



Case Reports & Case Series

Robust bone regrowth achieving autofusion across Interlaminar space following lumbar microdiscectomy: Case report[☆]

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ABSTRACT

Background: Autofusion of spinal vertebrae is uncommon, but it can occur due to advanced degenerative processes and infection. Post-operative spontaneous fusion following non-fusion surgery (autofusion) of spinal vertebrae is also generally uncommon, but it has been reported after laminoplasty, disc arthroplasty with and without heterotopic ossification, and histiocytosis biopsy. To the best of our knowledge, post-operative autofusion in the lumbar spine following decompressive surgery alone has not been reported previously.

Case description: The authors present an occurrence of a 29-year-old woman who underwent uncomplicated left L4-L5 microdiscectomy for spondylosis, low back pain, and left lower extremity radiculopathy. The patient returned to the hospital 6 years post-operatively due to recurrent radiculopathy, and CT imaging showed regrowth of left sided bone at the operative site and also extending across interlaminar space, ranging from the superior lamina to the most inferior part of the decompression.

Conclusions: The case indicates that post-operative bone regrowth can extend beyond operative decompression defects and cross over interlaminar space causing autofusion. Autofusion could be due to instability within the lumbar spine via degenerative disc changes, and it may be underreported due to lack of post-operative imaging in most patients undergoing uncomplicated, lumbar decompression surgery.

1. Introduction

A degree of post-operative bone regrowth commonly occurs at vertebral laminae and facets following lumbar laminectomy [1–3]. However, bone regrowth in these cases is typically limited to the surgical site and has not been reported to achieve an area greater than that of the original, pre-surgical bone. To our knowledge, post-operative regrowth above 100% or autofusion has not been reported in the human lumbar vertebrae post-laminectomy. Spontaneous vertebral fusion or autofusion is uncommon, but it has been reported due to infection, scoliosis, trauma, ankylosing spondylitis, and spondylolisthesis. Post-operative autofusion of spinal vertebrae following non-fusion surgery is also uncommon, but some cases have been identified after laminoplasty, disc arthroplasty, and biopsy of Langerhans cell histiocytosis [4–8]. However, lumbar vertebrae autofusion has not been reported post laminectomy to the best of our knowledge [5–9]. This case report describes a case of spontaneous bone growth across an

interlaminar gap following lumbar laminectomy and microdiscectomy for spondylosis, leading to autofusion of lumbar vertebrae.

2. Case report

2.1. History and examination

A 29-year-old woman presented with 1 year of progressively worsening lower back pain radiating into the left lower extremity more than the right. She experienced occasional subjective left leg numbness but did not experience any weakness or sphincter disturbances. On physical examination, strength, light touch, and pin prick sensation were intact in both lower extremities. Deep tendon reflexes were 2+ and symmetric in the lower extremities without pathologic reflexes. Straight leg raising was positive at 5° on the left and 10° on the right. MRI revealed left sided lumbar spondylosis and L4-L5 disc herniation.

Abbreviations: CT, Computed Tomography; FSE, Fast Spin Echo; MRI, Magnetic Resonance Imaging

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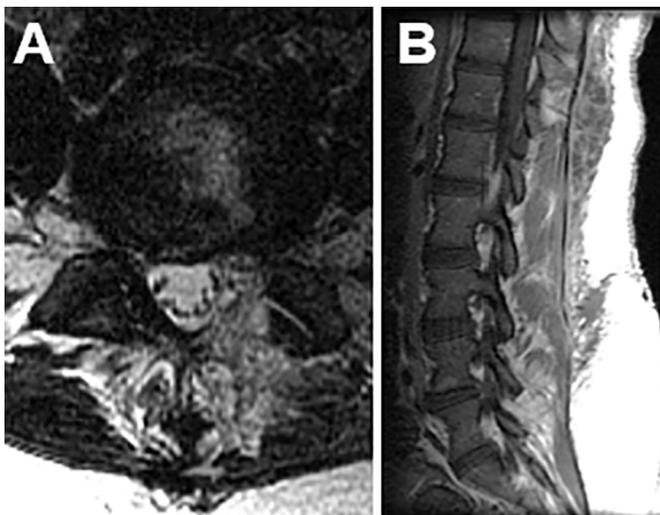


Fig. 1. Post-laminectomy and microdiscectomy MRI with routine post-operative changes.

Post-operative axial (A) and sagittal (B) T2 FSE MR images showing left sided L5 laminectomy and post-operative vertebral alignment.

2.2. Operation

The patient underwent a left sided L5 laminectomy and left L4-L5 microdiscectomy. She remained neurologically intact, post-operatively, but continued to experience some pain and initial difficulty walking. Her post-operative course was otherwise uneventful, prompting discharge to rehabilitation. Post-operative imaging showed a combination of degenerative changes and routine post-operative changes in the L4-L5 disc space and a normally-appearing left sided L4-L5 interlaminar gap (Fig. 1).

2.3. Delayed post-operative course

6 years post-operatively, she presented with recurrent radiculopathy prompting repeat imaging. A CT scan showed new growth of left sided bone at the surgical level extending across the native interlaminar space (Fig. 2). No lumbar herniation, cord compression, or malalignment was found. During future follow-up visits, she noted improvement of her preoperative radicular symptoms but continued to have chronic recurrent low back pain requiring oxycodone and acetaminophen and continued physical therapy. Subsequent X-rays (7 years post-operatively) and MRI after abdominal pain and heavy menstrual bleeding (12-years post-operatively) showed no further changes and no additional interventional treatment was performed.

