



## RESULTS OF SURGICAL DECOMPRESSION IN DEGENERATIVE LUMBAR SPINAL STENOSIS AT 6 MONTHS FOLLOW UP

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### ABSTRACT

**Introduction:** Spinal stenosis is a narrowing of the spinal canal with encroachment on the neural structures by surrounding bone and soft tissue. Patients typically present with radicular leg pain or with neurogenic claudication. Surgical management is being performed with increasing frequency, but information about its efficacy is sparse and debatable. **Aim:** To evaluate results of surgical decompression in degenerative lumbar spinal stenosis. **Material and Methods:** 52 patients with symptomatic degenerative lumbar spinal stenosis who had failed to improve after conservative treatment of at least 12 weeks were enrolled in the study. Surgical decompression was done in all cases. Decompression was combined with fusion in cases where preoperative or intra operative instability was present. Preoperative history taking, clinical and radiological examination with x ray and MRI of lumbar spine were done. The functional status of patients was assessed using Oswestry Disability Index (ODI) preoperatively and at 1, 3 and 6 months after surgery. Results were assessed on the basis of change in the Oswestry Disability index at 6 months of follow up. **Results:** Mean age was 50.21 years (30 to 70 years). There was male preponderance. Mean duration of symptoms was 11.25 months. 55.7% patients had neurological deficit on presentation. Posterior decompression was done in 100% patients. Mean ODI score had decreased from of 64.47% in preoperative period to 29.43% at 6 months after surgery ( $p < 0.05$ ). There was significant improvement in the clinical and functional status of patients after surgery at 6 months follow up. **Conclusion:** Surgical decompression leads to significant improvement in clinical and functional status of patients with degenerative lumbar spinal stenosis.

**KEYWORDS:** Lumbar spinal stenosis, surgery, decompression, Oswestry disability index, outcome.

### INTRODUCTION

Lumbar spinal stenosis is defined as the narrowing of lumbar spinal canal, producing symptoms of claudication or radiculopathy and is a common finding in degenerative spine in the old age.<sup>[1]</sup> Conservative therapies may be helpful but do not, in most cases, result in long term improvement.<sup>[2]</sup> The primary indication for surgery in patients with spinal stenosis is increasing pain that is resistant to conservative measures. Surgical treatment includes posterior decompression of the neural elements by laminectomy with or without fusion procedures. The incidence of lumbar spinal stenosis is gradually increasing due to degenerative changes in the spine and changing lifestyle. The disease causes significant symptoms and physical disability in the rural workers, farmers and city dwellers alike. The neurological symptoms and sensory motor deficit keep the patient away from his work causing economic loss and burden to the patient and his family. So, more

number of patients accept surgical management over prolonged conservative treatment providing temporary relief. Surgical management is being performed with increasing frequency, but information about their long-term efficacy is sparse and debatable.<sup>[3]</sup> During the past few decades, a number of studies describing the short-term outcome of surgical treatment of lumbar spinal stenosis have been published. Success rates of 26–100% have been reported for different surgical interventions. Although long-term outcome has been evaluated<sup>[4-7]</sup>, there is still a wide variation in reported success rates and a continuing controversy regarding differences in long-term clinical outcome between patients undergoing decompression alone and those undergoing both decompression and fusion.<sup>[8]</sup>

The present study aims to determine the results of posterior decompression surgery in symptomatic patients

of degenerative lumbar spinal stenosis at 6 months follow up.

### MATERIAL AND METHODS

This is a prospective cohort study of 52 patients with symptomatic degenerative lumbar spinal stenosis between the age group of 30 -70 years. All patients were diagnosed clinically and radiologically with X rays and MRI of lumbosacral spine. The study was conducted between June 2015 to September 2017. All the patients received at least 12 weeks of conservative treatment without significant relief. Antero-posterior diameter of lumbar spinal canal at the intervertebral disc level was less than 10 mm on MRI of lumbosacral spine in all the patients. Patients with prior history of lumbar spine surgery and lumbar spinal stenosis secondary to neoplasm, infection, fractures, significant deformity like scoliosis and kyphosis were excluded. Well informed written consent was taken for enrolment in the study and surgery. Patients functional outcome was assessed using the Oswestry Disability Index (ODI) in the preoperative and postoperative period.

