Can C3 Laminectomy Reduce Interlaminar Bony Fusion and Preserve Cervical Range of Motion after Cervical Laminoplasty?

Dong-Ho Lee, MD, PhD, Seoul, Republic of Korea
Jung-Ki Ha, MD, Seoul, Republic of Korea
Jae Hwan Cho, MD, Seoul, Republic of Korea
Choon Sung Lee, MD, PhD, Seoul, Republic of Korea
Chang Ju Hwang, MD, Seoul, Republic of Korea
Sunghun Choi, MD, Seoul, Republic of Korea
Chul Gie Hong, MD, Seoul, Republic of Korea
Youn-Suk Joo, MD, Seoul, Republic of Korea

Introduction: Interlaminar bony fusion after cervical laminoplasty is one of causes to decrease postoperative cervical range of motion (ROM). It was reported to occur in 53% of patients, with marked frequency at C2-3. In a previous report, C3 laminectomy, instead of laminoplasty, could minimize muscle detachment at C2 and decrease the postoperative neck pain. Our hypothesis in this study is if C3 lamina is resected rather than opened during multi-level laminoplasty, the bony fusion between C2-3-4 laminae could be prevented and postoperative motion would be preserved more.

Methods: Fifty-nine patients with cervical spondylotic myelopathy involving 3 or more levels including C3 were consecutively treated with laminoplasty and followed more than 2 years after surgery. The first 45 patients underwent open-door laminoplasty at C3 with same technique as other levels (Lp group) and the next 14 patients underwent laminectomy at C3 instead of laminoplasty (Lm group). Lp group was divided into two subgroups according to the development of interlaminar bony fusion at C2-3 and/or C3-4 until postoperative 2 years: Lp-NF (no fusion, 26 patients) and Lp-F (fusion, 19 patients). The clinical outcomes such as Neck Disability Index (NDI), Japanese Orthopedic Association (JOA) scores, JOA recovery rate, and Visual Analogue Scale (VAS) of neck pain were investigated. Radiographic parameters including cervical ROM, C2-7 lordosis and segmental instability were assessed pre- and post-operatively and compared between the groups.

Results: No interlaminar bony fusion of C2-3 and/or C3-4 was detected in Lm group, but only in Lp group. Nineteen out of 45 patients (42.2%) who underwent laminoplasty showed fusion at postoperative 2 years: 13 patients at C2-3, 5 at C3-4 and 1 at C2-3-4. Fusion developed more commonly in the patients who had smaller preoperative cervical ROM, especially with smaller ROM at C2-3-4 segments (Lp-F 14.3 ± 6.9° vs Lp-NF 21.4 ± 5.3°, P = 0.013).
Presentation #84 P

Both Lm and Lp groups showed significant improvements in NDI, JOA scores, JOA recovery rates and VAS of neck pain after surgery; however, there was no significant difference in those clinical outcomes between both groups. Cervical ROM significantly decreased in both Lm and Lp groups postoperatively; however the degree of decrease was significantly smaller in Lm group (10.5°, from 44.2 ± 9.1° to 33.7 ± 6.0°) than that in Lp-NF (15.1°, from 45.4 ± 8.5° to 30.3 ± 7.4°) and Lp-F groups (18.2°, from 39.6 ± 9.3° to 21.4 ± 10.3°)(P < 0.05). Postoperative segmental instability at C2-3 and C3-4 was not detected even after C3 laminectomy.

**Conclusion:** C3 laminectomy could prevent interlaminar bony fusion of C2-3-4 and finally result in more preservation of cervical ROM than C3 laminoplasty after multi-level laminoplasty. Furthermore, it assured similar neurologic and functional outcomes compared to C3 laminoplasty in this study.

Figure 1. Interlaminar bony fusion at C2-3 after C3 laminoplasty (A, B, C). This could be prevented by C3 laminectomy (D, E, F).
Table 1. Degree of decrease – Cervical ROM

<table>
<thead>
<tr>
<th></th>
<th>Lp-NF (°)</th>
<th>Lp-F (°)</th>
<th>Lm (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preoperative ROM</strong></td>
<td>45.4±8.5</td>
<td>39.6±9.3</td>
<td>44.2±9.1</td>
</tr>
<tr>
<td><strong>Postoperative ROM</strong></td>
<td>30.3±7.4</td>
<td>21.4±10.3</td>
<td>33.7±6.0</td>
</tr>
<tr>
<td><strong>Degree of ROM Decrease</strong></td>
<td>18.2±3.9</td>
<td>15.1±4.7</td>
<td>10.5±3.5*†</td>
</tr>
</tbody>
</table>

* Significant difference between Lm and Lp-NF, p<0.05
† Significant difference between Lm and Lp-F, p<0.05