3. Discussion

Spontaneous fusion or autofusion within the spine is generally

uncommon, but incidence has been reported to increase with certain conditions. Post-operative spinal autofusion is also relatively uncommon but has been previously noted. In the cervical spine, Garg et al. identified vertebral autofusion in 2 children following biopsies of Langerhans cell histiocytosis [4]. For cervical laminoplasty patients followed for 5 years or more after surgery, 11 out of 18 patients in Hyun et al. and 70 out of 72 patients in Ogawa et al. showed spontaneous autofusion of cervical laminae [5,7]. Kieser et al. followed cervical disc arthroplasty patients for 5 years or more after surgery and reported an autofusion rate of 13%, and a heterotopic ossification rate of 13% [6]. In the lumbar spine, Korres et al. surgically injured the lumbar spine in rabbits, and two-thirds of rabbits with injuries to both opposing end plates and the intervening intervertebral disk showed spontaneous autofusion at the injured intervertebral level [9]. Putzier et al. followed 53 lumbar disc arthroplasty patients for an average of 17 years, and 32 (60%) reported heterotopic ossification causing spontaneous ankylosis and 12 (22%) showed fusion after implant failure [8].

Post-laminectomy bone growth in the lumbar spine is not as robust in magnitude. Bone regrowth in these cases is typically limited to the surgical site encompassing less than 100% of the original bone area [1–3,10]. Bone regrowth after laminectomy or laminotomy commonly occurs in the lumbar spine at vertebral laminae and facets, and has been reported in up to 94% of patients [1–3,10]. Past research has identified L3/L4 as the lumbar level having the highest rate of bone regrowth, and bone regrowth rate increases with fusion procedures and in cases of increased vertebral instability [2,3,10].

To our knowledge, post-laminectomy autofusion of the lumbar spine has not been reported in humans. It is interesting to note the significant discrepancy in rate of post-operative vertebral autofusion after laminoplasty and arthroplasty, 61% to 97% post-laminoplasty and 26% to 82% post-arthroplasty [5–8], and the lumbar spine post laminectomy. This may be due to differences in the spinal instability caused by operation, as increased instability was previously reported with more bone regrowth in the lumbar vertebrae [2,3,10]. Thus, if the spine is more unstable after laminoplasty and arthroplasty than lumbar decompression surgery, the high instability could explain the high rate of postoperative bone growth and autofusion. This is suggested by a highlighted case in Ogawa et al. where one cervical spinal segment escaped laminar fusion post-laminoplasty, leading to concentration of mechanical stress, progression of posterior longitudinal ligament ossification, thickening of the ligamentum flavum, and spinal cord compression at that location [7].

In our case, degenerative disc changes within the L4-L5 disc space were noted postoperatively and may have caused enough instability to increase the rate of bone regrowth in the laminae, leading to autofusion across the L4-L5 interspace. Partial removal of L5 articulating processes during the initial operation may have contributed to this instability. However, it is unclear why previous studies looking into bone regrowth of laminae after decompression surgery in patients with disc degeneration did not report any cases of autofusion [1–3,10]. Thus, the overall mechanism behind spontaneous laminar bone regrowth in our case is unknown. Importantly, interpretation of post-operative imaging

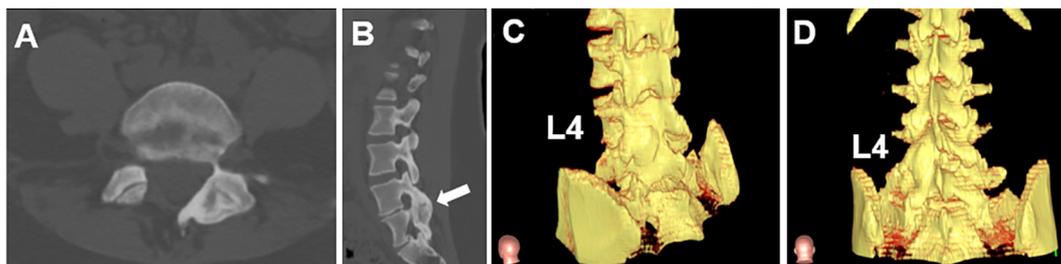


Fig. 2. Robust postoperative bone regrowth achieving autofusion across interlaminar space.

Axial (A) and sagittal (B) CT images obtained 6 years after surgery demonstrating left sided L5 bone regrowth within the L4-L5 laminae. 3D-reconstruction of CT images (C and D) showing left sided changes within the lumbar spine.

in our case can be challenging, especially for physicians other than the primary surgeon. Limited assessment of imaging could lead to suggestion of contralateral laminectomy instead of the true left sided laminectomy due to robust bone regrowth across the interlaminar gap. Since many patients with simple, uncomplicated lumbar decompression surgery will not be imaged post-operatively, the incidence of lumbar autofusion may be more common than what is reported in the literature. To avoid misinterpretation of imaging, the possibility of autofusion should be considered.

4. Conclusions

Post-operative autofusion of spinal vertebrae has been reported after laminoplasty, arthroplasty, and histiocytosis biopsy, but post-operative autofusion after lumbar decompression surgery presented in this case has not been reported previously to the best of our knowledge. Autofusion could be due to instability within the lumbar spine via degenerative disc changes, and it may be underreported due to lack of post-operative imaging in most patients undergoing uncomplicated, lumbar decompression surgery.

Disclosures

The authors report no conflicts of interest.

Declarations of interest

None.

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