

Commentary on article: Laminoplasty versus laminectomy and fusion for multilevel cervical myelopathy: A meta-analysis of clinical and radiological outcomes by Chang-Hyun Lee *et al*

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Abstract

Background: This is a commentary on the article laminoplasty versus laminectomy and fusion (LF) for multilevel cervical myelopathy: A meta-analysis of clinical and radiological outcomes by Chang-Hyun Lee *et al*. Here, the authors utilized seven studies to compare the efficacy of cervical expansive laminoplasty (EL) versus laminectomy and fusion (LF) to address three or more level multilevel cervical spondylotic myelopathy (CSM). Both procedures led to similar degrees of neurological recovery and short-term loss of lordosis, but found that LF led to more favorable long-term results.

Methods: For patients with three or more level CSM, laminectomy followed by an instrumented fusion (LF) has major advantages; open bilateral decompression of the nerve roots, while minimizing the risk of inadvertent injury to the cord, and the fusion's maintenance of lordosis.

Results: Some would argue that inadvertent cord/root injury is greater utilizing any of the EL techniques; e.g., unilateral, bilateral, or spinous process splitting techniques. In short, why risk cord/root injury by manipulating the compressive posterior/posterolateral elements, which are already threatening neural function.

Conclusion: Although the results of EL versus LF appeared comparable in the short-term in these seven articles, LF resulted in better long-term outcomes. Some would also argue that LF, utilizing an open approach offers safer bilateral neural exposure and decompression.

Key Words: Cervical surgery, efficacy, fusion, laminectomy, laminoplasty, safety, spondylotic myelopathy

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COMMENTARY

Commentary on article laminoplasty versus laminectomy and fusion (LF) for multilevel cervical myelopathy: A meta-analysis of clinical and radiological outcomes by Chang-Hyun Lee *et al*. (Authors: Chang-Hyun Lee, M.D, Jaebong Lee MsC, James D. Kang MD, Seung-Jae Hyun, MD, Ki-Jeong Kim MD, Tae-Ahn Jahng MD *et al*).

SUMMARY OF ARTICLE

To address three or more level multilevel cervical spondylotic myelopathy (CSM), the authors compared the short and long-term safety, efficacy, outcomes, and radiographic findings for patients undergoing expansive cervical laminoplasty (EL) versus LF. They performed a meta-analysis using MEDLINE, EMBASE, and the

Cochrane library. Seven studies contained sufficient information regarding 302 patients treated with EL and 290 with LF. Both treatment groups exhibited a slight cervical lordosis prior to any surgery, demonstrated a comparable loss of cervical lordosis postoperatively, and demonstrated similar postoperative improvement utilizing Japanese Orthopedic Association scores. Over the long-term, however, LF afforded better preservation of lordosis for patients undergoing LF, but this proved not to be statistically significant. The authors concluded that both procedure, EL and LF, led to similar degrees of neurological recovery and short-term loss of lordosis. They determined no greater short-term benefit of EL versus LF, but over the long-term, the latter LF patients appeared to show more favorable long-term outcomes.

Arguments favoring laminectomy with fusion

For patients with three or more level CSM, I am a strong proponent of laminectomy followed by an instrumented fusion to maintain the degree of lordosis; this enables one to use a posterior approach, and avoid kyphosis.^[1-3,5,6] Major advantages of the laminectomy portion of LF include the ability to decompress both sides of the spinal canal utilizing with bilateral medial facetectomy/foraminotomy to free individual nerve roots. Using this technique, all maneuvers are “away” from the underlying nerve tissue, and all efforts at excision are expended to decompress the neural tissues fully while minimizing trauma.

Although laminectomy alone may suffice in a very select group of patients who demonstrate no evidence of preoperative instability (e.g., occasionally those in their 70's or 80's), it would not be my primary recommendation particularly for treating younger patients.^[4] Typically, without the fusion, too many go on to develop progressive kyphosis warranting reoperative intervention.

