



## **Functional Efficacy of Epidural Steroid Injection in the Management of Lumbar Prolapsed Intervertebral Disc: An Interventional Study**

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### **Abstract**

A prolapsed lumbar intervertebral disc is a medical condition affecting the spine, in which annulus fibrosus is damaged, causing the nucleus pulposus to herniate. This can compress spinal cord or nerves leading to pain and spinal cord dysfunction. Chronic low back pain is a very common medical condition that leads to more socioeconomic losses and morbidities. In most cases, it is self-limiting, but it can cause functional impairment if it is consistent and had associated radicular pain.

### **Objective**

To assess the efficacy of epidural steroid injection in alleviating pain and disability among patients with prolapsed lumbar intervertebral disc.

### **Methods**

This interventional study was done at a tertiary care centre among 60 patients who came with orthopaedics department, diagnosed with the prolapsed lumbar disc. Patients were followed up till 6 months of treatment.

### **Results**

Most of the patients belonged to the age group 51-60 years. Most of the patients were males. The lesion was on the right side among the majority of patients. There was a significant difference in the VAS and JOA scores before and after treatment, there is a significant reduction in pain and disability after giving epidural steroid injections.

## **Conclusion**

Epidural steroid injection is a safe and effective procedure in reducing radiculopathy secondary to disc prolapse

## **Keywords**

Lumbar disc prolapse, spinal cord compression, low back pain, visual analogue scale, epidural spinal injection.

## **Introduction**

A prolapsed lumbar intervertebral disc is a medical condition affecting the spine, in which annulus fibrosus is damaged, causing the nucleus pulposus to herniate. This can compress spinal cord or nerves leading to pain and spinal cord dysfunction.

Chronic low back pain is a very common medical condition that leads to more socioeconomic losses and morbidities. In most cases, it is self-limiting, but it can cause functional impairment if it is consistent and has associated radicular pain.

Hoy and Christopher reported the prevalence of low back pain as 31.0% and the prevalence was highest among women and among patients aged 40 to 80 years.<sup>[1]</sup>

Non-operative management includes the usage of common analgesics or NSAIDs (non-steroidal anti-inflammatory drugs), oral or parenteral corticosteroids, certain exercises, and epidural injections.

Operative management in the form of excision shows various disadvantages like persistent back pain, adhesions, infection, and mechanical instability. Epidural steroid injection (ESI) helps to deliver corticosteroids at the problematic site, close to the inflamed nerve root.<sup>[2-3]</sup> ESI reduces inflammation by inhibiting the synthesis of inflammatory mediators like cytokines.<sup>[4]</sup>

ESI can be delivered into the lumbar spine by various approaches, which include interlaminar, transforaminal and caudal approaches. The interlaminar approach was the most preferable route, as it is more closely directed to the pathological site compared to the caudal approach, facilitating easy delivery of medication to the target site with just smaller doses.<sup>[5-7]</sup> Disadvantages include extradural placement of the needle and preferential cranial flow of the solution in epidural space. This technique may end up in the deposition of medication in the posterior epidural space. Though the treatment options are considerable, the outcomes associated with all these treatments are not well investigated. Hence the current study was undertaken.

## **Aim**

This study was done to assess the efficacy of lumbar ESI in patients with a prolapsed disc.

## **Materials and Methods**

Study site: Great eastern medical school (GEMS) and hospital, Srikakulam, Andhra Pradesh.

This interventional study was conducted for 12 months from January 2022 to December 2022 in the department of orthopaedics on 60 patients with confirmed lumbar disc prolapse.

## **Inclusion criteria**

- Patients aged 35-65 years, presenting with low back pain and radiculopathy due to lumbar disc prolapse (degenerative disc diseases)
- Patients who received conservative treatment for at least 6 months but didn't respond to treatment
- Patients with a disability to perform daily activities.

