**Anesthetic Impact on Motor Evoked Potentials during Spine Surgery in Pediatric Patients**

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### Background

Pediatric corrective spine surgeries are often elective operations for scoliosis. Electrophysiological neuro-monitoring techniques are used to minimize the risk of spinal cord injury during instrumentation of the spinal column. Transcranial motor evoked potentials (MEP) are used to identify potential neurologic damage intraoperatively. Early detection is important to prevent the development of permanent neurologic injury. With early detection, an assessment can be made whether this damage can be mitigated surgically or by optimizing hemodynamics.1

Many anesthetic agents are known to have a dose-dependent decrement on MEP and therefore decrease the reliability of MEP monitoring for detecting neurologic injury.2,3 In addition, other physiologic variables, including patient positioning and mean arterial pressure have been shown to impact quality of MEP monitoring.3

### Objective

To identify the clinical impact of anesthetic choice and physiologic properties on the ability to monitor motor evoked potentials during instrumentation of the spinal column. Transcranial motor evoked potentials (MEP) are used to identify potential neurologic damage intraoperatively. Early detection is important to prevent the development of permanent neurologic injury. With early detection, an assessment can be made whether this damage can be mitigated surgically or by optimizing hemodynamics.1

### Methods

- **Data Selection**
  - **Type of surgery**
    - Scoliosis Correcting Surgery 294 Cases
    - Neuromuscular Scoliosis 20 Cases
    - Idiopathic Scoliosis 93 Cases

- **MEP Monitoring**
  - **MEP Not Performed (SSEP only, MEP only)**
    - 13 Cases
  - **MEP Performed**
    - 119 Cases

### Results

- **93/119 patients with MEP monitoring had complete MEP data allowing analysis of physiological variables (see Table 1)**
  - While 72 patients had complete anesthetic data allowing analysis of anesthetic dosages (see Table 2)
  - At the start of surgery, 12 patients (12.9%) had MEP monitoring stopped due poor MEP signals. 11 (92%) of these patients had a preexisting neurologic deficit
  - 19.8% had a drop in MEP amplitude during rod manipulation requiring anesthetic, surgical or hemodynamic modifications to improve MEPs

### Table 1. Demographics

<table>
<thead>
<tr>
<th>Category</th>
<th>Total (n=119)</th>
<th>MEP poor at baseline (n=12)</th>
<th>MEP decreased during surgery (n=11)</th>
<th>MEP unchanged during surgery (n=96)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (years)</td>
<td>13.24</td>
<td>11.10</td>
<td>13.13</td>
<td>13.05</td>
</tr>
<tr>
<td>Sex (F:M)</td>
<td>61:32</td>
<td>7.5</td>
<td>12.4</td>
<td>42.23</td>
</tr>
<tr>
<td>Preexisting Neurologic Deficit</td>
<td>29</td>
<td>11</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>MAP &lt; 55</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Table 2. Anesthetic Variable

<table>
<thead>
<tr>
<th>Anesthetic Variable</th>
<th>Total (n=72)</th>
<th>MEP poor at baseline (n=7)</th>
<th>MEP decreased during surgery (n=1)</th>
<th>MEP unchanged during surgery (n=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volatile Anesthetic</td>
<td>16</td>
<td>2</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Propofol (&gt;100 mcg/kg)</td>
<td>39</td>
<td>4</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Propofol (&lt;100 mcg/kg)</td>
<td>17</td>
<td>1</td>
<td>0</td>
<td>16</td>
</tr>
</tbody>
</table>

### Discussion

- **In this cohort of corrective spine surgeries that had MEP monitoring, there were no neurologic sequelae immediately post surgery.**
- **Low or absent MEP at baseline are more common in younger patients and in patients with a preexisting neurologic deficit.**
- **All MEP decreases during rod manipulation were rectified by anesthetic, hemodynamic and/or surgical manipulation.**

### Conclusions

- In order to determine the impact of the MEP monitoring, we will further review the SSEP only monitored patients.
- In order to determine the impact of anesthetics (propofol), we plan to compare the data obtained in this study with a new protocol in which propofol infusion < 100 mcg/kg/min and sufentanil is the primary opioid infused during surgery.

### References