All the patients underwent posterior decompression by standard posterior decompressive laminectomy. Bilateral laminectomy was done and ligamentum flavum was removed from undersurface of lamina carefully. Decompression of the central canal, lateral recess and foramen was done as per the need without damaging neural structures. In addition to this, fusion with or without instrumentation was done in cases which had either preoperative instability or had developed it intra-operatively during laminectomy. Pre-operative instability was assessed using lateral radiographs of lumbosacral spine in flexion and extension. Fusion was done with autogenous bone graft prepared from excised laminae and spinous process by placing them between two adjacent vertebral bodies (interbody) and/or between two adjacent transverse processes (inter transverse). Instrumentation consisted of posterior fixation with bilateral pedicle screws and connecting rods. Adequate decompression of the neural canal was the main aim of all surgeries. Patients were followed up at 1 month, 3 months and 6 months after the surgery. Oswestry Disability Index (ODI) was calculated at every follow up and patients were examined for any change in the neurological status and complications of surgery. Results were graded in 4 categories depending on the ODI value at follow up. The categories were: Excellent (ODI 0-20%), Good (ODI 21-40%), Fair (ODI 41-60%) and Poor (ODI >60%).

### OBSERVATIONS AND RESULTS

The maximum number of patients (63.46%) were in the age group of 40- 59 years. More than 70% patients had claudication distance between 0 to 50 metres. The commonest level of stenosis was L4-5 (86.5%) followed by L3-4 (59.6%). 55.77% patients had some form of neurological deficit on presentation. Table 1 shows the demographic and symptomatic details of the patients.

Figure 1(a,b) and 2(a,b) show the preoperative and postoperative details of two patients in the study. The mean preoperative ODI was 64.47%. Follow up of 6 months was present in 98% patients. The mean postoperative ODI had improved to 43.07% at 1 month, 34.83% at 3 months and 29.43% at 6 months of follow up. Patients had improvement in the claudication distance, leg pain, back pain and neurological status. No difference was found between patients receiving decompression alone and those receiving decompression with fusion  $\pm$  instrumentation. The decrease in the ODI at 6 months was statistically significant [ $p=0.0001$ ; ( $p<0.05$ )] indicating improvement in functional status and decrease in the disability of patients after posterior decompressive surgery. At 6 months after surgery the outcome was excellent to good in 43 (84.31%) patients, fair in 7 (13.73%) and poor in 1 (1.96%) patient. There was 1 case of death due to surgical site infection and septicemia. Worsening of symptoms was seen in 3 patients. Postoperative motor deficit was seen in 6. This could have been due to intraoperative nerve root injury.

**Table 1: Demographic and symptomatic details of patients.**

Patient Characteristics	
Mean age	50.21 years
Age range	30-70 years
Male : Female	1.36 : 1
Mean duration of symptoms	11.55 months (3-36 months)
<b>Level of stenosis</b>	
Single level	11(21.15%)
Two level	18(34.62%)
Three or more level	23(44.23%)
<b>Neurological status</b>	
Sensory deficit	5
Motor deficit	8
Sensory + Motor deficit	16
Bladder and Bowel involved	3
No neurological deficit	23
<b>Preoperative ODI</b>	64.47% ( $\pm$ 13.41)

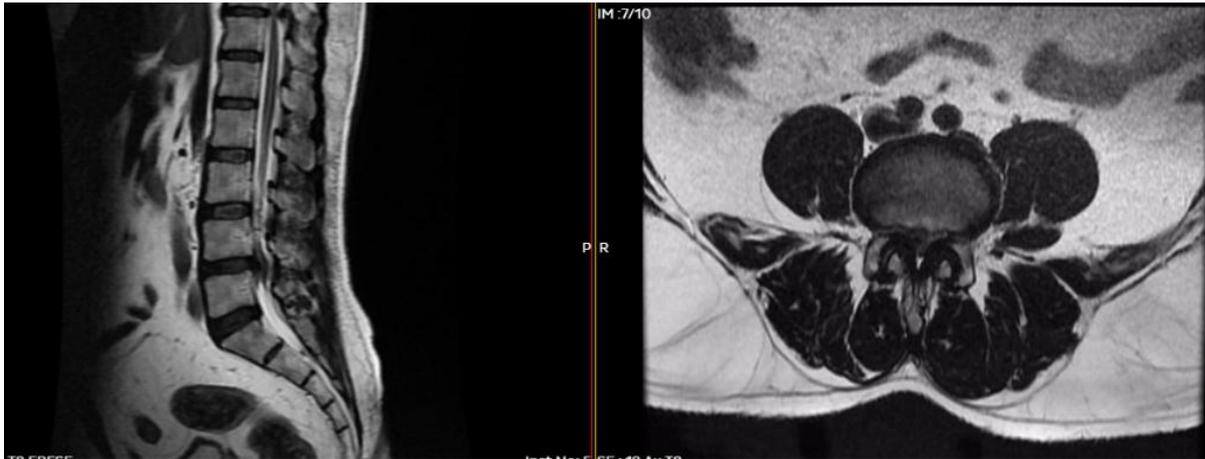


Figure 1a: Preoperative MRI of lumbosacral spine. Sagittal T2 weighted (left) and axial T2 weighted (right) images show disc desiccation, diffuse disc bulge and ligamentum flavum hypertrophy at L3-L4 and L4-5 level leading to spinal stenosis.

