



## FLUOROSCOPICALLY GUIDED EPIDURAL STEROID INJECTION IN THE MANAGEMENT OF LOW BACK PAIN

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**ABSTRACT** **Introduction:** Low back pain is a common clinical condition but not a life-threatening. It can cause profound disabilities in physical and psychological health. Low back pain can be broadly classified as non-specific low back pain, back pain potentially associated with a radiculopathy or spinal stenosis. **Aim and Objectives:** To assess the efficacy of low back pain relief in patients undergoing ESI. For comparison of delivering steroid into the epidural space by interlaminar, caudal and transforaminal approaches and its functional outcome. And to study the complications following fluoroscopically guided ESI. **Materials and Methods:** A total number of 120 samples size were obtained from OPD of Department of Orthopaedics in Katihar Medical College. The sampling technique used for the study is purposive convenient sampling technique. **Results:** Out of 120 patients 12 patients had the intervertebral disc prolapse at multiple levels (IVDP), 6 patients were post operative with symptoms and 2 were given multiple Injections, hence 100 patients were included in the study after filtering through the inclusion and exclusion criteria. The study population included 22 females (22%) and 78 males (78%). **Conclusion:** Significant functional improvement both statistically and clinically in patients with intervertebral disc prolapse after giving epidural steroid injections. We found that patients with 2AB type were more prone to have bad outcome and were more prone to go for surgery.

**KEYWORDS :** Low Back Pain, Epidural Steroid Injection, IVDP and LCS.

### INTRODUCTION

Low back pain is a common clinical condition but not a life-threatening [1]. It can cause profound disabilities in physical and psychological health [1]. Low back pain can be broadly classified as non-specific low back pain, back pain potentially associated with a radiculopathy or spinal stenosis [5] Intervertebral disc herniation and degenerative lumbar spinal stenosis are the two most common causes of lumbar radiculopathy [5]. Globally, the prevalence of low back pain varies from 50% to 84% [2]. The prevalence of low back pain in India is additionally disturbing with almost 60% of the individuals in India have experienced low back torment sooner or later during their life expectancy [2]. In India, the vast majority of the low-income group people are engaged in physically demanding employments which may increase the risk of low back pain and disability affecting the quality of life (QOL) of the whole family [2].

Although percutaneous fluoroscopic-guided interventions are safe and effective procedures for the management of chronic low back pain, which can be performed in an outpatient setting [3], there are several complications in fluoroscopically guided ESI such as chemical meningitis following inadvertent dural puncture/intrathecal steroid administration, "transient" blindness with retinal haemorrhages on ophthalmologic examination but with permanent vision changes, paraplegia, soft tissue abscess associated with osteomyelitis, epidural abscess, and epidural hematoma [4].

Aim of the study to assess the efficacy of low back pain relief in patients undergoing epidural steroid injection (ESI) and For comparison of delivering steroid into the epidural space by interlaminar, caudal and transforaminal approaches and its functional outcome.

### MATERIALS AND METHODS

A quantitative prospective Randomized control trial was conducted at Department of Orthopaedics in Katihar Medical College (KMC), Katihar, Bihar. Duration of study was carried out for the period of two years.

**Table 01: Inclusion and Exclusion criteria of the study**

INCLUSION CRITERIA	EXCLUSION CRITERIA
1. Patients of either sex, aged between 18-75	1. Patient refusal for the procedure. 2. Patients with significant

years.	coagulopathies and use of anticoagulants.
2. Radiculopathy and radiating low back pain of duration more than three months.	3. Patient with history of allergy to contrast media, steroids and local anesthetic agents.
3. MRI shows IVDP or LCS.	4. Previous lumbar spine surgeries or multiple epidural steroid injections.
4. ODI score more than 40%	5. Multi-level degenerative spine disease, unstable spine, vertebral compression fractures, spondylolisthesis, cauda equina syndrome and arachnoiditis.
	6. A patient diagnosed to have active cancer, history of substance abuse, current psychiatric co-morbidity, pregnancy, diabetes mellitus and congestive cardiac failure.

A total number of 120 samples size were obtained from OPD of Department of Orthopaedics in Katihar Medical College. The sampling technique used for the study is purposive convenient sampling technique.

