ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 06 | June - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

FUNCTIONAL OUTCOME OF SURGICAL TREATMENT OF LUMBAR SPINAL STENOSIS

Orthopaedics

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ABSTRACT

Background: Lumbar spinal stenosis (LSS) is a common spinal disorder in the older population, and a clinical syndrome consisting of pain in the buttock or lower extremity, with or without low back pain and corresponding imaging findings of narrowing of spaces around neural and vascular elements in the lumbar spine. **Material:** A prospective analysis and follow-up of 50 patients with lumbar canal stenosis between attending the OPD in our tertiary care center 2018 and 2021 were performed. All patients underwent surgery for lumbar stenosis. Surgeries performed were Laminectomy, Laminectomy with posterolateral fusion and Laminectomy with interbody fusion. Functional evaluations of the patients were performed using the visual analog scale, (VAS) and the Oswestry Disability Index (ODI). These parameters were recorded before surgery and at one month, 3rd month, 6 months and 1 year after treatment. **Results:** In our study majority of the patient belonged to age range of 51- 60 yrs. with the mean age of 56.01±7.99 years. In our study 52% patients were female and 48% were male. Out of total patients, 24 (48%) patients who had undergone laminectomy, 16 (32%) patients who had undergone laminectomy with posterolateral fusion and 10 (20%) patients of laminectomy with interbody fusion. In present study, total 90% patients were having good pain relief whereas 10% had fair to good outcome. Poor outcome was observed in less than 1% patients. **Conclusion:** Surgical treatment in patients of lumbar spinal stenosis yields excellent results as observed on the basis of Oswestry disability index and visual analog scale. No patient got recurrence of symptoms of nerve compression. The Functional outcome and pain relief was highly significant in all the operative groups.

KEYWORDS

Lumbar spinal stenosis (LSS), Oswestry Disability Index (ODI), Laminectomy, posterolateral fusion, interbody fusion.

INTRODUCTION

Lumbar spinal stenosis (LSS) is a common spinal disorder in the older population, and a clinical syndrome consisting of pain in the buttock or lower extremity, with or without low back pain and corresponding imaging findings of narrowing of spaces around neural and vascular elements in the lumbar spine.[1-3]

The space in the vertebral canal is limited, usually because of degenerative changes, supposed to be progressive, and sometimes in combination with a congenital narrow bony canal. Symptoms and signs are related to this limited canal space. Surgical decompression was considered as the natural treatment, and the results of this were reported in several publications.[4] Neurogenic claudication is the most common symptom for lumbar canal stenosis patients. The patients complain of pain or discomfort that radiates to the buttock, thigh and lower leg after walking for a certain distance.[5] Therefore leading to functional disability and decreased walking capacity.[6] MRI is commonly used to confirm the lumbar canal stenosis. The MRI, which has excellence in observation for soft tissue, is recommended to diagnose lumbar canal stenosis by many authors.[7]

There are various surgical modalities available including plain laminectomy, spinal decompression with posterolateral fusion and spinal decompression with interbody fusion. The aim of this study is to assess pain relief and functional outcome after surgical decompression in a patient of lumbar spinal stenosis. In the older population, spinal stenosis is among. the most often discovered condition. The expression stenosis comes from the Greek word "stenos", meaning narrow. Antoine Portal initiated the description of the ailment in 1803. The expression “spinal stenosis” has been described by Verbiest.[8,9] The degenerative changes in the lumbar spine, as the aetiology for the affected structure, and pathophysiology, in lumbar canal stenosis was explained by, Kirkaldy- Willis.[10,11]

Compression of the neural components may occur in the central canal, lateral recess, or foramen, as a result of restriction of the canal in lumbar spine. Depending upon the location of their neural compression the symptoms are triggered. Low back pain radiating into bilateral lower limbs or neurological claudication (commonly referred as heaviness and weakness in legs which worsens with ambulation and improves with bending forward posture or resting) is the manifestation of compression of neural tissue at the central canal. Ageing contributes to degeneration of the backbone, creating altered anatomy ultimately end in stenosis of the spinal canal.

The expression spinal stenosis is an anatomic identification. Its prevalence escalates with age. Some individuals can be asymptomatic.[12]

The specific cause for why some patients for this specific disorder have painful symptoms while some don't have any symptoms isn't well recognized. The difference in complaints of various individuals might be related to the varying abilities of people to compensate for the anatomic changes which have happened over the natural course of the disease. Symptoms usually prevail in line with the site of neurological compression.

Patients with severe symptoms not amenable to traditional therapy frequently need surgical therapy. In reality, in adults older than 65, spinal stenosis is the most common reason to experience lumbar spine surgery.[13]

MATERIAL AND METHODS

A prospective analysis and follow-up of 50 patients with lumbar canal stenosis between attending the OPD in our tertiary care center 2018 and 2021 were performed. All patients underwent surgery for lumbar stenosis. Surgeries performed were Laminectomy, Laminectomy with posterolateral fusion and Laminectomy with interbody fusion. Functional evaluations of the patients were performed using the visual analog scale, (VAS) and the Oswestry Disability Index (ODI). These parameters were recorded before surgery and at one month, 3rd month, 6 months and 1 year after treatment.

