It is helpful to understand how each of these surgical procedures evolved. The original operation for cervical myelopathy was a laminectomy. By the late 1970s it had become clear that a subset of laminectomy patients (20-30%) had poor outcomes due to post-laminectomy kyphosis, recurrent spinal cord compression, and/or pain. Scholars in different parts of the world sought to improve upon these results in different ways. North America was the birth-place of anterior decompression and fusion. Japan evolved the laminectomy into what we know today as the laminoplasty family of procedures. Western Europe provided most of the original innovations in internal fixation of the cervical spine, both anteriorly and posteriorly. By the early 1990s surgeons began to add posterior segmental instrumentation and fusion to a laminectomy in order to prevent the possibility of kyphosis and its consequences.

The difference in the outcomes of these two operations is not with respect to neurology. It has been well established that they are equally effective in decompressing the spinal cord. Recently published reviews of the literature have explored the evidence regarding the efficacy of these surgical options. With the addition of foraminotomies, nerve root decompression is also effective. Long-term follow-up studies for laminoplasty attest to the durability of the clinical results. Recently, diabetes with elevated preoperative Hb A1C levels, as well as segmental anterolisthesis have been identified as risk factors for impaired neurologic recovery.

Motor root palsy was initially described in association with laminoplasty. Thus a misconception took root that it was a complication unique to laminoplasty. However, motor root palsy can occur following any of the procedures performed for cervical myelopathy: anterior or posterior. A recent large study established this, and oddly the rate was least among laminoplasty patients. It is not entirely clear whether there are effective measures available to reduce the incidence. But there has been a general trend toward reduced frequency over the last 25 years, which may reflect evolving anesthetic techniques or subtleties of surgical technique. Thus it is probably best to think of this as a complication of the disease, rather than the chosen treatment.
Postop sagittal alignment is sometimes offered as a differentiating feature. As it turns out, the mean effect on alignment with laminoplasty is essentially neutral. A large recent series actually showed a mean increase in lordosis of 2 degrees. Laminectomy and fusion theoretically maintains or improves lordosis. But this depends on the alignment fixed intraoperatively, which can be less lordotic than appreciated. Moreover, excessive correction can lead to iatrogenic foraminal stenosis and nerve root complications.

More recently there has been a growing interest in the role that preoperative sagittal alignment and balance parameters might play in postoperative outcomes. There is some evidence that a positive sagittal balance may adversely influence the postoperative alignment. But Oshima et al did not find that such changes influenced the clinical or neurologic outcome. Sakai, et al observed a similar lack of relationship to clinical outcomes. Whereas preoperative sagittal imbalance along with age was a risk factor for post-laminoplasty kyphosis.

Range of motion after the two procedures will be different. By definition, if all of the intended fusions heal, the laminectomy & fusion patient will have sacrificed more motion in pursuit of their treatment than the laminoplasty patient. This is especially true in the era of internal fixation and early active range of motion for laminoplasty patients. The older data regarding postop pain and stiffness came from a time when patients were required to wear hard collars for up to 3 months. In Japan, at that time, patients were often kept at bed rest for a month in hospital. Thus one might imagine the incidental facet fusions and capsular contracture that occurred as a result. Rigid internal fixation for laminoplasty and early active motion has not completely eliminated spontaneous facet or interlaminar fusion. But it less likely, as is acquired axial pain.

The primary distinguishing feature between the two operations is with respect to complication and reoperations rates, specifically for non-unions and/or implant failure among the fusion patients. This has been shown fairly consistently in the few direct comparison studies. Laminectomy and fusion may also have a higher rate of postoperative motor root palsy.

Adjacent segment degeneration is a consideration among the fusion patients. But there are scant data on this issue. Nonetheless, we have all treated such patients. Among laminoplasty patients, since they are not fused, the issue is a bit different. They can develop nerve root compression from progressive osteophyte growth and foraminal stenosis with the decompressed region. This is also uncommon.

A word is also in order regarding comparative value. At this time in health care, we are compelled to consider cost and resource utilization for a given outcome. Studies have shown increased implant and total costs for laminectomy & fusion versus laminoplasty. And under the current coding and reimbursement system in the U.S., there are significantly larger surgical fees associated with laminectomy & fusion.
Lastly, what about return to normal activity? The laminoplasty patient is encouraged to move their neck as much as possible, as soon as possible. Internal fixation reduces the risk of hinge closure and re-stenosis when engaging in early AROM postop. Active resisted neck, shoulder & arm training can begin 6 weeks postop. Most surgeons would advise against this until a fusion patient has had adequate time to properly heal, which is at least three months, if not six.

Though laminectomy & fusion clearly has its place/indications, among the majority of multi-level CSM and OPLL patients eligible for either procedure, the data favor laminoplasty on the basis of fewer complications, less cost and earlier return to normal activity. They are equivalent with respect to neurologic outcomes.

**Laminoplasty: Indications & Contraindications:**

Laminoplasty is reasonably indicated in the following circumstances:

- Spinal cord compression involving ≥3 motion segments.
- Subaxial cervical alignment of ≤13° kyphosis
- Patients considered to be at increased risk for a non-union.
- In the presence of congenital stenosis, since degenerative changes flanking a fusion are not well tolerated.
- Persistent stenosis or new spinal cord compression after previous anterior surgery.

The procedure is relatively contraindicated when:

- Significant axial pain is part of the primary complaint
- If there is more than 13° of subaxial kyphosis
- In the presence of a “Hill Shaped” lesion of OPLL
- Segmental instability, especially anterolisthesis
- Previous post. Surg.
- Epidural fibrosis
References:


26. Cervical Alignment and Range of Motion After Laminoplasty Radiographical Data from more than 500 cases with Cervical Spondylotic Myelopathy and a Review of the Literature: Machino et al SPINE (2012)


34. Long term follow up studies of laminoplasty. Satomi et al, Spine (1994)


40. Risk Factors for Poor Outcome of Cervical Laminoplasty for Cervical Spondylotic


