LAMINOPLASTIES

Kemal YÜCESOY MD Haluk ÖZER MD Nail ÖZDEMİR MD
Ercan ÖZER MD Tansu MERTOL MD

ABSTRACT:

During the last six months, six patients having different spinal diseases were operated by using open door laminoplasty method, the laminas were reestablished with mini plaques. One case with servical spondylotic myelopathy was operated and servical spinal canal was widened using costa grafts and mini plaques. In this report we concluded that laminotomy is best choice in the posterior approach to spinal pathologies if possible, and can be used in the treatment of cervical spondylotic myelopathy successfully.

Key Words: *spinal disease, posterior approach, laminotomy*

INTRODUCTION

In surgical spinal pathologies, posterior approach is usually preferred because of easiness and confidence. Laminectomies which were used to approach spinal canal during many years caused kyphosis in multilevel donning, especially in children, loss of lordosis and instability. As a result it lost it's popularity in the last years (10, 19). To prevent these complications, instrumentation has also been used (1), but difficulties in procedure, complications of itself and increased cost forced the spinal surgeons looking for new applications. During the last years laminoplasty gained popularity, in spinal surgery, as a first choice in surgical therapy of servical spondylotic myelopathy (5, 7, 9, 11, 12, 13, 16, 18). Laminoplasties preserve osseous structure of spine and also decrease scar tissue damage to cord and spinal nerves. In this report we discussed our patient series in the light of literature.

PATIENT and METHODS:

Case 1:

A 56 years old woman admitted our outpatient clinic with pain in shoulders, elbows and lowback, and numbness in upper limbs. In neurologic examination, bilaterally decreased finger flexion was observed. Also right wrist extension was 4/5, and Hofmann's sign was positive on right. Lhermitte sign was presented. Deep tendon reflexes (DTR) were bilaterally increased and no sensory loss was found. In cervical CT C3–4 hard discal protrusion, osseous compression of cord from posterior were detected. In servical magnetic resonance imaging (MRI) myelomalasia caused by these compressions was found, posterior compression as more (Figure 1). The patient was operated using posterior approach and Miami method, laminoplasty was done with costa grafts and mini plaques. In the early postoperative period, patient had no pain complaint, Lhermitte sign was lost, numbness was present. At the third month control, patient had no problem and her control graphies showed no pathology (Figure 2).

Case 2:

47 years old woman patient admitted with complaint of lowback pain for 6 years and right leg pain for 4 years. Neurologic examination revealed no motor and sensory loss, increased patellar deep tendon reflexes and bilateral loss of achilles reflexes. Spinal MRI detected tethered cord, dural ectasia, displasia of L3 and L4 lumbal vertebra corpuses (Block vertebrae), lumbosacral posterior fusion defect and intradural lipoma (Figure 3). The patient was operated by a posterior approach, L3 and L4 laminotomy using fine Kerrison rongeur and high speed drill and L5 parsiyel laminectomy was done initially, intradural lipoma was taken out also using laser, filum terminale was cut thereafter and L3 and L4 laminas were put back using mini plaques (Figure 4).

Dokuz Eylül UUniversity, Faculty of Medicine, Department of Neurosurgery, İnciraltı–İZMİR