#### a. Tool for data collection:

To check the pain relief at the end of 24 hrs, 1 month and 3 months and 6 months after the epidural steroid injection, Oswestry Disability Index (ODI) and Numerical Rating Scale (NRS) were used.

#### b. Data collection methodology:

- During the above said period, 120 patients with low back pain satisfying the inclusion criteria are selected.
- Patients will be selected by randomly allocated methods into the three groups.
- 1.Group IL - For interlaminar approach
- 2.Group TF - For transformational approach
- 3.Group C - For caudal approach
- Patients are explained about the procedure and informed and written consent obtained.

The ODI and NRS scores were assessed pre-injection in the Outpatient department (OPD), the scores were repeated 24 hours, 1 month, 3 month and 6 months after the injection was administered.

All patients had imaging done either in KMC hospital, Katihar or elsewhere.

All the patients who were advised to get epidural steroid injection were given routine blood investigations i.e., Haemoglobin, Creatinine, Blood borne Virus screening (HbSAg, HCV and HIV), Random blood sugar and Chest X ray and ECG also were done as and when needed. Pre-anaesthesia check up was done and fitness was 49 obtained after which they are scheduled a time in Day care operation theatre for the administration of Epidural steroid injection.

- Administration of Epidural steroid injection.
- Routine NPO protocols will be followed.
- An intravenous line is secured.
- Following monitors are connected – NIBP, SpO2, ECG.

With all aseptic precautions, in group IL, the Tuohy epidural needle (16 gauge) is placed in epidural space with the patient in either the sitting or lateral position and a midline approach in lateral position under fluoroscopic guidance using isohexol dye and 40 mg (1 mL) of triamcinolone with 2 mL of normal saline is injected.

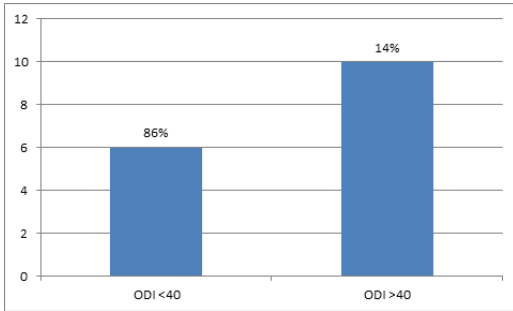
- With all aseptic precautions, in group TF, the Tuohy epidural needle (18 gauge) is placed in epidural space with the patient in either the prone or lateral position and a paramedian approach under fluoroscopic guidance using isohexol dye and 40 mg (1 mL) of triamcinolone with 1 mL of normal saline is injected.
- With all aseptic precautions, in group C, the 2<sup>nd</sup> straight bevelled needle (18 gauge) is placed in epidural space uses the sacral hiatus (a small bony opening just above the tailbone) with the patient in position either the prone or lateral position under fluoroscopic guidance using isohexol dye and 40 mg (1 ml) of triamcinolone with 4.5 ml of normal saline is injected.
- Patient monitored for 15 mins after the procedure and observed for immediate side effects if any.

Ethical Clearance done by institutional ethical committee

**RESULTS**

120 patients were given epidural steroid injections under the Spinal disorders unit, Department of Orthopaedics in Katihar Medical College and Hospital in day care operation theatre from October 2019 to October 2021.

Out of 120 patients 12 patients had the intervertebral disc prolapse at multiple levels (IVDP), 6 patients were post operative with symptoms and 2 were given multiple Injections, hence 100 patients were included in the study after filtering through the inclusion and exclusion criteria. The study population included 22 females (22%) and 78 males (78%).



**Figure 01: The number of patients with IVDP and LCS compared.**

This study included patients with intervertebral disc prolapse and Lumbar canal stenosis at a single level. There were a total of 100 patients included in the study out of which 86 were having intervertebral disc prolapse (IVDP) and 14 patients were having Lumbar canal stenosis.

**Table 02: Showing the Distribution of MSU grades.**

MSU grade	No of patient
1A	18
1B	2
2A	40
2B	6
2AB	12
3A	2

There were 18 patients with 1A, 2 patients with 1B, 2A were 40 patients, 2AB were 12, 2B were 6 and 3A were 2. This distribution was charted on a graph as on below.



