Complications of cortical screw fixation in the lumbar spine. A 3-year learning curve

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Disclaimer

Tharsa Thillainadesan
• No declarations

David Edis
• Held shares in: NIL
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Introduction

• Cortical bone trajectory first described in 2009 (Santoni et al.)

• Medial to lateral path = less muscle dissection

• Less extensive surgical exposure
• CS in PLIF provides similar clinical and radiologic outcomes compared to PS in PLIF.

• Patients were aged between 40-60 years and recruited from armed forces

• Unclear if these results translate to more typical older population with degenerate spondylosis

• No complications reported for the use of CS in this study

• Not stated if cases undertaken during learning curve
Biomechanics – CS favourable results compared with PS

- Increase screw-bone purchase
- Increase pull out strength
- In vivo studies 2.01 higher torque in patients undergoing CBT vs traditional PS (Matsukawa)
Aim

To describe our experience with CS fixation with regards to complications and revisions during the learning curve of adopting this new version of spinal fixation

In a more typical older population with degenerate spondylosis and stenosis
Methods

• Single-centre retrospective review

• Surgery all performed by one surgeon

• Ethics obtained Tasmanian Scientific Research Advisory Committee

• Complications for first 101 consecutive cases from June 2012 to June 2015
• CS technique utilized for lumbar spine fixation
• Approach through midline, less invasive (MIDLF)
Methods (cont.)

• Instrumentation:
  – CS screws = Solera™ dual thread multiaxial screws coupled to 4.75mm cobalt chrome rods (Medtronic Spine)

• Image guidance
  – Screw insertion technique was open assisted by biplanar fluoroscopy only

• Follow-up:
  – Median follow up time was 18.6 months (range 6 – 42)
## Results

<table>
<thead>
<tr>
<th>Demographic Data</th>
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<tbody>
<tr>
<td>Cases</td>
<td>101</td>
</tr>
<tr>
<td>Female</td>
<td>58 (58.6%)</td>
</tr>
<tr>
<td>Mean Age (y)</td>
<td>66.8 (38-91)</td>
</tr>
<tr>
<td>Smoker</td>
<td>8 (8%)</td>
</tr>
<tr>
<td>Diabetic</td>
<td>11 (10.9%)</td>
</tr>
<tr>
<td>Condition</td>
<td>Primary</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Number</td>
<td>90</td>
</tr>
<tr>
<td>No CS placed - anatomical variation</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Pedicle wall breach - repositioned</td>
<td>6 (7%)</td>
</tr>
<tr>
<td>Screw malposition on post op CT-early revision</td>
<td>7 (8%)</td>
</tr>
<tr>
<td>Incidental durotomy with no sequale</td>
<td>8 (8%)</td>
</tr>
<tr>
<td>Wound infection</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>
- 54 multilevel procedures out of 101
• 518 total screws inserted
  - 9 (1.7%) malpositioned intraoperatively and revised
  - 7 (1.4%) required salvage intraoperatively to PS
Conclusion

• CS is a largely effective technique with advantages of smaller incision and less muscle dissection

• In the first 101 cases with 518 screws,
  – 7 cases had symptomatic screw malposition and required early revision
  – 9 cases had one or more pedicles that could not be instrumented with CS and a PS was used to salvage
Caveat

• Novel technique that has specific technical demands and requires close attention to detail during image guidance
• Error margin for screw malposition is smaller compared to PS
• Intraoperative axial imaging would ensure screw malposition is not missed intraoperatively
• Navigation may reduce the rate of screw malposition during the learning curve
Further research

• Evaluate results of CS in patients with high risk – e.g. Obese, RA, osteoporotic

• Radiological analysis – Analysis of post op CT scans to evaluate fusion rates and potential early screw loosening
References


