Where Should a Laminoplasty Start? The Effect of the Proximal Level on Post-laminoplasty Loss of Lordosis

Keith W Michael, MD, Durham, NC, USA (n) Nothing;
John M Rhee, MD, Atlanta, GA, USA (3b) Biomet Spine; (5) Phygen (formerly Allez Spine LLC)

Introduction: Laminoplasty was originally devised as a motion sparing alternative to multi-level laminectomy that could avoid post-laminectomy kyphosis. Although catastrophic kyphosis after laminoplasty is rare, recent data suggest that loss of lordosis does occur even after laminoplasty. Disruption of the cervical extensor muscles is thought to be a risk factor. We examined whether limiting proximal muscle dissection by starting the laminoplasty at C4 versus C3 could potentially reduce post-laminoplasty loss of lordosis.

Methods: All patients undergoing plated open door laminoplasty for cervical myelopathy over a five year period were reviewed. The location and number of levels treated surgically were selected based on MRI and/or CT myelogram. If the proximal extent of stenosis was no further cephalad than the C3-4 disc level, a laminoplasty of C4 could be performed along with a dome laminectomy of C3 to achieve adequate decompression while avoiding any detachment of the C2 muscle insertions. Pre and postoperative radiographs were analyzed to determine the change in sagittal alignment. Comparisons were made to evaluate the impact of the most cephalad level included in the laminoplasty as well as the presence of a C2 dome laminectomy on postoperative sagittal alignment.

Results: Sixty-four patients treated with laminoplasty were followed for an average of 429 days. In the group as a whole, mean preoperative lordosis was 18.1° compared with 10.6° postoperatively, for an overall 7.5° loss of lordosis. When C3 was the proximal plated laminoplasty level, loss of lordosis averaged 8.9°. In contrast, when C4 was the proximal plated level, loss of lordosis averaged only 3.4° (p=0.04). Patients with a C2 dome laminectomy lost an average of 8.2° of lordosis compared with 6.9° in those with C2 intact, but this difference was not statistically significant.

Conclusion: Significantly less loss of lordosis (5.5°, p=0.04) occurred when the proximal laminoplasty level was C4 rather than C3. This may be related to the fact that the C2 extensor muscle insertions do not need to be disrupted to perform a laminoplasty at C4, but usually do need to be at least partially detached to perform a laminoplasty of C3. Although those with C2 dome laminectomies lost 1.3° more lordosis than those without, this difference was not significant, possibly because the extent of muscle detachment required to perform a C2 dome laminectomy is not much different than that required for a C3 instrumented laminoplasty. Therefore, when possible based on the location of spinal cord compression, starting the laminoplasty at C4 rather than C3 is preferable in terms of preserving lordosis. If a C3 laminoplasty is required neurologically, the inclusion of a C2 dome laminectomy may not significantly increase the risk of postoperative loss of sagittal alignment.