Case Report

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Dissecting basilar artery aneurysm manifesting as sudden sensorineural hearing loss: a case report and literature review

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Highlights

- Dissecting basilar artery aneurysm (DBAA) is relatively rare.
- We report the first case of a DBAA manifesting as sudden sensorineural hearing loss.
- This case report adds to the symptom spectrum of DBAA.

Abstract

Dissecting aneurysms of the basilar artery are rare and severe entities with high hemorrhage and mortality rates. Common clinical symptoms of this condition include cerebral ischemia, subarachnoid hemorrhage, and neurological deficits induced by space-occupying effects. Vertigo, headache, and cranial nerve paralysis are also frequent symptoms. We report a case of dissecting basilar artery aneurysm manifesting as sudden sensorineural hearing loss. A 53-year-old man presented with vertigo, left-sided tinnitus, and sudden sensorineural hearing loss for 1 hour. A physical examination showed left-sided hearing loss and bilateral horizontal nystagmus, and a radiological examination showed a dissecting aneurysm originating from the basilar artery. A diagnosis of a dissecting aneurysm of the basilar artery with sudden sensorineural hearing loss was made. The aneurysm was treated using stent-assisted coil embolization. Postoperatively, the vertigo and tinnitus, as well as the left hearing loss, greatly improved. Follow-up digital subtraction angiography 10 months after the operation showed complete disappearance of the dissecting aneurysm of the basilar artery. In patients with sudden sensorineural hearing loss, clinicians should be aware of the potential of a dissecting basilar artery aneurysm. An interdisciplinary approach is important in diagnosis and treatment of this rare condition.

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Introduction

A basilar artery aneurysm is relatively rare, and it comprises approximately 3% to 5% of all intracranial aneurysms. A dissecting aneurysm of the basilar artery is extremely rare and this condition is associated with an elevated hemorrhage rate and a high mortality rate.[1] The common clinical manifestations of a dissecting aneurysm of the basilar artery include cerebral ischemia, subarachnoid hemorrhage, and neurological deficits induced by space-occupying effects. Patients with a dissecting aneurysm of the basilar artery might also present with vertigo, headache, and cranial nerve paralysis.[2] Hearing loss due to a dissecting aneurysm may be a result of labyrinthine artery ischemia or pontine infarction. Hearing loss secondary to pontine infarction has been previously described.[3] We report the first case of a dissecting basilar artery aneurysm manifesting as sudden sensorineural hearing loss.

Case report

A 53-year-old man presented to the Emergency Department with vertigo, left-sided tinnitus, and sudden sensorineural hearing loss for 1 hour. He had hypertension and a corresponding family history, and he admitted long-term abuse of tobacco and alcohol. A physical examination showed left-sided hearing loss, bilateral horizontal nystagmus, and a positive Romberg's sign. Brain computed tomography (CT) showed hypointensity in the right basal ganglia and corona radiata, and slight hyperintensity in the right cerebellopontine angle (Figure 1a). Computerized tomographic angiography showed an aneurysm