**Figure 2: Levels of pathology**

Figure 02 shows the representation of the levels of pathology in pie chart. There were 10 patients with L3-4, 60 patients with L4-5 and 30 patients with L5-S1 level pathologies as shown in the graph below. The most common level of pathology in the study group was in L4-5 i.e., 60% of the total population followed by L5-S1 – 30% and then L3-4 – 10%.

**Table 3: Averages of ODI at regular intervals with standard deviation and the statistical significance.**

Review	ODI Score(Mean)	Standard deviation	P value
Pre-Injection	57.22	8.52	<0.001
24 hours post	46.35	9.04	<0.001
1 month	31.18	11.14	<0.001
3 months	28.04	11.76	<0.001
6 months	27.95	11.43	<0.001

Patients were scored at pre-injection, 24 hours, 1 month, 3 months and 6 months post injection and the average values are as shown in the table below.

**Numeric rating scale for pain:**

Pain scores were measured with Numeric rating scale (NRS).

Pain scores were rated in leg, buttock and back separately in three different postures i.e., standing, sitting and squatting positions.

A total of 14 patients (16.7%) underwent surgical treatment for the LBP as their symptoms were not better after injection.

For 4 patients at 1 month, 3 months and 5 months after injection and for 2 patient at 4 months after the injection was given. 16 patients (19.04%) had ODI scores of more than 40 i.e., Severe disability at the end of 6 months.

So in 30 patients (35.7%), the injection given was not effective at the end of 6 months, 14 of which were operated and 12 patients were still getting conservative treatment.

So, 64 (64.28%) of patients had good outcome.

**DISCUSSION:**

The global burden caused by low back pain and sciatica is enormous. The impact of the low back pain is seen considerably on individuals, families, communities and health care systems. The impact caused is devastating in low income countries. The estimated expenditure in USA in 1998 for back pain was \$90.7 billion. It was 1 billion pounds in UK in 2000 and low back pain was found to be one of the most costly diseases as the direct and indirect costs were estimated to be \$9.17 billion dollars [6]. LBP is caused by (i) Mechanical compression as in Intervertebral disc prolapse, lumbar canal stenosis etc., (ii) Inflammation causing chemical neuritis of the nerve roots and (iii) immune mediate.

Treatment for most of the patients with LBP is only conservative i.e., Rest, Physical therapy, Medication (NSAIDs, Pregabalin, Gabapentin etc), Short wave diathermy. But some patients who don't respond to conservative management will need further treatment. Surgical treatment gives a rapid pain relief and better functional outcome but

some comparative studies have shown that the long term results are same for surgical and non-surgical management of LBP (7–9). Epidural steroid injections are considered the intermediate between conservative management and surgical management of LBP (10, 11). Since the first epidural steroid injection given in the 1952 by Robecchi and Capra (12). They used hydrocortisone which was being replaced by different drugs. The drugs that are mainly used nowadays are Methyl Prednisolone, Triamcinolone, Dexamethasone and Betamethasone.

The pathogenesis of LBP as described above is by inflammation, immunity and mechanical compression. Non steroidal anti-inflammatory drugs (NSAIDs) are effective against inflammation but when they are not giving adequate symptomatic relief, steroids are supposed to deliver better response as they act at higher steps in the cascade of inflammation. Steroids are also known to be powerful immune modulators which are implicated in the pathogenesis of LBP. Steroids also act by inhibiting aggregation of Leukocytes, prevents degranulation of granulocytes, macrophages and mast cells; stabilization of lysosomal membranes. They also inhibit the synthesis and release of substances which are pro-inflammatory like PLA<sub>2</sub>, Arachidonic acid, IL-1, PG-E<sub>2</sub>, TNF- $\alpha$ .

Due to these inflammatory substances the nerve roots get inflamed and will become extremely sensitive. These inflamed nerved roots produce pain discharges for prolonged durations even with gentle manipulation or pressure. So steroids are believed to decrease the symptoms. Large and sustained doses of steroids can be delivered locally to the region of pathology via epidural route with minimal or no exchange to the systemic circulation.

