

Aberrant Internal Carotid Artery in the Middle Ear: a case report

RAYLEIGH PING-YING CHIANG^{1,3} CHIA-JUNG LEE¹ HSING-MEI WU¹ LIANG-KUANG CHEN^{2,3}

*Department of Otolaryngology¹, Shin-Kong Wu-Ho-Su Memorial Hospital
Department of Diagnostic Radiology², Shin-Kong Wu-Ho-Su Memorial Hospital
School of Medicine³, Fu Jen Catholic University*

Aberrant internal carotid artery in the middle ear is rare and may be misdiagnosed, leading to severe complications. Indeed, approximately 1% of new cases are misdiagnosed. We present here a case of aberrant internal carotid artery with the symptoms of aural fullness, hearing impairment, and vertigo. The aetiology, clinical characteristics, and management of this case are discussed. Our experience illustrates that after confirmation of the diagnosis of aberrant internal carotid artery, localized treatment and/or surgical procedures should be avoided.

Key words: Aberrant Internal carotid artery; Middle ear

Aberrant internal carotid artery (ICA) is a rare abnormal condition that can be associated with life-threatening ear bleeding [1]. Aberrant ICA is usually caused by erosion of the medial wall of the middle ear, congenital anomaly, or dilatation of ICA in the petrous part of temporal bone due to an aneurysm. Clinical symptoms associated with aberrant ICA include conductive hearing loss, pulsatile tinnitus, and vertigo. Due to the rareness of aberrant ICA, it is frequently misdiagnosed and confused with other conditions such as glomus tumours, dehiscent jugular bulb, and aneurysms. The misdiagnosis of aberrant ICA subjects patients to unnecessary explorative surgical procedures and/or localized treatment, which carry risks of massive haemorrhage or even hemiplegia. By reporting this case, we hope to share our experience of this rare condition, and illustrate diagnostic criteria that can be used to reduce the incidence of misdiagnosis of aberrant ICA.

CASE REPORT

A 70-year old female came to our clinic in October 2003. She presented with aural fullness, hearing impairment and vertigo, which had been ongoing for several months. The patient had coronary artery disease and had received percutaneous angioplasty on three occasions. Her eardrums were dull in the right ear. (Fig. 1). A pure-tone audiogram revealed mixed type hearing loss in the right ear (air-bone gap=17db) (Fig. 2). The tympanogram showed type B in bilateral ears. Our initial clinical impression was bilateral middle ear effusion with vertigo and oral medications were prescribed.

The vertigo improved after one week of medical treatment. However, other symptoms and signs did not improve after one month of medication. With the suspicion of prolonged middle ear effusion of both ears, tympanic aspiration of right ear was performed. However, active bleeding from the aspirated site of eardrum was noted immediately. After prompt packing with an epinephrine soaked gauze, the

Reprint requests to: Dr. Liang-Kuang Chen
Department of Diagnostic Radiology, Shin-Kong Wu-Ho-Su Memorial Hospital.
No. 95, Wen Chang Road, Taipei 111, Taiwan, R.O.C.

bleeding stopped within minutes and Surgicel® packing in right external ear canal was done thereafter. The residual packing was removed one week later and a regular bruit was noted in the right ear by a stethoscope. High resolution CT scan of temporal bone was performed and showed right side aberrant ICA with bony dehiscence of carotid canal (Fig. 3, 4). During 6 month-period of follow up, there was no other episode of aural bleeding or other complications.



Figure 1. Eardrum of right ear after removal of Surgicel®, a week after bleeding from the eardrum. There was some evidence of blood clots in the eardrum.

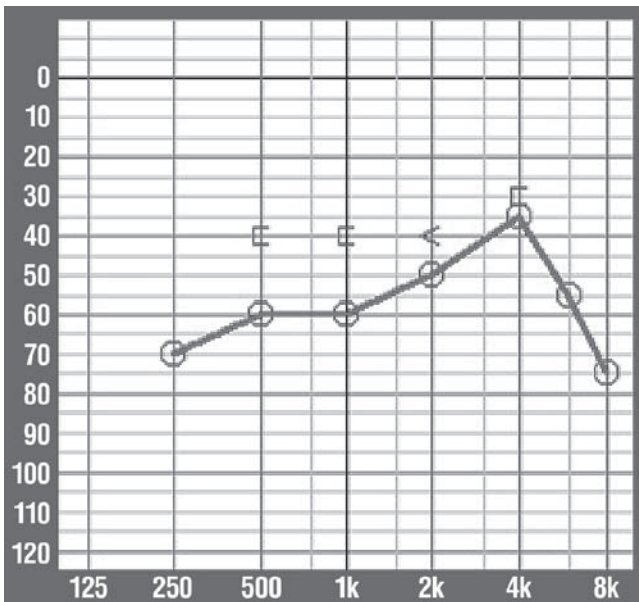


Figure 2. Audiogram of right ear. This audiogram revealed mixed type hearing loss.

DISCUSSION

Aberrant internal carotid artery is a very rare condition that was first reported by Max in 1899 [2].