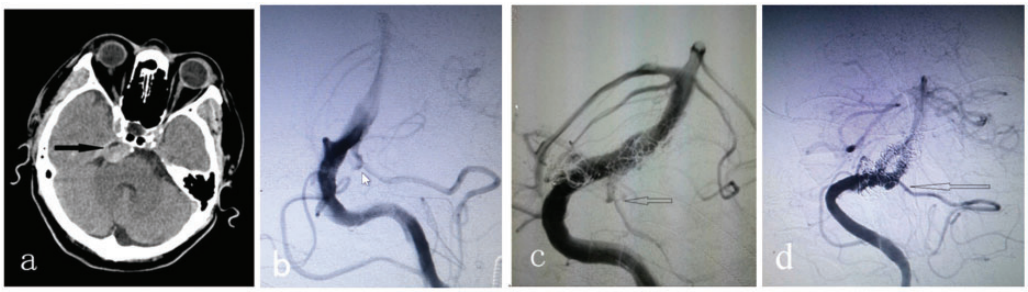

Figure 1. Radiological examination of the patient. (a) Brain computed tomography shows hypointensity in the right basal ganglia and corona radiata, and slight hyperintensity (arrow) in the right cerebellopontine angle. (b) Digital subtraction angiography shows an aneurysm in the root segment of bilateral anterior inferior cerebellar arteries, which both originated from the affected basilar artery. The white arrow indicates the left anterior inferior cerebellar artery. Digital subtraction angiography 15 days (c) and 10 months (d) after the operation shows that the dissecting aneurysm of the basilar artery has completely disappeared, and reconstruction of the lumen is favorable. Empty white arrows indicate the left anterior inferior cerebellar artery.

in the root segment of the left anterior inferior cerebellar artery (AICA) and bilateral AICAs, which both originated from the affected basilar artery. Additionally, the basilar artery was enlarged (Figure 1b). Because the AICA was the parent artery of the internal auditory artery, we speculated that this aneurysm was responsible for the sudden sensorineural hearing loss. The audiometric curve showed a steep drop in detection thresholds at high frequencies (Figure 2). A diagnosis of dissecting aneurysm of the basilar artery was confirmed by digital subtraction angiography (DSA).

We treated the aneurysm using stent-assisted coil embolization. After the end of the diseased basilar artery was shaped by a Headway-21 catheter (MicroVention, Inc., Tustin, CA, USA), a guide wire was inserted into the basilar artery over the lesion, and a Headway-17 catheter was placed into the aneurysm under guidance of the guide wire. The diameter of the basilar artery was 10 mm. Therefore, an LVIS 5.5- to 25-mm stent (MicroVention Europe, Saint-Germain-en-Laye, France) was placed into the distal basilar artery with the head end inserted into the normal artery and the distal end of the lesion inserted into a support stent in the embolization ring. We then replaced the stent catheter into the first bracket and reinserted a bracket. Placement of the stent and embolization of the aneurysm were satisfactory. Angiography was performed before each detachable coil, and the aneurysms were gradually filled with coils. Aspirin tablets and clopidogrel antiplatelet therapy were routinely provided postoperatively. Postoperatively, the vertigo and tinnitus, as well as the left hearing loss, were significantly improved. Follow-up DSA 15 days and 10 months after the operation showed complete resolution of the dissecting aneurysm of the basilar artery and favorable reconstruction of the lumen (Figure 1c and d).

This study was approved by the Ethics Committee of the Second Hospital of Jilin University. All procedures performed were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Written informed consent was obtained from the patient for publication.

Discussion

A dissecting aneurysm refers to a tear within the wall of a blood vessel, which allows blood

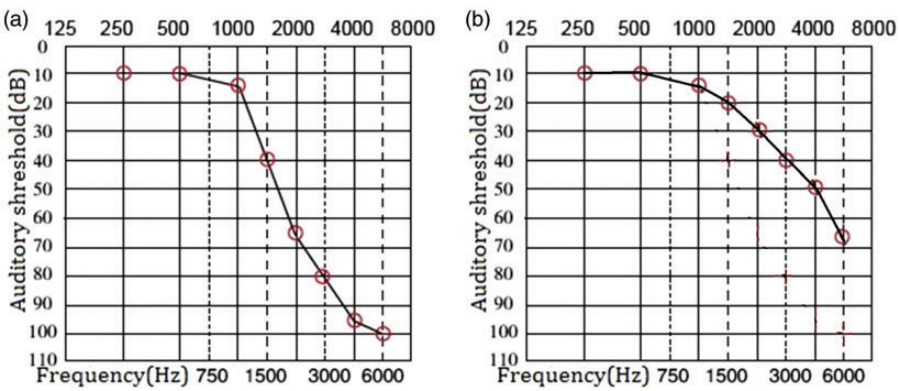

Figure 2. Preoperative and postoperative audiometric curves. (a) The preoperative audiometric curve shows a high-frequency pattern of descent. (b) The postoperative audiometric curve shows remarkable recovery.

