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Pulsatile tinnitus associated with dehiscent internal carotid artery: An irremediable condition?

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ABSTRACT

Dehiscent internal carotid artery (ICA) in the middle ear is a rare condition, with conservative treatment primarily recommended. We report the case of a 63-year-old patient referred to the Ear, Nose, and Throat (ENT) ward for unbearable pulsatile tinnitus. Otoscopy revealed a normal right tympanic membrane, with pulsatile tinnitus but without hearing impairment. Based on imaging studies, including computed tomography (CT) and magnetic resonance imaging (MRI) of the temporal bone, as well as Doppler ultrasound of the internal carotid artery and sigmoid sinus, the diagnosis of ICA canal dehiscence into the tympanic cavity was established, thus excluding the diagnosis of aberrant ICA.

Following the patient's own request, we undertook surgical correction, with the technique used described in the report. Immediately postoperatively, the pulsatile tinnitus had disappeared, with no surgical complications noted. At the 9-month follow-up, otoscopy revealed a healthy right tympanic membrane and the patient reported no remaining symptoms.

1. Introduction

Tinnitus is defined as pulsatile when patients report a sound synchronized with the heartbeat. Unlike idiopathic tinnitus, pulsatile tinnitus is usually unilateral and less common, concerning <10% of all tinnitus patients [1]. This condition is not linked to abnormal auditory functioning, but rather to various oncological or vascular pathologies, such as vascular tumors, atherosclerotic lesions, or vascular malformations [2].

Pulsatile tinnitus, predominantly vascular in origin, results from turbulent blood flow within the internal carotid artery (ICA). The perceived pulsations are likely transmitted via the cerebrovascular fluid to the cochlea. In most patients suffering from pulsatile tinnitus, it is possible to identify its cause using imaging techniques, including first-line magnetic resonance imaging (MRI) centered on the posterior cerebral fossa and ideally magnetic resonance angiography (MRA) and Doppler ultrasound of the supra-aortic trunks. CT is, however, yet more valuable in this context of dehiscence, as illustrated herewith. CT allowed us to carefully assess the topographic relationships between the tympanic cavity and two major vascular axes, namely the ICA and sigmoid bulb of the internal jugular vein. When suspecting aberrant ICA or vascular tumors (in the event of abnormal otoscopy), MRA should nevertheless be preferred.

A dehiscent ICA canal, defined as a thinning of the bony plate that separates the ICA from the middle ear, can cause unspecific symptoms. Since this condition often mimics other middle-ear lesions, it is paramount that appropriate imaging be conducted prior to embarking on surgery in order to avoid life-threatening complications [3].

This article sought to illustrate that, for patients suffering from intractable symptoms, surgical intervention may be a sound option. We also aimed to outline the anatomic

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prerequisites before such an intervention be envisaged, since the procedure cannot be applied to all carotid bony canal anomalies. By means of the technique described, we demonstrated that surgical correction can, in fact, be effective, easy, and low-risk.

2. Case report

This 63-year-old male was referred to our tertiary ward by an ENT specialist after having suffered from pulsatile right-sided tinnitus for several months. The tinnitus was described as debilitating, synchronized with his heartbeats, and causing him to experience insomnia.

2.1. Preoperative assessments

Otoscopic examination revealed a pulsatile right eardrum synchronized with the rhythm of the heartbeats, without visible retrotympanic masses. Cerebral MRI, performed with slices centered on the posterior cerebral fossa, disclosed neurovascular conflict in his left ear, but no right-sided anomalies. It should be noticed that no MRA was carried out, as MRI had already been conducted before the patient was referred to our service. Of note is that even without angiography, aberrant ICA could reasonably be excluded (Fig. 1).

Audiometric testing demonstrated the onset of bilateral presbycusis and Type A tympanograms on both sides, with intact stapedial reflexes. In our center, we furthered our investigations using transcranial Doppler sonography of the supra-aortic trunks and temporal bone CT with thin slices. These preoperative assessments revealed ICA dehiscence extending several mm^2 into the tympanic cavity, involving its horizontal portion around the protympanum (Fig. 2), its pulsatile feature clearly visible (Fig. 3A). CT proved instrumental in definitely excluding an aberrant ICA.

