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ScienceDirect

Journal of Otology 10 (2015) 125–129

www.journals.elsevier.com/journal-of-otology/

One-stage coclear implantation via a facial recess approach in children with otitis media with effusion

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Abstract

Objective: To investigate surgical indications, operative techniques, complications and auditory and speech rehabilitation for cochlear implant (CI) in children with otitis media with effusion (OME).

Material and methods: This is a retrospective review of records of 24children with bilateral profound sensorineural hearing loss and OME who were implanted during January 2011 to November 2014 in the Department of Otorhinolaryngology and Head and Neck Surgery at the PLA Hospital, using one-stage implantation via the facial recess approach and round window insertion. The incus was removed in 8 cases during the implantation procedure. Local infiltration of dexamethasone and adrenaline in the middle ear was also performed. Postoperative complications were examined. Preoperative and postoperative questionnaires including Categories of Auditory Performance (CAP), Speech Intelligibility Rating (SIR), and the Meaningful Auditory Integration Scale (MAIS) were collected.

Results: All electrodes were implanted successfully without any immediate or delayed complications. Inflammatory changes of middle ear mucosa with effusion were noted in all implanted ears. The scores of post-implant CAP and SIR increased significantly in all 24 cases ($t = -25.95$ and -14.09, respectively for CAP and SIR, $p < 0.05$).

Conclusions: One-stage CI via the facial recess approach with round window insertion is safe and effective in cochlear implant candidates with OME, as seen in the 24 children in our study who achieved improved auditory performance and speech intelligibility after CI.

Keywords: Cochlear implantation; Otitis media with effusion; Incus removal

1. Introduction

Cochlear implant (CI) is one of the most significant treatments to help restore auditory function in patients with severe to profound sensorineural hearing loss. It has become a relatively safe procedure via the well-standardized transmastoid approach. One of the previously established contraindications for cochlea implant is chronic middle ear inflammation due to concerns of increased risk of intracranial infection and/or device extrusion (Olgun et al., 2005; Achiques et al., 2010). Recently there is mounting new evidence indicating that cochlear implants can be safely performed in patients with chronic otitis media or atelectasis (Chen et al., 2009; Sampaio et al., 2011; Migirov et al., 2006). Otitis media with effusion (OME), also called serous otitis media, is a very common childhood disease. The reported incidence is as high as 20% among children, with a peak around ages one to two years (Migirov et al., 2006; Moriniere et al., 1998; American Academy of Family Physicians et al., 2004). Cochlear implants in pediatric patients, especially those younger than 2

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Peer review under responsibility of PLA General Hospital Department of Otolaryngology Head and Neck Surgery.

[1] Equal contribution.

http://dx.doi.org/10.1016/j.joto.2015.11.004

years of age, have become increasingly common. Clinicians are often confronted with OME in the expanding population of cochlear implant candidates. Accordingly, this study aims to report our experiences with cochlear implantation in children with OME.

2. Material and methods

A retrospective review of 24children (ages 11 months to 5.2 years)who underwent cochlear implantation in an ear with active OME was conducted between January 2011 to November 2014 in the Department of Otorhinolaryngology and Head and Neck Surgery, PLA Hospital, China. Study protocol was approved by the hospital's Institutional Review Board. All the 24 subjects were under 6 years of age without any residual hearing when admitted to our department as cochlear implant candidates. The candidates received a comprehensive preoperative radiological evaluation. Their radiologic findings showed middle ear and mastoid opacification with intact ossicles, indicating the presence of OME. Otoscopy found no evidence of tympanic membrane perforation. After audiological assessment, the 24 candidates were all diagnosed with bilateral profound sensorineural hearing loss without any residue hearing. All the operations were performed by the same experienced surgical team in our department. The demographic data, etiology of deafness, and surgical techniques were retrieved from medical records and summarized in Table 1.

Based on how the incus was handled, the subjects were divided into Group1 (incus left in place, n = 16) and Group 2 (incus removed, n = 8).

At follow ups, complications, and auditory and speech rehabilitation outcomes were reviewed. Complications included wound infection, meningitis or other intracranial infections, cerebrospinal fluid otorrhea, post-implant perforation of tympanic membrane, device extrusion and recurrence of OME. To assess post-implant auditory function and speech recognition, a prospective questionnaire was constructed including questions from Categories of Auditory Performance (CAP) (Archbold et al., 1998), Speech Intelligibility Rating (SIR) (Allen et al., 2001) and the Meaningful Auditory Integration Scale (MAIS or infant toddler-MAIS) (Robbins et al., 1991). The composite questionnaires were administered through interviews with the parents by an audiologist. All the subjects reported daily use of the CI and attending speech therapy programs.

3. Surgical techniques

Based on preoperative imaging and intraoperative finding, all subjects were determined to have active OME in the implant ear at the time of CI operation. To pursue an early hearing and speech rehabilitation, all the children in our study received one-stage cochlear implant operations (one patient had an adenoidectomy procedure done 3 months before CI).

All cochlear implantations in this study were performed via the facial recess approach with round window insertion under general anesthesia. Following a retroauricular incision, approximately 3 cm in length, an intact canal wall mastoidectomy and transantrum posterior tympanotomy were

Table 1
Demographic and clinical details of the 24 children.

Case	Gender	Age at implantation	Cause of deafness	Group	Implanted side	Cochlear device
1	Male	1 year 7 months	CHL	1	Left	24Contour
2	Female	2 years 8 months	LVAS	1	Right	Sonata
3	Female	2 years 8 months	LVAS	1	Right	C40+
4	Male	2 years 4 months	CHL	1	Right	C40+
5	Male	1 year 9 months	CHL	1	Right	C40+
6	Male	3 years 5 months	CHL	1	Right	C40+
7	Male	1 year 7 months	CHL	1	Right	Sonata
8	Male	1 year 5 months	LVAS	1	Right	24Contour
9	Male	1 year 3 months	CHL	1	Right	Freedom
10	Female	2 years 6 months	LVAS&MM	1	Right	24K
11	Female	2 years 5 months	CHL	1	Left	Freedom
12	Female	2 years 1 months	MM	1	Right	24Contour
13	Male	4 years 5 months	CHL	1	Right	Sonata
14	Female	11 months	CHL	1	Right	Sonata
15	Female	2 years 7 months	LVAS	1	Left	24Contour
16	Male	1 year 4 months	CHL	1	Right	Concerto
17	Male	1 year 7 months	LVAS	2	Right	24Contour
18	Male	1 year 8 months	CHL	2	Right	HiRes 90K
19	Female	3 years 10 months	CHL	2	Right	Freedom
20	Male	4 years 10 months	LVAS	2	Left	Freedom
21	Male	2 years 7 months	CHL	2	Right	Freedom
22	Female	5 years 2 months	LVAS	2	Left	Freedom
23	Male	1 year 7 months	MM	2	Left	Sonata
24	Female	2 years 1 months	CHL	2	Left	Freedom

CHL: Congenital Hearing Loss; LVAS: Large Vestibular Aqueduct Syndrome; MM: Mondini Malformation; Group1: Facial Recess Approach Implantation; Group2: Facial Recess Approach Implantation with Incus Removal.