## **Exclusion criteria**

- Pregnant and lactating women

- Patients with radiculopathy secondary to spinal stenosis;
- Patients with fracture history in the last 3 months.
- Patients with back pain due to infection, or inflammation, and tumours; Patients with cauda equina syndrome
- Patients with a known history of allergy to steroids.
- Patients using oral anticoagulants

**Parameters assessed**

- Age
- Gender
- Laterality of lesion

- Level of lesion
  - VAS score- Visual analogue scale for assessing pain before and after giving ESI
  - Japanese orthopaedic association (JOA) score
- VAS and JOA scores were compared before and after giving steroidal injections 1 month and 6 months later. The minimum VAS score was 0 and the maximum was 10. A score of 10 denotes unbearable pain. The minimum JOA score was 0 and the maximum score was 29.

**JOA score:** It was assessed as per the following image:

I. subjective Symptom (9 points)		II. Objective observations (6 points)		
A. Low back pain		A. SLR		2
a. None	3	a. Normal		1
b. Occasional mild pain	2	b. 30° -70°		0
c. Frequent mild or occasional severe pain	1	c. <30°		
d. Frequent or continuous severe symptom	0	B. Sensory		
		a. Normal		2
B. Leg pain and /or tingling		b. mild sensory deficit		1
a. None	3	c. severe sensory deficit		0
b. Occasional slight symptom	2	C. Muscle power		
c. Frequent slight or occasional severe symptom	1	a. Normal		2
d. Frequent or continuous severe symptom	0	b. Mild weakness		1
		c. severe weakness		0
C. Gait				
a. Normal	3			
b. Able to walk farther than 500 m although resulting in pain, tingling, and/or muscle weakness	2			
c. Unable to walk farther than 500 m owing to leg pain, tingling, and /or muscle weakness	1			
d. Unable to walk farther than 100 m because of leg pain, tingling, and /or muscle weakness	0			
III. Restriction of Activities of Daily Living (ADL) (14 points)		Severe Restriction	Moderate Restriction	No Restriction
ADL				
a. Truning over while lying		0	1	2
b. Standing		0	1	2
c. Washing		0	1	2
d. Leaning forward		0	1	2
e. Sitting (about 1 hour)		0	1	2
f. Lifting or holding heavy objects		0	1	2
g. Walking		0	1	2
IV. Urinary bladder function (-6 points)				
a. Normal				0
b. Mild dysuria				-3
c. Severe dysuria (incontinence, urinary retention)				-6

**Statistical Analysis:** Data analysis was done using Epi Info software version 7.2.5. The results were expressed as mean  $\pm$  S.D, percentages, and numerical parameters before and after steroidal injections were compared using the ANOVA test. P value  $< 0.05$  was considered significant.

**Ethical considerations:** Ethical committee approval was taken before conducting the study. The informed consent form was taken from every patient who participated in the study.

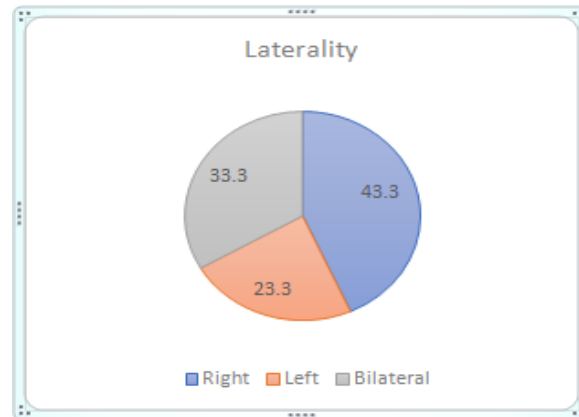
**Results: Demography**

The mean age of patients was  $56.2 \pm 2.3$  years and most of the patients were males. Most of the patients (60%) belonged to the age group 51 to 60 years.

