Pigtail catheter drain in the treatment of empyema thoracis

M J Pierrepoint, A Evans, S J Morris, S K Harrison, I J Doull

We compared the outcome of children with empyema managed either through thoracotomy with pleural debridment, conventional stiff chest drain, or pigtail chest drain. Compared to conventional drain, children who received either thoracotomy or pigtail catheters had a significantly decreased period of drain in situ, were afebrile earlier, were clinically improved earlier, and were discharged earlier.

Table 1 Outcomes following primary surgical thoracotomy with pleural debridment, stiff drain insertion, or pigtail drain insertion

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Group 1 (geometric mean)</th>
<th>Group 2 (geometric mean)</th>
<th>Group 3 (geometric mean)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms before procedure</td>
<td>16.9</td>
<td>8.5</td>
<td>11.2</td>
<td>0.02*</td>
</tr>
<tr>
<td>Hospital before procedure</td>
<td>2.6</td>
<td>3.6</td>
<td>4.1</td>
<td>0.9*</td>
</tr>
<tr>
<td>Drain in situ</td>
<td>5.0</td>
<td>11.5</td>
<td>4.9</td>
<td>0.002*</td>
</tr>
<tr>
<td>Patient afebrile</td>
<td>2.4</td>
<td>10.7</td>
<td>4.1</td>
<td>0.002*</td>
</tr>
<tr>
<td>Patient improved</td>
<td>2.5</td>
<td>6.9</td>
<td>1.8</td>
<td>0.02*</td>
</tr>
<tr>
<td>Procedure to discharge</td>
<td>6.9</td>
<td>15.3</td>
<td>5.6</td>
<td>0.002*</td>
</tr>
<tr>
<td>Secondary thoracotomy</td>
<td>6/7</td>
<td>6/7</td>
<td>0/9</td>
<td>0.001†</td>
</tr>
<tr>
<td>Drain adjust/replace</td>
<td>2/7</td>
<td>6/7</td>
<td>2/9</td>
<td>0.05†</td>
</tr>
</tbody>
</table>

*ANOVA; †Fisher’s exact test; ‡χ² test.

RESULTS

Over 31 months, 24 children with an empyema were admitted under our care. One child managed conservatively responded to intravenous antibiotics without need for a drain. Seven children (mean age 7.3 years, range 1.9–12.7) had a primary thoracotomy, seven had conventional stiff drain inserted (mean age 4.6 years, range 1.9–11.2), and nine had a pigtail drain inserted (mean age 7.1 years, range 2.1–12.3). Children receiving primary thoracotomy were symptomatic for significantly longer prior to the procedure (table 1). Compared to the conventional stiff drain, either primary thoracotomy with pleural debridment or pigtail catheter insertion were associated with significantly decreased period of drain in situ, time.
to becoming afebrile, time to improvement, and procedure to
discharge. Children with a stiff drain were significantly more
likely to require secondary thoracotomy, or need repositioning
or replacing of the drain than children who received a pigtail
catheter.

**DISCUSSION**

We have shown striking benefits from using a pigtail catheter
compared to a conventional stiff drain in the management of
childhood empyema. The pigtail catheter is considerably
smaller bore than a conventional chest drain, and in our
experience is much less traumatic to insert, with a noticeably
smaller residual scar. Our findings may therefore seem
surprising at face value. However, we believe that a number of
factors contribute to its improved efficiency: the size of drain-
age fenestrations is considerably larger in the pigtail catheter
compared to conventional drain; unlike a conventional stiff
drain, the pigtail catheter does not completely occlude when
kinked; the fixing system to the skin of the pigtail catheter is
much more secure than conventional drains; and this in com-
bination with the ease of insertion, results in much less pain
and discomfort while in situ; consequently the child is easier
to mobilise (thought to be important in dispersing the uroki-
nase within the pleural space).

We have effectively compared our current management
with historical controls, and therefore cannot exclude the
possibility that our findings reflect time trends in manage-
ment or disease aetiology. We believe this unlikely, as other
than the change to pigtail catheters, our management did not
change over the study period and the time period was too
short for significant changes in disease aetiology.

In our population pigtail catheter insertion compared
favourably with formal thoracotomy. However, pigtail catheter
insertion offers significant cosmetic advantages, and in our
experience results in considerably less discomfort. We did not
collect detailed follow up data, and it is possible that there may
be long term radiological or pulmonary function benefits that
we could not determine. Nevertheless our findings show clear
benefits for pigtail catheters compared to conventional stiff
drains, and we feel that insertion of such drains is preferable
to thoracotomy and is now the treatment of choice.

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