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Disclosures

• We have no relevant financial relationships with any commercial interest as it pertains to this presentation.

• Non-financial relationships include:
  – Holstad - Audiology Advisory Board Cochlear Americas
  – Shapiro - Audiology Advisory Board Cochlear Americas and Advanced Bionics
  – Roland - Advisor/Consultant for Cochlear Americas and Advanced Bionics
## Past and Present Device Information

<table>
<thead>
<tr>
<th>Age at Implant</th>
<th>Device Type</th>
<th>Internal Device</th>
<th>Number of Active Electrodes</th>
<th>Reason for Explant</th>
</tr>
</thead>
<tbody>
<tr>
<td>2; 9</td>
<td>CI (1)</td>
<td>CI24RE(ST)</td>
<td>14</td>
<td>Progressive electrode loss, aberrant output, poor sound quality, FNS, &amp; pain</td>
</tr>
<tr>
<td>8; 4</td>
<td>CI (2)</td>
<td>CI24RE(ST)</td>
<td>9</td>
<td>Ossification, FNS, high impedance, &amp; compliance issues</td>
</tr>
<tr>
<td>9; 7</td>
<td>CI (3)</td>
<td>CI422</td>
<td>7</td>
<td>Did not stimulate</td>
</tr>
<tr>
<td>9; 11</td>
<td>ABI (1)</td>
<td>ABI541</td>
<td>6</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Device Information:**
- **CI**: Cochlear Implant
- **ABI**: Auditory Brainstem Implant
- **CI24RE(ST)**: CI24RE with SPEAK Technology
- **CI422**: CI422 cochlear implant
- **ABI541**: ABI541 auditory brainstem implant

**Reasons for Explant:**
- **Progressive electrode loss**
- **Aberrant output**
- **Poor sound quality**
- **FNS**
- **Pain**
- **Ossification**
- **High impedance**
- **Compliance issues**

**Notes:**
- **NA**: Information not available
ABI

• Pre-initial activation OR eABR results revealed good neural responses.

• Initial activation (1-month post):
  – Day 1: Non-auditory side effects or auditory + NASE
    • Various BP modes – 16 possible channels
  – Day 2: Auditory and some NASE
    • MP2
  – Day 3: Auditory responses
    • Final: SPEAK, 250 Hz, 3 max, BP-5 to BP+14, 400 PW

• Auditory skills therapy initiated at 2-weeks post.
• Audiologic care transferred to Moog at 3 months.
Auditory Skills Therapy

• Followed a typical auditory skills hierarchy.
• Included pitch discrimination and ranking, program comparisons, and assessments.
• Collaborated with child’s audiologists, therapists, and surgeons.
## Auditory Skills Results

<table>
<thead>
<tr>
<th>Skill</th>
<th>Set</th>
<th>Time Acquired Post Initial Activation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ling 6 Detection</td>
<td>Closed</td>
<td>2 weeks</td>
</tr>
<tr>
<td>Pattern Perception</td>
<td>Closed</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Ling ID</td>
<td>Closed (with repetition)</td>
<td>5 weeks</td>
</tr>
<tr>
<td>Spondee ID</td>
<td>Closed</td>
<td>8 weeks</td>
</tr>
<tr>
<td>Monosyllabic ID V&amp;C</td>
<td>Closed</td>
<td>10 weeks</td>
</tr>
<tr>
<td>Spondee ID</td>
<td>Open</td>
<td>20 weeks</td>
</tr>
<tr>
<td>Monosyllabic ID C Only</td>
<td>Closed</td>
<td>22 weeks</td>
</tr>
<tr>
<td>Ling ID</td>
<td>Closed (without repetition)</td>
<td>6 months</td>
</tr>
<tr>
<td>Monosyllabic ID V Only</td>
<td>Closed</td>
<td>9 months</td>
</tr>
<tr>
<td>Common Questions/Phrases</td>
<td>Open</td>
<td>9 months</td>
</tr>
</tbody>
</table>
Auditory Concerns

• Frequent fluctuations in auditory skills.
• Perception of vowels poorer than consonants.
• Slow to see impact of MAP changes on skills.
• Connected speech tasks more difficult and progress slower than single word tasks.
• With connected speech, needs significantly slower rate and longer processing time.
Ongoing Programming Concerns

• Cobwebbing of current due to limited channels.
• MAP changes not directly related to aided thresholds.
• Low frequency detection good, but confuses some low frequency sounds (same w/CI).
• Initially, minor MAP changes resulted in a negative emotional reaction.
• Longer time period needed to see positive impact of programming changes.
• Less overall MAP stability.
Emergent Programming Concerns

• 3 months:
  – Perceived sound quality change described as “grrrr”.
  – Refused to wear device.
  – 2KHz aided threshold elevated to 70dBHL.

• 6 months:
  – Soft, distant sounds interfered with hearing.

• 16 months:
  – Parent noted negative change in responsiveness.
# Speech Perception Test Results

<table>
<thead>
<tr>
<th>Test</th>
<th>Mode</th>
<th>Best CI</th>
<th>ABI (1yr) and 16 mo. post</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ESP – Pattern</strong></td>
<td>REC</td>
<td>24/24</td>
<td>(23/24) 24/24</td>
</tr>
<tr>
<td><strong>ESP – Spondee</strong></td>
<td>REC</td>
<td>24/24</td>
<td>(23/24) 24/24</td>
</tr>
<tr>
<td><strong>ESP – Monosyllables</strong></td>
<td>REC</td>
<td>17/24</td>
<td>(15/24) 13/24</td>
</tr>
<tr>
<td><strong>WIPI</strong></td>
<td>REC</td>
<td>13/25</td>
<td>(17/25) 18/25</td>
</tr>
<tr>
<td><strong>MLNT – Easy</strong></td>
<td>MLV</td>
<td>7/12</td>
<td>(5/12) 7/12</td>
</tr>
<tr>
<td><strong>MLNT – Hard</strong></td>
<td>MLV</td>
<td>7/12</td>
<td>(4/12) 4/12</td>
</tr>
<tr>
<td><strong>GASP – Words</strong></td>
<td>MLV</td>
<td>DNT</td>
<td>(8/12) 9/12</td>
</tr>
<tr>
<td><strong>GASP – Sentences</strong></td>
<td>MLV</td>
<td>DNT</td>
<td>(10/10) 10/10</td>
</tr>
<tr>
<td><strong>Common Phrases</strong></td>
<td>MLV</td>
<td>DNT</td>
<td>KW Sent (19/20) 10/20</td>
</tr>
</tbody>
</table>
Conclusion

• When re-implantation with a CI is no longer a viable option for children with auditory/oral backgrounds, candidacy for an ABI should be considered.

• Positive, open collaboration on the part of professionals resulted in the best outcomes.

• The benefit from restoration of audition, for this child, far outweighed the unknowns surrounding auditory brainstem implants in children.
Thank you for your attention!

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