

ORIGINAL RESEARCH

Outcome of cases of cochlear implantation in children

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ABSTRACT

Background: Cochlear implantation (CI) in children was originally described in the 1970s. The present study was conducted to assess the incidence of co-morbidities in children undergoing cochlear implant.

Materials & Methods: 120 patients who had undergone cochlear implantation procedure were studied. Parameters such as unilateral/ bilateral surgery, cause of deafness, co-morbidities, premedication, PONV & peri-operative complications were recorded.

Results: Out of 120 patients, males were 80 and females were 60. Unilateral surgeries were seen in 100 and bilateral in 20. Anaesthesia maintenance involved inhalational sevoflurane in 20, propofol in 40 and thiopentone in 60 patients. Intra-operative anti-emetics used was iv ondansetron in 95 and iv ondansetron+ dexamethasone in 32 patients. Complications included was mortality in 1, flap necrosis in 2 and the procedure was abandoned in 3 patients. The cause of deafness was congenital in all 120 cases. Co-morbidities found were 2 operated cases of PDA. The mean duration of the implantation procedures was 2.4 hours. 2 patients received blood transfusion. PONV was observed in 10 patients. The difference was significant ($P < 0.05$).

Conclusion: Cochlear implantation in children is a relatively safe procedure. It involves few perioperative complications.

Key words: Children, Cochlear implantation, complications

INTRODUCTION

Cochlear implantation(CI) in children was originally described in the 1970s. It has evolved as preferred and successful treatment for the management of irreversible hearing loss.¹ Cochlear implantation accomplished at a younger age guarantees that the child obtains maximum amount of auditory information during the critical periods for spoken language development.² Parameters such as aetiology, duration of deafness, age of onset, pre-implant amplification, communication mode, age of children during implantation, type of speech processor used and duration of implant usage affects the outcome of CI.³

The cochlear implant programme is a team work comprising of the audiologist, the paediatrician, the surgeon and the anaesthesiologist. Anaesthesia services are needed in preoperative audiometry procedures like BERA, CT scan, MRI, and ultimately when the implant procedure is performed.⁴ Anaesthetist mainly aim to record various syndromes, cardiac anomalies, maintains airway difficulties etc. Long standing surgeries requires hypotensive anaesthesia etc. Considering the fact that cochlear implantation in children is time

consuming, and challenging, the anaesthesiologist should have sufficient knowledge about many risks in dealing with this communication-impaired paediatric age group.⁵

Medical and radiological criteria have been extended to enrol children with cochlear dysplasia, multiple developmental delays and certain systemic medical conditions.⁶ Hence, it is imperative to consider each and every child carefully by an experienced cochlear implant team consisting of an otolaryngologist, audiologist, a rehabilitation and educational professional and others as needed.⁷ The present study was conducted to assess the incidence of co-morbidities in children undergoing cochlear implant.

METHODOLOGY

The present study consisted of 120 patients who had undergone cochlear implantation procedures of both genders. All parents gave their written consent for active participation in the study.

Data such as name, age, gender etc. was recorded. Parameters such as unilateral/ bilateral surgery, cause of deafness, co-morbidities, premedication, anaesthesia preference for induction and maintenance etc. were recorded. The peri-operative anaesthesia management, complications related to anaesthesia were recorded. The results were compiled and subjected for statistical analysis. P value less than 0.05 was set significant.

RESULTS

Table I Distribution of patients

Total- 120		
Gender	Male	Female
Number	80	40

Table I shows that out of 120 patients, males were 80 and females were 60.

