Bacterial contamination of epidural needles after multiple skin passes

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Background. Infection and epidural abscess are important complications of epidural analgesia. Difficult insertion may be associated with an increased risk of bacterial contamination of the epidural needle or catheter.

Methods. Bacterial contamination of epidural needles and trocars after difficult epidural insertion, defined as two or more skin passes, was assessed in 38 obstetric and ten gynaecological patients.

Results. There was no bacterial growth on any of the 48 epidural needles or trocars despite the mean (range) insertion time being 20 (10–30) min and the number of insertion attempts being 3 (2–4).

Conclusions. Difficult epidural insertion is not associated with an increased risk of needle contamination and is therefore an unlikely source of epidural infection.

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Infection and epidural abscess is an important complication after epidural analgesia. A recent prospective multi-centre Danish survey reported nine epidural abscesses out of 17 372 epidurals, or an incidence of one in 1930 patients.1 Sterility at time of sitting the epidural is critical to prevent the introduction of bacteria with the passing of the epidural needle. A prospective study has recently identified an overall 16.7% incidence of bacterial contamination of spinal needles (n=114) and 25% contamination of epidural needles (n=20) after a single pass of the needle in elective orthopaedic or urological surgery.2

As a result, we postulated that difficult epidural catheter insertion might be associated with an even higher incidence of bacterial contamination of epidural needles. We undertook a study to establish the incidence of epidural needle bacterial contamination after difficult epidural placement.
and to determine whether the incidence of bacterial contamination increased with difficulty.

**Methods and results**

Approval for the study was obtained from the Hospital Research Committee. Epidural needles and trocars after difficult epidural insertion in 38 obstetric and ten gynaecological patients were cultured. Difficult epidural insertion was defined as two or more skin passes (i.e. the epidural needle was removed from the patient’s back and re-inserted, either through the original skin puncture or through a new puncture).

Standard aseptic technique at our institution for the sitting of epidurals included face-mask, hat, sterile gown and gloves. The skin was cleaned using a red-tinted chlorhexidine 0.5% in alcohol 70% solution applied at least three times and allowed to dry. Disposable epidural Abbott kits (Abbott Ireland, Sligo, Republic of Ireland) were used at the time of study.

After any difficult epidural insertion, the epidural needle and trocar were placed in separate sterile containers by the anaesthetist and sent to the laboratory, where 1 ml of sterile BBL trypticase soy broth (Becton Dickinson Biosciences, Lane Cove, Australia) was added to each of the needle and trocar tip containers. After vigorous vortexing for 30 s, 0.5 ml was removed and inoculated in toto onto a 5% defibrinated horse blood Columbia agar plate (Oxoid, West Heidelberg, Australia). After drying in air, plates were incubated aerobically with additional carbon dioxide 5% at 35°C for 24 h and for a further 24 h if no growth was then observed. A total of 48 epidural needles and trocars were studied after 38 lumbar and ten thoracic epidurals. Further data is shown in Table 1.

The mean (range) number of attempts was 3 (2–4) and time of insertion was 20 (10–30) min. At the time of insertion, four patients were receiving antibiotics for surgical reasons. There was no bacterial growth on any of the epidural needles or trocars (95% CI for the incidence of bacterial contamination 0–7.4%).

**Comment**

Despite multiple skin passes and difficult insertions, we were unable to demonstrate any bacterial growth. This is in marked contrast to the overall 17.9% incidence of contamination of mostly spinal needles, which were sited with a single pass in another study.²

The most likely explanation for our findings may be attributable to the different methodologies used. In the study by Raedler and colleagues,² the tryptic soy broth used to rinse the needles was incubated for 24 h before the plating out onto Columbia blood agar. This methodology is sensitive in detecting, via growth amplification, any viable organisms present on the needles from any source, and may include skin organisms acquired at the time of skin passage during placement of the block, or contamination of the needle subsequent to its removal. Another disadvantage of this methodology is that it does not allow for any quantitative estimation of the contaminating bacterial inoculum, as both low and high initial bacterial inoculums will result in the same positive broth culture result.

In conclusion, provided rigorous skin asepsis is used, an increase in number of skin passes, or time taken establishing epidural anaesthesia, does not appear to be risk factors for bacterial contamination of epidural needles.

**Table 1** Distribution of weight, ASA status and distance to epidural space

<table>
<thead>
<tr>
<th>ASA</th>
<th>n</th>
<th>Distance to epidural space (cm)</th>
<th>Weight (kg)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>16</td>
<td>3</td>
<td>&lt;50</td>
<td>2</td>
</tr>
<tr>
<td>II</td>
<td>25</td>
<td>4</td>
<td>50–75</td>
<td>18</td>
</tr>
<tr>
<td>III</td>
<td>6</td>
<td>5</td>
<td>76–100</td>
<td>20</td>
</tr>
<tr>
<td>IV</td>
<td>1</td>
<td>6</td>
<td>101–125</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>&gt;6</td>
<td>11</td>
<td>&gt;125</td>
<td>2</td>
</tr>
</tbody>
</table>

In the study of Raedler and colleagues,² there was mention of hats, sterile gloves and drapes, but not of sterile gown and face-mask. The absence of these may increase the risk of bacterial contamination which, coupled with the culture methods used, may have resulted in their high rate of bacterial contamination. The risk of bacterial contamination when not using a face-mask is highlighted by a case report where the bacteria cultured from an epidural abscess was exactly the same as that found in the nose of the anaesthetist who performed the procedure.⁵

Also, the iodine 10% solution used in the Raedler study may not be the most effective antiseptic. In a study of 69 patients undergoing back surgery, the operative field was prepared with three-layer application of either chlorhexidine 0.5% in alcohol 80%, or povidone-iodine 10%.⁶ Excised skin specimens were cultured with an incidence of 5.7% positive culture in the chlorhexidine group compared to 32.4% incidence in the iodine sample (P<0.01).

In conclusion, provided rigorous skin asepsis is used, an increase in number of skin passes, or time taken establishing epidural anaesthesia, does not appear to be risk factors for bacterial contamination of epidural needles.

**References**