Volume 19 Issue 3
Originally issued as H1

Global Journal of Medical Research: H
Orthopedic and Musculoskeletal System
Volume 19 Issue 1 Version 1.0 Year 2019
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

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GJMR-H Classification: *NLMC Code: WE 725*



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Functional Outcome of Surgical Management of Lumbar Spinal Stenosis

Hitesh Sehrawat [α], Amit Dwivedi [σ], Tushar Sachdev [ρ] & Vikram Dagar [ω]

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Materials and Methods: In this study 20 patients of lumbar spinal stenosis were enrolled. All the Patients were managed with three different surgical techniques according to pre-formulated indications. JOA scoring system for low backache was used to assess the patients. The recovery rate was calculated as reported by Hirabayashi et al. (1981). Surgical outcome was assessed on the recovery rate and was classified using a four grade scale: Excellent, improvement of >90%; good, 75–89% improvement; fair, 50–74% improvement; and poor, below 49% improvement. The patients were evaluated post-op at 3 months, 6 month and one year follow-up.

Results and Discussion: Total 50% patients were having good functional outcome whereas 10% had excellent outcome. Fair outcome was observed in 35% patients and poor in 5% patients. 55% patients in the study were having JOA scores less than 19 preoperatively. On post operative 3rd month 75% patients had scores 20 and above whereas on post operative 6th month, the proportion was increased to 95%. On post operative one year all patients had scores more than 20.

Conclusion: Surgical treatment in patients of lumbar spinal stenosis yields good to excellent results as observed on the basis of JOA scoring system.

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I. Introduction

Spinal stenosis is the narrowing of the spinal canal, the lateral nerve root canals, or the neural foramen. This narrowing derives from facet or ligament umflavum hypertrophy, extruded disc, spondylolisthesis or any combination of the above. It may form part of a generalized degenerative process at several spinal levels or may be more localized.

In lumbar spinal stenosis, spinal canal narrows and leads to compression on the spinal cord and nerve roots. Symptoms include low back pain, neurological claudication and neurological deficit.

Prolapse intervertebral disc occurs in about 5-10% of all low backache patients and is a common cause of sciatica. Disc prolapse alters the disc height and mechanics of the rest of the spinal column, possibly adversely affecting the behavior of other spinal structures such as muscles and ligaments. The standard treatment of prolapsed lumbar disc has been surgical excision of the disc or conservative treatment, though the methods vary.

The first disc prolapse operation falsely accredited to Mixter and Barr was conducted by Oppenheim and Krause in Berlin but it was interpreted as an enchondroma of spinal disc. Mixter and Barr's[1] classical paper "Rupture of inter vertebral disc with involvement of spinal canal" opened an era of systematic diagnosis and operative treatment of lumbar disc prolapse. Their approach showed the effectiveness of Laminectomy and Discectomy in its management and since then there has been an ever increasing enthusiasm to solve sciatica problems surgically by disc excision. Although minimally invasive operations such as percutaneous nucleotomy[2,3] and microendoscopic[4] discectomy have gained attention in recent years, standard discectomy is still the preferred management technique among the majority of surgeons, and its favorable outcomes and affordability have been reported.[5]

Other mode of treatment, "active" nonoperative treatment is also used, except in patients with progressive neurologic deficit and cauda equina syndrome, both of which are indications for urgent decompression[6]. Hence any surgical intervention without appropriate conservative therapy leads to unnecessary surgery and also a poor outcome.[7]

With the basic understanding of disease process, new diagnostic techniques, refinements in conservative treatment and discectomy, improvements in surgical instrumentation revealed that surgical removal of the offending disc herniation is reasonably safe procedure with satisfactory results. Mortality of this surgery is almost negligible. Thus the present study was undertaken to study the functional outcome of the surgical management of degenerative lumbar canal stenosis.

