Sequential Bilateral Cochlear Implantation in Children: Factors Contributing to Performance

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Disclosures

- Anita Vereb, PhD - None
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Program History

- 175 pediatric bilateral CI recipients
Objective

- Evaluate outcomes in children with sequential bilateral cochlear implants based on time between 1st and 2nd CI.
Methods

- Review of available speech-language data (PPVT and EVT) performed in binaural condition and speech perception data (MLNT and LNT) performed with 2nd ear only obtained during routine clinic visits

- Data points:
  - Closest prior to 2nd CI
  - 1 year post 2nd CI (+/- 6mos)
  - Limitations: Varying ages at 1st and 2nd CI. Test measures affected by CI recipients’ age.
Inclusion Criteria

- Prelingually deafened
- No concern regarding cognitive abilities based on clinical interactions with the child
- Bilateral implant user (sequential), minimum of one year of consistent CI device use of 2nd CI
- Normal cochlear anatomy with full insertion
- English, primary language
- Oral mode of communication
Subjects

- N = 175 bilateral recipients
- 93 subjects removed– postlingually deafened, multiply-involved, < 1 year post 2nd, ELL, simultaneous bilateral, or atypical cochlear anatomy
- 8 removed relocated/transfer of care
- 5 removed explant/reimplant of 2nd CI
- 8 removed due to non-use
- Final N = 60
Subjects

- Final N = 60
- 25 Male, 35 Female
- 67% 1st CI right ear
- Time btw 1st CI and 2nd CI
  - Mean 58 mos
  - Range 4 – 182 mos
Groups

- Subjects broken down into three groups based on time between 1\textsuperscript{st} and 2\textsuperscript{nd} CI
  - Group 1 = less than 2 years (n=16)
  - Group 2 = 2-5 years (n=19)
  - Group 3 = greater than 5 years (n=25)
Means for Group 1 (<2yr btw CIs)

- Mean age activation 1st CI = 23 mos, Mean age activation 2nd CI = 35 mos, Mean Time Between CIs Mean = 12 mos (Range 4-23 mos)
Means for Group 2 (2-5yr btw CIs)

- Mean age activation 1st CI = 30 mos, Mean age activation 2nd CI = 71 mos, Mean Time Between CIs Mean = 41 mos (Range 25-59 mos)
Means for Group 3 (>5yr btw CIs)

- Mean age activation 1\textsuperscript{st} CI = 40 mos, Mean age activation 2\textsuperscript{nd} CI = 141 mos, Mean Time Between CIs Mean = 101 mos (Range 61-182 mos)
Summary of Group Differences

- Group 1 demonstrated better language outcomes post 2nd CI
  - youngest mean age at 1st CI
  - youngest mean age at 2nd CI
  - shortest time in between surgeries
- Both groups 2 & 3 demonstrated open-set speech recognition in the 2nd ear, even when provided at older mean ages of 71 and 141 months, likely that these scores will improve over time.
Analyses

- General linear modeling, controlling for age at of the first ear, was performed.
- Compared scores prior to 2\textsuperscript{nd} CI and 1 year post 2\textsuperscript{nd} CI.
- Group 1 was not included in the analysis of speech/language data as most children were not able to perform these tests prior to the 2\textsuperscript{nd} CI due to their young age.
Speech/Language: Group 2 and 3

**Graphs:**

1. **EVT SS**
   - Time between CIs: between 2 and 5 yrs, more than 5 yrs
   - Pre Bilateral CI vs. 1yr Post
   - NS

2. **PPVT SS**
   - Time between CIs: between 2 and 5 yrs, more than 5 yrs
   - Pre Bilateral CI vs. 1yr Post
   - NS
Groups 2 and 3

MLNT

LNT

Time btw CIs
between 2 and 5 yrs
more than 5 yrs

p<.001

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Lessons Learned

- Language outcomes remained stable between pre and 1yr post 2\textsuperscript{nd} CI.
- Even children with significant time between the 1\textsuperscript{st} and 2\textsuperscript{nd} CI obtained open-set speech recognition in the 2\textsuperscript{nd} ear.
Non-Users of 2\textsuperscript{nd} CI

- Non-users (N= 8)
- Time btw 1st CI and 2nd CI
  - Mean 121 mos, Median 122 mos
  - Range 13-189 mos
Conclusions

- Although patient care is trending towards simultaneous bilateral CIs, a large number of potential sequential bilateral CI recipients remain.
- Data from this study can be used to counsel families of such children regarding expectations of performance and to encourage them to implant the 2nd ear sooner rather than later.
Thank You For Your Attention

- Questions: Anita Vereb, PhD – avereb@umich.edu