

Unilateral Isthmus Resection for Elderly Foraminal Stenosis

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We present an elderly patient with unilateral foraminal stenosis treated by isthmus resection. An 83-year-old female could not walk due to severe leg pain along right L5 sensory dermatome. Despite the laminotomy for spinal stenosis on the right side at the L4-5 level, her leg pain did not improve. Careful review of computed tomography scans and coronal source images of magnetic resonance myelography revealed foraminal stenosis on the right side at the L5 vertebra. Because of medical problem, she underwent isthmus resection on the right side at the L5 level instead of total facetectomy and fusion. After surgery, her leg pain was markedly improved. Isthmus resection showed successful result for this medically compromised elderly patient with unilateral foraminal stenosis.

KEY WORDS : Isthmus · Resection · Radiculopathy · Lumbar vertebra.

Introduction

There are several surgical options for lumbar foraminal stenosis^{1,5,6,8-11,15}. It has been reported that foraminal stenosis can be decompressed without spinal fusion via medial or lateral approaches^{6,11,15}. With the evolution of minimally invasive spinal surgery, several pioneers reported that foraminal stenosis could be successfully decompressed using percutaneous endoscopic foraminoplasty^{6,11,15}. However, thorough decompression of foraminal stenosis is not always possible with these surgical techniques, and may sometimes result in failed back surgery syndrome⁷. Regarding the percutaneous endoscopic surgery, the learning curve of percutaneous endoscopic surgery is usually very steep and the clinical outcomes could be affected by the surgeon's personal techniques. In this regard, total facetectomy and fusion has been performed as a traditional surgical option for foraminal stenosis^{5,8}. However, in elderly patient, posterior fusion surgeries have been reported

to yield relatively high perioperative complication rates^{3,4,14}.

We present an elderly patient with lumbar foraminal stenosis who was successfully treated by unilateral isthmus resection, without spinal fusion.

Case Report

An 83-year-old female presented with lower back pain and right leg pain along L5 sensory dermatome of one year duration. On admission, she could not stand and walk at all



Fig. 1. Magnetic resonance (MR) images (A, B) and MR myelography (C) showing severe spinal stenosis at the L4-5 level. There was no definite foraminal stenosis on the right side at the L5-S1 level on sagittal MR image (A).

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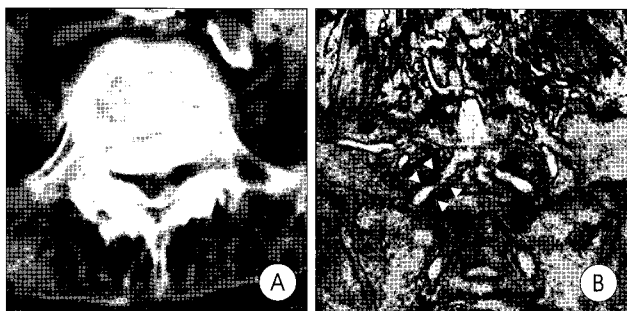


Fig. 2. Computed tomography scans (A) and coronal source images of magnetic resonance myelography demonstrating (B) foraminal stenosis on the right side at the L5-S1 level (white arrowheads).

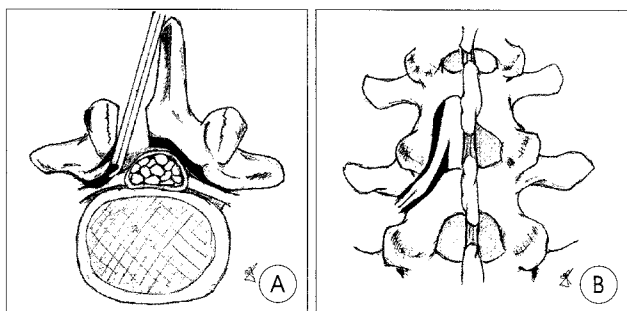


Fig. 3. Illustrations showing unilateral isthmus resection. Resection of bone and foraminal ligament at isthmic portion was carefully performed with Kerrison punches along L5 ganglion (A). After full resection of L5 isthmus, L5 ganglion is thoroughly decompressed (B).

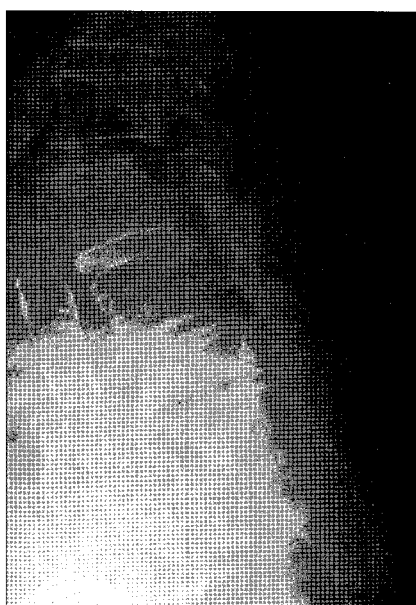


Fig. 4. Follow-up standing radiograph does not show any progression of spondylolisthesis at the L5-S1 level.

due to severe leg pain. She had taken medications for cardiac angina and asthma. Electrocardiography revealed atrial fibrillation. On echocardiography, moderate degree of aortic valve regurgitation was noted. There were no abnormal findings in the preoperative laboratory analyses except hyperkalemia. On the neurological examination, evaluation of motor weakness was impossible due to severe leg pain. She showed decreased bilateral knee jerk and ankle jerk reflexes. She showed positive Lasegue's sign bilaterally (40°/40°). Plain radiographic examination revealed anterolisthesis at the L4-5 levels, but there was no instability. Magnetic resonance (MR) imaging and MR myelography demonstrated severe central and lateral

recess stenosis at the L4-5 levels (Fig. 1).

