Awake Embolization of Sigmoid Sinus Diverticulum Causing Pulsatile Tinnitus: Simultaneous Confirmative Diagnosis and Treatment

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Summary

Sigmoid sinus diverticulum, a rare dural sinus anomaly, is regarded as one of the very rare causes of pulsatile tinnitus, and there have been only a few reports on their surgical or endovascular management. We describe a 31-year-old woman presenting with a three-year pulsatile tinnitus in her right ear. After finding the small bony defect in her right temporal bone on CT which was filled with contrast after enhancement, we confirmed the presence of sigmoid sinus diverticulum with the cerebral angiogram and embolized it with two detachable coils in awake status. Right after filling the two coils into the sac, thanks to her alert consciousness, she was able to refer the disappearance of her tinnitus. The operation was finished only with the detachment of the coils.

Introduction

Generally, tinnitus is classified into subjective or objective types and often can be divided into pulsatile or nonpulsatile patterns according to the features of sound that the patient perceives. Diagnosis of the origin of the pulsatile tinnitus often requires more careful and specific evaluation than sensorineural tinnitus¹⁻³. The majority of cases of pulsatile tinnitus are vascular lesions and an accurate diagnosis can be made by imaging studies⁴. A sigmoid sinus diverticulum is regarded as a very rare

cause of pulsatile tinnitus and there have been only a few reports on their management⁵⁻⁹.

We describe a case of sigmoid sinus diverticulum in a 31-year-old woman who presented with intractable pulsatile tinnitus in the right ear that was successfully managed with endovascular coil embolization under regional anesthesia without the assistance of a stent. As far as we know, this is the first report on its awake embolization.

Case Report

A 31-year-old woman had a three-year history of pulsatile tinnitus in her right ear. She had a low pitched audible bruit around the right mastoid area, and noted that the bruit was decreased by compressing on her ipsilateral (right) upper neck and increased by compressing on her contralateral (left) jugular area. Otoscopic and neurologic examinations were normal. The computed tomography demonstrated a small bony defect in the right temporal bone which was enhanced by intravenous contrast injection. On conventional cerebral angiogram, via the right femoral route, a small sigmoid sinus diverticulum (7×6 mm; neck 4.5 mm) was noted on the lateral side of the right sigmoid sinus (Figure 1A,B). We decided to embolize the diverticulum under regional anesthesia, in which state we could confirm that the diverticulum was the culprit of the pulsatile

Figure 1 Axial (A) and coronal (B) temporal bone CTs which show the cavity (arrow) in the right temporal bone. After enhancement (C,D), we can confirm that the cavity is connected with the dural sinus.

tinnitus by the patient's symptom disappearance. An additional right femoral venous route was made with a 7F sheath and a 7F Envoy catheter (Codman, Miami Lakes, FL, USA) was placed in the proximal right internal jugular vein under roadmap guidance. Then a Prowler select plus catheter (Codman, Miami Lakes, FL, USA) and Excel 10 (Boston Scientific, Fremont, CA, USA) microcatheter were placed within the diverticulum dome after manual tip shaping and we delivered one detachable coil each into the sac. Right after fill-

ing of the sac with the two coils, the patient said that her tinnitus disappeared. The procedure was completed only with the detachment of the two coils. Although the packing seemed to be incomplete, we did not try further packing because of low pressure and slow flow in the sigmoid sinus, a condition in which coil compaction is unlikely to happen. The patient was discharged three days later without any neurologic deficit. She did not take any medication such as antiplatelets afterward and there was no recurrence of the pulsatile tinnitus after 22 months.

Discussion

A sigmoid sinus diverticulum or aneurysm is considered to be a very rare cause of pulsatile tinnitus and there have been only a few reports about it ⁵⁻⁹. The pathogenesis or pathophysiology is not well known yet, but the chronic low pressure erosion of the overlying bone with congenital defects of sinus seems most likely. Recently Otto et al. ⁸ presented five cases of sigmoid sinus diverticulum, three of them were successfully treated with transmastoid reconstruction of the sigmoid sinus. However this surgical approach may have a chance of massive bleeding or dural injury, so meticulous bone work and careful reduction of the diverticulum are needed during the operation.

Endovascular management for this lesion has been reported and it has many advantages compared with conventional surgery ⁵⁻⁷. All of the previously reported cases were carried out under general anesthesia and most of them used a stent to prevent herniation of coils. In contrast to the previous cases, we used the double microcatheter technique instead of stent considering the relatively narrow neck and this allowed the patient to live without any medications such as antiplatelets. We also carried out the case under regional anesthesia. With the patient's alert consciousness, we were able to confirm the diagnosis as a very rare cause of pulsatile tinnitus and the disappearance of symptoms after only two inserted coils. So, we could stop the coil packing although the coil mass seemed not to compact because the alert patient notified us of the disappearance of her tinnitus. The slow flow and low pressure of sigmoid sinus draining which had little probability of coil compaction also contributed to the early completion of the procedure. As we expected, there was no evidence of symptom recurrence during 22 months of follow-up.

Figure 2 A) AP projection of venous phase of DSA shows right sigmoid sinus diverticulum (arrow). B) Obliteration of the diverticulum after coil placement.

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