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Case Report

# An Aberrant Carotid Artery; Which is Underlying Cause of Unilateral Objective Tinnitus

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Aberrant internal carotid artery is rarely seen in the middle ear cavity. Aberrant internal carotid artery can mimic dehiscence of the jugular bulb, glomus tumours, haemangiomas, and cholesterol granulomas on computed tomography. Because the symptoms and signs are usually nonspecific or absent, clinical diagnosis of aberrant internal carotid artery is very difficult. The most common symptoms are pulsatile tinnitus, hearing loss, and retrotympanic mass. In this case, we report an aberrant internal carotid artery in the middle ear presenting with pulsatile tinnitus and hearing loss.

**KEY WORDS:** Tinnitus, aberrant carotid artery, hearing loss

## INTRODUCTION

The internal carotid artery (ICA) enters the petrous bone through the carotid canal. The vessel ascends vertically via the carotid canal and runs anteriorly to the cochlea and middle ear. It usually passes the middle ear covered with bone. Rarely, congenital or acquired lytic lesions can be seen on the bone around the ICA. Aberrant ICA is rarely seen in the middle ear cavity and these cases are encountered more often in females than males [1]. Aberrant ICA can mimic dehiscence of the jugular bulb, glomus tumours, haemangiomas, and cholesterol granulomas [2-4]. In the past, it was often found during ear surgery or biopsy and may cause massive bleeding and life-threatening complications [5]. Because the symptoms and signs are often nonspecific or absent, clinical diagnosis of aberrant ICA is very difficult. The most common symptoms are pulsatile tinnitus, hearing loss, and retrotympanic mass [4]. In this case, we report an aberrant ICA in the middle ear presenting with pulsatile tinnitus and hearing loss.

## CASE REPORT

A 54-year-old female presented with hearing loss and pulsatile tinnitus on her right side for 10 years. She had no history of acute or chronic otitis media, otorrhea, or facial nerve paralysis. The woman was a nonsmoker and had no family history of ear diseases. She also had no history of systemic diseases. The view of the tympanic membrane was intact and atrophic. There was a pulsatile, red-coloured mass behind the right tympanic membrane (Figure 1). The patient did not have any other pathological signs. An audiological examination showed 46 dB conductive hearing loss in her right ear and 36 dB sensorineural hearing loss in her left ear. An aberrant ICA was seen in the right middle ear on computed tomography (CT) of the temporal bone (Figure 2). Carotid artery angiography showed an abnormal course of the ICA (Figure 3). The patient was informed about her diagnosis and possible complications of middle ear operations. She was followed regularly on her outpatient controls for 1 year.

## DISCUSSION

Tinnitus is one of the most common symptoms in the population but objective tinnitus is a very rare condition. Objective tinnitus usually occurs due to vascular pathologies. This kind of tinnitus may be audible using an otoscope or a stethoscope. Aberrant ICA is a rare cause of pulsatile tinnitus.

The ICA enters into the temporal bone medial to the styloid process and anterior to the jugular vein through the carotid canal. It lies anteriorly to the cochlea and tympanic cavity. The vertical segment of the ICA is usually covered by a 0.5 mm thick bone wall in the middle ear cavity. This bony wall may be cribriform in childhood and may be resorbed in patients with chronic otitis media or some malignancies. Aberrant ICA is rarely seen in the middle ear cavity and in these patients, the ICA has an aberrant course toward the middle ear [1]. Aberrant ICA is usually seen in females and on the right side [1]. The cause of aberrant ICA is not well explained. This anomaly occurs by an embryogenic malformation of the first and second branchial arches.

