Outcome of correction surgery using pedicle screw for cervical kyphosis exclusive of ankylosing spondylitis

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Introduction

- Severe cervical kyphosis exclusive of ankylosing spondylitis (AS) is rare.
- Decompensation of the alignment due to multilevel disc degeneration, loss of disc height, anterior slip of the vertebra, and/or denervation of paravertebral muscles can cause severe kyphotic deformity.
- Canal stenosis, osteoarthritis of the facet, and/or foraminal stenosis may coexist. Therefore, correction surgery for those has a risk to cause neural complications such as spinal cord injury and C5 nerve palsy.

The purpose of the present study was to examine the outcome of correction surgery using pedicle screw for severe cervical kyphosis (>20°) exclusive of AS.
Our algorithmic strategy for selecting a surgical approach

- **Is kyphosis reducible in extension?**

  - yes
  - no

  **Posterior Approach**
  17 cases
  (pedicle screw insertion, laminoplasty, occasional foraminotomy, correction with rod connection, bone grafting)

  - Does canal stenosis exist?
  - Is facet joint fused?

  - no
  - yes

  **3-staged surgery**
  7 cases
  (Posterior: pedicle screw insertion, Laminoplasty, occasional foraminotomy
  Anterior: anterior release+cage insertion
  Posterior: correction with rod connection, bone grafting)

- **2-staged surgery**
  6 cases
  Anterior: anterior release+cage insertion
  Posterior: pedicle screw insertion, correction with rod connection, bone grafting)
Clinical Object and Methods

30 cases (Male were 17, and female 13, mean age was 63.5 years old) who underwent correction surgery of cervical kyphosis > 20 were involved.

Preoperative cervical kyphosis angle was a mean of 32.0 degrees (from 20 to 74).

- Operation time
- Amount of bleeding
- Kyphosis angle
- Correction angle
- Incidence of complications
- Fusion rate

were examined amongst the groups
## Results

<table>
<thead>
<tr>
<th></th>
<th>Operation time (min)</th>
<th>Amount of bleeding (g)</th>
<th>Kyphosis angle (pre-op)</th>
<th>Correction angle</th>
<th>Spinal cord injury</th>
<th>C5 palsy</th>
<th>Bony union</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P</strong>*</td>
<td>245 ± 37</td>
<td>280 ± 155</td>
<td>25.0 ± 6.7°</td>
<td>26.6 ± 11.1°</td>
<td>0/17</td>
<td>5/17</td>
<td>17/17</td>
</tr>
<tr>
<td><strong>AP §</strong></td>
<td>376 ± 103</td>
<td>388 ± 120</td>
<td>41.0 ± 7.3°</td>
<td>43.8 ± 6.6°</td>
<td>0/6</td>
<td>1/6</td>
<td>5/6</td>
</tr>
<tr>
<td><strong>PAP+</strong></td>
<td>485 ± 83</td>
<td>393 ± 125</td>
<td>41.3 ± 17.1°</td>
<td>46.9 ± 17.2°</td>
<td>0/7</td>
<td>4/7</td>
<td>7/7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$p$</th>
<th>*VS §</th>
<th>N.S.</th>
<th>*VS §</th>
<th>*VS §</th>
</tr>
</thead>
<tbody>
<tr>
<td>$p$</td>
<td>p&lt;0.05</td>
<td>p&lt;0.05</td>
<td>p&lt;0.05</td>
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</table>
Representative Cases; Group P

65 years old, male
Representative Cases; **Group AP**

74 years old, female
Representative Cases;  Group PAP

51 years old, male
Discussion

- Correction of severe cervical kyphosis used be very dangerous.  

- In this series, we were able to avoid catastrophic complications because of:
  - careful decision making of surgical procedure
  - and not having too much correction (up to straight or slight lordosis)
Discussion

- We still had several incidence of C5 nerve palsy.
- Especially, we have to be aware of the incidence in group PAP which required massive range of realignment.
- The incidence occurred even after we introduced prophylactic foraminotomy, however, this procedure may lessen the severity of the complication because those all were transient.