Outcomes for Children with Autism Spectrum Disorder & Cochlear Implants

American Cochlear Implant Alliance
2016 - Toronto

Ellen Thomas, M.A. SLP-CCC, LSLS Cert. AVT
Casey Stach, AUD
Jennifer Still, M.H.S. SLP-CCC, LSLS Cert. AVT
Terry Zwolan, PhD
Disclosures

- Ellen Thomas – none
- Casey Stach – none
- Jennifer Still – none
- Terry Zwolan – Advisory Board, Cochlear Americas; Instructor, Institute of Cochlear Implant Training
University of Michigan Cochlear Implant Team

Terry Zwolan, PhD, Director
H. Alexander Arts, MD
Gregory Basura, MD
Hussam El-Kashlan, MD
Emily Stucken, MD
Steven Telian, MD
Marc Thorne, MD
Caroline Arnedt, AuD
Chelsea Conrad, AuD
Brandi Griffin, AuD
Kara Schwartz-Leyzac, PhD
Heidi Slager, AuD
Casey Stach, AuD
Jennifer Still, MHS, LSLS Cert AVT
Kelly Starr, MA, LSLS Cert AVT
Ellen Thomas, MA, LSLS Cert AVT
Autism Spectrum Disorder

- Etiology unknown
- Genetically based
- Neurobiological condition

(Bailey, Phillips & Rutter, 1996; Rutter, Bailey, Simonoff & Pickles, 1997).
Prevalence of Autism Spectrum Disorder (ASD)

- 2014: Centers for Disease Control and Prevention (CDC) prevalence of autism in the United States.
  - 1 in 68 children
    - 1 in 42 boys
    - 1 in 189 girls
Prevalence of ASD & Hearing Loss

Comorbidity rates of HL in children with ASD are high and increasing (Szymanski et al., 2012).

Estimates are that 1-6% of children who have hearing loss have co-occurring autism.

The number of children with profound hearing loss and autism is disproportionately high (35.4%)
Timeline for Diagnoses

15 to 18 months - time lag between diagnoses, especially when a hearing loss is identified first.  (Chakrabarti & Fombonne, 2005; Ozand et al., 2003; Spitzer & Siegel, 1990; Volkmar, Stier, & Cohen, 1985)
This Study

- **Objective:** to evaluate our service provision and outcomes of cochlear implant recipients with co-occurring autism spectrum disorder
- **Setting:** University of Michigan Medical Center – tertiary care facility
- **Subjects:** 18 patients ages 3 to 22 years
Age of Implantation

- Mean = 28 mos

Subject Number

Age of Subject in Months

- ASD dx prior to CI

Mean = 28 mos
Survey

- University of Michigan Cochlear Implant Program Behavioral and Quality of Life Survey: assesses 3 core characteristics of ASD (communication, behavior, interaction with others)
- Family Stress Scale Quittner (1991)
Parental Survey

- 18 respondents of 31 surveys sent out
- 58% return rate
- 13% (4 potential subjects) chose not to participate as they disagree with an ASD diagnosis for their child
How does your child perform with his/her CI?
Would you recommend an implant to a family who had a child whose situation was similar to your child’s?

82%

18%
How do you communicate with your child at home?

- Sign Language Only
- Spoken Language Only
- Spoken and Sign Language
- Other, please describe [i.e. augmentative/alternative communication (AAC), Picture Exchange Communication System (PECS), etc...]

Otolaryngology - Head & Neck Surgery
University of Michigan Health System
Speech Perception

Average 2.5 - words/phrases
Lowest score = 1
Highest score = 4 (n=4)

TABLE 1. Speech perception categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Perception criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No awareness of environment</td>
</tr>
<tr>
<td>1</td>
<td>Awareness, detection or localization of sound</td>
</tr>
<tr>
<td>2</td>
<td>Identification/recognition of words</td>
</tr>
<tr>
<td>3</td>
<td>Identification/recognition of simple phrases (2 words) and commands</td>
</tr>
<tr>
<td>4</td>
<td>Understands conversations</td>
</tr>
</tbody>
</table>

Eshragi, 2015
### Oral Expression

**TABLE 2. Speech expression categories**

<table>
<thead>
<tr>
<th>Category</th>
<th>Expression criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No vocalization</td>
</tr>
<tr>
<td>1</td>
<td>Some vocalization (consonants, vowels, nasal sounds)</td>
</tr>
<tr>
<td>2</td>
<td>Words only</td>
</tr>
<tr>
<td>3</td>
<td>Simple phrases and commands (where is X, lets go, etc)</td>
</tr>
<tr>
<td>4</td>
<td>Able to produce sentences</td>
</tr>
</tbody>
</table>

Average = 2  
Lowest Score = 0 (n =1)  
Highest Score = 4 (n=4)

Eshragi, 2015
Family Stress Scale

- There was great variability across families with regards to what aspect of life they found most stressful
### Family Stress Scale

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
<th>Quittner et al Mean for CI and no ASD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationships with parents or extended family</td>
<td>2.13</td>
<td></td>
</tr>
<tr>
<td>Following routines (mealtimes, bedtime)</td>
<td>2.19</td>
<td></td>
</tr>
<tr>
<td>Medical/audiological care</td>
<td>2.44</td>
<td></td>
</tr>
<tr>
<td>Marital relationship</td>
<td>2.69</td>
<td></td>
</tr>
<tr>
<td>Discipline</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Having to be a language teacher for your child (alphabet, numbers...)</td>
<td>3</td>
<td>2.75</td>
</tr>
<tr>
<td>Communication (child understanding you speaking)</td>
<td>3.06</td>
<td></td>
</tr>
<tr>
<td>Outings in the community (keeping track of child, behavior)</td>
<td>3.19</td>
<td>2.71</td>
</tr>
<tr>
<td>Relationships with other children</td>
<td>3.19</td>
<td></td>
</tr>
<tr>
<td>Behavior problems</td>
<td>3.19</td>
<td></td>
</tr>
<tr>
<td><strong>Finances</strong></td>
<td><strong>3.25</strong></td>
<td>2.71</td>
</tr>
<tr>
<td><strong>Educational concerns</strong></td>
<td><strong>3.5</strong></td>
<td>2.49</td>
</tr>
<tr>
<td>Safety (crossing the street...)</td>
<td>3.81</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

- Given the high prevalence of ASD among children with severe-profound HL (35.4%), and trends to implant children at very young ages (typically before ASD is diagnosed), clinics should recommend early screening for ASD.
- Word level understanding and use of spoken language was the average outcome of our study patients. This is poorer than what we typically see in children without ASD.
- Despite this, 17/18 families in our study used spoken language, which would not be possible without the intervention of the CI.
Parent Comments

- “I feel this survey does not begin to show the benefit of our son having a cochlear implant.”
- “I just want to comment. My son is now 24 yrs. Looking back, getting his cochlear implant was one of the best things I ever chose for him.”