DEMOGRAPHIC VARIABLES	FREQUENCY OR MEAN	PERCENTAGE
MEAN AGE	56.2 $\pm$ 2.3 years	
FEMALES	24	40%
MALES	36	60%

Table 1: Demographic variables of study patients

**Laterality of lesion:** Most of the lesions were right-sided lesions.



Graph 1: Laterality of lesion

**Level of lesion:** The level of lesion was L4-L5 in most of the patients.

Level of lesion	Frequency	Percentage
L4-L5	22	36.67%
L5-S1	18	30%
L3-L4	12	20%
L2-L3, L3-L4	8	13.33%

Table 2: Level of lesion in study patients

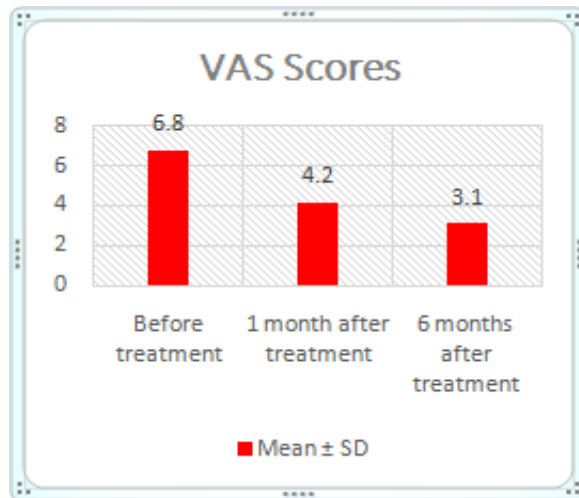
**VAS Score**

There is a significant improvement in the mean VAS score before and after treatment.

VAS score	Mean ± SD	Percentage of improvement
Before treatment	6.8±2.3	23.5%
1 month after treatment	4.2±2.4	26.1%
6 months after treatment	3.1±2.0	

ANOVA analysis

Table 3: Mean VAS score before and after treatment



Graph 3: Improvement in VAS score

**JOA Score**

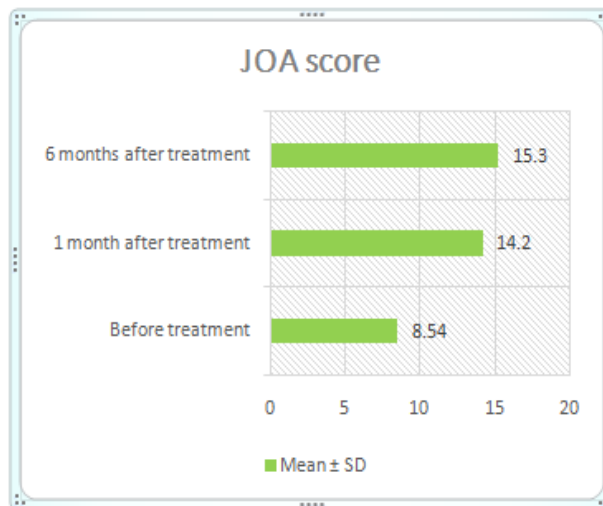
There is a significant improvement in the mean JOA score before and after 1 and 6 months of treatment.

JOA score	Mean ± SD	Percentage of improvement
Before treatment	8.54±3.2	66.5%
1 month after treatment	14.2±2.1	43.87%
6 months after treatment	25.3±1.2	

