

Long-term complications after cochlear implantation

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ABSTRACT

Objective: Cochlear implantation has become an effective treatment for many profoundly deaf patients. As with any surgical procedure, a proportion of patients suffer postoperative complications. The aim of this study was to analyze long-term postoperative complications in patients with cochlear implants with a view to improve clinical interventions and propose a consensus for reporting complications.

Methods: A total of 406 cases received cochlear implants between December 1985 and April 2007 at Tokyo Medical University (TMU) Hospital. We retrospectively reviewed case notes from 366 patients who had undergone cochlear implantation (215 adults and 151 children) after excluding 40 patients of re-implantation including 13 cases implanted initially at other hospitals. Life-threatening, major and minor complications were examined retrospectively.

Results: Major complications occurred following cochlear implantation in 32 patients (8.7%) who had received their initial implant at TMU Hospital. Revision surgery was required for 30 patients. The mean age at implantation was 33 years 6 months (range, 1 year 9 months to 83 years; median, 37 years). The main etiology of deafness was unknown or progressive (113, 52.6%) in adults and congenital (132, 87.4%) in children. The cause of deafness was meningitis in 41 cases (11.2%), and 26 cases (7.1%) were diagnosed with idiopathic sudden deafness.

Flap-related problems (including middle ear infection and/or flap necrosis) developed in 13 cases (3.6%), with 12 cases (7 adults, 5 children) requiring re-implantation. Electrode slip-out occurred in 8 patients (7 adults, 1 child). All adult cases in whom electrodes slipped out underwent implantation before 1994, while the child (1 pediatric case) was operated in 2003. All cases required re-implantation and most cochlear implantations were performed using the modified split-bridge technique after 1997. Six patients (4 adults, 2 children) experienced device failure. Four patients experienced electrode problems. Non-surgical major complications included 1 patient with permanent facial nerve paralysis as a result of thermal injury in 1995.

The total number of minor medical and surgical complications was 27, representing 7.4% of all operations.

Conclusion: Many cases of major complications, including electrode problems and facial paralysis, excluding traumatic device failure were considered avoidable by strict operative and postoperative procedures. Some cases of flap infection and traumatic device failure may not be able to be avoided completely, and every possible care should be taken by implant patients and others involved.

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1. Introduction

Cochlear implantation is a well-established and effective treatment for many profoundly deaf patients. As with any surgical procedure, a proportion of patients experience postoperative complications. Previous studies have examined the incidence of major and minor complications following cochlear implantation. A number of reports [1–6; see Table 1] in the literature have described surgical complications following cochlear implantation in large series.

Major complications of cochlear implant surgery include electrode failure, meningitis, problems such as skin infection at the implant site, middle ear infection requiring revision surgery because of flap necrosis, and severe sequelae such as permanent facial paralysis. Minor complications are those that can be managed conservatively with medical or audiological interventions, such as wound infection or non-auditory stimulations.

Over 25 years, we have performed multichannel cochlear implantation in more than 500 cases. Postoperative courses were satisfactory in the vast majority of cases, although some postoperative problems were encountered in the 366 cochlear implant patients who were operated at Tokyo Medical University (TMU) Hospital between December 1985 and April 2007, with an implantation duration of more than 5 years.

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Table 1
Major and minor complications in prior studies.

	Webb et al. [2]	Hoffman et al. [3]	Bhatia et al. [4]	Green et al. [5]	Stratigouleas et al. [6]	
Year of publications	1991	1995	2004	2004	2006	
Number	153	Adults 3064	Children 1905	Children 300	Adults 240	176
Major	26 (17.0%)	208 (6.8%)	79 (4.1%)	7 (2.3%)	15 (6.3%)	7 (4.0%)
Flap related problem (incl. implant extrusion, skin infection, etc.)	13 (8.5%)	109 (3.6%)	30 (1.6%)	1 (0.3%)	11 (4.6%)	
Electrode problem (incl. ele. failure, ele. migration, ele. slip-out, non-auditory stimulation, ele. array exposure)	10 (6.5%)	82 (2.7%)	38 (1.6%)	1 (0.3%)	11 (4.6%)	
Facial paralysis (permanent)	3 (2.0%)	17 (0.6%)	11 (0.6%)			1 (0.6%)
Ear infection (incl. middle ear and external ear infection, mastoiditis, excl. flap infection)				2 (0.7%)		2 (1.1%)
Cholesteatoma				3 (1.0%)		
Minor				33 (11.0%)		
Facial stimulation	1 (0.7%)					
Facial palsy (transient)				2 (0.7%)	1 (0.42%)	3 (1.7%)
Balance problem (permanent)					3 (1.3%)	4 (2.2%)
Flap infection				13 (4.3%)		2 (1.1%)
Minor electrode reposition						2 (1.1%)
Altered facial sensation					4 (1.7%)	
Posterior cal wall defect				9 (3.0%)		
Hematoma or flap swelling				14 (4.6%)		