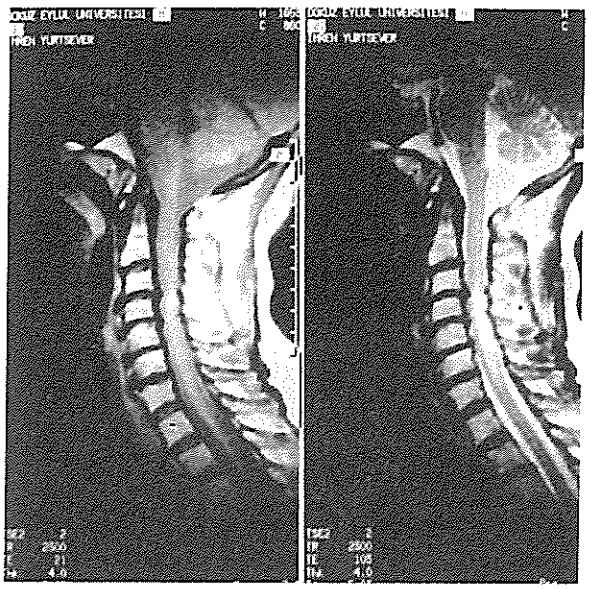
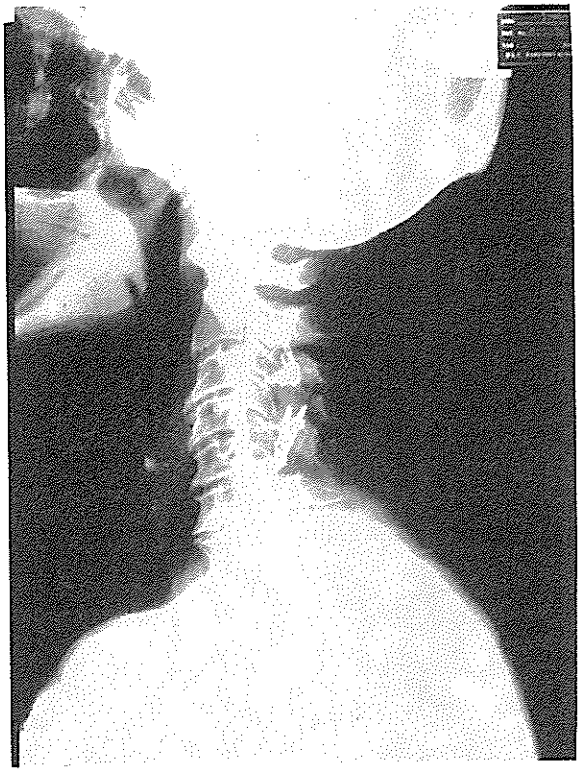


Figure 1.



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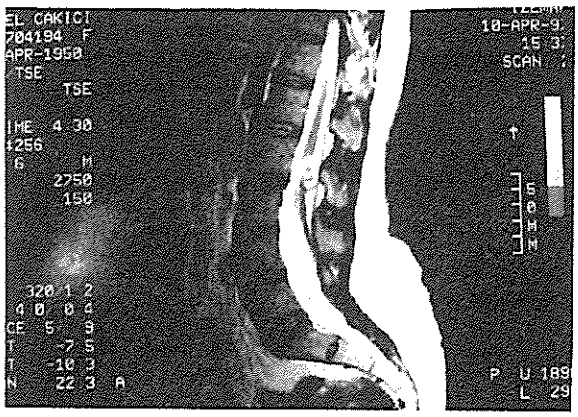

Figure 3.

Case 3:

A 63 years old woman having numbness and weakness at her both legs was examined at a neurosurgical clinic 2 years before admission and lumbal arachnoid cyst was detected. The patient had been operated in the same clinic because of left L4–5 and L5–S1 disc protrusion and developed arachnoiditis 4 years before the diagnosis of arachnoid cyst. The patient admitted to our clinic with added neurologic symptoms, urinary incontinence and walking lost.

In neurologic examination right and left ankle big toe dorsiflexion was 0/5, bilateral ankle plantar flexion was 4/5, hipoesthesia of right L1 dermatom was also detected. In spinal MRI, a intradural extramedullar meningeal arachnoid cyst between T12–S2 levels was observed. The patient operated using T12–L1 laminotomy method and cystostomy in the subarachnoid space cystosubarachnoidal tube was placed. The radiological control with MRI showed loss of cyst, normal structure of spinal canal at that level. Five months later from operation urinary complaints of patient disappeared and the patient could walk independently.