2.2. Surgery

Because the patient complained of intense discomfort and requested a drastic solution, surgery was proposed. After he had been given a thorough explanation of the intervention-related risks and provided his consent, surgery was performed under

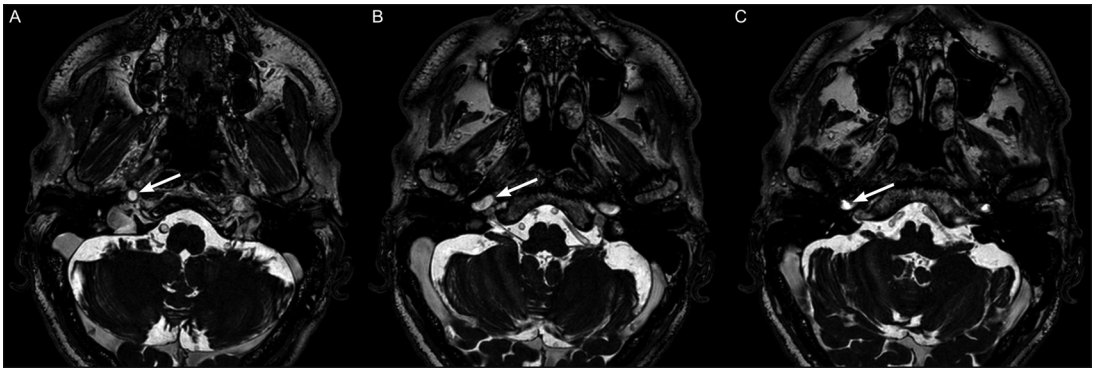

Fig. 1. (A–C) Preoperative MRI images with T2 CISS sequences without injection of gadolinium; arrows show the right ICA in a correct position.

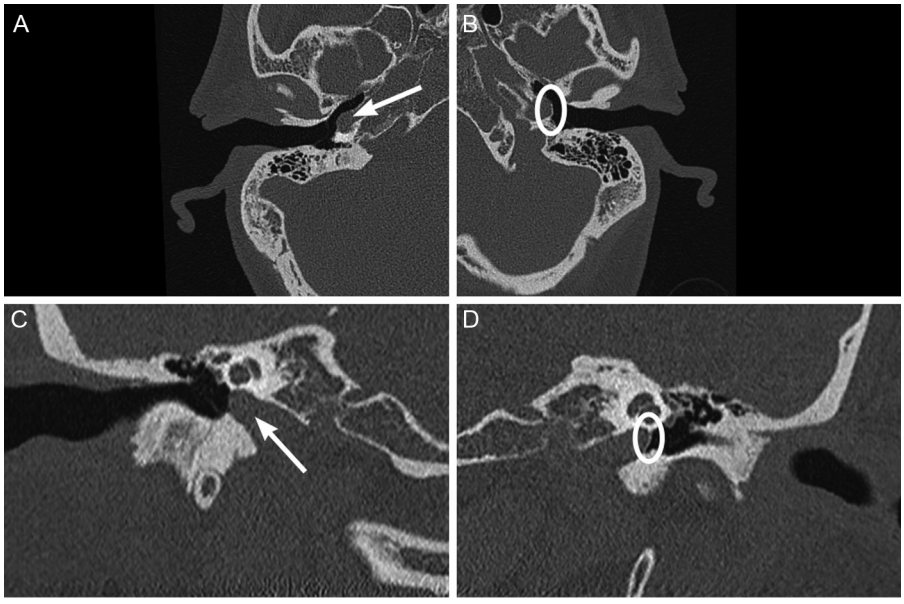

Fig. 2. Computed tomography scan without injection of contrast medium; axial slices of the right ear in which the defect in the bony covering of the internal carotid artery is clearly visible (arrow A, C); left ear confirming the correct bone cover of the ICA (circle B, D).

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