

## PERSISTENT STAPEDIAL ARTERY: A CONGENITAL ANOMALY TO KNOW

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**Persistent stapedial artery, one of the rare arterial congenital anomalies of the middle ear, is important to know due to its possible clinical repercussions. Ignoring its existence may lead to complications during surgery of the middle ear (notably hemorrhage). Exploration of the vascular malformation is rendered possible via high-definition computed tomography (CT) imaging of the petrous bones, which reveals the frequent bilaterality of this anatomical variation as well as the presence of associated anomalies. We report on two cases of persistent stapedial artery discovered during CT scan explorations.**

**Key-word:** Arteries, abnormalities.

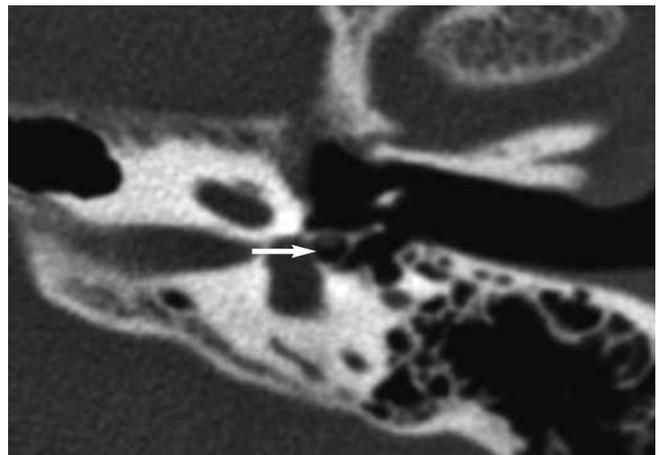
### Case report

A 36-year-old patient presented with hypoacusia of the right ear, evolving for over one year. CT imaging in fine slices with multiplanar reconstructions revealed a small tubular mass 4mm in size, exiting from the angle of the internal carotid artery and passing between the branches of the stirrup (Fig. 1) before joining the tympanic segment of the facial nerve channel (Fig. 2). There was no spiny foramen (not illustrated). A diagnosis of a persistent stapedial artery was made.

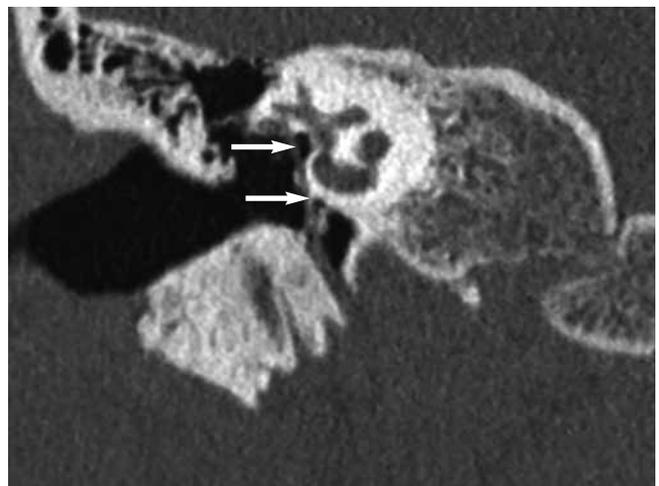
Prior to cochlear implantation, a CT scan of the petrous bones was performed on a 6-year-old child. The absence of spiny foramen was bilateral (Fig. 3). A small tubular structure showing a cranial-caudal path was visible from the promontory, in front of the fenestra vestibuli, in contact with the anterior branch of the stirrup and rejoining the enlarged facial channel in a bilateral manner (Fig. 4). A diagnosis of a persistent stapedial artery was made.

### Discussion

Persistent stapedial artery is a rare vascular anomaly, with a prevalence estimated to be between 0.02% and 0.05% in a surgical series (1) and slightly higher in a study focused on the temporal bone (2). This condition is often clinically unknown, as it is generally asymptomatic and discovered fortuitously. It may be revealed as a retro-tympanic beating red mass on otoscopic examination or during an imaging examination with direct visualization of the abnormal vessel.