2. Materials and methods

A total of 406 cases received cochlear implants between December 1985 and April 2007 at TMU Hospital and have been using cochlear implants for longer than 5 years. The data required for this study were collected by a retrospective review of case notes from 366 patients who had undergone cochlear implantation, excluding 40 patients of re-implantation. Seventeen patients had undergone initial implantation at other hospitals (Fig. 1).

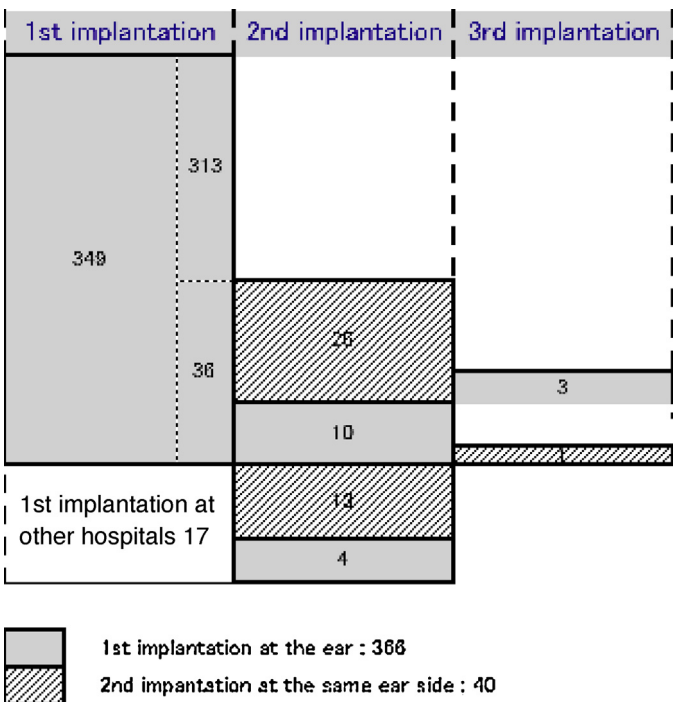


Fig. 1. Background of 406 cases. A total of 406 cases received cochlear implants between December 1985 and April 2007 at TMU Hospital and have been using cochlear implants for longer than 5 years. The data required for this study were collected by a retrospective review of case notes from 366 patients who had undergone cochlear implantation, excluding 40 patients of re-implantation. Seventeen patients had undergone initial implantation at other hospitals.

Life-threatening, major and minor complications were examined retrospectively.

3. Results

A total of 366 patients were included in this study comprising 215 adults and 151 children (including 120 infants). Patients included 190 females and 176 males. The mean age at implantation was 33 years 6 months (range, 1 year 9 months to 83 years; median, 37 years) (Fig. 2). The main etiology of deafness was unknown or progressive (113, 52.6%) in adults and congenital (132, 87.4%) in children. The cause of deafness was meningitis in 41

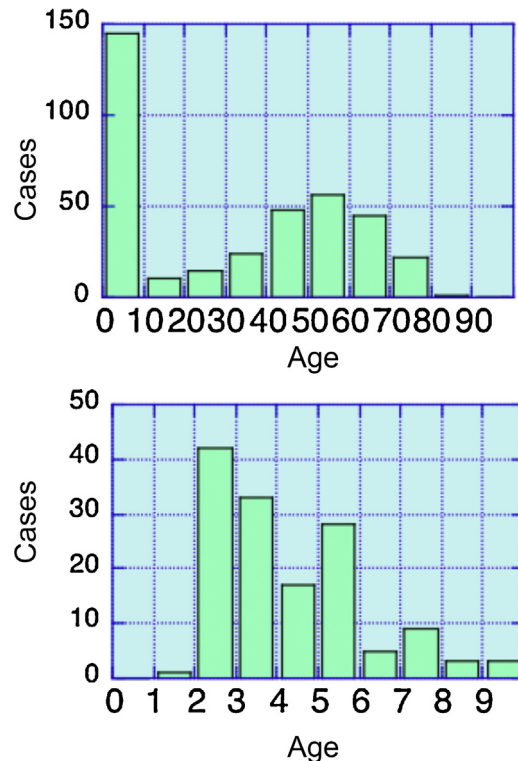


Fig. 2. Age at implantation (the bottom figure shows up to 10 years).

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