Retrolisthesis and anterolisthesis of degenerative lumbar spine: Their different contribution in sagittal alignment

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Compensatory mechanism

- Reduction of TK
- Hyperextension of adjacent segments
- Retrolisthesis
- Pelvic retroversion
- Knee flexion
- Ankle extension

Retrolisthesis

- The backwards slippage of one vertebral body on another
- Severe spinal degeneration
- Sagittal mechanism
Objective

- To compare sagittal alignment between anterolisthesis and retrolisthesis, as well as to elucidate their different contribution in sagittal balance.
Inclusion and Exclusion criteria

**Inclusion criteria:**

- Age > 45 yrs
- With Long-cassette standing upright radiographs
- Retrolisthesis > 3mm
- Anterolisthesis: > 5%, < 50%

**Exclusion criteria:**

- Combined anterolisthesis and retrolisthesis
- Isthmic spondylolisthesis
- Idiopathic or congenital or neuromuscular scoliosis
- Spinal tumor
- Sagittal imbalance due to compressive fractures
Methods

- TK
- LL
- SVA
- SSA
- PI
- PT
- SS

Methods

Low PI
Type 1: $SS<35^\circ$, long kyphosis, apex of LL close to L5
Type 2: $SS<35^\circ$, flat back

High PI
Type 3: $35^\circ<SS<45^\circ$, LL balanced between 2 arches
Type 4: $SS>45^\circ$, increased LL

## Results

### Table 1: Comparison of the spino-pelvic parameters

<table>
<thead>
<tr>
<th></th>
<th>Retrolisthesis</th>
<th>Anterolisthesis</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TK</td>
<td>20.86 ± 16.38</td>
<td>22.12 ± 14.35</td>
<td>0.919</td>
</tr>
<tr>
<td>LL</td>
<td>31.56 ± 17.49</td>
<td>43.40 ± 13.67</td>
<td>0.016</td>
</tr>
<tr>
<td>PI</td>
<td>40.28 ± 13.19</td>
<td>57.24 ± 9.63</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PT</td>
<td>20.69 ± 9.01</td>
<td>22.28 ± 6.94</td>
<td>0.362</td>
</tr>
<tr>
<td>SS</td>
<td>19.59 ± 11.54</td>
<td>34.96 ± 7.26</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>SVA</td>
<td>15.35 ± 44.31</td>
<td>48.16 ± 32.95</td>
<td>0.032</td>
</tr>
<tr>
<td>SSA</td>
<td>113.58 ± 14.91</td>
<td>112.49 ± 16.74</td>
<td>0.576</td>
</tr>
</tbody>
</table>
Demo cases

Retrolisthesis

VS.

Anterolisthesis

Li 63yrs M
Wu 63yrs M
Cai 60yrs F
Zhang 60yrs F
Results

Table 2: Distribution of Roussouly sagittal classification in the two groups

<table>
<thead>
<tr>
<th>Type</th>
<th>Retrolisthesis</th>
<th>Anterolisthesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>12 (46.15%)</td>
<td>1 (3.3%)</td>
</tr>
<tr>
<td>Type 2</td>
<td>9 (34.62%)</td>
<td>6 (20%)</td>
</tr>
<tr>
<td>Type 3</td>
<td>4 (15.38%)</td>
<td>14 (46.7%)</td>
</tr>
<tr>
<td>Type 4</td>
<td>1 (3.85%)</td>
<td>9 (30%)</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>20</td>
</tr>
</tbody>
</table>
Conclusion

- PI, SS, LL and SVA in anterolisthesis group were all greater than the values in retrolisthesis group.

- The results confirmed that retrolisthesis permitted to limit anterior translation of the axis of gravity since PT and TK were similar in both groups.

- It may also be speculated that low PI may contribute to development and progression of different slip direction of vertebrae.
## Disclosure

### E-Poster #P4

Retrolisthesis and anterolisthesis of ...

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No Relationships

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