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JOA SCORE

1) Low Back Pain		
A	None	3
B	Occasional, Mild	2
C	Frequent Mild or Occasional Severe	1
D	Frequent, Severe	0
2) Leg Pain		
A	None	3
B	Occasional Mild Leg Pain or Numbness	2
C	Frequent Mild or Occasional Severe Leg Pain or Numbness	1
D	Frequent Severe Leg Pain or Numbness	0
3) Gait		
A	Normal	3
B	Able to Walk >500 M With Leg Pain or Numbness	2
C	Able to Walk For 100- 500 M	1
D	Unable to Walk > 100m	0
4) Straight Leg Raising Test		
A	Normal	2
B	30-700	1
C	< 300	0
5) Sensory Deficit		
A	Normal	2
B	Slight Disturbance	1
C	Severe Disturbance	0
6) Motor Deficit		
A	Normal	2
B	Motor Power > Grade Iii	1
C	Motor Power <= Grade Iii	0
7) Turn Over While Lying		
A	Easy	2
B	Difficult	1
C	Impossible	0
8) Standing Up		
A	Easy	2
B	Difficult	1
C	Impossible	0
9) Washing Face		
A	Easy	2
B	Difficult	1
C	Impossible	0
10) Leaning Forward		
A	Easy	2
B	Difficult	1
C	Impossible	0
11) Sitting About 1 Hour		
A	Easy	2
B	Difficult	1
C	Impossible	0
12) Lifting Heavy Weight		
A	Easy	2
B	Difficult	1
C	Impossible	0
13) Running		
A	Easy	2
B	Difficult	1
C	Impossible	0
Maximum Joa Score		29
Minimum Joa Score		0

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II. Material and Methods

The present study was conducted during Jan 2016 to Feb 2017 in santosh hospital, ghaziabad. Total 20 patients of lumbar spinal stenosis were enrolled in the study using following inclusion and exclusion criteria.

a) Inclusion Criteria

- Patients aged 50-70 years with lumbar spinal stenosis.
- Neurological claudication distance less than 500m.

b) Exclusion Criteria

- Post traumatic spinal stenosis.
- Lumbar spinal stenosis due to tumors and infections.
- Patients not willing to participate in the study.

Patients were managed with three different surgical techniques according to preformulated indications. Laminectomy with Discectomy, Laminectomy with Discectomy with Posterior spinal fusion or Laminectomy with Discectomy with Posterior Instrumentation, Inter body cage. All the patients were followed for one year at fixed interval (3 months, 6months and 1 year) to study the outcome.

Pre and post operative assessment of the patients was done according to JOA evaluation system for low back pain. The JOA score was determined by direct questions to evaluate symptoms, signs, and restriction of daily living activities. The recovery rate was calculated as reported by Hirabayashi et al. [8]

Recovery rate (%) = (Postoperative score - Preoperative score) / (29 - Preoperative score) × 100.

Rate of Recovery was classified as: Excellent, > 90 %, good, 75-89 %; fair, 50-74 %, and poor, below 49 %.

III. Results

Table 1: Distribution of Patients According to Various Characteristics

Variable		No. (n = 20)	%
Age	≤ 50 yrs	4	20
	51 - 55 yrs	3	15
	56 - 60 yrs	6	30
	61 - 65 yrs	4	20
	66 - 70 yrs	3	15
Sex	Female	7	35
	Male	13	65
Claudication Distance	< 100 m	6	30
	101 - 200m	7	35
	201 - 300m	4	20
	301 - 400m	3	15
Procedure	Laminectomy with Discectomy	6	30
	Laminectomy with Discectomy with Posterior Spinal Fusion	12	60
	Laminectomy with Discectomy with Posterior Instrumentation with Interbody Cage Fixation	2	10

It was observed that majority of the patients were more than 55 years old (65%). And it has male predominance (65%). 30% patients were having Claudication distance less than 100 meters.

Laminectomy with Discectomy with Posterior spinal fusion was performed in 60% cases and it was followed by Laminectomy with Discectomy in 30% patients.

Table 2: Distribution of Patients According to JOA Scores

Score	Pre Operative	Post Operative		
		3 Month	6 Month	1 Year
10-14	1 (5%)	1 (5%)	0	0
15-19	10 (50%)	4 (20%)	1 (5%)	0
20-24	9 (45%)	14 (70%)	9 (45%)	3 (15%)
25-29	0	1 (5%)	10 (50%)	17 (85%)