Under spinal anesthesia, she underwent laminotomy along with medial facetectomy and foraminotomy on the right side at the L4-5 level. However, she continued to complain of severe right leg pain following surgery. Postoperative thin section computed tomography (CT) scan showed well decompressed central and lateral recess stenosis. Careful review of thin section CT scans and coronal source images of MR myelography revealed foraminal stenosis on the right side at the L5 foraminal level (Fig. 2). Because she could not undergo total facetectomy and fusion due to poor general condition and medical illness, unilateral isthmus resection at the L5 level was done instead.

Surgical technique

The patient was prepared for surgery and positioned as for standard laminotomy. After midline skin incision was made, the right L5 root and pedicle were identified through previous laminotomy site. After drilling L5 isthmus using high-speed drill, resection of bone and foraminal ligament at isthmic portion was carefully performed with Kerrison punches along L5 ganglion (Fig. 3). After full resection of L5 isthmus, decompression of ganglion was confirmed with probing. The wound was closed layer by layer after irrigation and drain insertion.

Postoperative course

After isthmus resection, she showed marked improvement of leg pain and could walk with assistance. One year after surgery, her leg pain was improved markedly and she could walk without assistance. There was no instability on follow-up standing radiographs (Fig. 4).

Discussion

Foraminal stenosis is a frequent cause of persistent symptoms after spinal surgery⁸⁾. Burton et al.²⁾, in their review of failed back surgery syndrome, attributed the lack of recognition or inadequate treatment of lateral canal stenosis as an etiology in almost 60% of patients with continued postoperative symptoms. Total facetectomy and fusion has been performed as one of the standard surgical options for foraminal stenosis, because thorough decompression of foraminal stenosis is not always possible with decompression via medial or lateral approaches^{5-8,11,15)}. However, it is sometimes difficult to perform posterior fusion surgery in elderly patients because of poor general condition and osteoporosis. Furthermore, posterior fusion surgeries have yielded relatively high peri-operative complication rates in elderly patients^{3,4,14)}.

Unilateral resection of isthmus (pars interarticularis) is a new surgical technique proposed by Tender et al.¹²⁾, which enables thorough decompression of foraminal stenosis while preserving

stability of spine. Unilateral resection of isthmus can preserve spinal stability, because the inferior facet is not damaged during the procedure and is strongly anchored to the lamina as well as the joint itself²⁾. Biomechanical cadaveric studies by Tender et al.¹³⁾ suggested that at least in rotation, there was no significant difference between the intact spine and the spine after unilateral isthmus resection. Based on the result of biomechanical studies, they performed unilateral isthmus resection in 36 consecutive patients with foraminal stenosis¹²⁾. At 1 year, 91% of patients showed improvement of leg pain. The Prolo economic and function scores improved in 58% and 75% of patients. No iatrogenic spondylolisthesis was observed at any level which resection had been performed.

In the present case, we found that persistent leg pain after laminotomy at the L4-5 level was due to missed foraminal stenosis at the L5 vertebra. Thin section CT scans and coronal source images of MR myelography, which are used to extract conventional MR myelography images, helped us to diagnose the foraminal stenosis. Because spondylotic changes at the mid-foraminal portion was the main pathology, additional decompression via medial or lateral route was not considered sufficient for the present case. Also, total facetectomy and fusion was also not thought to be a good surgical option because of patient's poor general condition and medical illness. In the present case, radiological examinations showed relatively progressed spondylosis and disc space narrowing at the L5-S1 level, which suggested relatively well-maintained stability at the L5-S1 level. Therefore, unilateral isthmus resection at the L5 was decided.

Unilateral isthmus resection is a relatively simple surgical procedure. The most important aspect of this technique is to identify the L5 ganglion and L5 pedicle. After identifying these structures, decompression can be performed along the L5 ganglion with ease.

In the present case, the surgical outcome of unilateral isthmus resection was successful. Just after surgery, she showed marked improvement of her leg pain and could walk with assistance. Follow up radiography at one year after surgery did not show any progression of spondylolisthesis. Although unilateral isthmus resection showed successful result in the present case, we do not think it can be routinely applied for foraminal stenosis. As Tender et al.¹²⁾ emphasized, some patients might complain new back pain after unilateral isthmus resection. The possibility of subsequent spinal fusion also should be considered.

However, in elderly patients with stable spine who cannot undergo fusion surgery, unilateral isthmus resection may be considered as one of the surgical options for foraminal stenosis, as in our case.

Conclusion

In elderly patients with stable spine who cannot undergo fusion surgery, unilateral isthmus resection can be one of the surgical options for foraminal stenosis.

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