

**Labyrinthitis with endolymphatic hydrops revealed by imaging analysis in a case
with severe postoperative complications following stapes surgery**

Masumi Kobayashi¹, Tadao Yoshida¹, Yasue Uchida², Satofumi Sugimoto¹, Shinji
Naganawa³, Michihiko Sone¹

1. Department of Otorhinolaryngology, Nagoya University Graduate School of Medicine,
Nagoya, Japan

2. Department of Otorhinolaryngology, Aichi Medical University, Nagakute, Japan

3. Department of Radiology, Nagoya University Graduate School of Medicine, Nagoya,
Japan

Running heads : Imaging of deaf ear following stapes surgery

Address for correspondence:

Masumi Kobayashi, MD.

Department of Otorhinolaryngology

Nagoya University Graduate School of Medicine

65 Tsurumai-cho, Showa-ku, Nagoya 466-8550, Japan

Tel: +81-52-744-2323, Fax+81-52-744-2325

E-mail: masumi@med.nagoya-u.ac.jp

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1 Case Report

2 A 32-year-old man visited our hospital 3 months after stapes surgery, due to
3 postoperative hearing loss in the right ear for bilateral otosclerosis at another hospital.
4 He had undergone Fisch's reversal steps stapedotomy, in which the prosthesis was
5 introduced after perforation of the footplate following removal of the superstructure. He
6 experienced vertigo and hearing loss in the operated ear on the day following surgery,
7 progressing to severe sensorineural hearing loss from the fifth postoperative day after
8 intravenous steroid treatment for possible inner ear damage. The patient had suffered
9 from conductive hearing loss in both ears and experienced no symptoms related to inner
10 ear disturbances preoperatively, such as vertigo and fluctuating sensorineural hearing
11 loss (Fig. 1). Computed tomography (CT) performed 6 months after the surgery
12 revealed that the inserted piston was in an appropriate position, although the
13 semicircular canals were ossified (Fig. 2). On magnetic resonance imaging (MRI)
14 performed 4 h after intravenous injection of gadolinium hydrate, high enhancement and
15 significant endolymphatic hydrops (EH) were observed in the cochlea of the operated
16 ear, and there were no lymphatic spaces visible in the vestibule or the semicircular
17 canals (Fig. 3). EH was also found in the cochlea, vestibule and semicircular canals on
18 the non-operated side. He did not request hearing aids to improve his hearing difficulty,

19 and only his hearing on the contralateral side was subsequently followed up.

20

21 Discussion

22 Stapes surgery for otosclerosis is a surgical procedure with a high success rate,
23 although vertigo and sensorineural hearing loss (SNHL) are serious postoperative
24 complications (1). Fisch's reversal steps stapedotomy was performed in the present case
25 to reduce the risk of a footplate incident leading to inner ear damage (2), and
26 postoperative CT revealed that the inserted piston was in an appropriate position. EH
27 associated with otosclerosis has been previously reported (3). Recent MRI studies have
28 demonstrated that the presence of EH in ears with otosclerosis and ears with EH in the
29 vestibule are associated with long periods of dizziness postoperatively, indicating that
30 the preoperative presence of EH in the vestibule on MRI might be a high-risk factor for
31 complications following stapes surgery (4, 5).

32 High enhancement in the cochlea and ossification in the semicircular canals
33 suggested the occurrence of severe inflammation in the operated ear in the present case.
34 Significant EH in the cochlea in the operated ear might have represented secondary EH
35 due to labyrinthitis, although EH was also detected on the non-operated side. The

36 imaging findings suggest that in cases with an abnormally extended membranous
37 labyrinth due to EH, the inserted piston might unexpectedly traumatize the labyrinth,
38 which might result in severe labyrinthitis and postoperative complications following a
39 standard stapes procedure. A history of vertigo or fluctuating hearing loss suggestive of
40 inner ear disease should be elicited preoperatively, since this can lead to unexpected
41 complications after **stapes surgery**.

42 **References**

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54 *Otolaryngol* 2017;137:242–5.

