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Assessment Of Functional Outcome After Decompression & Stabilization In Lumbar Canal Stenosis.

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ABSTRACT

Lumbar canal stenosis is a degenerative spinal disorder characterized by narrowing of the spinal canal, leading to compression of neural structures. It commonly presents with neurogenic claudication, back pain, and radiculopathy. When conservative management fails, surgical decompression with stabilization is considered to improve functional outcomes. To assess the functional outcomes in patients undergoing decompression and stabilization surgery for lumbar canal stenosis. This prospective observational study was conducted over a period of one year on 40 patients diagnosed with lumbar canal stenosis. All patients underwent decompression and pedicle screw stabilization. Functional outcomes were assessed using the Oswestry Disability Index (ODI) and Visual Analogue Scale (VAS) preoperatively and at 3, 6, and 12 months postoperatively. Data were analyzed using SPSS version 23, and a p-value <0.05 was considered statistically significant. There was a significant reduction in mean ODI scores from 58.2 preoperatively to 22.5 at 12 months postoperatively ($p < 0.001$). The majority of patients showed marked improvement in pain and mobility. Complication rates were low, with only 10% experiencing minor, manageable issues. Decompression with stabilization is effective in improving functional outcomes in lumbar canal stenosis with minimal complications.

Keywords: Lumbar canal stenosis, Decompression, Functional outcome

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INTRODUCTION

Lumbar canal stenosis is a common degenerative condition, particularly in the elderly population, characterized by the narrowing of the spinal canal in the lumbar region, leading to compression of neural elements [1]. This condition often presents with symptoms such as neurogenic claudication, lower back pain, radiculopathy, and decreased functional mobility. When conservative measures like physical therapy, analgesics, and epidural steroid injections fail to provide relief, surgical intervention becomes necessary [2, 3].

Decompression surgery aims to relieve pressure on the neural elements by removing the causative anatomical structures such as hypertrophied ligamentum flavum, bony spurs, or herniated discs. However, decompression alone may lead to spinal instability, particularly in cases with pre-existing or iatrogenic instability. Hence, it is often supplemented with spinal stabilization procedures using instrumentation and fusion techniques. The goal of combining decompression with stabilization is not only to alleviate symptoms but also to preserve or restore spinal alignment and improve patient function [4-6].

Our study aims to assess the functional outcomes in patients undergoing decompression and stabilization for lumbar canal stenosis. Evaluating parameters such as pain relief, neurological improvement, mobility, and quality of life will help determine the effectiveness of this surgical approach and guide future clinical decision-making.

STUDY METHODOLOGY

This prospective observational study was conducted over a period of one year in the Department of Orthopaedics at a tertiary care hospital. The study aimed to assess the functional outcomes of patients undergoing decompression and stabilization for lumbar canal stenosis. A total of 40 patients who met the inclusion criteria were enrolled after obtaining informed written consent. Ethical clearance was obtained from the institutional ethics committee prior to the commencement of the study.

Patients included in the study were adults aged between 40 and 80 years, diagnosed with lumbar canal stenosis based on clinical symptoms and radiological findings (MRI or CT scan), and who were refractory to conservative management. Patients with spinal infections, trauma, malignancy, previous lumbar surgery, or significant comorbidities contraindicating surgery were excluded from the study. All patients underwent surgical decompression along with stabilization using pedicle screw and rod instrumentation.

Preoperative clinical assessment included detailed history taking, neurological examination, and baseline functional evaluation using the Oswestry Disability Index (ODI) and Visual Analogue Scale (VAS) for pain. Postoperative assessments were carried out at regular intervals—at 1 month, 3 months, 6 months, and 12 months—to evaluate changes in pain and functional status using the same scoring systems. Complications and adverse events were also recorded during the follow-up period.