Inclusion Criteria

1. Patients presenting with symptoms corresponding to diagnostic criteria of lumbar canal stenosis.
2. Age > 40 years
3. Provision of informed consent

Exclusion Criteria

Participants with one or more of the following diseases will be excluded from study:

1. Vasculogenic claudication
2. Spinal tuberculosis
3. Ankylosing spondylitis
4. Rheumatoid arthritis
5. Spine fracture
6. Malignancy

After admission of patient preoperative oswestry disability index (ODI) score and vasual analogue scale (VAS) score is calculated with informed written consent for procedure and anaesthetic fitness patient was taken for operation. X ray lumbosacral spine AP/lateral/flexion view/extension view. MRI lumbosacral spine with whole spine screening.

After completion of the MR examination, all patients were subsequently instructed to duly answer and complete the national translation of the ODI questionnaire. The questionnaire contained six statements (denoted levels 0 to 5) in each of the 10 sections related to impairments like pain, and abilities such as personal care, lifting, walking, sitting, standing, sleeping, sex life, social life and traveling. In each section, the patient chose the statement that best described his/her status. If the limitation fell between two levels, the higher point value was selected. The chosen statements received scores 0 to 5 corresponding to the level indicated. The total scores could range from 0 (highest level of function) to 50 (lowest level of function). To accommodate patients who did not respond to every section, a percentage disability was calculated on the basis of the total possible points. Upon adding up all of the points, the total score was divided by 50 and multiplied by 100 to calculate the percentage disability: Total Points/50 × 100 = %Disability

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Percentage disability was scored as follows: 0–20% was considered to be minimally disabled such that the patient could cope with most living activities. Usually, no treatment is indicated apart from advice on lifting, sitting and exercise. A percentage of 21 to 40 were classified as moderate disability. A percentage of 41 to 60 were considered to be severely disabled, with pain accounting for the main problems and impacting daily living. Sixty-one to −80% were classified as being crippled, where back pain impinged on all aspects of the patient's life and required positive intervention.

Statistical analysis of collected data has been done with the appropriate test. Continuous variable before and after surgery was analayzed using paired t test

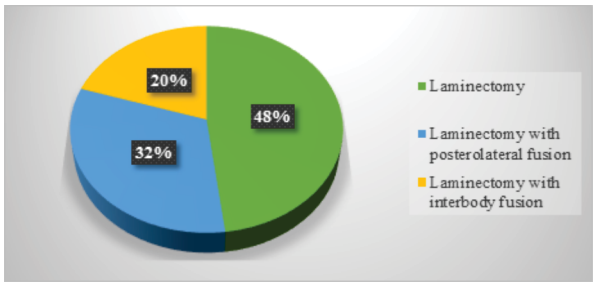
RESULTS

A prospective analysis and follow-up of 50 patients with lumbar canal stenosis between attending the OPD in our tertiary care center 2018 and 2021 were performed. In our study majority of the patient belonged to age range of 51- 60 yrs. with the mean age of 56.01±7.99 years. In our study 52% patients were female and 48% were male.

Table No. 01: Demographic Data with respect to intervention

Demographic Data		Laminectomy	Laminectomy with posterolateral fusion	Laminectomy with interbody fusion
Age	Mean, SD	57.2±8.37	57.18±8.2	54±6.93
	Range	45-70	46-69	46-69
Sex	Male	9	10	5
	Female	15	6	5

In present study out of total 50 patients, 24 (48%) patients who had undergone laminectomy, 16 (32%) patients who had undergone laminectomy with posterolateral fusion and 10 (20%) patients of laminectomy with interbody fusion.



In present study, total 90% patients were having good pain relief whereas 10% had fair to good outcome. Poor outcome was observed in less than 1% patients. 95% patients in the study were having vas scores more than 7 preoperatively. On post-operative 6th month 75% patients had vas score less than 5 and on postoperative 12th month, the proportion of patients having vas score less than 3 were 95%. On post-operative one year all patients had vas score less than 2.

In our study Total 85% patients were having good functional outcome whereas 13% had good outcome. Fair outcome was observed in less than 2% patients. 95% patients in the study were having ODI scores more than 52 preoperatively. On post operative 6th month 75% patients had ODI score less than 30 and on post operative 12th month, the proportion of patients having ODI score less than 20 were 95%. On post operative one year all patients had ODI score less than 25.

