The Sunnybrook Experience with Cochlear Implants for Single Sided Deafness

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Disclosures

Nothing to disclose
Funding Limitations for CI for SSD in Canada
Study Design

• Prospective study
• Patients with unilateral hearing loss of recent duration

Subjects

• N=10 (avg. age = 49.3 years ; range = 30-57 years)
• 6 male, 4 female
• Audiometric thresholds in the better ear of normal to mild
• Audiometric thresholds in the poorer ear of severe to profound
• Short duration of hearing loss (<5 years)
<table>
<thead>
<tr>
<th>Subject</th>
<th>Etiology</th>
<th>Age</th>
<th>Previous Tx</th>
<th>Duration of HL (years)</th>
<th>CI Ear</th>
</tr>
</thead>
<tbody>
<tr>
<td>157</td>
<td>SSNHL of unknown etiology</td>
<td>55.94</td>
<td>none</td>
<td>1.88</td>
<td>Left</td>
</tr>
<tr>
<td>169</td>
<td>SSNHL of unknown etiology</td>
<td>53.67</td>
<td>none</td>
<td>2.52</td>
<td>Left</td>
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<tr>
<td>184</td>
<td>Meniere's disease, progressive, labyrinthectomy</td>
<td>47.89</td>
<td>CROS aid</td>
<td>4.01</td>
<td>Right</td>
</tr>
<tr>
<td>189</td>
<td>Meniere's disease, post labyrinthectomy</td>
<td>53.80</td>
<td>BAHA 2011</td>
<td>3.28</td>
<td>Right</td>
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<tr>
<td>190</td>
<td>SSNHL of unknown etiology</td>
<td>30.82</td>
<td>none</td>
<td>1.25</td>
<td>Right</td>
</tr>
</tbody>
</table>
Methods

Testing:

• CNC Words & AzBio Sentences in quiet and in + 5 dB SNR
  • good ear alone (poor ear plugged)
  • poor ear alone (good ear masked)
  • in best aided condition

• Adaptive HINT with speech presented from 0 degree azimuth and noise presented from 0, 90, or 270 degrees

• Subjective questionnaires (HUI3, SSQ, PHQ-9 for Depression, Tinnitus Handicap Inventory)

Pre-Operatively 1 month post-operatively 6 months post-operatively 12 months post-operatively
Methods

Testing:

• Prior to surgery, patients were fit with a Phonak wireless CROS hearing aid for a one month trial

• Patients completed the aforementioned speech testing at one month post CROS fitting along with a questionnaire about their experience with the CROS HA
Localization testing was completed at the 3 months post CI activation

- unaided
- with the CROS hearing aid
- with the cochlear implant
AzBio Sentences in Quiet CI Only

Pre | 1 Mo | 6 Mo | 12 Mo
CNC Words in Quiet CI Only

Pre 1 Mo 6 Mo 12 Mo

0 10 20 30 40 50 60 70
Localization – Azimuth Correct

[Diagram showing angles from 0° to 360° with percentage correct values for Unaided, CROS, and CI categories.]

- Overall % Correct:
  - Unaided: 21.3%
  - CROS: 17.2%
  - CI: 31.5%

Significance: *(p = 0.01)*
Localization – Hemisphere Correct

* (p = 0.004)

24.6
10.3
85.66

Sound detection from deaf side

Unaided
CROS
CI

Sunnybrook
HEALTH SCIENCES CENTRE

12
Localization – Rear Quadrant

* (p = 0.02)
SSQ Results

- *p=.02
- *p=.001
- *p=.034

Results:
- Speech: 1.8 (pre-op), 5.6 (1 month post-op), 5.6 (6 month post-op), 5.4 (12 month post-op)
- Spatial: 1.1 (pre-op), 3.2 (1 month post-op), 4.2 (6 month post-op), 5.1 (12 month post-op)
- Quality: 2.7 (pre-op), 6.2 (1 month post-op), 6.4 (6 month post-op), 7.2 (12 month post-op)

Legend:
- Red: pre-op
- Purple: 1 month post op
- Green: 6 month post op
- Blue: 12 month post op
THI Results

* p=.03
Results

• Improvements in speech perception in the poor ear over time

• Improvements in the ability to localize sound (particularly in hemisphere correct & correctly detecting sounds from behind on the CI side)

• Improved ratings on the SSQ scale

• Improved perceived tinnitus
• Importance of motivation and willingness to commit to auditory training

• Possibly a critical period of SSD after which adaption to a CI becomes difficult
Future Directions

• Ongoing project with further enrollment for greater power

• Localization testing to be completed at later time points

• Evaluate the impact of duration of deafness on the success with cochlear implants for SSD

• Longer term follow up to evaluate satisfaction with the CI

• The role of rehabilitation in adaptation to a CI for SSD