COMBINED EEG MONITORING IN HIGH-RISK CRITICALLY ILL NEONATES: A Pilot Study

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RESULTS

- 10 neonates were recruited over a 9 month period (Figure 2); patient characteristics summarized in Table 1
  - Average gestational age was 38 weeks + 4 days (SD 28 days; range 27-41 weeks + 2 days)
  - Average age upon enrollment was 6 days (SD 5 days; range 2-16 days)
  - Enrolled patients were treated with an average of 4 medications (SD 2 medications; range 1-7)
  - 9 of 10 patients received antiepileptic medications to abort seizure activity (range 1-3 drugs)
  - Combined monitoring was established for 8 patients

Combined EEG Monitoring

- Median delay to establishment of combined monitoring was 990 minutes (range 27-2942 minutes)
  - In only one case, cEEG was applied first before aEEG
  - Median duration of combined monitoring was 1293 minutes (range 35-1450 minutes)
  - Some discordance noted between seizure and background abnormality information available from aEEG vs. cEEG monitoring
  - More data needed to comment on sensitivity and specificity of aEEG vs. cEEG

Table 1. Participant Characteristics

<table>
<thead>
<tr>
<th>ID</th>
<th>Sex</th>
<th>GA</th>
<th>Apgar at 1 min</th>
<th>Apgar at 5 min</th>
<th>Admission Diagnosis</th>
<th>Number of Medications</th>
<th>Duration of Combined Monitoring (min)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>38+4</td>
<td>9</td>
<td>9</td>
<td>Seizures</td>
<td>1</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>40+2</td>
<td>8</td>
<td>8</td>
<td>Respiratory Distress</td>
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<td>1</td>
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<tr>
<td>3</td>
<td>F</td>
<td>38+6</td>
<td>7</td>
<td>9</td>
<td>R/O Genetic Condition</td>
<td>4</td>
<td>1419</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>38+6</td>
<td>4</td>
<td>9</td>
<td>Apnea, R/O Septica, Seizures</td>
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<td>21</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>40+5</td>
<td>2</td>
<td>9</td>
<td>R/O Meningitis, Seizures</td>
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<td>855</td>
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<tr>
<td>6</td>
<td>M</td>
<td>39+0</td>
<td>9</td>
<td>9</td>
<td>Seizures</td>
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<td>1130</td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>39+3</td>
<td>1</td>
<td>1</td>
<td>R/O</td>
<td>4</td>
<td>1450</td>
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<tr>
<td>8</td>
<td>M</td>
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<td>6</td>
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<tr>
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<td>6</td>
<td>Preterm, cardiac/ congenital anomalies, CID</td>
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<tr>
<td>10</td>
<td>F</td>
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<td>1</td>
<td>4</td>
<td>R/O, R/O Septic &amp; R/O Rasa</td>
<td>3</td>
<td>1387</td>
</tr>
</tbody>
</table>

COMBINED EEG MONITORING IN THE CHEO NICU is feasible

- More data needed to establish preliminary values of sensitivity and specificity of aEEG monitoring for seizure detection in neonates admitted to CHEO NICU
  - Some evidence of discord between aEEG and cEEG findings
  - Seizure activity and background abnormalities
  - Current sample size not adequate for calculations
  - Specificity values will need to be addressed once we reach target enrollment and in future studies

DISCUSSION

- Work supports need for multi-centre study to achieve target sample size
  - This project represents the first stage of a multi-phase program of research on neonatal EEG monitoring (Fig. 3)
  - Has informed a larger study at CHEO in collaboration with other centres to assess the feasibility and accuracy of a brain monitoring algorithm combining both aEEG and cEEG (Fig. 4)
  - Process of recruiting under unique deferred consent model currently being considered by REB

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REFERENCES