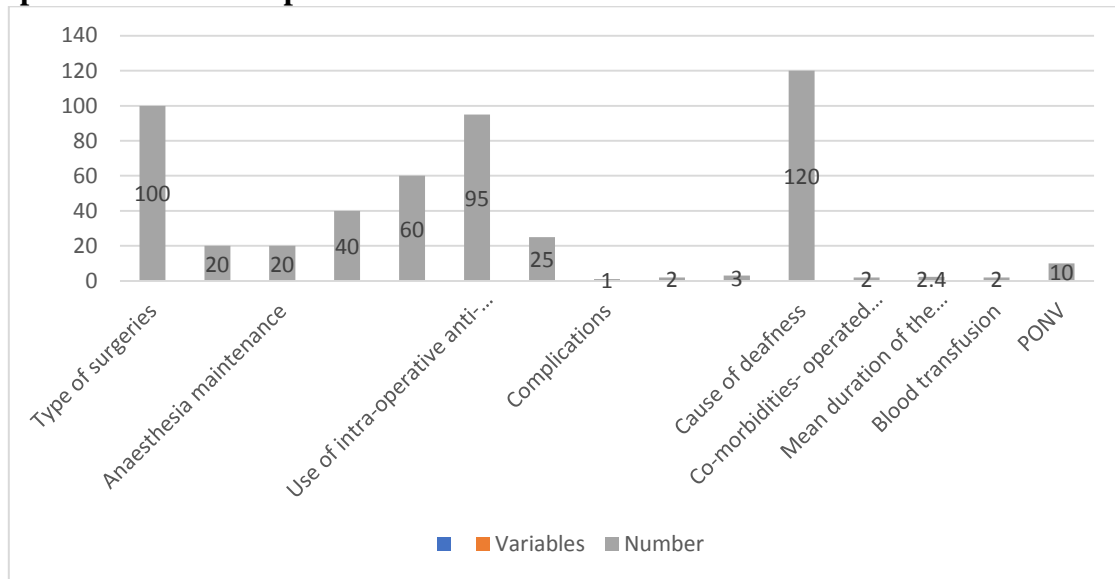
Table II Assessment of parameters

Parameters	Variables	Number	P value
Type of surgeries	Unilateral	100	0.01
	Bilateral	20	
Anaesthesia maintenance	inhalational sevoflurane	20	0.05
	propofol	40	
	thiopentone	60	
Use of intra-operative anti-emetics	iv ondansetron	95	0.01
	iv ondansetron+ dexamethasone	25	
Complications	Mortality	1	0.84
	flap necrosis	2	
	procedure abandoned	3	
Cause of deafness	Congenital	120	-
Co-morbidities- operated cases of PDA		2	-
Mean duration of the implantation procedures (hours)		2.4	-
Blood transfusion		2	-
PONV		10	-

Table II, graph I shows that unilateral surgeries were seen in 100 and bilateral in 20. Anaesthesia maintenance involved inhalational sevoflurane in 20, propofol in 40 and thiopentone in 60 patients. Intra-operative anti-emetics used was iv ondansetron in 95 and iv ondansetron+ dexamethasone in 32 patients. Complications included was mortality in 1, flap necrosis in 2 and the procedure was abandoned in 3 patients. The cause of deafness was congenital in all 120 cases. Co-morbidities found were 2 operated cases of PDA. The mean

duration of the implantation procedures was 2.4 hours. 2 patients received blood transfusion. PONV was observed in 10 patients. The difference was significant ($P < 0.05$).

Graph I Assessment of parameters



DISCUSSION

Cochlear implantation children before 2.5 year is of great benefit.⁸ Earlier perceived potential for electrode migration secondary to skull growth were considered limitation for implanting very young children. The use of monopolar cautery is prohibited in patients with implant.⁹ The size of middle and inner ear at birth are adult size and the facial recess is also fully developed in neonates.¹⁰ However, the absence of facial recess growth after birth may result in a narrow facial recess in cases of prematurity; thus impeding the safe angulation of the drill away from the facial nerve and the placement of the insertion tool through the opening.^{11,12} An inferiorly and laterally located stapedial tendon poses insufficient view through the facial recess and obstruct satisfying access to the area of the cochleostomy.^{13,14} The present study was conducted to assess the incidence of co-morbidities in children undergoing cochlear implant.

We found that out of 120 patients, males were 80 and females were 60. Majdani et al¹⁵ a total of 2639 patients underwent CI. There were no differences between unilateral (ST = 171, TORT = 245) and revision CI (ST = 160, TORT = 232), but bilateral procedures were longer (ST = 295, TORT = 377, $P < 0.001$). In unilateral surgeries, Cochlear Limited (CL) devices were implanted faster (ST = 165, TORT = 225) than Advanced Bionics (ABC) (ST = 183, $P = 0.001$; TORT = 240, $P = 0.023$) or MedEl (ST = 193, $P < 0.001$; TORT = 253, $P = 0.002$) devices. There were no differences for unilateral CI between ABC and MedEl devices. For revision CI, ABC devices (ST = 141, TORT = 219) were implanted faster than CL devices (ST = 181, $P = 0.001$; TORT = 266, $P < 0.001$). There were no differences by age group or between Germany and the U.S. ST and TORT were shorter for 575 CIs performed in the final two years of the study (unilateral CI: ST = 145, TORT = 209; bilateral CI: ST = 259, TORT = 330; revision CI: ST = 138, TORT = 205). For unilateral CI, ST and TORT decreased yearly (linear regression, $P < 0.001$) and inversely correlated with surgeon experience (linear regression, $P < 0.01$).

We found that unilateral surgeries were seen in 100 and bilateral in 20. Anaesthesia maintenance involved inhalational sevoflurane in 20, propofol in 40 and thiopentone in 60 patients. Intra-operative anti-emetics used was iv ondansetron in 95 and iv ondansetron+

dexamethasone in 32 patients. Complications included was mortality in 1, flap necrosis in 2 and the procedure was abandoned in 3 patients. The cause of deafness was congenital in all 120 cases. Co-morbidities found were 2 operated cases of PDA. The mean duration of the implantation procedures was 2.4 hours. 2 patients received blood transfusion. PONV was observed in 10 patients. It is advisable to select contralateral ear if one ear is significantly dysplastic or hypoplastic.¹⁶ It is also recommended to select least obstructed labyrinth. Earlier, the worse ear was generally selected as implantation itself would destroy residual hearing and the better hearing ear should be conserved in case the implant did not work. Now many programs select the better hearing ear as it is likely to have a higher population of residual neural elements and hence offer the possibility of better performance.¹⁷

CONCLUSION

Cochlear implantation in children is a relatively safe procedure. It involves few perioperative complications.

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