55 **Figure legends**

56 Figure 1: Preoperative and postoperative audiogram of the present case

57 A preoperative audiogram showed right-sided conductive hearing loss with an average
58 hearing level of 57.5 dB, and a postoperative audiogram showed severe sensorineural
59 hearing loss.

60 Figure 2: Computed tomography (CT) performed 6 months after the stapes surgery. A)

61 The inserted piston was in an appropriate position (arrow). B) All the semicircular canals
62 and part of the vestibule on the operated side were ossified (arrows).

63 Figure 3: Magnetic resonance imaging (MRI) performed 4 h after intravenous injection

64 of gadolinium hydrate 6 months after the stapes surgery. A) High enhancement was

65 observed in the cochlea of the operated ear on the heavily T2-weighted FLAIR

66 enhanced MRI, indicating severe labyrinthitis (arrows). B) Significant endolymphatic

67 hydrops (EH) was observed in the cochlea of the operated ear (arrows), and there were

68 no lymphatic spaces visible in the vestibule or the semicircular canals (asterisk). On the

69 non-operated side, mild EH was found in the cochlea, and significant EH was also

70 identified in the vestibule and semicircular canals (arrows).

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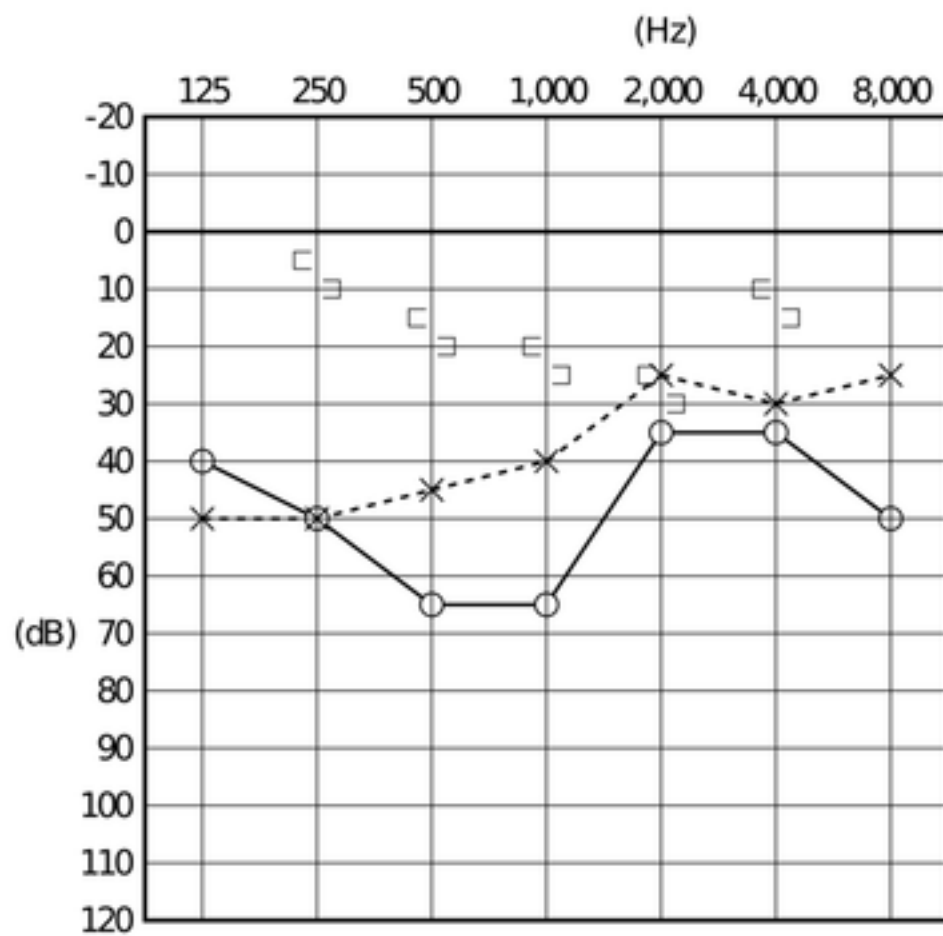
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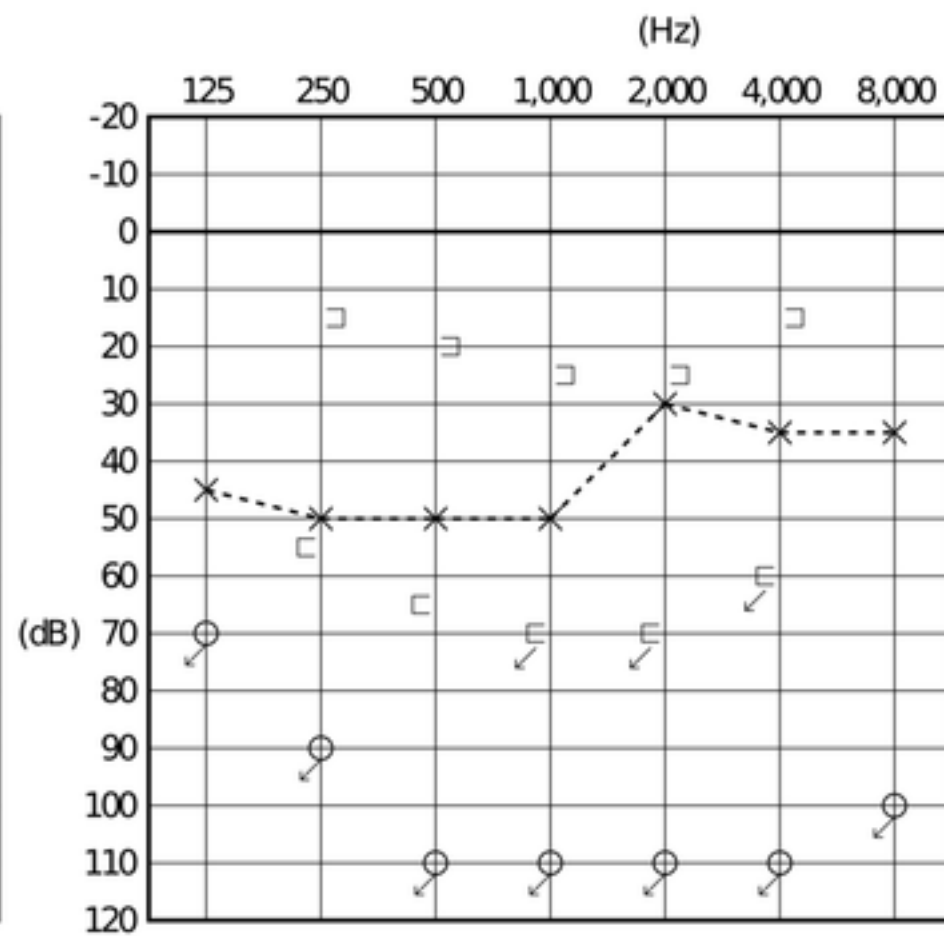
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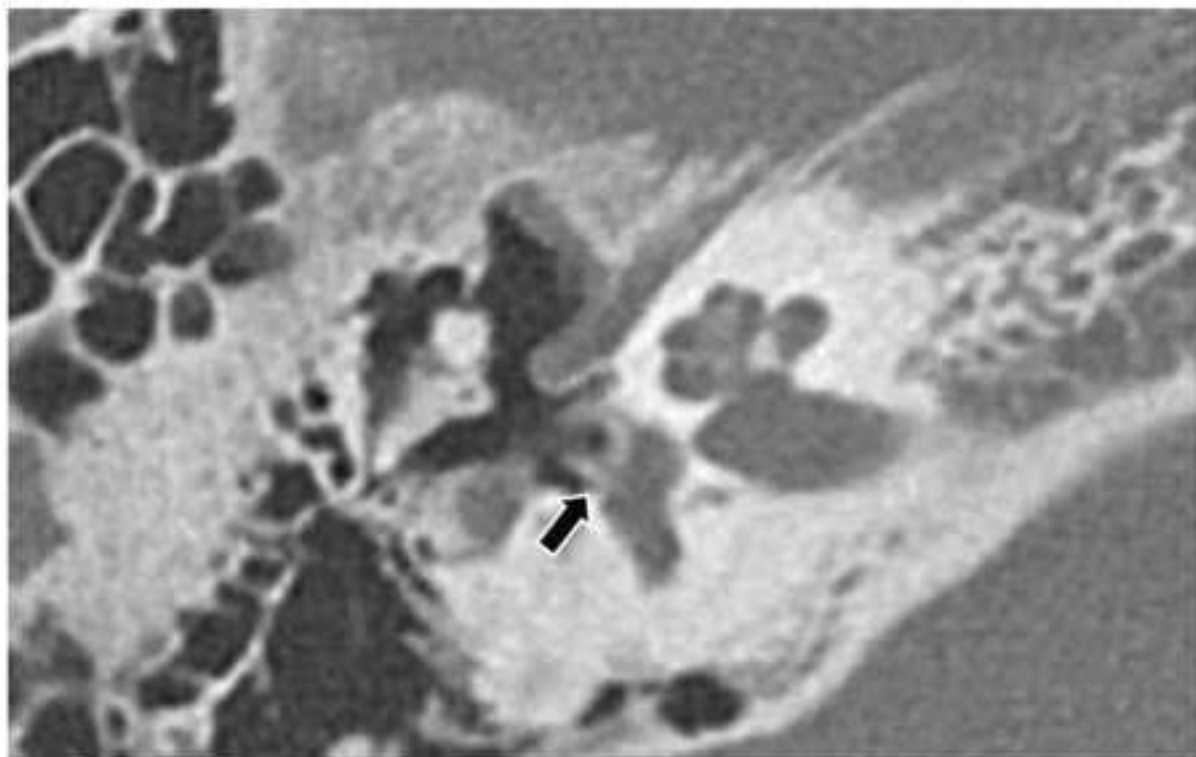


