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Case report

Transcanal endoscopic ear surgery for perilymphatic fistula after electric acoustic stimulation

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ABSTRACT

Transcanal endoscopic ear surgery (TEES) will become a very useful therapeutic option. A perilymphatic fistula (PLF) is defined as sudden sensorineural hearing loss and/or vertigo caused by leakage of the perilymph through a fistula from the oval window and/or round window. We report a case of PLF after electric acoustic stimulation (EAS), a kind of cochlear implant, successfully treated by TEES. A 38-year-old man presented to our hospital with vertigo and hearing loss (HL). His vertigo was induced by Valsalva maneuvers. Eight months ago, he underwent EAS for his right ear for congenital sensorineural HL. Although he maintained his hearing level after EAS, his pure tone audiogram this time showed deterioration of hearing at low frequencies in his right ear. A diagnosis of right PLF was made. After confirming the non-effectiveness of oral prednisolone treatment, PLF repair surgery to patch the oval and round windows by TEES was performed. His vertigo did not recur after the surgery. To the best of our knowledge, this is the first report of PLF repair surgery by TEES without a microscope. The wide-field view of the middle ear by TEES was useful to prevent electrode damage in a PLF patient with a cochlear implant.

1. Introduction

Transcanal endoscopic ear surgery (TEES) is an innovative surgical option to access the tympanic cavity. Endoscopic ear surgery of the middle ear has taken place since the first report by Thomassin et al. in 1993 [1]. Today, TEES is used increasingly for ear diseases including perilymphatic fistula (PLF). TEES can avoid an external skin scar and is less invasive. In addition, it is easy for the TEES clinicians to understand the anatomy of the middle ear and visualize the ear canal, tegmen tympani, and facial recess.

PLF is characterized by sudden sensorineural hearing loss or vertigo caused by leakage of the perilymph from the inner ear to the middle ear. The causes of PLF are head injury, atmospheric pressure change, or other events associated with perilymph fistula formation. However, we often see patients with no clear cause for their PLF. Idiopathic spontaneous perilymphatic fistula (sPLF), a kind of PLF without any such cause, cannot be reliably diagnosed.

Because of the narrow external auditory canal of Japanese people, PLF and sPLF may often be treated by an external incision behind the auricle and tympanotomy with a microscope in Japan. The postauricular incision may damage the electrode of cochlear implant (CI). To the best of our knowledge, no previous study has reported the usefulness of TEES for PLF in patients with a CI. Thus, this is the first report of a case of PLF

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after electric acoustic stimulation (EAS), a kind of CI, treated with TEES without a microscope. This report also demonstrates the effectiveness of TEES for PLF after CI.

2. Case report

A 34-year-old-man presented to our office with a chief complaint of bilateral sensorineural hearing loss. His hearing loss was a mild to moderate low-frequency sensorineural hearing loss sloping to a profound hearing loss at the higher frequencies (Fig. 1). He had never had vertigo.

He had undergone EAS of his right ear using the round window approach. His cochlea had no malformation on computed tomography. The EAS system was a MED-EL CONCERTO® Mi1000 with FLEX24® (MED-EL, Innsbruck, Austria). All electrodes were inserted smoothly, with no cerebrospinal fluid gushers. The effectiveness of EAS 6 months after surgery was very good. His percentages on the Japanese monosyllables discrimination test improved from 20% (with no hearing aid) and 50% (with a hearing aid on his right ear) to 75% with EAS for his right ear. He did not have vertigo after EAS surgery.

Eight months after the EAS surgery, the patient came to our office presenting with vertigo. A pure tone audiogram showed severe hearing loss of his right ear at all frequencies (Fig. 1). He had lateral gaze-evoked horizontal nystagmus on both sides. His vertigo made it hard to walk, and it was stimulated by the movement of picking his right ear and straining. The medical history suggested PLF or sPLF. Surgery for PLF was recommended, but he refused. After one week of oral administration of prednisolone (30 mg/day), he did not improve.

One month later, the patient underwent PLF repair surgery to patch the oval and round windows by TEES under general anesthesia. A tympanomeatal flap was created, and the tympanic membrane was everted. The chorda tympani was also preserved. In the tympanic cavity, the FLEX® electrode array was in the proper position at the round window and was fully inserted (Fig. 2). There was no significant leakage of the perilymph from the stapes footplate (the "oval window") and round window during Valsalva maneuvers. Lavage of his right tympanic cavity was performed, and the fluid was collected to measure cochlin-tomoprotein (CTP). The concentration of CTP was 0.25 ng/mg. Subcutaneous tissue behind his right ear was collected with a very small external incision. The round window and oval window were packed with it, and it was fixed with Beriplast P combi-set® (CSL Behring, King of Prussia, PA, USA) (Fig. 3). The FLEX® electrode array was not damaged during the surgery.