Table No. 02: Comparison between pre-operative and postoperative with respect to intervention

Intervention			Pre	Post	Test	P Value
Laminectomy	VAS	Mean±SD	7.25± 1.11	5.25± 1.10	4.43	<0.0001
		Range	6 TO 9	1 TO 4		
	ODI	Mean±SD	50.21± 9.81	19.21± 6.6	4.02	<0.0001
		Range	36-74	8 TO 28		
Laminectomy with posterolateral fusion	VAS	Mean±SD	7.75± 1.06	5.31±0.7	1.95	<0.0001
		Range	6 TO 9	2 TO 4		
	ODI	Mean±SD	55.65± 11.02	19.38± 6.18	8.85	<0.0001
		Range	42-73	10 TO 30		
Laminectomy with interbody fusion	VAS	Mean±SD	7.6±1.51	5.2±1.16	2.97	<0.0001
		Range	6 TO 9	1 TO 4		
	ODI	Mean±SD	53.7± 14.07	17.7± 6.86	7.54	<0.0001
		Range	35-71	10 TO 30		

In present study there was highly statistically significant difference in VAS and ODI at the post-operative assessment than preoperative assessment with p value <0.0001 while comparing different intervention.

DISCUSSION

Lumbar Spinal Stenosis (LSS) is a common spinal disorder in the older population, and a clinical syndrome consisting of pain in the buttock or lower extremity, with or without low back pain and corresponding imaging findings of narrowing of spaces around neural and vascular elements in the lumbar spine.[1-3] The space in the vertebral canal is limited, usually because of degenerative changes, supposed to be progressive. Symptoms and signs are related to this limited canal space.

Surgical treatment of lumbar spinal stenosis has two aims. The first is the decompression of neural structures (cauda equina and nerve roots), which are mechanically compressed by the degenerative tissues that form the spinal canal and the intervertebral foramina. The second aim is the correction of deformities on a sagittal and coronal plane and the maintenance of spinal column stability.

The aim of our study was to evaluate the outcome of surgical management of lumbar canal stenosis and to analyze the effect on outcome variables using oswestry disability index and visual analog

scale.

In a study published by Rajendranath et al[14] thirty-two patients of degenerative lumbar canal stenosis managed surgically were included in this study. Laminectomy (n=2), laminectomy with disectomy (n=23), laminectomy and disectomy with instrumental stabilization (n=5), and laminectomy, disectomy with posterior interbody fusion (n=2) were performed. JOA scoring system for low backache was used to assess the patients. Surgical outcome was assessed based on the recovery rate and was classified using a fourgrade scale: Excellent, improvement of >90%; good, 75-89% improvement; fair, 50-74% improvement; and poor, below 49% improvement. The patients were evaluated at 3 months, one year and at last followup.

At 3-month followup, 18.75% patients showed excellent outcome, 62.50% patients showed good outcome, and 18.75% showed fair outcome. At 1-year follow up, 64% patients showed excellent outcome and 36% patients showed good outcome. At >1 year follow up (average 34.2 months, range: 2-110 months), 64% patients showed excellent outcome, 28% showed good outcome, and 8% showed fair outcome. No patient had poor outcome. Outcome of the patients improved as the time after surgery increased till 1 year and was sustained thereafter till the last follow-up. Similar results were observed in present study.

In a study done by Panagiotis et[15] all to evaluate Functional outcome of surgical treatment for multilevel lumbar spinal stenosis they evaluated the clinical and radiological findings in 41 patients with complex degenerative spinal stenosis of the lumbar spine who were treated surgically.

Between 1997 and 2003, 41 patients suffering from degenerative lumbar spinal stenosis were included in a prospective clinical study. The spinal stenosis was multilevel in all patients and in 13 of them there was degenerative scoliosis, in 18 there was degenerative spondylolisthesis, and in 10 there was segmental instability. Plain radiographs, MRI and/or CT myelograms were obtained preoperatively. The patients were assessed clinically with the Oswestry disability index (ODI) and visual analog scale (VAS). Surgery included wide posterior decompression and fusion using a transpedicular instrumentation system and bone graft. After a mean follow-up of 3.7 (1–6) years, the patients' clinical improvement on the ODI and VAS was statistically significant. Recurrent stenosis was not observed, and 39 of 41 patients were satisfied with the outcome. 3 patients with improvement initially had later surgery because of instability. In this study 90% patients had excellent outcome, 8% had good outcome and 2 % had fair outcome. Similar results were observed in present study.

	OUTCOMES (%)				
Sr.No.	Study	Excellent	Good	Fair	Poor
1	Rajendranath et.al14	64%	28%	8%	<1%
2	Panagiotis et. al15	90%	8%	2%	<1%
3	Our Study	85%	13%	2%	<1%

CONCLUSION

Surgical treatment in patients of lumbar spinal stenosis yields excellent results as observed on the basis of Oswestry disability index and visual analog scale. No patient got recurrence of symptoms of nerve compression. The Functional outcome and pain relief was highly significant in all the operative groups. In our study we managed to prove that surgical treatment of lumbar spinal stenosis should be the preferred line of treatment in all the cases having severe symptoms and failed conservative line of management. By our study we managed to improve the quality of life of the patients having symptomatic lumbar spinal stenosis by giving them a pain free and disability free post-operative life.

Lumbar decompression is effective in improving quality of life patients. Patient-reported outcome measures like oswestry disability index and VAS score collected routinely and analyzed are a powerful tool for assessing the efficacy of lumbar spine interventions and allow accurate counseling of patients perioperatively.

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