

Critical Review: The Effect of Cochlear Implantation on Speech Perception and Neural Integrity for Children with Auditory Neurodegeneration

Studies selected for inclusion in this critical review were required to investigate outcomes in speech perception and/or electrophysiological measurements of neural integrity in patients with AN/AD and sensory hearing loss using a cochlear implant. This review is directed towards the pediatric population, therefore, studies which included individuals implanted as adults were excluded.

Studies which did not compare the results of children with AN/AD to children with sensory hearing loss were also excluded. No limitations were placed on the type of outcome measures that were used to determine speech perception or neural performance.

Data Collection

Results in the literature search yielded three articles that were congruent with the selection criteria above: case study (1) and non-randomized clinical trials (2).

Results and Discussion

Three studies have been conducted that compare speech perception and/or electrophysiological benefits in cochlear implanted children with Auditory Neuropathy/Dyssynchrony (AN/AD) versus cochlear implanted children with a sensory hearing loss.

Buss et al. (2002) studied four children identified with AN/AD who had received a Clarion cochlear implant unilaterally through the Carolina Disorders Program at the University of North Carolina. The first two subjects (S1 and S2) were implanted at approximately 2 yrs of age and used oral communication, whereas the remaining two (S3 and S4) were implanted at approximately 5.5 yrs of age and used manual and cued speech respectively. The decision to implant the children in this study was made after an unsuccessful trial period with amplification. All of the children were diagnosed with AN/AD by the presence of a cochlear microphonic or otoacoustic emissions and the absence of a synchronized auditory brainstem response pre operatively.

Speech perception outcomes were measured by the Paden-Brown test. This standard test assesses the kinds of errors children with poor auditory language exposure might make in producing speech. The children were scored based on auditory Neu

mean implantation age of 33.3 ± 16.9 months with a mean age at testing of 89.6 ± 42.1 months. The other 10 children demonstrated some success with amplification and were fitted with BTE hearing instruments bilaterally from an early age. These children were selected to match the implanted AN/AD group for age at assessment at 94.2 ± 57 months. Both of these groups were compared to a third group of 37 implanted children with sensory hearing loss. They were also matched to the AN/AD implanted group for age of implantation and age at assessment.

Speech perception outcomes were examined using pre-recorded consonant-nucleus-consonant (CNC)

Previous research on both pediatric and adult populations with AN/AD has shown that improvement