The patient no longer felt vertigo from postoperative day 2. The positional nystagmus disappeared after postoperative day 6. He restarted using EAS from 1 month after surgery. The

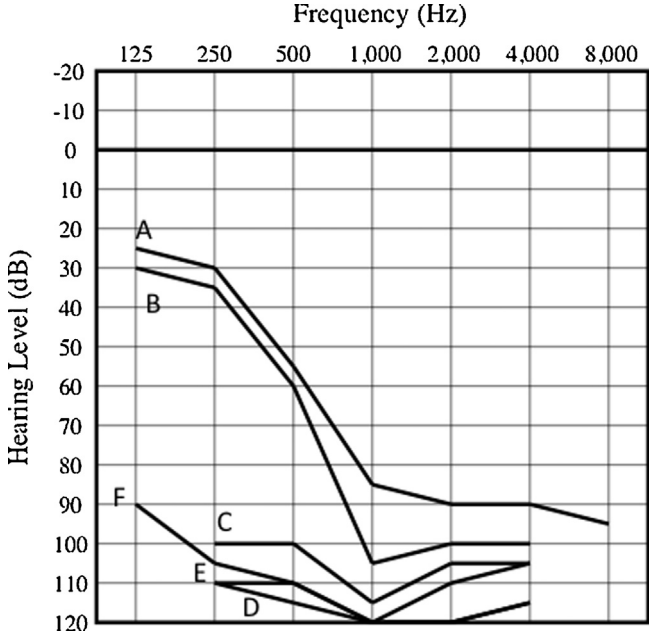

Fig. 1. Pure tone audiograms of the right ear before and after TEES. A, before EAS surgery; B, 2 weeks after EAS surgery; C, 1 week after the onset of PLF; D, 1 day before TEES; E, 2 weeks after TEES; F, 3 months after TEES.

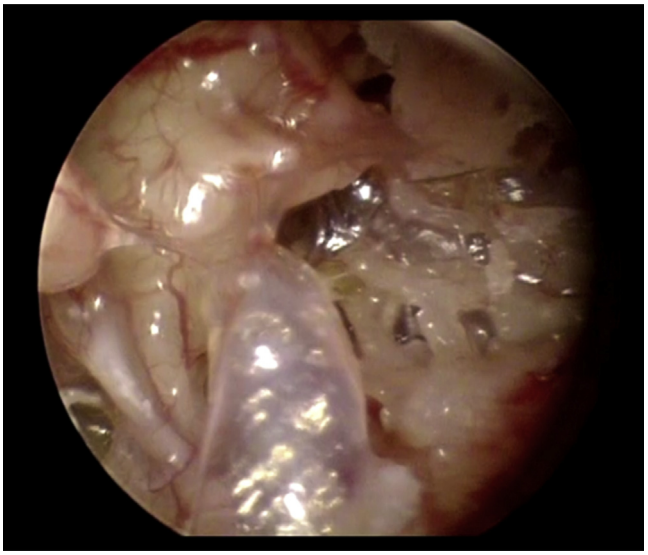

Fig. 2. Electric acoustic stimulation resulted in no complications such as infection in transcanal endoscopic ear surgery.

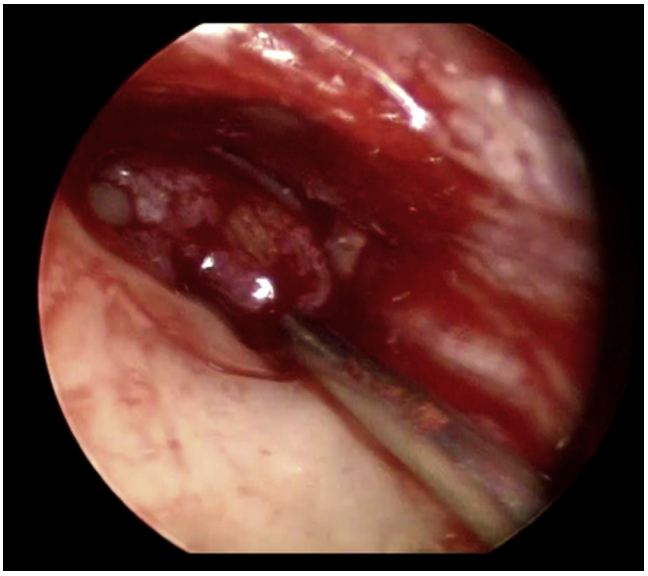

Fig. 3. Packing with connective tissue around the round window.

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