Arguments against laminoplasty

The authors themselves acknowledge that there are many different laminoplasty techniques involved in these studies. In fact under study limitations they state, “as an additional limitation, EL has different techniques, such as open door and French door, however, these differences were not considered.” I would argue that this is a major shortcoming of this study, and would offer that each of these techniques place patients at increased risk. Utilizing the unilateral hinge-door laminoplasty technique, the hinged side is never really decompressed as the underlying hypertrophied/ossified yellow ligament (OYL) and shingled laminae are not removed. Rather they are dorsally “rotated” and “elevated” -at least

that is what one hopes happens. Indeed, this may occur in the most expert of hands, but I would think that in many more inexperienced hands it results in untoward neurological cord and/or nerve root deficits. Similarly, with bilateral unroofing techniques, that use plates/screws to “reapply” the posterior elements, one must question how much “manipulation” goes into accomplishing this. Furthermore, how often do the plate/screw constructs fail particularly in osteoporotic patients. The spinous process splitting approaches would seem to be the most risky. In patients with a very compromised spinal cord/bilateral nerve roots, largely attributed to extensive dorsal compression (shingled laminae/OYL), why risk lateral root injury by manipulating the posterior elements, while also threatening the cord centrally by splitting the spinous processes?

SUMMARY

It is of interest that in the overall table, five studies involving a totally of 231 patients undergoing EL versus 232 having LF were cited. However, looking at these studies individually, it turns out that Manzano's study involved only 9 and 7 patients, respectively, Lee's study 21 and 21 patients, with numbers rising in each category from there. In fact, it is very difficult to compare the results of these different studies utilizing different patient selection criteria, surgeons, and operative techniques. The notation that LF appears to have the better long-term outcomes supports my bias. However, another added benefit of LF is the greater inherent safety attributed to the open neural exposure afforded during the operative dissection. After all, our aim was to achieve the best neurological outcome, and I think that LF in more surgeons' hands would be safer and more effective than EL.

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Commentaries

ADDITIONAL COMMENTARIES

Beside the honest acknowledgment of the Author's methodological limitations, in our opinion a strong limitation of this paper is the absence of neuroradiological pre- and post-operative comparative studies available to the readers to critically review and comment on the published results.^[1,3-7]

In European Countries noninstrumented cervical laminectomies seems to claim an interesting role in the global surgical landscape and when adequately performed in absence of preoperative dystabilities, offer surprisingly good results.

The advantages of EL found in the literature include; Improved neurological outcomes, preservation of normal motion and alignment, and the avoidance of post-laminectomy membranes. The real take home message is that the real efficacy of EL vs. LF in preventing postoperative spinal deformity has not yet been established.^[2]

Although some could conclude that EL is indeed an operation in search of a disease, we prefer to think that both techniques could be utilized based on the individual patient's needs.

The question of the better operative treatment in a cervical stenotic/myelopathic patient continues to be a challenge. In the past at different times I supported the two techniques for multi-level disease used in this paper. My conclusions (not in any manuscript) were identical as outlined here. The only way I could assure no minor or major progressive kyphosis was by doing an anterior multi-level discectomy/fusion (no anterior hardware) and a posterior laminectomy with device/hardware. However, that procedure did take 5 h. Moreover, it did work well, and the complication rate was extreme low; and once I

Dr. Epstein nicely summarizes this article, and I agree with her analysis of the literature. It appears that LF is probably a better option for patients requiring a three-level (or greater) posterior decompression and stabilization. Her comments are sure to engender a response from proponents of both procedures, of which there are many in both camps. Of interest, the AOSpine International CSM study showed that these procedures are equivalent in terms of clinical outcome

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retired my group continued, in select patients, doing that operation. If there was significant anterior pathology and stenosis along with early kyphosis, my approach was to correct the alignment and achieve a stable decompression. Am I correct or am I nuts? Time may tell, for I am not operating now; all I do is consulting reviews. However, I think this paper is very important.

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metrics. This was a prospective, nonrandomized, multicenter, multinational prospective study that looked at 266 posterior procedures, and may add more fuel to the debate, as proponents on either side will be able to claim their operation is superior (full disclosure: I am a co-author and participant in that study).

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This was an exhaustive review of the literature. Although the paper concluded that both procedures are safe and effective with similar outcomes for the treatment of spondylotic cervical myelopathy, it also appropriately mentioned that both tend to result in a more positive sagittal balance. My only criticism was that the paper never addressed the fact that in Table 1 LF was over 3 times

more likely to result in C5 palsy than EL. I realize that only 2/8 studies reported this, but I think this is an important clinical finding and should have been mentioned.

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