

Revision Surgery for Otosclerosis



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KEYWORDS

- Otosclerosis • Revision • Stapedectomy • Stapedotomy • Prosthesis
- Complications

KEY POINTS

- Revision surgery for otosclerosis is fraught with the risk of complications, including failure to improve hearing, inner ear damage, dead ear, and facial nerve damage.
- Primary indications for revision are persistent air bone gap, intractable vertigo, and facial nerve complication.
- Audiogram, computed tomography, and the previous operative report can be important in surgical planning.
- Preoperative preparation of equipment including laser, bone cement, and necessary prosthetics is critical.
- Local anesthesia with sedation can provide immediate feedback during challenging cases.

BACKGROUND

Revision surgery for the treatment of otosclerosis is fraught with difficulty for the ear surgeon. In previous years, the risk of severe inner ear damage with sensorineural hearing loss ranged from 0.4% to 20%, while 32.7% to 66% of patients achieved closure of air-bone gap defined either as less than 10 dB or less than 20 dB.^{1–14} Over the last 2 decades, partially because of changes in methodology as outlined below and the consolidation of expertise within high-volume centers, the outcomes have improved but continue to be worse than those of primary surgery.^{15,16} Today, less than 20-dB air bone gap results are achieved in 71% to 96.3%, and 0% to 2% of patients go on to have profound sensorineural hearing loss, or a dead ear,

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postoperatively.^{17–24} These challenges partly stem from a selection bias for more severe disease, but a revision surgeon must also adapt each surgery to the previous surgeon's handiwork. The primary management of otosclerosis has evolved greatly over the last 6 decades since Shea first described modern stapedectomy with a Teflon implant. Thus, complete evaluation of a revision patient requires a robust system that minimizes intraoperative surprises and optimizes postoperative results with techniques and equipment tailored to each case.²⁵ Below, the initial evaluation, preoperative planning, and intraoperative techniques are detailed with review of the available evidence for each step.

INITIAL EVALUATION

The initial challenge facing an otologist with a patient presenting with poor outcomes from primary otosclerosis surgery is in understanding the nature and etiology of the patient's complaints.

Patient Presentation²⁶

- Early presentation
 - Failure of improved hearing
 - Severe vertigo
 - Severe tinnitus
- Later presentation
 - Progressive hearing loss
 - Loose wire syndrome
 - Aural fullness
 - Dysgeusia

Physical examination can help evaluate additional conditions such as semicircular canal dehiscence or cholesteatoma, which would require a change in treatment plan. An audiologic evaluation is also essential for understanding the etiology of the patient's concerns.

Causes of immediate conductive hearing loss or poor response to primary surgery include

- Failure of initial prosthesis placement
- Excessive tissue graft
- Reparative granuloma
- Incorrect diagnosis such as third mobile window syndrome or ossicular fixation from the malleus or incus²⁶

Causes of progressive conductive loss

- Displacement of the prosthesis
- Inappropriate prosthesis length
- Incus erosion
- Allergy to the prosthetic substance, typically nickel-titanium (Nitinol)
- Footplate refixation
- Ongoing otosclerosis^{12,26–29}

In any case, an observation period of up to 6 weeks after the initial surgery can be important in assessing severity and stability of symptoms. At follow-up, it is important to discuss the risks and benefits of potential surgery with the patient. In particular, this conversation should assess the feasibility of the patient's expectations.

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