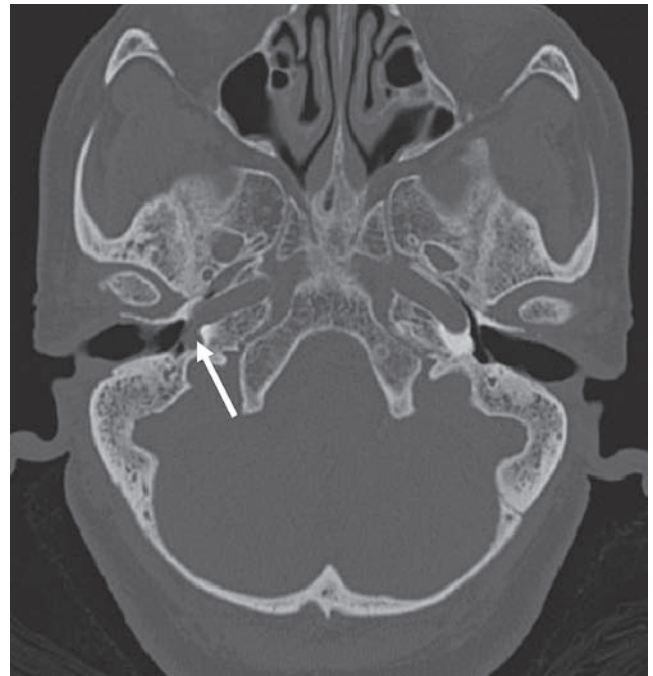


Figure 3. Axial view of CT scan of temporal bone showed a soft-tissue mass in the right middle ear space (arrow) continuous with the ICA



Figure 4. A high resolution CT scan of the temporal bone showed bony deficiency in the petrous part of ICA



Figure 5. Vertical segment of normal left ICA

Approximately 45 cases of aberrant ICA had been reported in English scientific literature by 2002 [3]. Of these cases, 75% affected the right ICA and more than 90% affected women. Clinical symptoms include pulsatile tinnitus, vertigo, progressive conductive hearing loss, and otalgia.

The internal carotid artery enters the temporal bone through the carotid canal. The initial vertical segment is separated from the middle ear cavity by a bony plate approximately 0.5mm in thickness. Rarely, the internal carotid artery takes an aberrant course and enters the middle ear cavity. There are several hypotheses regarding the formation of aberrant ICA [3]. The first hypothesis considers congenital or acquired defects in the bony plate that separates the ICA from the middle ear cavity to be the cause of aberrant ICA. The second hypothesis attributes this condition to the persistence of the embryonal vessels that alter the passage of the ICA. A third hypothesis states that aberrant ICA may be due to failure of the carotid canal to develop thus resulting in the altered route of the ICA.

Computed tomography (CT) scans and magnetic resonance angiography (MRA) are useful tools that provide excellent visualization of the temporal bone for the diagnosis of aberrant ICA. CT scan [4, 5] shows the characteristics of an enlarged inferior tympanic canaliculus, the absence of the vertical segment of the carotid canal, a dehiscent bony plate along the petrous part of the ICA, and the presence

of an enhancing mass in the hypotympanum. The absence of the vertical segment of the carotid canal and dehiscent bony plate along the petrous part of the ICA were noted in this case. In cases where a CT scan cannot allow for a definitive diagnosis, MRA can be used as an additional tool.

The relative position of eardrum in aberrant ICA is often in the anterior-inferior part. In contrast, the eardrum in dehiscent jugular bulb and glomus tumour is usually located in the posterior part.

The aberrant ICA is light red in colour, in contrast to the dark reddish blue of the glomus tumour and the dark blue of the dehiscent jugular bulb [4]. Pulsation is noted in glomus tumour and aberrant ICA. However, due to the sensorineural hearing loss component of this case, the pulsation was not mentioned as a symptom by the patient.

Management of aberrant ICA should avoid manipulation. It is essential for all physicians involved in the patient's care to keep this condition in the list of differential diagnosis [7, 8]. If any form of iatrogenic injury to an aberrant ICA occurs, immediate management including packing of the external acoustic canal, ICA ligation, or balloon occlusion should be undertaken [1, 3, 5, 6, 8].

CONCLUSION

The consequences associated with the failure to accurately diagnose aberrant ICA are serious and potentially life-threatening [9]. Aberrant ICA should be included in the differential diagnosis of the middle ear masses. Otolaryngologist should remain alert regarding the symptoms and signs discussed in this case report. Otoscopy and the audiometry should be performed with radiological investigations. CT scan is a useful tool for diagnosing aberrant ICA. When CT scans are inconclusive, MRA should be considered as an additional tool permitting the definitive diagnosis of aberrant ICA [9]. After confirmation of an aberrant ICA, localized treatment and/or surgery of the middle ear is contraindicated.

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中耳之異位性內頸動脈：病例報告

江秉穎^{1,3} 李佳融¹ 吳幸美¹ 陳良光^{2,3}

財團法人新光吳火獅紀念醫院 耳鼻喉科¹ 放射診斷科²
天主教輔仁大學醫學院 醫學系³

中耳之異位性內頸動脈是一種很稀有的病症，容易造成誤診，甚至引發嚴重的併發症。事實上，大約有百分之一的新病例是被誤診的。我們在此報告一個中耳之異位性內頸動脈的病例，其臨床上的表現為耳悶，聽力減退及頭暈。將探討病因，臨床上的特徵以及處理方法。我們的經驗顯示，當一個中耳的異位性內頸動脈確定診斷時，局部治療及耳朵的手術都是必須避免的。

關鍵詞：異位性內頸動脈；中耳

