surgery for AVM is indicated primarily for symptom relief and if necessary, for cosmetic purposes and to prevent hemorrhage. Incomplete removal can lead to recurrence rates as high as 8.7%. Other treatment options include endovascular embolization and sclerotherapy.

In this manuscript, we have presented a very unique case of pulsatile tinnitus that the patient can control it on her own because of the anatomical location of the AVM. Furthermore, we can learn that subtle physical exam is very important to not miss or to orient our diagnosis. Finally, the patient was very happy with the relief of her symptoms after our intervention.

**Declarations**

We declare that there is no funding or conflict of interest to report for this submission.

**Ethics Approval and Consent to Participate**

A written informed consent was obtained from the patient.

**Consent for publication**

The patient has given his consent for publication.

**Availability of data and materials**

Not applicable.

**Competing interests**

The authors have nothing to disclose.

**Funding**

None.
Author contributions

EK was the major contributor in writing the manuscript; SF was the radiologist who diagnosed and treated the patient. All authors reviewed the final manuscript and gave their consent.

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Not applicable

References


Figures
Figure 1

Hyperemic and congested right ear
Figure 2

Red arrow showing early filling of the right retromandibular vein indicating arterio-venous shunting. Blue arrow showing enlarged feeding external carotid artery
Figure 3

Yellow arrow showing dilated feeding right temporal artery compared to the normal left (thin blue arrow)
Figure 4

White arrow showing dilated vascular structures anterior to the EAC
Figure 5

Red arrow showing dilated venous structures compatible with arteriovenous malformation