



DEHISCENT INTERNAL CAROTID ARTERY CANAL IN THE MIDDLE EAR : – ALERT IN OTORHINOLARYNGOLOGY

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ABSTRACT

Dehiscent internal carotid artery (ICA) canal in the middle ear space is present in 1% of the population. The clinical diagnosis can be difficult as patients with this anomaly are either asymptomatic or have nonspecific clinical symptoms and signs. Moreover, the diagnosis can easily be missed because of absent symptoms. Further still, injury may occur to the ICA during middle ear surgery with resulting life-threatening complications. A knowledge of this anomaly and its differential diagnosis is of high importance to the ENT Surgeon. We report a 26-year-old female with a left dehiscent ICA canal presenting with ear discharge and reduced hearing with review of published studies.

KEYWORDS

Dehiscent, Internal carotid artery, Middle ear space

INTRODUCTION:

The presence of a vascular mass in the middle ear is rare. The diagnosis can range from an dehiscent internal carotid artery (ICA) canal, glomus tumour and haemangioma.¹ If the correct diagnosis is not made before middle ear surgery profuse blood loss may occur as a result of injury to the vessel which may be fatal sometimes.

A dehiscent ICA canal is present in approximately 1% of the population² and could result in the visible pulsation in middle ear. We report a patient in whom this condition was suspected on meticulous clinical examination of the ear and ear endoscopy. HRCT scan of Temporal bone confirmed the diagnosis of an dehiscent ICA canal in the middle ear.

CASE PRESENTATION

A 26-year-old female presented with decreased hearing and discharge from the right ear. Endoscopy of the ear revealed a large central perforation with pulsations visible in the antero-inferior quadrant. (Figure 1).

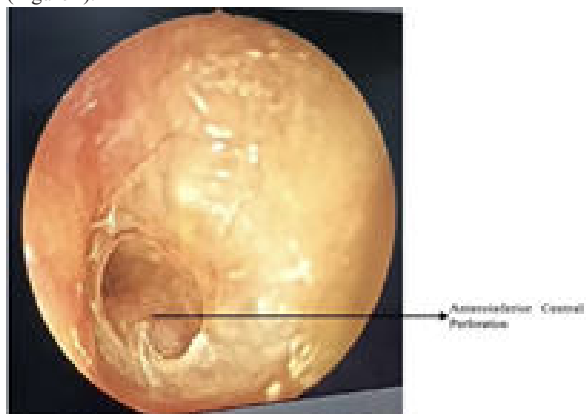


Figure 1:-Intra findings showing anteroinferior Central Perforation of Left Tympanic membrane with Dehiscent pulsating internal carotid artery

Pure tone audiometry showed a left moderate conductive hearing loss of 45 dB. The right ear was normal. The tympanometry and stapedia reflex were normal. High Resolution Contrast Tomography (HRCT) scan of Left side Temporal bone showed dehiscent ICA canal (Figure 2).

The condition was explained to the patient. Written consent was taken for loss of vision and hypoxic injury to brain. Endoscopic

tympanoplasty with repair of dehiscence was planned. Though tympanoplasty is routinely done under Local anaesthesia at our tertiary care centre but we preferred General Anaesthesia in this case as the slight head movement of patient during operation could be detrimental. Temporalis fascia graft harvested with a small incision in the supraauricular region. Margins of perforation were freshened. At each step due care was taken not to injure ICA. Trans canal incision was made lifting the tympanomeatal flap 270 degree, till the annulus. Handle of malleus denuded. There was a posteroinferior canal wall hump which was reduced by drilling carefully taking care not to injure the ICA. Middle ear was entered, ossicles were examined. Ossicles were found to be intact and mobile. Graft was placed in the middle ear by underlay technique with gel foam kept in the middle ear and external auditory canal. Tragal cartilage was placed over the bony dehiscence of ICA. (Figure 3)