*Fig. 1.* — CT scan of right petrous bone using oblique axial reconstructions reveals the presence of a nodular element between the two branches of the right stirrup (white arrow).



*Fig. 2.* — CT scan of right petrous bone using oblique coronal slices: visualization of the stapedial artery exiting from the internal carotid artery and joining the tympanic segment of the facial channel (white arrows).

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The most common clinical sign is the presence of a pulsating tinnitus. More rarely, there may be a conductive deafness due to ankylosis of the stirrup. At times, this anomaly is

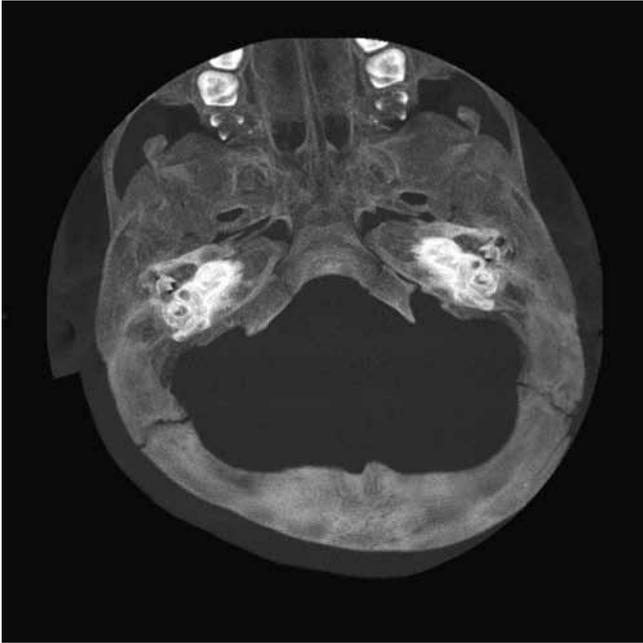


Fig. 3. — CT scan with transverse slices passing through the petrous bones using MIP reconstructions reveals the absence of the spiny foramen on both sides.

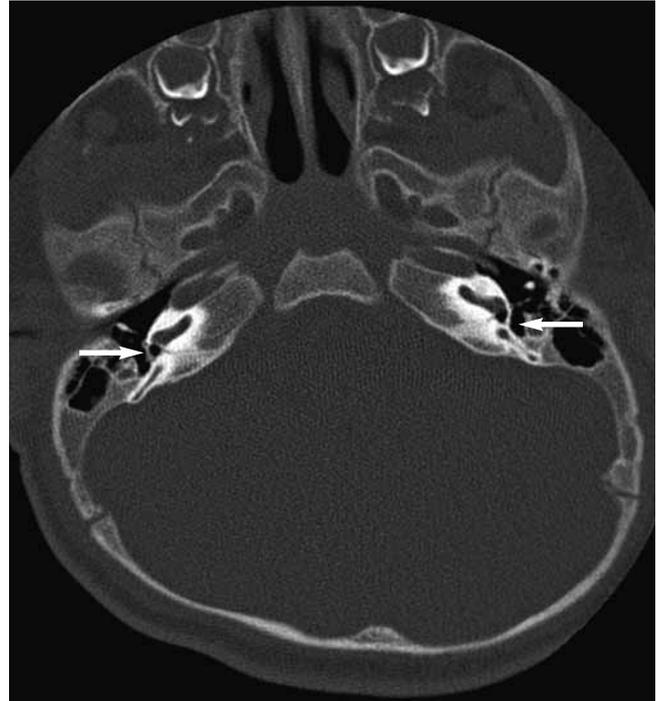


Fig. 4. — CT scan with axial slices passing through the petrous bones shows a persistent stapedial artery on both sides.