Case 4:

This patient was 51 years old and admitted with complaints of both buttock and leg pains, and burning sensation in the legs. The patient described neurogenic claudicatio on 50 meter walking. Neurologic examination revealed decreased right big toe dorsiflexion as 4/5. Lumbal CT showed narrowed spinal canal at the levels of L3–4 and L4–5, L4–5 disc herniation. Myelography showed narrowed L4–5 level mostly (Figure 5). The patient was operated and,

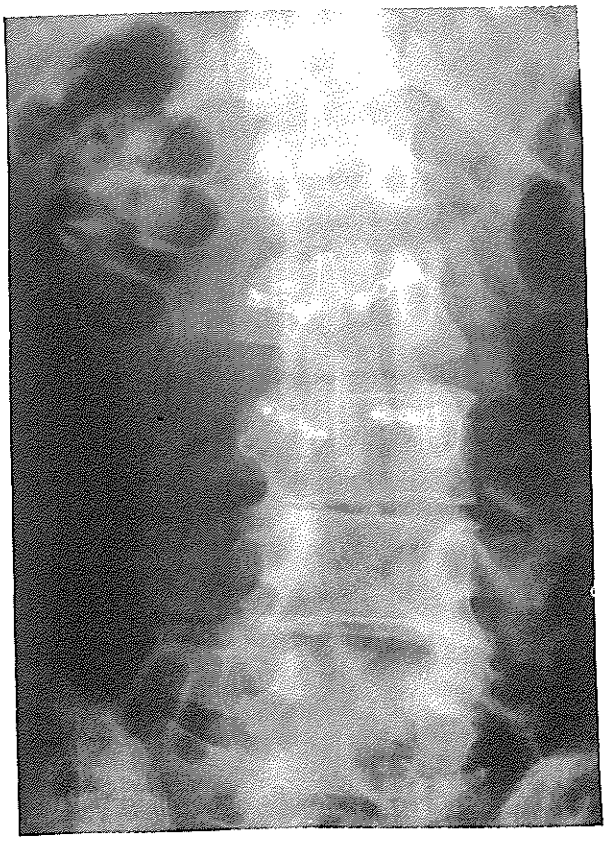

Figure 4.

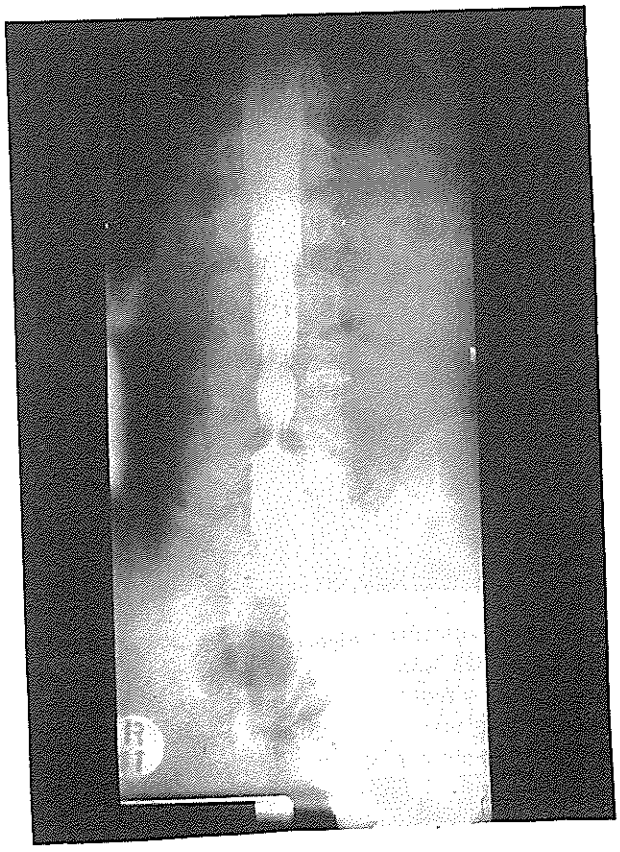

Figure 5.

bilateral L4–5 discectomy, bilateral L4 and L5 foraminotomy were done and L4 lamina was raised en bloc and fixed in its place with mini–plaques. After the operation, the patient had no complaints and control myelography confirmed radiologic improvement (Figure 6).

