Scoring Risk Factors in Early Wound Dehiscence and Progression to Deep Infection after Instrumented Spinal Fusion in Children with Neuromuscular Scoliosis

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Abstract

Aims

1. Identifying and scoring risk factors that predict early wound dehiscence and progression to metalwork infection.

2. Results of wound healing, eradication of infection and progression to union with the use of vacuum dressing.

3. Compare results of serial washouts against early vacuum dressing in this group of children with significant medical co-morbidities.

Method

A review of 443 patients (257 retrospective and 186 prospective) with neuromuscular scoliosis who underwent posterior instrumented correction and fusion between 2008 and 2013 at two institutions. 44 patients had early wound infection of which 27 had wound dehiscence requiring wound washout(s). Of these 27 patients, 12 had subsequent vacuum dressing. 1 patient was excluded from the study. Medical notes, clinical photographs and imaging were reviewed. Minimum follow up period was 14 months.

Results

This study shows that readmission to PICU, presence of viscero-cutaneous devices (e.g. PEG, tracheostomy), concomitant infection, polymicrobial (gram negative) organism and hyperlordotic deformities are cumulative risk factors to developing early wound dehiscence leading to deep seated infections. All patients in our series went on to have a sealed, non infected wound with union confirmed on CT. Patients who had multiple serial washouts (n= 3-7), eventually required vacuum dressing.

Discussion

By stratifying risk factors in patients with neuromuscular scoliosis, the occurrence of wound dehiscence can be predicted. With higher risk factor scores, early vacuum dressing is recommended as multiple serial wound washouts have poor results and with added morbidity to the patient.
Data Summary

Retrospective data (between Oct 2008 and Oct 2011) – 257
Prospective data (Oct 2011 to date) – 186
Early wound infection – 44 (21 / 23)
Antibiotics only – 17 (7 / 10)
Washout and antibiotics – 15 (8 / 7)
Washout, antibiotics and vac – 12 (6/6)
Exclusion – 1 from vac group

Results - Demographic

Male: n=20, Mean age: 13.75, Range: 7-21
Female: n=25, Mean age: 13.5, Range: 8-20

Results – Primary Diagnosis
Results – Medical Co-Morbidity

![Bar chart showing medical co-morbidities]

Results

<table>
<thead>
<tr>
<th>Hyperlordosis</th>
<th></th>
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<tbody>
<tr>
<td>Yes</td>
<td>8/44</td>
</tr>
<tr>
<td>No</td>
<td>36</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Body Mass Index (BMI) - standardised for age</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>8/44</td>
</tr>
<tr>
<td>Normal</td>
<td>23</td>
</tr>
<tr>
<td>High (overweight &amp; obese)</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indwelling devices</th>
<th></th>
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<tbody>
<tr>
<td>PEG</td>
<td>37/44</td>
</tr>
<tr>
<td>Tracheostomy</td>
<td>4</td>
</tr>
<tr>
<td>None</td>
<td>3</td>
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</table>
Results – Infection and PICU Readmission

<table>
<thead>
<tr>
<th>Concomitant Infection</th>
<th></th>
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<tbody>
<tr>
<td>Yes</td>
<td>16/44</td>
</tr>
<tr>
<td>Respiratory</td>
<td>14/16</td>
</tr>
<tr>
<td>Urinary</td>
<td>1</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>28/44</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Readmission to PICU after ward transfer?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>9/44</td>
</tr>
<tr>
<td>No</td>
<td>35</td>
</tr>
</tbody>
</table>

Results - Microbiology

All SSI Infections: n = 44

- Polymicrobial
- Monomicrobial

Polymicrobials
- Gram negative
- Gram positive
- Mixed

Monomicrobials
- Gram negative
- Gram positive
- Mixed
Discussion - Identified Risk Factors

This study shows that the preoperative identified risk factors include hyperlordotic deformity, Pre-existing respiratory disease, extremes of BMI and presence of indwelling devices. Similarly readmission to PICU and concomitant infection, polymicrobial (gram negative) organism are cumulative risk factors in to developing early wound dehiscence leading to deep seated infections.

Discussion - Comparative Effectiveness

Retrospective data

Non vac - average 2 washouts
Vac – 3 or more washouts

Prospective data

Vac applied after 1 washout in 5 patients (based on risk factor score)
Reduced morbidity vs prolonged inpatient stay
Discussion - Results of Vacuum Dressing

Duration of vac therapy 4 / 52 – 3 / 12

Follow up 14 / 12 – 41 / 12

Wound closure achieved in all patients

Normal CRP at 12 / 12

No metalwork failure – serial radiographs

CT on retrospective patients – union
Conclusion

Risk factors in predicting early deep wound infections allow early vacuum therapy, reducing morbidity of repeat anaesthesia. Current series and literature review shows good outcome with this therapy.

References

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Disclosure declaration: none of the authors has any potential conflict of interest