Efficacy of Posterior Segmental Decompression Surgery for Pincer Mechanism in Cervical Spondylotic Myelopathy - A retrospective case–control study using propensity score matching


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The authors report no actual or potential conflict of interest in relation to this article.
Pathomechanism of CSM

Pincer mechanism

- Compression of the spinal cord is observed in the articular segment.
- A bulging disc compresses the spinal cord anteriorly.
- The ligamentum flavum compresses the spinal cord posteriorly.

Surgical Methods for CSM

- **Segmental articular decompression**
  - Surgical methods include….
  - **Skip Laminectomy**
    
  - **Segmental Partial Laminectomy**
    
  - **Microendoscopic Laminopalstsy (CMEL)**
    
Cervical MicroEndoscopic Laminoplasty (CMEL)

Developing to the bilateral decompression surgery by the unilateral approach

1. Approach and Contra-lateral side: Laminotomy
2. Enlargement of the spinal canal: Laminoplasty

(Minamide A. Eur Spine J, 2010)
Purpose

is to evaluate the efficacy of CMEL for the articular segment with pincer mechanism in cervical spondylotic myelopathy (CSM) patients by comparing the clinical results of CMEL with conventional expansive laminoplasty (ELAP) for patients with CSM.
Study Design

Retrospective case-controlled study using propensity score matching:
This retrospective case–control study of the clinical outcomes of CMEL and ELAP for the treatment of CSM used the propensity score matching method.

- A one-to-one matching analysis was performed between patients who underwent ELAP and CMEL on the basis of the estimated propensity scores of each patient.

- Patients were matched according to calculated propensity scores in a logistic regression model adjusted for age, sex, and preoperative severity of disorder (JOA score).

- A nearest-neighbor matching procedure was used, with the restriction that the propensities matched had to be within 0.05 units of each other.
Patient Population

A total of 259 patients underwent either of posterior decompression surgeries.

- CMEL group: cervical microendoscopic laminoplasty
- ELAP group: conventional cervical expansive laminoplasty (French-door or open-door type)

All patients were followed postoperatively for ≥ 2 years.

Clinical Assessment

- JOA score (Full score 17 points)
- Recovery rate of JOA score; Rates=100x(Final JOA-preop.JOA)/(17-preop.JOA)
  JOACMEQ: Japanese Orthopedic Association Cervical Myelopathy Evaluation Questionnaire
- VAS for axial pain
- Short Form 36 (SF-36)

All parameters were statistically analyzed by Student’s t-test (p<0.05).
## Characteristics of each group on matching by the calculated propensity score

<table>
<thead>
<tr>
<th></th>
<th>ELAP</th>
<th>CMEL</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>71 pts</td>
<td>71 pts</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>M 47, F 24</td>
<td>M 47, F 24</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>63.8±11.7</td>
<td>62.8±13.7</td>
<td>0.645</td>
</tr>
<tr>
<td>Preoperative JOA</td>
<td>10.1±2.4</td>
<td>10.2±2.6</td>
<td>0.96</td>
</tr>
</tbody>
</table>

## Clinical outcomes on each surgical procedure at the 2-year follow-up

<table>
<thead>
<tr>
<th></th>
<th>ELAP</th>
<th>CMEL</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOA</td>
<td>13.9±2.1</td>
<td>14.1±1.9</td>
<td>0.485</td>
</tr>
<tr>
<td>JOA recovery rate</td>
<td>56.3±22.2</td>
<td>62.8±13.7</td>
<td>0.349</td>
</tr>
<tr>
<td>VAS for axial symptoms</td>
<td>42.8±32.4</td>
<td>24.5±25.6*</td>
<td>0.001</td>
</tr>
<tr>
<td>Satisfaction for surgery</td>
<td>7.8±2.1</td>
<td>8.5±1.8*</td>
<td>0.036</td>
</tr>
</tbody>
</table>
There were no significant differences in any subscale of JOACMEQ and SF-36 between groups.
Conclusion

- Cervical microendoscopic laminoplasty (CMEL) exhibited comparable clinical outcomes as conventional expansive laminoplasty (ELAP) according to propensity score matching analysis.

- Posterior decompression of the cervical spinal cord in CSM is sufficient to remove the elements of the articular segment, such as the ligamentum flavum and the superior or inferior edge of the lamina.

- CMEL is promising for reducing postoperative neck and shoulder complaints caused by ELAP-induced soft-tissue damage.

- This minimally invasive technique (CMEL) is a useful surgical method for CSM patients.