Sacropelvic fixation in adult spinal deformity (ASD)
A very high rate of mechanical failure

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European Spine Study Group
Background & Aim

- Sacropelvic fixation (SPF) is an integral part of ASD surgery.
- Literature suggests that the combination of S1 and iliac screws may be associated with lowest rate of complications.

- To analyze
  - the mechanical failure rate of SPF and,
  - potential factors associated with failure
  - Residual sagittal imbalance
  - Type of SPF
  - Age
Patients

• 504 patients with adult spinal deformity in a prospective international database
  • coronal deformity > 20°,
  • sagittal vertical axis > 5 cm,
  • pelvic tilt > 25°,
  • thoracic kyphosis > 60°

• 239 treated conservatively, 265 surgically
• 45 patients with SPF and > 6 months of f-up
• Average age 63 +/- 14
• Diagnoses:
  – Degenerative: 20 patients
  – Failed back: 11 patients
  – Other: 14 patients
• Gender: 40 females, 5 males
• Average length of instrumentation: 11.6 levels
• Type of SPF:
  – S2Alar(S2Al): 20 patients
  – Iliac w/L connector: 25 patients
## HRQoL

<table>
<thead>
<tr>
<th></th>
<th>Pre-op</th>
<th>6 months</th>
<th>F_up</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODI</td>
<td>57 +/- 22</td>
<td>43 +/- 22</td>
<td>45 +/- 22</td>
</tr>
<tr>
<td>SF36 v2 MCS</td>
<td>40 +/- 12</td>
<td>41 +/- 12</td>
<td>41 +/- 13</td>
</tr>
<tr>
<td>SF36 v2 PCS</td>
<td>30 +/- 8</td>
<td>35 +/- 9</td>
<td>38 +/- 9</td>
</tr>
<tr>
<td>SRS 22 subtotal</td>
<td>3 +/- 1</td>
<td>3 +/- 1</td>
<td>3 +/- 1</td>
</tr>
</tbody>
</table>
# Sagittal balance

<table>
<thead>
<tr>
<th></th>
<th>Pre-op</th>
<th>Post-op</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVA (mm)</td>
<td>66 +/- 68</td>
<td>44 +/- 53</td>
</tr>
<tr>
<td>T1 Sagittal tilt (°)</td>
<td>1 +/- 8</td>
<td>-2 +/- 5</td>
</tr>
<tr>
<td>Global tilt (°)</td>
<td>32 +/- 17</td>
<td>26 +/- 14</td>
</tr>
<tr>
<td>L-Gap (°)</td>
<td>25 +/- 19</td>
<td>15 +/- 15</td>
</tr>
</tbody>
</table>
Results

Implant related complications

• 17 patients (37.7%) (8 had to be revised)
  – 10 w/ disintegration of the SPF (22.2%) (5 had to be revised)
  – 4 w/ rod fractures (8.9%)
  – 2 w/ sacral and/or iliac screw loosening
  – 1 w/ painful prominent iliac screw

• Time to failure
  – Average: 267.9 days (8 to 709)
  – Median: 125 days
Disintegration of SPF

• 7 cases of S2Al screws
  – 3 screw head breakages (all w/ same brand)
  – 5 set screw dislodgements (4/5 w/ same brand)

• 3 cases of IwL
  – 1 set screw dislodgement
  – 2 rod-connector dislodgements

• Failure rate by brand of screws:
  – P value: 0.42
# Type of SPF

<table>
<thead>
<tr>
<th>N (%)</th>
<th>S2AI</th>
<th>IwL</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed</td>
<td>7 (35)</td>
<td>3 (12)</td>
<td>10</td>
</tr>
<tr>
<td>Not failed</td>
<td>13 (65)</td>
<td>22 (88)</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>20 (100)</td>
<td>25 (100)</td>
<td>45</td>
</tr>
</tbody>
</table>

P-value: 0.07
<table>
<thead>
<tr>
<th>SPF failure</th>
<th>Age</th>
<th>SVA post op</th>
<th>T1 sagit. tilt post op</th>
<th>Global tilt post op</th>
<th>L-Gap post op</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>70 +/- 11</td>
<td>67 +/- 56</td>
<td>0 +/- 6</td>
<td>31 +/- 11</td>
<td>19 +/- 16</td>
</tr>
<tr>
<td>Absent</td>
<td>61 +/- 14</td>
<td>37 +/- 51</td>
<td>-2 +/- 5</td>
<td>23 +/- 14</td>
<td>14 +/- 15</td>
</tr>
<tr>
<td>P value</td>
<td><strong>0.05</strong></td>
<td><strong>0.16</strong></td>
<td><strong>0.38</strong></td>
<td><strong>0.12</strong></td>
<td><strong>0.46</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N (%)</th>
<th>Degenerative</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed</td>
<td>7 (35)</td>
<td>3 (12)</td>
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<td>Total</td>
<td>20 (100)</td>
<td>25 (100)</td>
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</table>

P-value: 0.07
Effect on HRQoL @ 1 and 2 years

<table>
<thead>
<tr>
<th>SPF failure / 1 year</th>
<th>ODI</th>
<th>SF36 v2 MCS</th>
<th>SF36 v2 PCS</th>
<th>SRS 22 subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>52 +/- 14</td>
<td>36 +/- 7</td>
<td>38 +/- 10</td>
<td>3 +/- 1</td>
</tr>
<tr>
<td>Absent</td>
<td>42 +/- 24</td>
<td>43 +/- 15</td>
<td>39 +/- 9</td>
<td>3 +/- 1</td>
</tr>
<tr>
<td>P value</td>
<td>0.18</td>
<td>0.18</td>
<td>0.89</td>
<td>0.36</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPF failure / 2 years</th>
<th>ODI</th>
<th>SF36 v2 MCS</th>
<th>SF36 v2 PCS</th>
<th>SRS 22 subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>52 +/- 15</td>
<td>45 +/- 12</td>
<td>26 +/- 3</td>
<td>3 +/- 0</td>
</tr>
<tr>
<td>Absent</td>
<td>38 +/- 24</td>
<td>43 +/- 14</td>
<td>37 +/- 10</td>
<td>3 +/- 1</td>
</tr>
<tr>
<td>P value</td>
<td>0.15</td>
<td>0.82</td>
<td><strong>0.013</strong></td>
<td>0.30</td>
</tr>
</tbody>
</table>
Conclusions

• Implant related complications of SPF in ASD is found to be 37.7%.

• Mechanical failure rate of SPF in ASD may be much higher than previously reported – 22.2% vs. ≈ 10%.

• Risk factors for failure include:
  – Age
  – Diagnosis
  – Type of fixation (S2Al screws)

• Failure of SPF appears affect the HRQoL inversely especially in longer follow up.
Disclosures

Acaroglu E:

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Onur Yaman:

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Guler U.O:

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grants/research support*: Depuy Spine, Synthes
consultant*: Depuy Spine, Synthes

Perez-Grueso F.S:

ESSG