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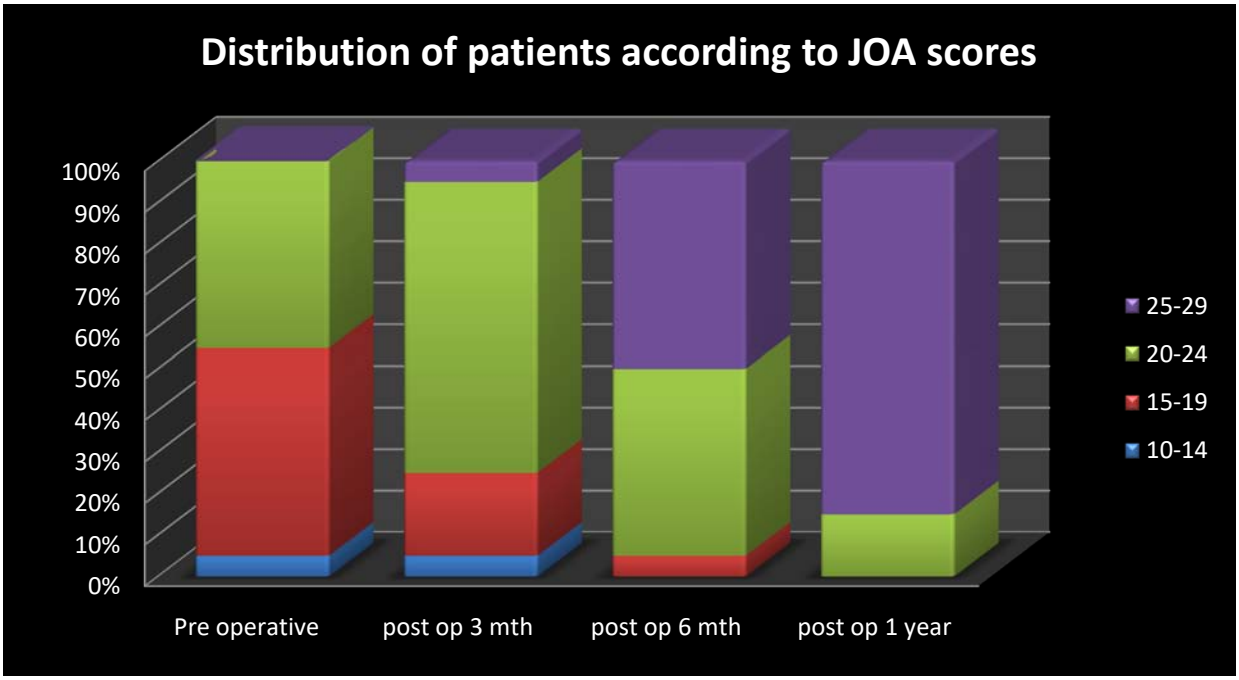


Chart 1: Distribution of Patients According to JOA Scores

It was seen that majority of the patients (55%) in the study were having JOA scores less than 19 preoperatively. On post operative 3rd month 75% patients were having scores 20 and above whereas on post operative 6th month proportion was increased to 95%. On post operative one year no patient was having scores less than 20.

Table 3: Outcome According to Recovery Rate

Outcome	No. (n = 20)	%
Excellent	2	10
Good	10	50
Fair	7	35
Poor	1	5

Outcome of the surgical procedure was calculated by using the recovery rate. It was observed that 50% patients were having good functional outcome whereas 10% were having excellent outcome. Fair outcome was observed in 35% patients and poor in 5% patients.

IV. Discussion

The present study was undertaken to study the functional outcome of surgical management of lumbar spinal stenosis. Japanese orthopedic association score (JOA) was used to measure the functional outcome. It was observed that majority of the patients in the study were more than 55 years old (65%).

It was also observed that 30% patients were having Claudication distance less than 100 meters. Majority of cases came with complaints of low backache and radicular pain. The duration of symptoms varied from 1 month to 5 years. Most of patients had a positive SLRT along with neurological deficit & paraspinal spasm. Laminectomy with Discectomy with Posterior spinal fusion was the most commonly (60%) performed procedure.

55% patients in the study were having JOA scores less than 19 preoperatively. Improvement in the JOA score was observed postoperatively. And after one year of surgery no patient was having scores less than 20.

The formula of recovery rate was used to calculate the functional outcome of the surgery[9-12]. 50% of patients were having good functional outcome and 10% were having excellent outcome. Fair outcome was observed in 35% patients and poor in 5% patients.

Ganz et al[13] (1990) reported almost similar result showing 86% good outcome in their series of 33 patients treated by de-compressive surgery. Weinstein et al[14] (2010) showed that patients with degenerative spondylolisthesis and spinal stenosis treated surgically showed substantially greater improvement in pain and function during a period of 2 years than those treated non-surgically.

Weber et al[11] and Spengler DM et al[15] also reported higher proportion of good and excellent outcome in surgically treated groups.

Thus we could say that operative treatment in patients of lumbar spinal stenosis yields excellent long term functional results as observed on the basis of JOA scoring system provided that patients are properly selected and de-compressive surgery is performed simultaneously addressing the associated instability orlisthesis. Majority of the activities of daily living which were assessed using JOA score showed significant improvement.

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V. Conclusion

On the basis of these results and discussion we could conclude that Operative treatment in patients of lumbar spinal stenosis yields good to excellent results as observed on the basis of JOA scoring system.

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