The safety profile of cochlear implantation in children less than one year old

Brendan P. O'Connell MD

Meredith A. Holcomb Aud

Ted A. Meyer MD PhD

David R. White MD

Disclosures

- No financial disclosures

MUSC Health
MEDICAL UNIVERSITY of SOUTH CAROLINA

Introduction

- Increased identification of young cochlear implant candidates
- Notion of critical period
- Improved outcomes with early implantation
- Children younger than 12 months old
- Safety profile remains unclear

MUSC Health
MEDICAL UNIVERSITY *of* SOUTH CAROLINA

Potential perioperative issues posed by early implantation

- Anesthetic factors
  - Hypoxia
  - Bradycardia
  - Exaggerated hypovolemic effects
- Surgical factors
  - Delicate tissue
  - Tip/stylomastoid foramen
  - Thin skull

MUSC Health
MEDICAL UNIVERSITY of SOUTH CAROLINA

Aim

- Determine if differences in complication rates exist in children undergoing implantation between 6 and 12 months when compared to children 12-18 months of age

MUSC Health
MEDICAL UNIVERSITY of SOUTH CAROLINA

Experimental Design

- Retrospective review 2002-2014
- Patients between 6 and 18 months of age undergoing cochlear implantation
- Single institution

MUSC Health
MEDICAL UNIVERSITY *of* SOUTH CAROLINA

Outcome Measures

- Primary outcome measure = surgical or anesthetic complications
  - Minor vs. Major
  - Infection, facial nerve injury, spinal fluid leak, wound breakdown, medical problems
- Secondary outcome measures = perioperative variables
  - Total operative time, anesthetic time, blood loss, time in the post-operative anesthesia unit, and length of post-operative hospital stay

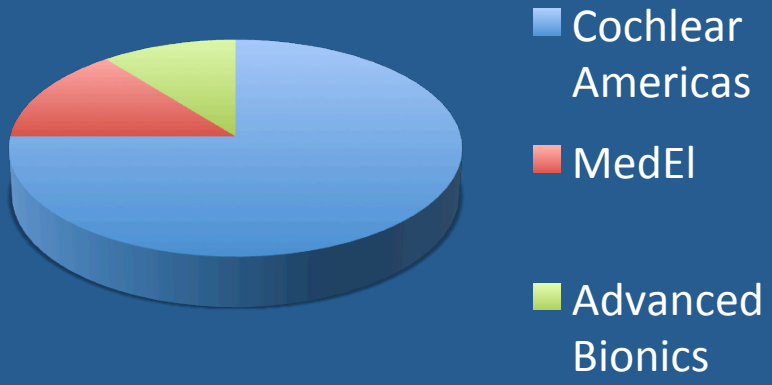
MUSC Health
MEDICAL UNIVERSITY of SOUTH CAROLINA

Patient Demographics

	Group 1 6-12 months	Group 2 12-18 months	*p* value
No. of Children	23	35	NA
No. of ears implanted	37	47	
Mean age at CI (months)	10.1 ± 1.2	15.0 ± 1.4	NA
Race Caucasian Other	 17 (74.0%) 6 (26.0%)	 22 (62.9%) 13 (37.1%)	 0.55
Sex Male Female	 14 (60.9%) 9 (39.1%)	 24 (68.6%) 11 (31.4%)	 0.75
Ear Right Left	 23 (62.2%) 14 (37.8%)	 31 (66.0%) 16 (34.0%)	 0.90
Weight (kg)	8.8 ± 1.2	10.0 ± 1.0	0.002
Simultaneous bilateral	7	6	0.64

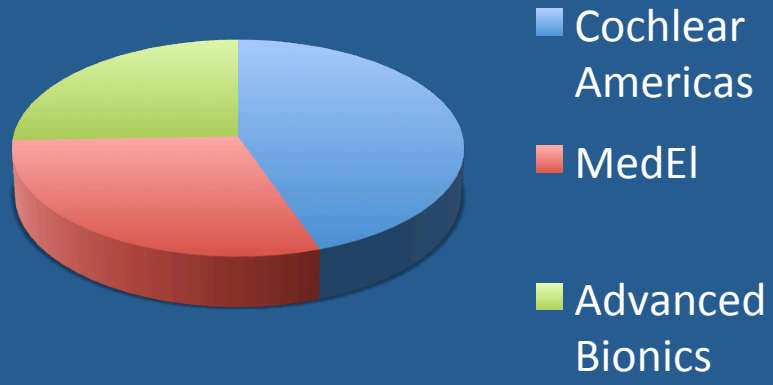
Devices Implanted

Device Manufacturer:
6-12 month group



Average time to activation: 16.5 ± 7.1 days

Device Manufacturer:
12-18 month group



Average time to activation: 20.3 ± 6.2 days

Results: Perioperative Metrics for unilateral implant cases

	Group 1 6-12 months	Group 2 12-18 months	*p* value
Total operative time (minutes)	127.2 ± 31.1	136.9 ± 46.7	0.74
Total anesthetic time (minutes)	162.3 ± 34.4	181.9 ± 53.7	0.27
Blood loss (cc)	10.9 ± 6.5	17.7 ± 19.3	0.16
Time spent in the PACU (minutes)	80.4 ± 31.5	83.0 ± 46.0	0.98
Length of hospital stay (days) *	0.07 ± 0.37	0.02 ± 0.15	0.75

* All patients, except two, were discharged home after surgery from the PACU
- No differences were observed between groups for bilateral implants (data not shown)

Results: Complications

- Overall rate of complication 6/84 (7.1%)
- Average follow-up of 3.7 ± 2.9 years

	Group 1 6-12 months	Group 2 12-18 months	*p* value
Total complications	3 (8.1%)	3 (6.4%)	1.0
Minor complications	2 (5.4%) - pressure ulcer - delayed FN paralysis	1 (2.1%) - swelling over implant	0.58
Major complications	1 (2.7%) - seroma drainage in OR	2 (4.3%) - abscess required I+D - abscess required I+D	1.0

- 2 device failures in each group

Conclusions and Significance

- Cochlear implant surgery appears to be safe in infants under 12 months of age
- Surgery requires meticulous care with hemostasis, soft tissue dissection, and drilling of the well
- Can be performed in outpatient setting
- Future studies with increased sample size are needed

MUSC Health
MEDICAL UNIVERSITY of SOUTH CAROLINA