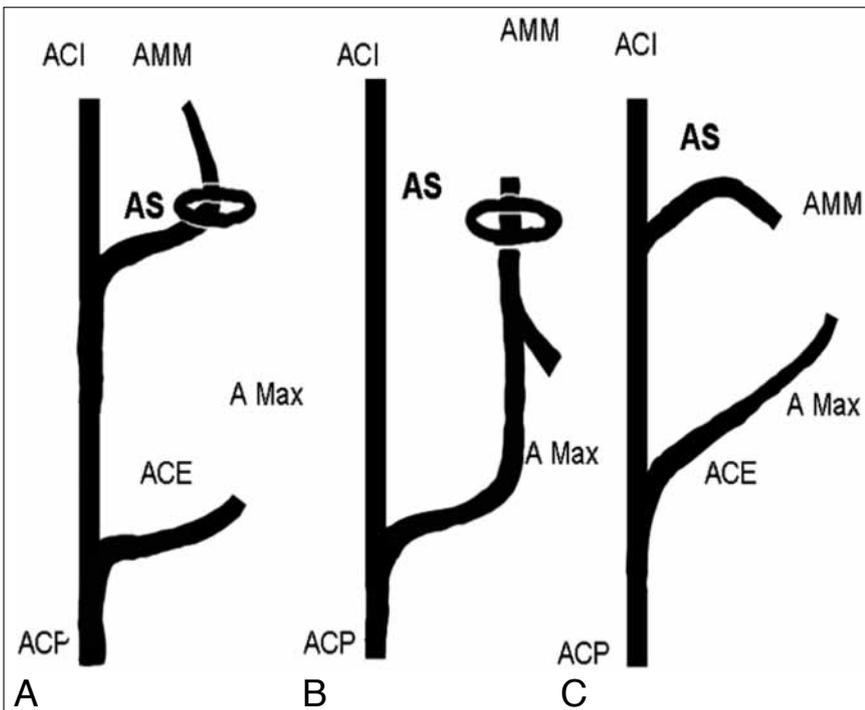


Fig. 5. — A: in utero, B: normal, C: persistent stapedial artery.  
 ACP: primary carotid artery; ACI: internal carotid artery; ACE: external carotid artery; AMax: maxillary artery; AMM: meningeal middle artery; AS:stapedial artery.

detected in patients with trisomy 13, Paget's disease, or osteosclerosis (3). This abnormality is congenital in nature and occurs in the case of abnormal regression or absent

regression of the embryonic vessels during the course of development (4, 5). Persistent stapedial artery is an abnormal vessel issuing from the intra-petrous internal

carotid artery that crosses the middle ear by passing through the branches of the stirrup. The artery terminates as a middle meningeal artery. The anomaly may occur solely or be associated with an aberrant crossing of the internal carotid artery in the middle ear (6).

To better comprehend this particular anatomical pathway, one needs to understand the modifications of embryonic development leading to this anomaly. The stapedial artery is normally present in the embryo. It derives from the intra-petrous portion of the internal carotid artery and divides, naturally, into two branches, namely a superior branch that becomes the middle meningeal artery and an inferior branch that becomes the maxillary artery, which exits the cranial cavity via the spiny foramen. In the rare cases when it does not regress, the stapedial artery becomes, in the adult, the middle meningeal artery without the spiny foramen (Fig. 5).

CT scan with fine slices and multiplanar reconstructions permits the diagnosis (7) via a direct visualization of the artery in the form of a hypodense tubular structure of 1 to 2mm in diameter, presenting at the level of the promontory and stirrup. Two key indirect signs are: the absence of the spiny foramen and the enlargement of the tympanic segment of the facial channel.

### Conclusion

Persistent stapedial artery is a rare congenital anomaly, often asymptomatic and of unknown existence. Its identification is crucial in order to prevent hemorrhagic complications during surgery of the internal ear. During the analysis of a CT scan of the petrous bones, a systematic examination of the spiny foramen should be performed.

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