In a prospective, double blind randomized controlled study conducted by Breivik and colleagues; they studied 35 patients with low back pain and sciatica which was not responding to the conservative management for a significant amount of time. The studied the outcomes with epidural steroid injections and found that there was a good outcome in 65% of patients and so they could return to work early (13).

In the prospective, randomized controlled study conducted by Ridley et al, they observed a statistically significant improvement in 65% patients who received epidural steroid injection (14). Buttermann et al in a prospective, non-blinded, randomized controlled study, including 169 patients observed that there was a good or favourable outcome in 56% of patients who got epidural steroid injection. In this study he compared the outcomes after epidural steroid injection with that of discectomy. He concluded that ESIs are not as good as discectomy in reducing the symptoms or disability when associated with a herniated disc which is large, but they were found to be effective in around half of the patients with symptoms even after 6 weeks of non-invasive conservative management. (9) In a prospective, double blinded randomized control study conducted by Valat, Rozenberg et al, they concluded that the epidural steroid injections provide no additional benefit. (15)

In the study we conducted, which is a prospective cohort study, there were 120 patients who were given the epidural steroid injection in the study period i.e., Oct. 2019 to Oct. 2021. There were 12 patients had the intervertebral disc prolapse at multiple levels (IVDP), 6 patients were post operative with symptoms and 2 were given multiple injections.

So a total of 100 patients were included in the study 86 patients had intervertebral disc prolapse and 14 patients had lumbar canal stenosis. Out of the 86 patients who had intervertebral disc prolapse, 16 patients (19.0%) had ODI scores more than 40% showing that they have significant morbidity at 6 months post injection and 14 patients (16.7%) underwent surgical treatment due to persistent symptoms. There were 64.28% of patients who had good functional outcome at the end of 6 months after injection was given. And this result was consistent with the literature quoted above.

In the meta analysis conducted by Kuan liu et al, they concluded that epidural steroid injections were not giving a statistically significant improvement in symptoms of ability to walk in patients with lumbar canal stenosis. In the Lumbar canal stenosis group, 10 out of 16 patients had bad functional outcome at the end of 6 months post injection i.e., 62.5% of the patients had a bad functional outcome after giving epidural steroid injection. In our study we observed that

according to Michigan state university classification of the intervertebral disc prolapse, 2A was the most common type. Almost all the types had similar functional outcome scores at the end of 6 months. But it was observed that 6 out of 10 patients with 2AB type underwent surgery as their symptoms did not resolve with the epidural steroid injection.

### Incidence of surgery after ESI

The cross over rate from Epidural steroid injection to the discectomy group was mentioned by Buttermann and Riew in different studies. They both observed the cross over rate are around 50%. In Buttermann's randomized controlled study 27 out of 50 (54%) patients from epidural steroid injection underwent discectomy and in Riew's study 29 out of 55 (53%) patients did cross over (9,16).

In the Meta analysis conducted by William Lavalley et al, they studied a large group of population 482,893 patients were diagnosed to have disc herniation. 27,799 (5.76%) underwent discectomy. 7,420 patients received epidural steroid injections and 9.34% of them underwent discectomy at a later date (17). In our study 14 patients out of 86 patients (16.67%) with IVDP underwent discectomy after being given an epidural steroid injection. The average time period between the epidural steroid injection and the discectomy as was in the study conducted by Buttermann et al was 3.3 months and a range of 1 to 13 months(9). In our study there were 4 patients who underwent surgery at 1 month, 2 patients at 3 months, 1 patient at 4 months, 2 patients at 5 months. The average time period between the epidural steroid injection and the surgery was 3.14 months.

### CONCLUSION

We conclude that there is a significant functional improvement both statistically and clinically in patients with intervertebral disc prolapse after giving epidural steroid injections. The outcomes in the lumbar canal stenosis were not satisfactory, but the study population is too less to come to a conclusion on that. The relation between different types of Michigan state university classification of intervertebral disc prolapse could not be clearly defined as the study population was too low to do so. But we found that patients with 2AB type were more prone to have bad outcome and were more prone to go for surgery.

### Conflict of Interest: None

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