A Retrospective Comparison of Intrathecal Duramorph and Hydromorphone Epidural for Analgesia Following Posterior Spinal Fusion Surgery in Adolescents with Idiopathic Scoliosis

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**Background**

- Posterior spinal fusion (PSF) to correct idiopathic scoliosis is associated with severe postoperative pain.
- Intrathecal morphine (ITM) is commonly used for analgesia after adolescent PSF; however, anticipating and managing the increase in pain scores after resolution of ITM analgesia is challenging.
- At our institution, the standard of care for postoperative analgesia in adolescents undergoing PSF has been an opioid (hydromorphone) only epidural (EPI).
- While this method provides pain relief comparable to intravenous (IV) patient-controlled analgesia, the increased concern for infection, nursing difficulties with epidural pumps, and serous fluid leaking around the epidural site remain.

**Objective**

- In 2014, we developed a clinical protocol detailing both the administration of ITM intraoperatively and the transition to routine, scheduled oral analgesics at 18 hours postoperatively.
- The goal of our study was to examine the efficacy of our ITM protocol versus EPI for postoperative analgesia after PSF.

**Methods**

- Following IRB approval, we retrospectively identified children in our electronic database with a diagnosis of idiopathic scoliosis who had undergone elective PSF surgery from June 2014-April 2015.
- We included children ages 10-20 years who were developmentally intact with an ASA classification I, II, or III.
- Trained research assistants reviewed the electronic medical records to obtain all data.

**Results**

- During the study time period, 20 patients received ITM and were successfully matched with 20 patients who received EPI. There were no differences in demographic or surgical characteristics between the two groups.
- All patients in the ITM group were transitioned to oral analgesics on the first postoperative day, whereas EPI patients required an IV opioid after discharge from the PACU.
- Compared to the EPI group, the ITM group reported lower pain scores in the PACU (2.3 ± 3.2 vs 6.5 ± 3.3; p=0.001) and first 8 hours after surgery (3.7 ± 3.5 vs 5.6 ± 2.2; p=0.002) and higher pain scores in the 24-48 hour postoperative period (7.6 ± 2.2 vs 5.4 ± 2.6; p=0.037). See Figure 1 and Table 1.
- The documented time to ambulation (21.8 ± 5.5 hours vs 28.8 ± 12.2 hours; p=0.028) was statistically earlier in the ITM group, and the hospital length of stay was significantly shorter (3.0 ± 0.5 days vs 3.5 ± 0.7 days; p=0.03).
- Adverse events did not significantly differ between the groups, however high rates of nausea, vomiting, and pruritis were experienced by both groups. Two patients were admitted to the PICU for postoperative surgical issues. See Table 2.

**Conclusions**

- The efficacy of intraoperative ITM for postoperative analgesia in the PSF patient population has been shown previously; however, the pain and analgesic trajectory, including transition to other analgesics, has not previously been studied.
- Our findings suggest that for many patients, use of ITM in addition to routine administration of non-opioid medications, facilitates direct transition to oral analgesics in the early postoperative period.
- In our study group, scheduling oral oxycodeone at 18 hours post-ITM injection was well-tolerated, no patients required epidural rescue. This may contribute to earlier routine discharge of PSF patients on postoperative day 2 with subsequent decrease in healthcare expenses.

**References**


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**Table 1. Total postoperative intravenous and oral analgesic doses (mg/kg/day) in each group.**

<table>
<thead>
<tr>
<th>IV Dose</th>
<th>ITM</th>
<th>EPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphin equivalents</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>IV Disarium</td>
<td>0.12 ± 0.07</td>
<td>0.14 ± 0.05</td>
</tr>
<tr>
<td>Oral Acetaminophen</td>
<td>13.62 ± 12.77 (p&lt;0.002)</td>
<td>13.88 ± 13.82</td>
</tr>
<tr>
<td>IV Ketorol</td>
<td>0.93 ± 0.29</td>
<td>0.94 ± 0.38</td>
</tr>
</tbody>
</table>

**Table 2. Adverse events in each group. Data presented as n (%).**

<table>
<thead>
<tr>
<th>Adverse event</th>
<th>ITM</th>
<th>EPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>PONV</td>
<td>18 (90%)</td>
<td>16 (80%)</td>
</tr>
<tr>
<td>Pruritis</td>
<td>8 (40%)</td>
<td>13 (65%)</td>
</tr>
<tr>
<td>Use of Nasal Cannula O2</td>
<td>7 (35%)</td>
<td>7 (35%)</td>
</tr>
<tr>
<td>Oversedation (per chart notes)</td>
<td>0</td>
<td>3 (15%)</td>
</tr>
<tr>
<td>ICU admission (any reason)</td>
<td>2 (10%)</td>
<td>0</td>
</tr>
</tbody>
</table>

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**Figure 1. Highest and lowest reported pain scores for each time period from the ITM and EPI groups.**