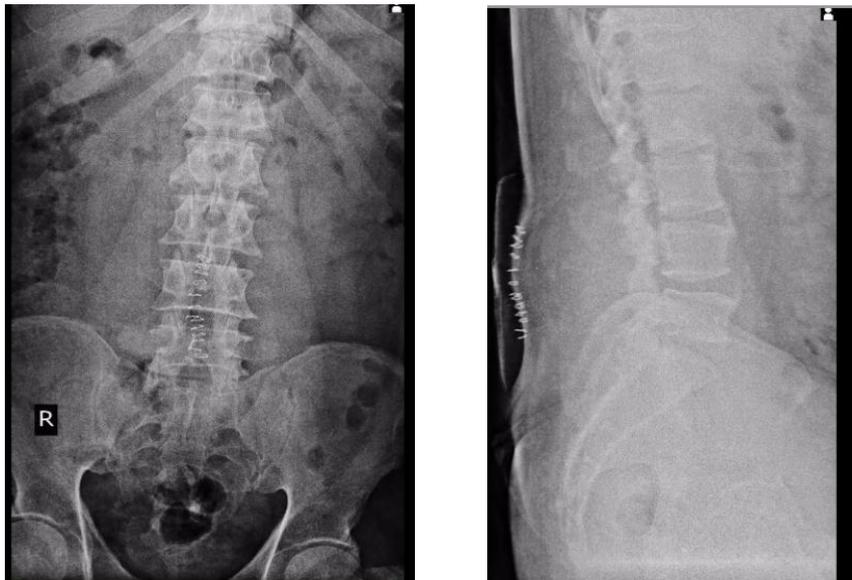


Figure 1b: Postoperative anteroposterior (left) and lateral (right) radiograph after posterior decompression (bilateral laminectomy) at L3-4 level.

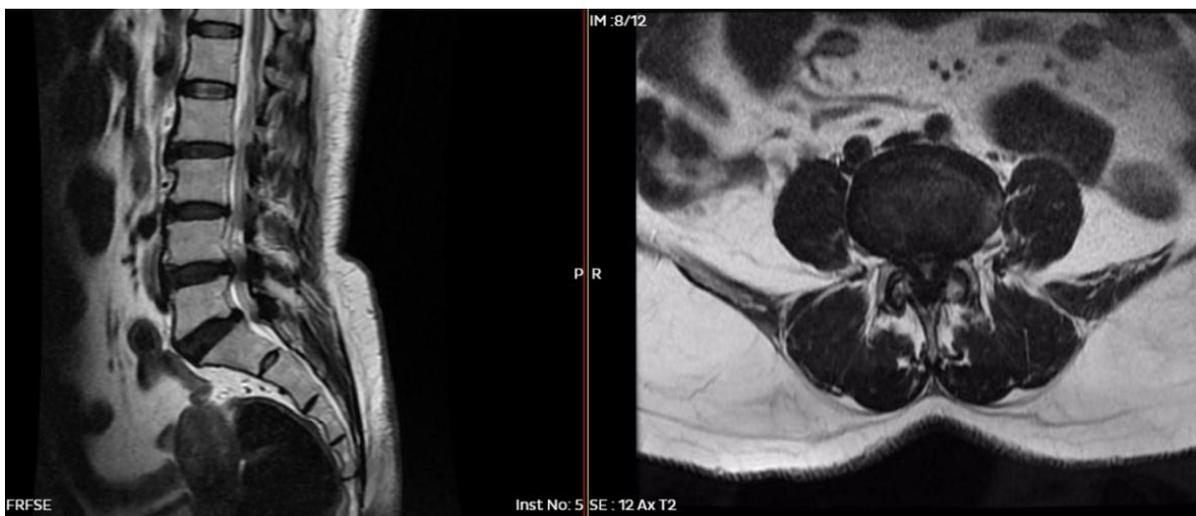
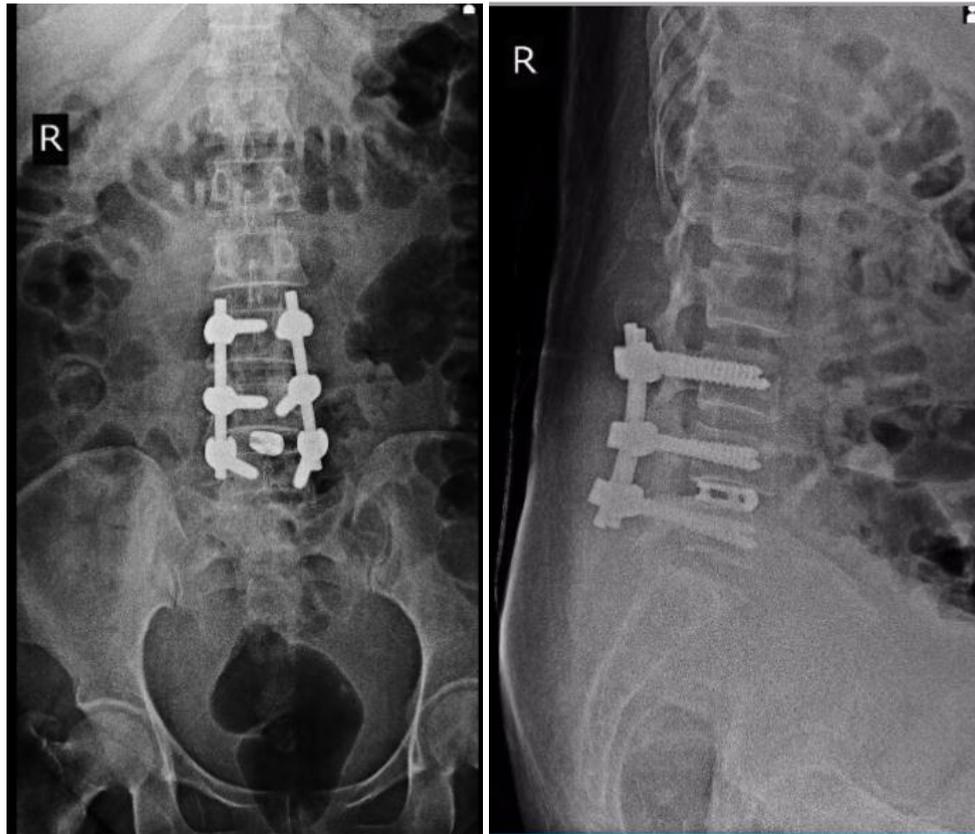


