Prevalence of Intra-operative Tissue Bacterial Contamination in Posterior Pediatric Spinal Deformity Surgery

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BACKGROUND

• Surgery to correct pediatric spinal deformity has risks for early or late surgical site infection.

• Prevalence of deep surgical site infection varies from 1-14%, depending on the severity of spinal deformity and type of patient.1

• The most common bacterial causes of infection are normal skin flora such as Propionibacterium acnes, Staphylococcus epidermidis, as well as Staphylococcus aureus.2,3

• However, little is known about intra-operative contamination of the surgical site and its role in postoperative deep surgical site infection.

• In this study we sought to determine if children with neuromuscular scoliosis with fusion to the pelvis, and thus longer duration of surgery, have higher intra-operative culture positive rates than children receiving surgery for adolescent idiopathic scoliosis (AIS).

Complications in 4369 Posterior Instrumentations and Fusions for AIS

<table>
<thead>
<tr>
<th>Complication Type</th>
<th>No.</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound infection</td>
<td>59</td>
<td>1.35%</td>
</tr>
<tr>
<td>Other</td>
<td>815</td>
<td>19.2%</td>
</tr>
<tr>
<td>Pulmonary (and pulmonary embolus)</td>
<td>10</td>
<td>0.23%</td>
</tr>
<tr>
<td>Nerve injury</td>
<td>78</td>
<td>0.18%</td>
</tr>
<tr>
<td>Autonomic failure</td>
<td>9</td>
<td>0.20%</td>
</tr>
<tr>
<td>Neurological</td>
<td>114</td>
<td>2.6%</td>
</tr>
<tr>
<td>Other</td>
<td>365</td>
<td>8.33%</td>
</tr>
<tr>
<td>Intra-operative Debridement</td>
<td>151</td>
<td>3.45%</td>
</tr>
<tr>
<td>Intra-operative Debridement</td>
<td>1</td>
<td>0.02%</td>
</tr>
</tbody>
</table>

Debridement was seen only in children 11 years or older (p=.02) and only with back acne (p <.0001).

RESULTS

• Patients who underwent posterior spinal deformity surgery between January 2009 and December 2010 and had a pre-closure tissue culture as part of their standard treatment were selected for this study.

• Two patient groups were created; those with positive and those with negative tissue cultures.

• After surgical implants were placed, the paraspinal muscle tissue had surface damage due to compression by the self retaining retractors.

• This tissue was routinely debrided before the final irrigation and incision closure sent to the microbiology laboratory for aerobic and anaerobic culture.

• Back acne was also evaluated since patients with back acne may be at high risk for P. acnes contamination.

• Photographs of each patient received an acne severity grading, blinded to the results of the patient’s bacteria cultures.

• The prevalence of P. acnes, which has a documented role in deep surgical site infections in spine surgery, was correlated with the presence of back acne.

Source of Culture Sample

• P. acnes was seen only in children 11 years or older (p=0.02) and only with back acne (p <.0001).

• 8/19 (42%) patients with pelvic fusion had positive cultures (p=.04) and all 8 were neuromuscular patients.

• Duration of surgery greater than 6 hours is common in cases with pelvic involvement and is a significant risk factor (p <.02)

• 81% of culture positive patients were older than 11 years of age (p< .01).

• 3/114 (2.7%) patients developed an early deep SSI, all with positive cultures (p=.01).

CONCLUSIONS

• Neuromuscular patients fused to the pelvis, children older than 11 years, and surgery duration greater than 6 hours was associated with positive cultures.

• Back acne is may be a preventable risk factor for P. acnes seeding.

• Intra-operative bacterial contamination indicates a need to consider the type of surgery and patient age to determine prophylactic antibiotics and other modalities to prevent infection.

• Proposals that have been implemented as a result of this study
  • Consult with dermatology to treat back acne
  • Preoperative shower with antimicrobial wash
  • Strict timing of prophylactic antibiotics
  • 3M™ Ioban™ 2 Antimicrobial Incise Drape with Mastisol® adhesive
  • Pulse lavage
  • Antibiotics tethered to bone graft

References