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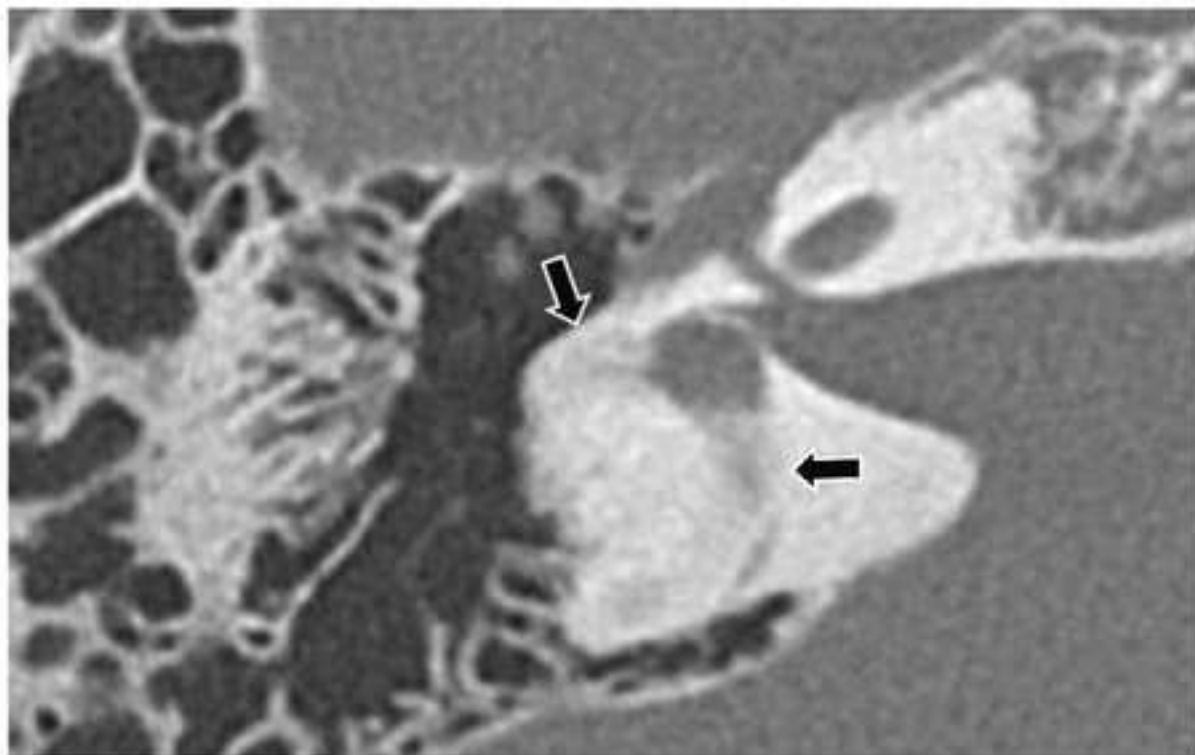