Case 5:

33 years old woman was diagnosed at the age of 21 years as spinoserebellar ataxia because of the complaints of imbalance and walking difficulty. The patient admitted to our hospital's Neurology clinic as a result of increased symptoms and dependent walking during the last year. In neurologic examination; paraparesia as right 3/5, left 2/5, parahipoestesia under thoracal 5 on right, thoracal 8 on left, loss of vibration and position senses, positive babinski sign bilaterally were found. Spinal MRI showed syrinx cavity between T5–11 and a mass lesion enhanced with contrast at the level of T9 and L5–S1 disc herniation. The patient was operated via posterior laminotomy and intradural mass lesion evacuated subtotally and a syringosubarachnoid tube was placed to drain syrinx cavity. In the same operation left classic L5–S1 discectomy was also performed. Postoperatively the patient had no additional neurologic deficit and her control X–ray had no problem. Pathologically lesion was identified as ependymoma. Patient's radiotherapy is still going on.

Case 6:

13 years old girl admitted to our hospital's orthopedics clinic with the complaint of urinary incontinence and curved trunk. The patient had thoracal scoliosis, and in spinal MRI type 2 split cord was detected. She was consulted with our clinic and thereafter the patient was operated via laminotomy. T11, fused T12 and L1 laminas were raised and involved cord was released by cutting from adhering fibrotic bands. In the same operation, with the same method through L4 lamina, filum terminale was cut. Mini plaques were used for holding replacement.

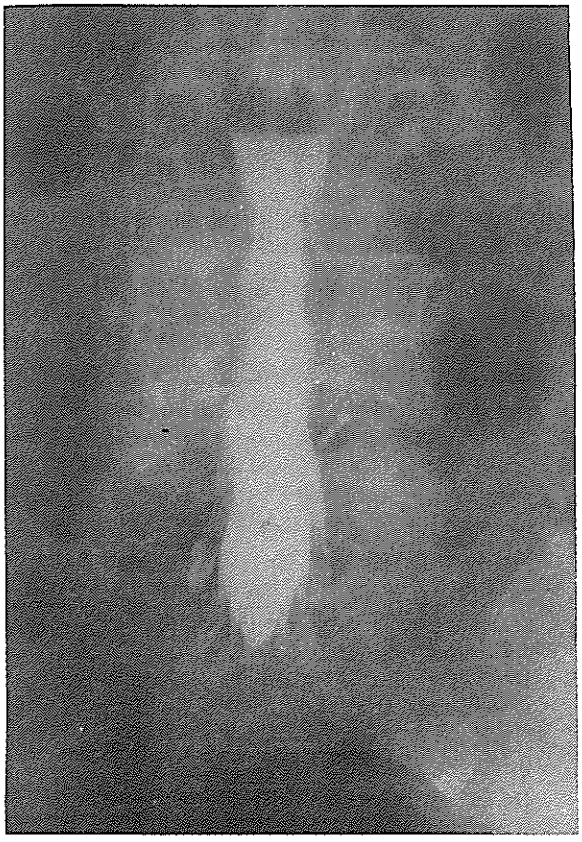

Figure 6.

Case 7:

A man aged 42 years admitted with lowback and right leg pain. Neurologic examination revealed right foot and big toe dorsiflexion as 3/5. CT scan showed L3–4 and L4–5 spinal stenosis and L4–5 herniated nucleous pulposus. L4–5 narrowing was more significant on myelography. He was operated upon and laminotomy of L4 lamina was done. Postoperatively his complaints were lost, motor deficits regressed to 4/5. Control lumbal X–ray graphies showed exact placement.