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**Figure 1.** The view of the tympanic membrane is intact and atrophic. There is a pulsatile red mass behind the right tympanic membrane

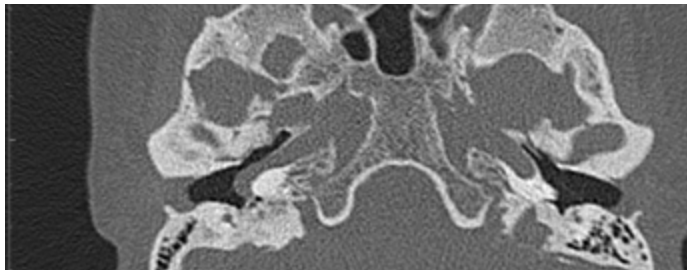

**Figure 2.** An aberrant internal carotid artery is seen in the right middle ear on computed tomography

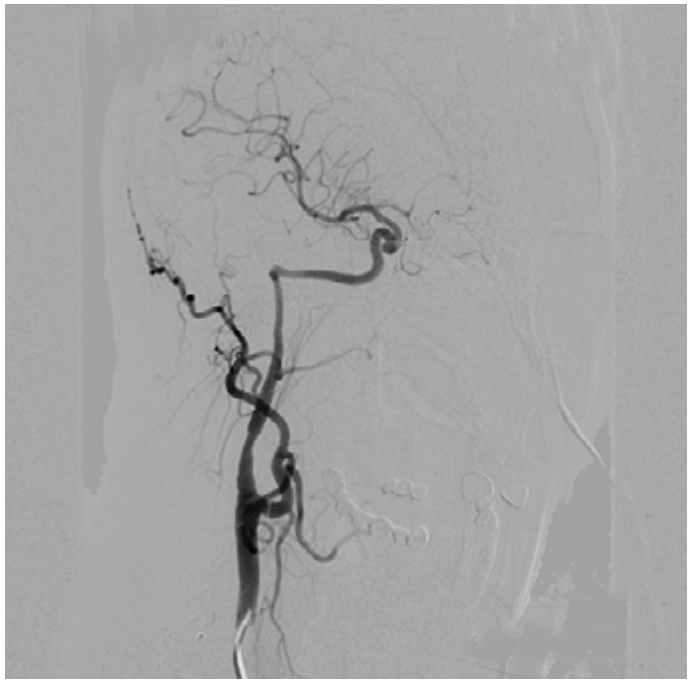

**Figure 3.** Abnormal course of the internal carotid artery is seen on carotid artery angiography

Aberrant ICA usually presents with pulsatile tinnitus and a red-blue mass behind the tympanic membrane [6]. If a coloured mass is seen behind the intact tympanic membrane, the initial diagnosis is usually glomus tumour. Arteriovenous malformations, high jugular bulb, cholesterol granulomas, and aberrant carotid artery are other possible diagnoses [7]. Because the symptoms and signs are nonspecific or absent, clinical diagnosis of aberrant ICA is very difficult. Objective pulsatile tinnitus, hearing loss, and a coloured mass behind the intact tympanic membrane are the most common symptoms of aberrant ICA. Sometimes this anomaly can be found incidentally [4, 8]. Most of the cases in the literature were diagnosed during middle ear surgery. The majority of cases suffered from massive haemorrhage, hearing loss, and neurological deficiency caused by surgery [9].

Aberrant ICA can be diagnosed by CT, magnetic resonance angiography, and conventional angiography. CT scan may easily determine the bone defect of the carotid canal in the middle ear [10]. Angiographic imaging can provide great visualisation of the ICA in the temporal bone [11].

If an aberrant ICA is diagnosed in the middle ear, the surgeon should primarily avoid the surgery [12]. Some authors suggested that the ICA should be separated from the middle ear by surgery. In these operations, they proposed covering a fascia or bone graft over the ICA [13].

In conclusion, aberrant ICA is a rare abnormality of the middle ear and it can be the cause of severe complications in middle ear surgery. It should not be ignored in patients with pulsatile tinnitus, hearing loss, and a coloured mass behind an intact tympanic membrane.

**Informed Consent:** Written informed consent was obtained from patient who participated in this study.

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