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 birthplace 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. With the addition of foraminotomies, nerve root decompression is also effective. They differ primarily in the complication and reoperation rates.

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.

Postoperative 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.\textsuperscript{28}

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.\textsuperscript{28,29} 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.\textsuperscript{22,23} 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 that occurred as a result. Internal fixation and early 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.\textsuperscript{9,10,11}

Adjacent segment degeneration is a consideration among the fusion patients. But there are scant data on this issue. None the less, we have all treated such patients. Among laminoplasty patients, since they are not fused, the issue is a bit different.\textsuperscript{30} They can develop nerve root compression from progressive osteophytes 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.\textsuperscript{10} 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.\textsuperscript{24,31,32} 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.
References:


13. Lordotic alignment and posterior migration of the spinal cord following en bloc open-door laminoplasty for cervical myelopathy: a magnetic resonance imaging study:


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)


The FDA has not cleared the following pharmaceuticals and / or medical devices for the use described in this presentation. Posterior lateral mass screws are not approved for this use in the cervical spine by the FDA.