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Kurz titanium prostheses in paediatric ossiculoplasty—Short term results

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Summary

Objective: The objective of this study is to assess the efficacy of ossiculoplasty procedures in the paediatric population when the Kurz titanium ossicular prosthesis is used.
Patients and methods: Data was collected prospectively upon 14 ossiculoplasty cases using Kurz titanium prostheses. Audiological parameters using four frequency average (FFA(0.5, 1, 2 and 4 kHz)) were assessed pre- and post-operatively.
Results: In the case of patients reconstructed using partial ossicular reconstruction prostheses, 7/9 (78%) achieved an air bone gap (<20 dB) using FFA criteria. Parameters at 12-month follow-up suggested 4/5 (80%) patients reconstructed using total ossicular reconstruction prostheses achieved an air bone gap (<20 dB) using FFA.
Conclusion: The question of age and presence of co-existing cholesteatoma or tympanic membrane perforation does not appear to mitigate against performing ossicular reconstruction in this age group. Consequently, the results of this study suggest that the use of Kurz titanium prostheses is a feasible option to augment hearing in paediatric cases involving chronic otitis media. This is a significant finding especially in view of the added psychological burden of hearing difficulties carried by the paediatric population.

1. Introduction

Multiple prostheses materials and designs have been employed in reconstructing the ossicular mechanism as refinements in design and technique have occurred to generate improved audiological results and reduce complication rates.

Although autograft material may be used to fashion a prosthesis, their use may be limited both by the underlying aetiology such as the possibility of cholesteatoma within the ossicle and also by erosion arising from the disease process limiting the availability of autograft material. Whilst the issue of availability of material may be addressed through

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Table 1 Table presenting individual operative findings and procedures, together with prosthesis type used and tensor tympani status

Case number	Operative findings	Operative procedure additional to ossiculoplasty	Tensor tympani	Prosthesis type used
1	Perf + R.P. + Chol	Atticoantrostomy plus reconstruction	Cut	Aerial TORP
2	Perf	Not done	Intact	Aerial TORP
3	Intact TM with Chol pearls	Revision cortical mastoid[a]	Intact	Aerial TORP
4	Cholesterol granuloma	Revision mastoid cavity + reconstruction[a]	Intact	Aerial TORP
5	Operated cavity	Revision mastoid cavity + reconstruction[a]	Intact	Aerial TORP
6	R.P.	Not done	Intact	Bell PORP
7	Perf with R.P.	Not done	Cut	Bell PORP
8	Perf with R.P.	Atticotomy plus reconstruction	Cut	Bell PORP
9	R.P. and limited Chol	Atticoantrostomy plus reconstruction[a]	Cut	Bell PORP
10	R.P. and limited Chol	Atticotomy plus reconstruction	Cut	Bell PORP
11	R.P. and limited Chol	Cortical plus atticotomy plus reconstruction[a]	Cut	Bell PORP
12	R.P.	Cortical	Cut	Clip partial PORP
13	Chol	MRM plus reconstruction	Cut	Clip partial PORP
14	R.P.	Not done	Intact	Clip partial PORP

Perf: perforation; R.P.: retraction pocket; Chol: cholesteatoma.
[a] Revision procedure.

allograft prostheses, there remain inherent concerns regarding the transmission of infection [1] if these prostheses are used.

Artificial reconstructive materials overcome the aforementioned difficulties but can raise alternate concerns regarding audiological benefit and complication rates; most notably extrusion frequency. As a result, multiple prosthesis designs in varying materials have arisen to achieve an optimal ossicular prosthesis. One such metal, titanium, has been used as a prosthetic material for many years in craniofacial and orthopaedic surgery [2] with its use for ossicular reconstruction being first described in 1996 [3]. In this way, titanium has an established and confirmed biocompatibility spectrum [4] proven through multiple medical uses [5,6].

However, although the use of varying ossiculoplasty techniques is widely reported in adults, the literature presents few articles investigating the surgical reconstruction of the ossicular chain in the paediatric population and to our knowledge, there are no studies presented in the literature regarding the results of the use of Kurz titanium prostheses in this age group. Therefore, in order to investigate this further, a prospective study was conducted to evaluate the efficacy of such prostheses.

2. Patients and methods

Data was collected prospectively upon 14 cases who underwent ossiculoplasty using the Kurz titanium prosthesis. Informed consent had been obtained prior to each procedure with all cases having been offered the option of hearing aids. The mean age was found to be 11 years (S.D. 2) with a range of 7–14 years.

Table 1 presents the distribution of disease processes, operative interventions and prostheses used and shows that 64% of ears were reconstructed using PORP's. In all cases, a cartilage interposition graft was used. Five (36%) cases were revision procedures with cholesteatoma noted in 6 (43%) cases. Nine (64%) cases were associated with a retraction pocket and 4 (29%) cases were documented to have a perforation.

Titanium ossiculoplasty was performed in isolation or as an accompaniment to surgery for chronic ear disease. Audiological assessment was achieved using four frequency (FFA) average air conduction (AC) and bone conduction (BC) (FFA(0.5, 1, 2 and 4 kHz)) levels pre- and post-operatively at 3 months, 6 months and 1 year with the 1-year results being reported. Hearing results were assessed by comparing pre-operative and post-operative pure tone averages over the above frequencies as well as closure of the air bone gap (ABG) and improvement in air conduction. Complications including extrusion rates were also been assessed. This study, being a service evaluation, did not require review by the local ethics committee.

2.1. Surgical procedure

All patients in this series underwent a standard tympanoplasty/tympanomastoidectomy under gen-