SS	MS	F	P value
8758	4379.4	816.5	0.000
949.3	5.3		
9708.1			

ANOVA analysis

Table 4: Mean JOA score before and after treatment



Graph 4: Improvement in JOA scores

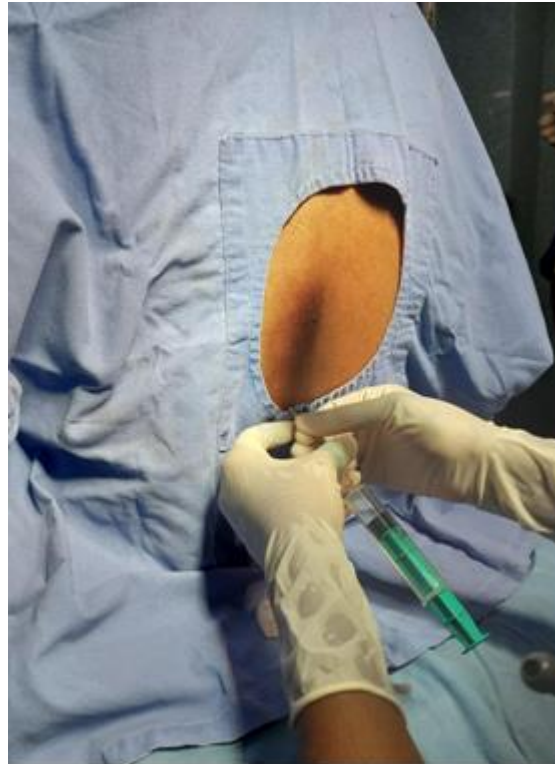
Need for discectomy: No patient ultimately needed discectomy when followed for 6 months. The treatment of ESI was successful in 100% of patients.

**Post-treatment complications**

80% of the patients don't have any complications.

Complications	Frequency	Percentage
Nausea and vomiting	5	8.33%
Headache	4	6.66%
Dizziness	3	5%
Nil	48	80%

Table 5: Post-treatment complications



**Image 1: Epidural steroid injection – given for patient no: 3**



**Image 2: Straight leg raising test in a patient with left lower limb radiculopathy in patient no: 23**



Image 3: MRI of disc bulge at L4-L5 level in patient no: 8

### Discussion

The study included 60 patients with prolapsed intervertebral discs. Lumbar spine was considered in our study, as there is less risk of disc prolapse for thoracic spine. [8-9]

The mean age of patients was 56 years and most of the patients were males in our study.

In the study of EL Ghaitet al. [10] 30 patients with lumbar disc lesions were included. The mean age was 52 years and 80% of the patients were males. These results were comparable with our study results.

Taurulliet al reported that males and females are affected equally, but males are most commonly affected in their 40's, and females are most commonly affected between 51-60 years [11]

Epidural steroid injections act as effective analgesics for disc prolapse in short term, but discectomy can be more effective compared to conservative management until one year after surgery as per few studies. [12-14]

Treatment was found to be effective for all patients and no patient required a discectomy in our study during 6-month follow-up period. In the study of Butterman [15] 169 patients were included and patients who underwent discectomy found to have a most rapid decline in symptoms, with above 92% of patients reporting that treatment was successful over the follow-up period. Around 42% to 56% of patients who underwent epidural steroid injection reported that treatment to be effective.

There was a significant decline in pain as assessed by VAS score after treatment and significant improvement in JOA score after treatment in our study. In the study of Pandey RA [16], 152 patients with lumbar prolapsed intervertebral disc were included. Disability in their study was also assessed through JOA score. The study found significant improvement in JOA score after 1, 6 and 12 months of treatment with epidural steroids. The study compared efficacy in transforaminal, caudal and interlaminar



routes. One study reported failure of interlaminar approach to give statistically significant improvements among patients with pain due to prolapsed disc<sup>[17]</sup>.

The strength of this study was we provided effective intervention to patients with a prolapsed disc at free of cost. The main limitation is the small sample size. Due to logistic constraints, we didn't take more sample size.

We recommend studies on the comparison of various modes of epidural spinal injection among patients with a prolapsed disc.

The study is self-sponsored.

There were no conflicts of interest.

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### **Conclusion**

In the current study, we tested the efficacy of epidural steroid injection in patients with prolapsed intervertebral disc. Results proved that there was a significant improvement in pain and disability as assessed by VAS and JOA scores after 1 and 6 months of treatment. Epidural steroid injection is safe and effective procedure in reducing radiculopathy secondary to disc prolapse.

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