to separate the wall layers. Theoretically, dissecting aneurysms can be found in any artery throughout the whole body. The most common location of dissecting aneurysms is the thoracic aorta, followed by the neck and intracranial arteries.[4] Spontaneous dissecting aneurysms in basilar arteries are extremely rare and result in great diagnostic and therapeutic challenges. As previously reported, dissecting aneurysms of the basilar artery have a much higher mortality rate than do saccular aneurysms.[1] The clinical manifestations of these aneurysms are usually localization-related. Subarachnoid hemorrhage is a relatively severe complication when the dissection is subadventitial and pierces through a thin adventitia into the subarachnoid space.

CT angiography and DSA are the main radiological modalities for diagnosing a dissecting basilar artery aneurysm. String sign, pearl and string sign, and double-lumen sign are typical imaging features of dissecting basilar artery aneurysms.

Treatment of dissecting basilar artery aneurysms remains challenging.[2] Dissecting basilar artery aneurysms without subarachnoid hemorrhage can be managed non-surgically with anti-platelet and/or anti-coagulation therapy. In patients with a definite diagnosis, hemorrhagic symptoms indicate the use of either emergency craniotomy or endovascular embolization. Aneurysms with space-occupying effects and giant aneurysms of >10 mm also require surgical treatment.[5] The diameter of the basilar artery in our case was 10 mm, which is strongly indicative of future rupture. In particular, acute ischemic symptoms may be related to enlargement of a vertebrobasilar artery aneurysm. Because of these issues, we selected surgical or endovascular intervention for our case. Over the past two decades, endovascular intervention has been widely used, and the mainstream approaches include the following: 1) trapping, 2) proximal occlusion, 3) stent-assisted coiling, and 4) stent implantation.[4] Endovascular procedures can be effective for unruptured symptomatic dissecting basilar artery aneurysms, which are associated with favorable outcomes.[5] Therefore, we chose endovascular intervention in our case. Because of the high postoperative recurrence rate of dissecting basilar artery aneurysms, follow-up in patients after endovascular treatment is performed during 10 months after the operation.[6]

Sudden sensorineural hearing loss is a common symptom in the Department of Otolaryngology. Common causes of sudden sensorineural hearing loss include specific virus infection, autoimmune factors, cochlear hydrops, oxidative stress, psychological factors, and circulatory factors.[7] The internal auditory artery, which feeds the inner ear, is closely related to the occurrence of sudden sensorineural hearing loss, with the main causes in this situation being arteritis, atherosclerosis, and arterial dissection, as we reported in the current case.[8,9] The blood of the inner ear is supplied by the internal auditory artery originating from the anterior inferior cerebellar artery. The anterior inferior cerebellar artery arises from the vertebrobasilar artery. In the current case, the left anterior inferior cerebellar artery originated from the basilar artery, and the dissecting basilar artery aneurysm affected the blood supply of the anterior inferior cerebellar artery. This resulted in ischemia of the internal auditory artery, which may be the major reason for the patient developing sudden sensorineural deafness. Endovascular intervention combined with antiplatelet therapy restored the blood flow of the basilar artery and the left anterior inferior cerebellar artery, which led to improvement of the hearing loss. Differential diagnosis of dissecting aneurysm-related sudden sensorineural hearing loss is challenging and interdisciplinary thinking is required.

Conclusions

In patients with sudden sensorineural hearing loss, clinicians should be aware of the

potential for a dissecting basilar artery aneurysm. An interdisciplinary approach should be highlighted to diagnose and treat this rare condition.

Authors' contributions

Yi-zhi Zhang wrote the manuscript. Qiu-hui Chen provided diagnostic assistance. Zhan-chuan Liu performed imaging analysis. Ying Zhang and Yan-qiu Han performed clinical data analysis. Shan-ji Nan designed the study.

Availability of data and materials

The datasets generated and analyzed during the present study are available from the corresponding author on reasonable request.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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