The Effect of T1-Slope in Spinal Parameters after Cervical Disc Arthroplasty

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Poster ID: 2064
NOTHING to disclose
Increased T1-slope

Cervical kyphosis:
Traditionally contraindicated in CDA

- Increased C2-7 Cobb angle
- Increased cervical lordosis

- Laminoplasty
  - Increased interlaminar bony fusion

- Posterior C1-2 fusion
  - Loss of lordotic curve

- Cervical disc arthroplasty (CDA)

Oichi et al., 2017; Guo et al., 2016
Inclusions

1-level CDA

2009-2016
Taipei Veterans General Hospital, Taiwan
Retrospective review

Exclusions

ROM <2° at indexed level
OPLL
Severe facet arthropathy
>50% collapse of normal disc height
Trauma
Infection
Active malignancy

Pre-OP, post-OP 1.5, 3, 6, 12, 24 months...

Clinical outcomes
Visual Analogue Scale (VAS)
for neck and arm pain
Japanese Orthopedic Association (JOA)
Nurick scores

Radiologic outcomes
Radiographs
MRI
CT
After CDA

All clinical outcomes improved

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### Table 1: Demographics between the two groups

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>95</td>
</tr>
<tr>
<td>Age (year)†</td>
<td>46.1±9.7</td>
</tr>
<tr>
<td>Sex (F:M)</td>
<td>52:43</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>5</td>
</tr>
<tr>
<td>Hypertension</td>
<td>18</td>
</tr>
<tr>
<td>T1-slope (°)†</td>
<td>28.1±7.0</td>
</tr>
</tbody>
</table>

**High T1-Slope Group (≥28°)**

- n=45

**Low T1-Slope Group (<28°)**

- n=50

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### Table 2: Pre- and post-operative clinical characteristics (n=95)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Pre-operation</th>
<th>Post-operation</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of motion at the index level (°, by lateral flexion/extension)†</td>
<td>8.8±4.4</td>
<td>8.4±5.6</td>
<td>0.62</td>
</tr>
<tr>
<td>C2-7 Cobb angle (°)†</td>
<td>12.4±10.8</td>
<td>12.5±9.7</td>
<td>0.96</td>
</tr>
<tr>
<td>Clinical outcomes†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS (neck pain)</td>
<td>4.5±3.1</td>
<td>2.6±2.7</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>VAS (arm pain)</td>
<td>4.3±3.2</td>
<td>2±2.5</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>JOA</td>
<td>13.0±2.8</td>
<td>14.9±2.2</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Nurick score</td>
<td>0.9±1.0</td>
<td>0.3±0.5</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>
Table 3: Comparison between the groups of high and low T1-slope

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>T1-slope (degree)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥ 28° (HTSG)</td>
<td>&lt; 28° (LTSG)</td>
</tr>
<tr>
<td>No. of patients</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>Age†</td>
<td>45.0±9.1</td>
<td>47.0±10.1</td>
</tr>
<tr>
<td>Sex (F:M)</td>
<td>24:21</td>
<td>28:22</td>
</tr>
<tr>
<td>Mean follow-up (months) †</td>
<td>39.8±19.5</td>
<td>42.5±20.7</td>
</tr>
<tr>
<td>Range of motion at the index level (°, by lateral flexion/extension) †</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-operation</td>
<td>8.8±4.2</td>
<td>8.8±4.6</td>
</tr>
<tr>
<td>Post-operation</td>
<td>8.1±5.5</td>
<td>8.8±5.7</td>
</tr>
<tr>
<td>Change of ROM (ΔROM°) †</td>
<td>-0.7±7.0</td>
<td>0±6.6</td>
</tr>
<tr>
<td>C2-7 Cobb angle (°) †</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-operation</td>
<td>16.8±9.5</td>
<td>8.4±10.3</td>
</tr>
<tr>
<td>Post-operation</td>
<td>15.3±9.8</td>
<td>9.9±8.9</td>
</tr>
<tr>
<td>Change of cervical lordosis (ΔC2-7 Cobb angle°) †</td>
<td>-1.5±9.3</td>
<td>1.5±9.7</td>
</tr>
<tr>
<td>Clinical outcomes (post-operation) †</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS (neck pain)</td>
<td>2.1±2.5</td>
<td>3.0±2.8</td>
</tr>
<tr>
<td>VAS (arm pain)</td>
<td>1.6±1.7</td>
<td>2.4±3.0</td>
</tr>
<tr>
<td>JOA</td>
<td>15.3±1.9</td>
<td>14.7±2.4</td>
</tr>
<tr>
<td>Nurick score</td>
<td>0.3±0.4</td>
<td>0.4±0.5</td>
</tr>
</tbody>
</table>

HTSG and LTSG

Similar pre- and post-op ROM

Change of ROM

HTSG: decreased
LTSG: increased (non-significant)

HTSG

Higher pre- and post-op cervical lordosis

Change of cervical lordosis

HTSG: decreased
LTSG: increased (non-significant)
The Effect of T1-Slope in Spinal Parameters after Cervical Disc Arthroplasty

**High T1-Slope Group (≥28°)**
- **Higher** cervical lordosis (16.8±9.5°)*
- Similar segmental mobility (8.8±4.2°)

**Low T1-Slope Group (<28°)**
- **Lower** cervical lordosis (8.4±10.3°)*
- Similar segmental mobility (8.8±4.6°)

**Mean T1-Slope 28.1±7.0°**

**Decreased** cervical lordosis (-1.5±9.3°)  
**Less** segmental mobility (-0.7±7.0°)

**Increased** cervical lordosis (+1.5±9.7°)  
**More** segmental mobility (0±6.6°)

*: p<0.05
The Effect of T1-Slope in Spinal Parameters after Cervical Disc Arthroplasty

T1-slope correlated well with the global cervical lordosis

T1-slope did not affect the pre- or post-op ROM

After CDA, Δ cervical lordosis correlated with Δ ROM

Segmental lordosis should be cautiously preserved during CDA surgery as it could determine the mobility of the disc.

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