Laser stapedotomy using SMART piston: 5 year results
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Introduction

The selection of a particular prosthesis is often dictated by the ease of usage, safety profile, and favorable hearing outcome. Introduced by Gyrus-ENT (Barlett, TN), the SMart prosthesis is composed of a nitinol-based shepherd hook and a Teflon-based piston. Nitinol is a metal alloy of nickel (45%) and titanium (55%) that allows self-crimping by a heat-activated shape memory conformation. The self-crimping is seen as a favorable characteristic that avoids technically challenging manual crimping. The application of low energy to the nitinol-based hook induces a change to a previously determined closed shape (memory shape). This results in a snug fit between the wire and the incus. The hook holds uniform contact with the incus long process and eliminates any dead space. This results in favorable vibratory transmission and enhanced sound conduction. The result is a decreased chance of malcrimping and thus a theoretical advantage for long-term stability and decreased incidence of incus necrosis.

No-touch heat-activated crimping reduces the risk of trauma to the inner ear by minimizing manipulation of the stapedial footplate and the prosthesis within the vestibule. Manual crimping is technically difficult, and mal-crimping results in delayed failure due to incus necrosis and decreased effective vibration and acoustic transmission. The theoretical advantages of the SMart prosthesis in avoiding manual crimping and providing a snug fit to the incus are offset by certain limitations. These limitations are the presence of a narrow oval window, an excessively narrow or fat incus, thermally induced mucosal damage at the crimping site, lateral migration of the prosthesis, and the possible allergic reaction to nickel.

Methods and Materials

This is a retrospective review of prospectively collected data. 5 year post-operative follow up data for 32 patients is presented. Pre-operative pure tone audiograms recording air and bone conduction thresholds at 0.5, 1, 2, 3 and 4 kHz were recorded. Post-operative Pure Tone Audiograms at the same frequencies were recorded after 6 weeks, 6 months, 1, 2, 3, 4 and 5 years. Air-bone gaps and pure tone averages at 0.5, 1, 2 and 3 kHz were calculated.

Statistical Analysis:
• IBM SPSS advanced statistics version 20 for MAC
• ANOVA (Repeated measures)
• Paired samples t-test

Results

• 32 patients
• September 2005 to January 2007
• 12 Males & 20 females
• Age: 26 – 69 (48 years)
• Surgeon: JL
• No reported complications

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Conclusions

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