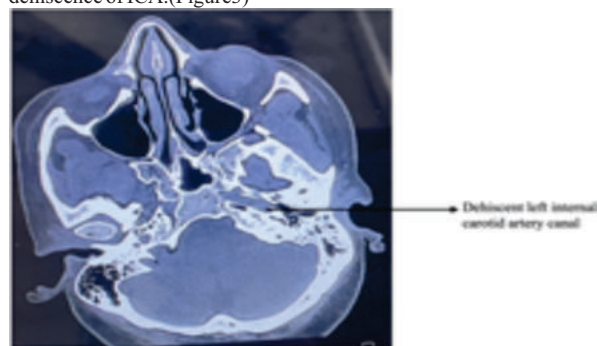


Figure 2 :-Axial HRCT view showing Dehiscent left internal carotid artery canal

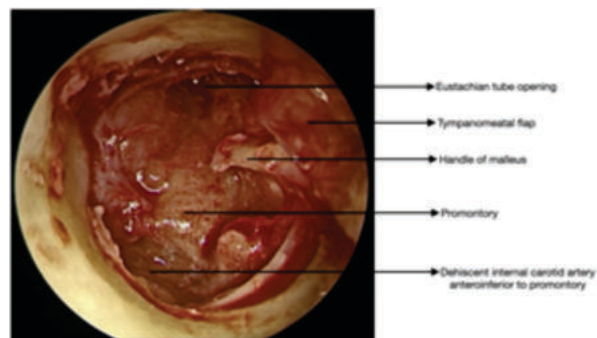


Figure 3:-Intraoperative -showing tympanomeatal flap elevation 270degree with posteroinferior hump reduction to visualize the annulus.

Post-operative day 1 dressing was done which was uneventful. The patient was discharged on day 2 with antibiotics, decongestants, and ear-drops for 14 days. Regular follow-up was done.

Graft was well taken up on the 6th week with pure tone audiometry showing air bone gap closure of 20 dB. (Figure 4)

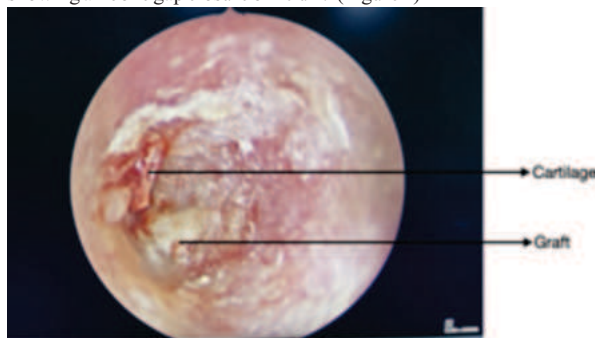


Figure 4:- 6 weeks Postop showing healed neotympanum post tragal perichondrium grafting [No tinnitus, No hearing loss]

DISCUSSION:

Vascular anomalies of the middle ear space are uncommon. Their symptoms and signs are nonspecific, causing a diagnostic dilemma. Patients with these anomalies may be asymptomatic or may present with complaints of reduced hearing, pulsatile tinnitus, ear pain, or aural fullness. On otoscopic examination, a vascular red-to-dark red or bluish swelling extending from the tympanic membrane to the middle or lower tympanic cavity can be observed. Such an observation should first raise the clinician's suspicion to one of the following possibilities: a dehiscent jugular bulb, a glomus tumour, cholesterol granuloma, or petrous carotid aneurysm with dehiscent bone. Dehiscent ICA² Hence, it is important to obtain a CT scan and/or an MR Angiogram before surgery if vascular anomaly is suspected in middle ear even in the absence of symptoms and signs.

Clinical diagnosis can be confirmed by performing the appropriate imaging examination vis-a-vis high-resolution CT scan of the temporal bone, MR Angiogram, CT angiography or conventional angiography. CT findings may reveal such a characteristic feature as an intratympanic mass contiguous with the ICA through a dehiscence of the lateral carotid plate and dilatation of the inferior tympanic artery canal.^{3,4} The classic finding in an dehiscent ICA canal is that the medial bend of the ICA is lateral to a line drawn vertically through the vestibule, as described by LaPayowker et al, in 1971.^{5,6} Also, common is displacement of the ICA posterior to the overlying image of the external auditory canal.⁷ The CT angiogram is fast becoming the radiological test of choice to look at disease of blood vessels.⁸ Wiindfuhr⁸ found that 68.6% of patients were females, and in 73% of cases, the right side was affected. He also found in his review that most patients were found to be under 10 years of age. The published data indicates a 15% incidence of bilaterality.⁹

The treatment of an dehiscent ICA canal in the middle ear space is controversial. In general, it is preferable to avoid any manipulation in the middle ear after the diagnosis has been established.^{4,10,11,12} Paralysis of the facial nerve and deafness,¹¹ Horner syndrome, conductive hearing loss,¹³ hemiparesis,⁴ aphasia, and intractable vertigo¹⁴ had been reported because of middle ear manipulation. However, several management strategies had been described. Sinnreich et al described the placement of a thick silicone sheet between the ossicular chain and the dehiscent ICA canal to reduce the pulsatile tinnitus.¹⁵ To prevent perforation of the vessel by the malleus handle, the malleus was removed¹⁶ or the incudostapedial joint disarticulated.¹⁷ Ruggles and Reed recommended separating the ICA canal by covering it with fascia, compressing it into the promontory, and placing a bone and fascia grafts in the defect.¹⁷