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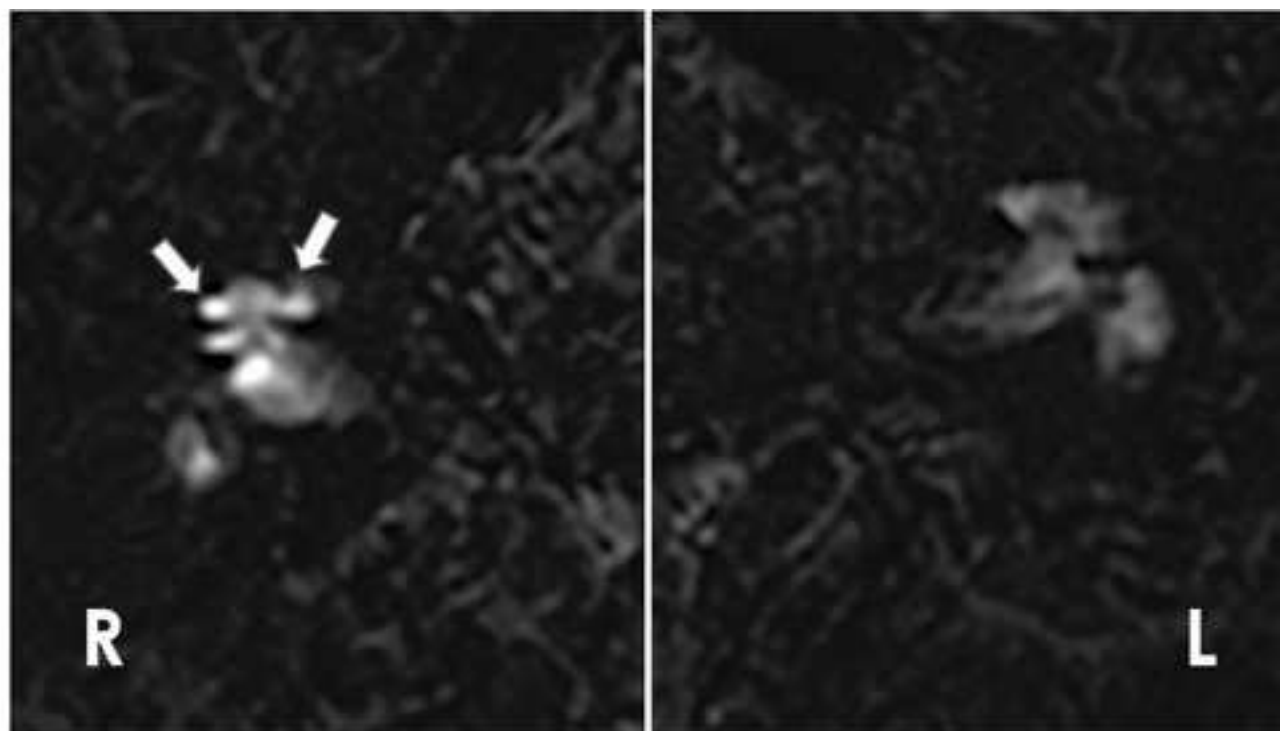
2A



2B



3A



3B

