Introduction

Shea et al. first described a technique for surgical repair of otosclerosis in 1956 using a vein interposition graft. Numerous technical modifications have been employed over the past 59 years and to date, multiple stapes prostheses are utilized in stapes surgery. Results from stapedotomy procedures are uniformly favorable in the existing otolaryngology literature. In a study of 2525 patients who underwent 3050 stapedotomies for otosclerosis with a teflon prosthesis, a bucket handle prosthesis or a total prosthesis, the air-bone gap was closed to within 10 dB in 94.2% of cases. Deterioration in hearing with time after stapedotomy did not exceed hearing loss due to presbycusis (age-related hearing loss).

Reported complications from stapes surgery include perilymph fistula, tinnitus, facial palsy or paralysis, vertigo and persistent or worsened hearing loss. Malattached or migrating prosthetic pistons have been reported to cause substantial inter-individual variation and overall unsatisfactory long-term results. Newer prostheses employ nickel-titanium alloy which harbor shape memory, allowing for crimping of the metal to allow for looping of the prosthesis around the long process of the incus without significant manipulation. To date, no large retrospective studies evaluating efficacy and safety of these nickel-titanium prostheses when used by a single surgeon have been conducted. Long-term analyses of self-reported patient outcomes are also lacking in existing otolaryngology literature.

Objective

The objective of this retrospective study was to identify the efficacy and safety profile of stapedotomy performed with a nickel titanium prosthesis for patients with otosclerosis by a single surgeon at our institution over a 12-year period.

Methods

Study Design: Retrospective chart review of outcomes by a single surgeon at the same institution over a period of 12 years using the same MRI-compatible nickel titanium stapes prosthesis.

Setting: Academic tertiary care referral center.

Patients: The records of 372 unique initial stapes surgeries were reviewed to yield 279 records with both preoperative and postoperative audiograms.

Intervention(s): Left or right stapedotomy with nickel titanium prosthesis.

Main outcome measure(s): Pure-tone averages (PTA) at baseline and six weeks after surgery were recorded over four frequencies: 0.5, 1, 2 and 4 kHz. Average air-bone gaps (ABG) were also calculated based on preoperative and postoperative audiograms.

Results

Average preoperative baseline PTA was 57 dB in the affected ear. Postoperative PTA (for most patients measured at approximately six weeks after surgery) was 31 dB, a 26 dB improvement. Initial average ABG was 31 dB, while postoperative ABG averaged 6.6 dB, a 24.4 dB improvement. Complications were noted and recorded, including recurrent conductive hearing loss (6), post-operative BPPV (3), progressive SNHL (2), and prosthesis dislocation (1). Overall complication rate was 4.3%.

Summary & Conclusions

Stapedotomy with a nickel titanium prosthesis is a safe and well-tolerated procedure that leads to a significant improvement in hearing outcomes with a relatively low rate of complications. Our outcomes data at six-weeks showed a significant improvement for non-revision stapedotomy patients who received surgery by a single surgeon with an MRI-compatible nickel titanium prosthesis over a 12-year period.

We have submitted and received approval for an IRB proposal to prospectively follow the patients in this study who have undergone stapedotomy. We will aim to create a database of the longest follow-up to date of post-stapedotomy patients, with questions including:

- Have your initial results persisted?
- Have you needed to or been recommended to undergo revision surgery?
- Do you wear a hearing aid now in the operated ear?
- Have you had any long-term complications?
- Would you undergo the procedure again?

References


Sponsorship

The authors of this study have no disclosures or conflicts of interest to report. IRB approval was obtained from our institution, #74535.