Audiologic Outcomes in Infants After Therapeutic Hypothermia Due to Hypoxic Ischemic Encephalopathy

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OBJECTIVE/ PURPOSE

Pediatric Audiology Services, an affiliate of Pediatric Medical Group, provides diagnostic audiologic services to high-risk infants in the neonatal intensive care unit (NICU) at Inova Children’s Hospital in Falls Church, Virginia. One population receiving routine diagnostic audiologic evaluations are babies who experience Hypoxic Ischemic Encephalopathy (HIE), as it is widely known that hearing can be negatively impacted by hypoxic/anoxic events. Currently there are no specific guidelines in place for audiologic re-evaluations on infants with HIE who subsequently receive treatment via therapeutic hypothermia. This study reviewed the initial and follow-up comprehensive audiologic evaluations of babies born with HIE who received therapeutic hypothermia.

METHODS

From April 2011 through December 2014, 41 infants experienced HIE and received active therapeutic hypothermia within the first 6 hours of life. A total of 41 infants received comprehensive audiologic evaluations while in the NICU. The following tests were included in the comprehensive test battery:

Distortion Product Otoacoustic Emissions (DPOAE) evaluation: DPOAEs were evaluated in each ear from 2000 to 8000 Hz.

Auditory Brainstem Response (ABR) - A high-intensity click evoked ABR (70/80dBnHL) utilizing both rarefaction and condensation polarities was obtained in each ear. In addition, at least two frequencies (typically 500 and 2000 Hz) were evaluated for threshold in each ear via toneburst ABR.

One Month Follow-up for Infants Initially Diagnosed with Hearing Loss

All infants who were initially diagnosed with hearing loss were recommended to have a repeat comprehensive audiologic evaluation by one month of age to confirm results and to continue to investigate hearing sensitivity. All 5 infants with abnormal ABRs completed their one month follow-up appointment.

<table>
<thead>
<tr>
<th>1-month Follow-up</th>
<th># of infants</th>
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<tbody>
<tr>
<td>Initial Abnormal ABR</td>
<td>5</td>
</tr>
<tr>
<td>Confirmed SNHL</td>
<td>3</td>
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<tr>
<td>*Normal ABR</td>
<td>2</td>
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*Normal ABRs include: 1 infant previously diagnosed with hearing loss; 1 infant with grossly abnormal high intensity clicks only.

Recommendation for Follow-up Audiologic Evaluation 3-6 Months After Initial Evaluation

All infants who had a normal audiologic evaluation in the NICU were recommended to receive an additional comprehensive audiologic evaluation in 3-6 months, per the recommendation of Pediatrix Audiology Services.

Only 9 out of 36 initially normal hearing infants (25%) were documented in the state reporting system as having returned for their recommended follow-up audiologic evaluation.

Of the 9 infants who returned for the audiologic re-evaluation, 1 baby had since developed SNHL.

Conclusions

Diagnostic ABRs should be performed early in life and in the NICU when possible on infants diagnosed with HIE who undergo therapeutic hypothermia.

In addition, this and further research may indicate that follow-up at 3-6 months for initially normal hearing infants with HIE should be strongly recommend, to ensure detection of delayed-onset/progressive hearing loss that may otherwise be missed.

Overall, the results of this study support the continued need for diagnostic audiological services in the NICU and emphasize existing recommendations for audiological follow-up and monitoring of infants with risk indicators for developing hearing loss.

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