Improvement in gait pattern and its relationship with preoperative pelvic compensation after surgery in patients with sagittal plane deformity

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Introduction
The study was conducted to investigate the improvement in gait parameters after surgery and whether corrective surgery for sagittal imbalance would be influenced by preoperative pelvic compensation.

Materials and Methods
- A total of 32 patients who were scheduled to undergo corrective surgery for sagittal plane deformity were included and were followed-up for 1 year after surgery. Radiological parameters were measured on biplanar full-body imaging.
- Before surgery and 6 months after surgery, three-dimensional motion analyses were performed to estimate center of gravity (CoG) deviation from the center of mass (CoM), mean trunk kyphosis (TK) angle, gait deviation index (GDI), and kinematic parameters.
- Before surgery, the patients were classified into CoG+ and CoG− groups. “+” and “−” representing increases and decreases in the distance of CoG from CoM of the pelvic segment from 1st to 3rd trials, respectively. Oswestry disability index (ODI) and EuroQol-5D (EQ-5D) were measured for 1 year after surgery.

Results

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Preoperative states</th>
<th>Postoperative states</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVA (°)</td>
<td>17.5 ± 9.0</td>
<td>1.4 ± 3.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>SS (°)</td>
<td>16.8 ± 8.7</td>
<td>25.1 ± 7.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PT (°)</td>
<td>36.1 ± 12.2</td>
<td>23.3 ± 7.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>LL (°)</td>
<td>-7.0 ± 21.9</td>
<td>37.7 ± 7.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PI− LL (°)</td>
<td>48.5 ± 37.6</td>
<td>10.7 ± 7.8</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

SD: standard deviation; SVA, sagittal vertical axis; SS, sacral slope; PT, pelvic tilt; PI, pelvic incidence; LL, lumbar lordosis.

Conclusion
Preoperative abnormal stooping gait, and progressive worsening of sagittal imbalance in patients with sagittal plane deformity improved after corrective surgery. Patients with preoperative dynamic sagittal imbalance could have similar surgical results to those without it after corrective surgery.

Acknowledgment
- After corrective surgery for 32 patients with sagittal plane deformity, abnormal stooping gait improved.
- Progressive worsening of sagittal imbalance during or after walking was resolved after corrective surgery.
- Lastly, patients with dynamic sagittal imbalance could have similar surgical results after corrective surgery to those of patients without it.