Figure 2a: Preoperative MRI of lumbosacral spine. Sagittal T2 weighted (left) and axial T2 weighted (right) images show multiple level spinal stenosis at L2-3, L3-L4, L4-5 and L5-S1 levels.



**Figure 2b: Postoperative anteroposterior (left) and lateral (right) radiograph following posterior decompression and instrumented fusion at L3-4 and L4-5 level. Interbody fusion with cage done at L4-5 level.**

## DISCUSSION

Surgical management of lumbar spinal stenosis is commonly done after failure of conservative treatment or when patient develops progressive neurological deficit and severe disability. Most studies<sup>[9,10,11]</sup> have shown that lumbar spinal stenosis is more common in males and older individuals. Consistent with this the mean age in our study was 50.21 years (range: 30-70) with a sex ratio of 1.36:1. The mean duration of symptoms was 11.55 months. This is less as compared to other studies.<sup>[9,11]</sup> Time since most recent episode of symptoms was 6 months or more in 73.07% of patients in our study which is similar to the studies by Weinstein JN *et al*<sup>[10]</sup> and Chang Y *et al*.<sup>[12]</sup> Most of the studies<sup>[10,13]</sup> have noted neurological deficit in more than 50% cases at presentation. This is consistent with our study which shows neurological deficit in the form of sensory/motor deficit and bladder bowel involvement in 55.77% cases. L4-5 (86.5%) was the most commonly affected level by stenosis followed by L3-4 (59.6%) and L5-S1(57.6%). This is similar to most other studies.<sup>[10,11,14]</sup> There is a downward trend in the ODI from 1 month after surgery and it persistently decreases till 6 months demonstrating significant improvement in the functional status of patients postoperatively. Similar change in ODI is observed by other studies by Kim J-H, Kwon Y-J<sup>[14]</sup>, Crawford III CH *et al*<sup>[15]</sup> and in the meta-analysis by Ma X-I *et al*.<sup>[16]</sup> Excellent to good results were seen in 84.31% patients which is comparable to most of the

studies like Kleeman TJ *et al*<sup>[17]</sup> (88%), Gelalis ID *et al*<sup>[9]</sup> (72%), Nath R<sup>[18]</sup> (64%).

## CONCLUSION

Degenerative lumbar spinal stenosis is commonly seen between 40 to 60 years of age and causes severe disability due to neurological claudication, neurological deficit and back and leg pain. Although majority of patients are managed conservatively, decompression surgery provides effective relief of symptoms, improves the functional status of patients and gives better quality of life. Hence surgical decompression is effective in the management of lumbar spinal stenosis with more than 80% patients achieving excellent to good results at 6 months of follow up.

## Recommendation

Randomized controlled trials with longer follow up are required to assess the long term outcome of decompression surgery in lumbar spinal stenosis.

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