An emergency treatment in situations of severe bleeding requires packing of the ear canal and nasopharynx in case of nasal bleeding.^{2,8,18} Even if the packing must be replaced and left in place for several weeks because of recurrent bleeding,¹⁹ overpacking may damage the ICA and cause serious neurologic deficits.¹⁴ Recurrent mild bleeding does not indicate intervention: ICA ligation in the neck, balloon occlusion, or embolization should be reserved for emergency situations to avoid possible severe complications or death.^{18,20,21}

CONCLUSION:

Awareness of the existence of vascular anomalies in the middle ear is essential. Failure to suspect or diagnose such anomalies could lead to disastrous consequences. Once an anomaly is suspected, radiological investigations in the form of high-resolution CT scan or, preferably, MR Angiography should be performed before any middle ear surgery. The treatment of this condition is confirmed by clinical sign and symptoms, radiological evaluation. Careful surgical steps should be planned, once the condition is diagnosed.

Conflict Of Interests: none

REFERENCES:

- Ridder GJ, Fradis M, Schipper J. Aberrant internal carotid artery in the middle ear. *Ann Otol Rhinol Laryngol*. 2001;110:892-4.
- Goldman NC, Singleton GT, Holly EH. Aberrant carotid artery presenting as a mass in the middle ear. *Arch Otolaryngol*. 1971;94:269-73.
- Selesnick SH, Lessow AS. Aberrant internal carotid artery. *Am J Otol*. 1999;20:403-4.
- McElveen JT, Jr, Lo WW, el Gabri TH, Nigri P. Aberrant internal carotid artery: Classical findings on computed tomography. *Otolaryngol Head Neck Surg*. 1986;94:616-21.
- Millar S, Weill A, Maillard JC, Miaux Y, Chiras J. Aberrant ICA presenting in the midline retropharyngeal space. *Can Assoc Radiol J*. 1997;48:33-7.
- LaPayowker MS, Liebman EP, Ronis ML, Safer JN. Presentation of the ICA as a tumour of the middle ear. *Radiology*. 1971;98:293-7.
- Botma M, Kell RA, Bhattacharya J, Crowther JA. Aberrant internal carotid artery in the middle ear space. *J Laryngol Otol*. 2000;114:784-7.
- Wiindfuhr JP. Aberrant Internal Carotid Artery in the Middle Ear. *Ann Otol Rhinol Laryngol Suppl*. 2004;113:1-16.
- Ashikaga R, Araki Y, Ishida O. Bilateral aberrant internal carotid arteries. *Neuroradiology*. 1995;37:655-7.
- Cohen SR, Briant TD. Anomalous course of the internal carotid artery-a warning. *J Otolaryngol*. 1981;10:10283-6.
- Phelps PD, Lloyd GA. Vascular masses in the middle ear. *Clin Radiol*. 1986;37:359-64.
- Saada AA, Shikani AH, Niparko JK. Imaging quiz case 1. Ectopic internal carotid artery (ICA) within the petrous temporal bone. *Arch Otolaryngol Head Neck Surg*. 1996;112:792-4.
- Glasscock ME, 3rd, Dickens JR, Jackson CG, Weit RJ. Vascular anomalies of the middle ear. *Laryngoscope*. 1980;90:77-88.
- LaPayowker MS, Liebman EP, Ronis ML, Safer JN. Presentation of the internal carotid artery as a tumour of the middle ear. *Radiology*. 1971;98:293-7.
- Sinnreich AI, Parisier SC, Cohen NL, Berreby M. Arterial malformations of the middle ear. *Otolaryngol Head Neck Surg*. 1984;92:194-206.
- Anand VK, Casno PJ, Flaiz RA. Diagnosis and treatment of the carotid artery in the middle ear. *Otolaryngol Head Neck Surg*. 1991;105:743-7.
- Ruggles RL, Reed RC. Treatment of aberrant carotid arteries in the middle ear: a report of two cases. *Laryngoscope*. 1972;82:1199-205.
- Goodman RS, Cohen NL. Aberrant internal carotid artery in the middle ear. *Ann Otol Rhinol Laryngol*. 1981;90:67-9.
- Glasgold AI, Horrigan WD. The internal carotid artery presenting as middle ear tumour. *Laryngoscope*. 1972;82:2217-21.
- Bordish BN, Woolley AL. Major vascular injuries in children undergoing myringotomy for tube placement. *Am J Otolaryngol*. 1999;20:46-50.
- Oates JW, McAuliffe W, Coates HL. Management of pseudo-aneurysm of a lateral aberrant internal carotid artery. *Int J Pediatr Otorhinolaryngol*. 1997;42:73-9.