DISCUSSION

Laminoplasty was first done by Hirabayashi for servical spondylosis (5), and later it became first surgical treatment choice of servical spondylotic myelopathy as methods improved (3, 14, 18). Because laminoplasty prevents postlaminectomy kyphosis (17, 18, 19), preserves stability (3, 18, 19) and scar invasion to neural structures (18, 22), application field increased through years. It was also indicated in myelopathy due to posterior longitudinal ligament calcification (7, 15, 21) and soft disc herniation (9). Kohno et al (13) evaluated the prognostic factors in servical spondylotic myelopathy and found atrophic cord degeneration, long time of symptomatology, age over 70, severe cord compression, presenting radiculopathy, kyphotic servical curvature presence as effective factors for negative healing. Matsui et al (17) reported 20 patients' series of laminoplasty. 18 of them were with lumbal spinal stenosis. They had multilevel stenosis, additional degenerative changes and/or spondylolisthesis, 2 were cauda tumours and their lumbal spinal canal diameter had increased by 119% and Japonese Orthopaedic Association (JOA) functional scores from 10.4 to 24. We also reported two patients with lumbal spinal stenosis treated with laminoplasty successfully.

Due to clinical and biomechanical studies so far, laminoplasty preserves osseous structure, prevents subluxations and loss of lordosis (3, 10, 17, 18, 19). Nowinski et al (19) found that 25% facet excision preserved stability in cadaver studies, 50% facet excision permitted the wiev of 3–5 mm of spinal nerve while 75% excision permitted 8–10 mm of spinal nerve. So it's clear that facet removal maintaining enough surgical field and confidence could cause instability 25% facet excision adding to laminectomy results in instability in the movements of all lateral bending, flexion extension and axial rotation, however laminoplasty causes in stability in the movements only in axial rotation.

Against these affirmative reports, some studies reported that there is no statistical difference between them according to postoperatively occurring kyphosis, and laminoplasty could cause spinal cord damage through posterior movement to lamina defects (11) and more shoulder and neck pain compared with anterior interbody fusion (6). These disagreements caused some alternating applications like anterior subtotal corpectomy, reported as superior in some studies (2, 23).

Indicated laminoplasty cases almost always have multilevel stenosis, so multileveled laminoplasty causes surgical difficulties, especially degenerative osseous structure and existance of osteophytes increase the morbidity. These difficulties forced the improvement of techniques like cutting of lamina unilaterally, usage of high speed drills, fracturing of

other side thinned by drill and bone graft placements between cut sides (3, 12, 16, 17, 19). Cutting of lamina through middle of it after excision of spinous process which is called as French window. It has been described by Hukuda and modified by Morimoto popularised because of easiness (8, 10, 14, 18). Techniques like replacement of lamina using mini plaques without bone graft usage, raising laminas without exact separation resulting in vascularized pedincul laminas has come to use. All these techniques have additional foraminotomy to ease the affected spinal nerves (3, 4, 8, 10, 12, 14, 16, 17, 18, 19, 20). A new technique described as raising laminas enblocke and replacing after were especially used in cases presenting ligament calcification in the last years (10, 15, 21).

We operated a servical spondylotic myelopathy case with open door laminoplasty method described by Lee et al. (16). Six patients having different spinal diseases approached and/or treated with laminotomy. High speed drills and thin pointed rongeurs were used to raise laminas and titanium mini plaques for replacements. In choosing lamintomy method to approach the spinal lesions, we aimed to preserve osseous structure and stability and prevent scar tissue damage to neural structures like Morimoto et al (18). A pediatric patient having increased incidence of postoperative kyphosis after laminectomy due to age was also operated using this approach for a short segment operation. Patients had no complication due to operative technique.

As a result; it could be concluded that laminoplasties should be preferred in spondylotic myelopathy and posteriorly approached spinal canal lesions which could result in some postoperative complications, to preserve osseous structure in children. In order to preserved structure, splitting the lamina through middle in infants that have immature osseous structure should be thought. There are multiple studies about open door laminoplasties in servical spondylotic myelopathy, however more studies are needed with more cases and follow ups about the use of laminoplasties.

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