Paravertebral block in paediatric abdominal surgery—a systematic review and meta-analysis of randomized trials

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Introduction

The increased popularity of paravertebral block (PVB) can be attributed to its relative safety and comparable efficacy when compared with epidural analgesia. PVB has a lower risk of sympathetic block and neuronal injury. It has thus been recommended for open cholecystectomy and other less painful surgeries such as inguinal hernioplasty and appendectomy. We performed a systematic review of PVB in paediatric abdominal surgery to assess its clinical efficacy and side effects when compared with other anaesthetic techniques.

Methods

A search of Medline, Embase, and Web of Science and hand-searching references from inception date to May 2016 was performed. Included studies were randomized clinical trials in patients 0–18 years old comparing PVB (single shot or continuous catheter) with any comparator and analgesic medication in any operation involving an abdominal incision. The primary outcomes were pain scores and requirement for rescue analgesia. Secondary outcomes were length of stay, satisfaction, and clinically relevant adverse effects, such as postoperative nausea and/or vomiting and other complications. Risk of bias was also assessed by two reviewers. A random effects model was used for the final analysis, and the methods of the trials, we were unable to attribute a rating to the overall quality of the evidence.

Results of the Search

Six studies were included in the final analysis, enrolling 358 paediatric patients. PVBs were all single-shot and included medications such as bupivacaine, ropivacaine, lidocaine, and fentanyl. Surgical procedures studied were inguinal hernioplasty, open and laparoscopic cholecystectomy, and open appendectomy. One study used ultrasound-guided PVB and one study used placebo blocks as a comparator. Other comparators included general anaesthesia, ilioinguinal block, caudal block, and epidural anaesthesia.

Discussion

This review demonstrates that PVB provides a beneficial effect on pain scores at 4 h but not at 24 h in children after abdominal surgery. The reduction in pain scores is minimal at both time points and results are based on a meta-analysis of only four trials. All trials had small sample sizes. Studies used different comparative variables and measurement scores. Studies varied in PVB solution and technique for insertion. Furthermore, the thresholds used for rescue analgesia were also variable, as were the follow-up periods studied. Given the significant heterogeneity in the methods of the trials, we were unable to attribute a rating to the overall quality of the evidence.

Conclusion

There are few randomized trials of PVB in paediatrics and only one trial included controlled placebo blocks as a control. Our review of the evidence of PVB compared with ‘standard care’ allows the clinician to make an informed decision about the risks and benefits of PVBs in paediatric abdominal surgeries. From this review, we conclude that PVB is an acceptable alternative for abdominal surgery in children, especially if factors in addition to absolute reduction in pain scores are significant for individual patients.

Effects of Intervention

Favours paravertebral | Favours control
---|---
Pain Score
<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Paravertebral</th>
<th>Mean Difference</th>
<th>SD</th>
<th>Total Weight</th>
<th>Mean Difference</th>
<th>SD</th>
<th>Total Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naja 2005</td>
<td>2.76</td>
<td>2.36</td>
<td>25</td>
<td>5.81</td>
<td>26.5</td>
<td>25</td>
<td>23.8%</td>
</tr>
<tr>
<td>Naja 2006</td>
<td>2.6</td>
<td>1.56</td>
<td>39</td>
<td>3.92</td>
<td>39</td>
<td>29.5%</td>
<td></td>
</tr>
<tr>
<td>Tog 2011</td>
<td>1.1</td>
<td>0.35</td>
<td>35</td>
<td>0.9</td>
<td>35</td>
<td>24.8%</td>
<td></td>
</tr>
<tr>
<td>Viscov 2015</td>
<td>42.5</td>
<td>26.93</td>
<td>41</td>
<td>27.28</td>
<td>42</td>
<td>25.9%</td>
<td></td>
</tr>
</tbody>
</table>

Favours paravertebral | Favours control
---|---
PVB stayed >24 h, compared with 16% in the comparator group (P<0.05). There are few randomized trials of PVB in paediatrics and only one trial included controlled placebo blocks as a control. Our review of the evidence of PVB compared with ‘standard care’ allows the clinician to make an informed decision about the risks and benefits of PVBs in paediatric abdominal surgeries. From this review, we conclude that PVB is an acceptable alternative for abdominal surgery in children, especially if factors in addition to absolute reduction in pain scores are significant for individual patients.

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