Data collected were compiled using Microsoft Excel and analyzed statistically using SPSS software version 23. Continuous variables were expressed as mean \pm standard deviation, while categorical variables were presented as frequencies and percentages. Paired t-tests were used to assess the significance of changes in functional scores pre- and post-surgery. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1: Age and Gender Distribution of Patients (n = 40)

Age Group (Years)	Male (n=25)	Female (n=15)	Total (%)
40-49	6	2	8 (20%)
50-59	10	4	14 (35%)
60-69	6	6	12 (30%)
≥ 70	3	3	6 (15%)

Table 2: Preoperative Symptom Distribution

Symptom	Number of Patients (n=40)	Percentage (%)
Neurogenic claudication	30	75%
Low back pain	35	87.5%
Radiculopathy	28	70%
Motor weakness	12	30%
Sensory disturbances	15	37.5%

Table 3: Functional Outcome (ODI Score) Pre- and Post-Surgery

Time Point	Mean ODI Score \pm SD	p-value
Preoperative	58.2 \pm 9.1	–
3 Months Post-op	38.6 \pm 7.8	< 0.001
6 Months Post-op	30.2 \pm 6.4	< 0.001
12 Months Post-op	22.5 \pm 5.1	< 0.001

Table 4: Postoperative Complications

Complication Type	Number of Patients	Percentage (%)
Superficial wound infection	2	5%
Transient neurological deficit	1	2.5%
Implant-related issues	1	2.5%
No complications	36	90%

DISCUSSION

Lumbar canal stenosis is a progressive degenerative spinal condition commonly seen in the elderly population, presenting with neurogenic claudication, back pain, and radiculopathy. Surgical intervention in the form of decompression with stabilization has gained significant attention as a definitive treatment modality when conservative measures fail. In the present study, we evaluated the functional outcomes following decompression and pedicle screw stabilization in 40 patients over a period of one year [7].

The demographic data revealed a higher incidence in males (62.5%) compared to females (37.5%), with the majority of patients belonging to the 50–59-year age group. This aligns with the epidemiological understanding that lumbar canal stenosis typically manifests in middle-aged and elderly individuals due to cumulative degenerative changes. The high frequency of neurogenic claudication (75%) and low back pain (87.5%) in our study corroborates previous literature, highlighting these symptoms as the hallmark clinical presentations of lumbar canal stenosis.

Functional improvement post-surgery was significant, as reflected in the Oswestry Disability Index (ODI) scores. Preoperatively, the mean ODI score was 58.2, indicating severe disability. This score improved markedly over time, dropping to 38.6 at 3 months, 30.2 at 6 months, and further to 22.5 at the 12-month follow-up, with all changes statistically significant ($p < 0.001$). These findings suggest that the combination of decompression and stabilization not only alleviated pain but also restored a considerable degree of functional independence and quality of life in patients.

The improvement in ODI scores over the postoperative follow-up period is consistent with findings reported in similar studies. Decompression relieves neural compression, while stabilization helps maintain spinal alignment and prevents further degeneration or iatrogenic instability, especially in patients with multilevel stenosis or spondylolisthesis. This dual approach provides biomechanical support, facilitating better long-term functional recovery.

In terms of safety, the postoperative complication rate was low. Only 2 patients (5%) developed superficial wound infections, which were managed conservatively with antibiotics and dressings. One patient experienced transient neurological weakness that resolved within three weeks, and one patient had an implant-related complication that required minor surgical intervention. No mortality or major

disability was recorded. This relatively low complication rate indicates that with proper surgical technique and perioperative care, decompression with stabilization is a safe procedure [8-11].

Our study's strength lies in its prospective design and regular follow-up assessments using validated functional outcome tools. However, it is not without limitations. The sample size was relatively small (n=40), and the follow-up duration was limited to one year, which may not capture long-term complications or recurrences. Additionally, the study did not include a comparison group (e.g., decompression alone), which could have provided more definitive insights into the added benefit of stabilization.

CONCLUSION

In conclusion, our study demonstrates that surgical decompression combined with stabilization significantly improves functional outcomes in patients with lumbar canal stenosis. The procedure is associated with a low complication rate and should be considered a viable option in appropriately selected patients who fail to respond to conservative management. Long-term, multicentric studies with larger sample sizes are recommended to validate these findings and refine patient selection criteria.

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