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Original Article

C-Arm Guided Epidural Steroid Injection: An Effective Treatment for Patients with Radiculopathy in Tertiary Level Hospital of Bangladesh

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Abstract

Introduction: Epidural steroid injections (ESI) have been utilized for over 50 years in the conservative therapy of prolapsed lumbar intervertebral discs. However, controversy persists regarding their effectiveness in reducing pain and improving function, with literature supporting and opposing them.

Aim: To study the effectiveness of epidural steroid injection in treating pain caused by a prolapsed lumbar intervertebral disc and compare the effectiveness between caudal, transforaminal, and interlaminar injection routes.

Materials and Methods: A total of 152 patients with back pain with Radiculopathy with a lumbar disc prolapse confirmed on MRI were included in the study. Their pre-injection Japanese Orthopedic Association Score (JOA) counted up. In this study, participants were enrolled using a simple randomization procedure (picking a card).in the Department of Physical Medicine & Rehabilitation at BSMMU, Dhaka, from May 2020 to April 2021. Among 152 patients were intervenes as transforaminal (n=62), caudal (n=53), and interlaminar (n=25) approach with subsequently received epidural steroids as methylprednisone. Twelve individuals were dropped from the trial because they failed to show up for their scheduled therapy.

Results: The prevalence increased dramatically, leading to a JOA Score at 12 months following injection via any of the three methods 53 (37.26%) via the caudal pathway, 62 (44.21%) via transforaminal, and 25 (18.53%) via interlaminar. At six months and 12 months post-injection, the transforaminal route wassubstantially more efficacious than the caudal (p=0.01) and interlaminar routes (p=0.03). Comparing the caudal and interlaminar methods yielded no statistically significant difference (p=0.36).

Conclusion: In the current study, methylprednisone epidural injections effectively treat radiculopathy and back pain caused by a herniated lumbar disc. All three injection techniques are adequate, with the best result obtained by the transforaminal route.

Keywords: Low back pain, ESI, Radiculopathy

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Introduction

A prolapsed lumbar intervertebral disc (PLID) is a proximate cause of chronic low back pain and sciatica.[1]It is such a problem that makes the patient physically inactive and potentially disabled and exerts a huge burden on the family as well as on the country for an indefinite period of time. Moreover, PLID is one of the potential causes of

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temporary disability, morbidity, and reasoning of absence at workplaces. Besides, a huge amount of expenditure is associated with PLID related to healthcare management and loss of income due to absence from work. According to research conducted by Damian Hoy and Christopher Bain, the mean worldwide prevalence of low back pain is 31.0%, with the highest frequency seen in women and those between the ages of 40 and 80.

All kinds of conservative and surgical treatments have been used with varying success. Non-surgical chronic low back pain treatment covers various treatment options besides physiotherapy, chiropractic, and other manual traction methods. These conservative methods burden general practitioners, surgeons, and hospital outpatient departments.[2] Surgical treatment in the form of excision has disadvantages, like persistent discomfort in the back, infection, scar tissue buildup after surgery, and mechanical instability. According to the research conducted by Solberg *et al.*, there is a 4% chance of increasing symptoms following a lumbar discectomy.[3]

This study caudal, transforaminal, and interlaminar epidural steroid injections to evaluate their functional efficacy in treating chronic low back pain routes and compare their results. This will probably help to suggest the most effective route of drug administration in pain modification and the development of a treatment plan for long-term or short-term application.

Materials and Methods

This prospective study's respondents were experiencing low back pain with radiation to their lower extremities. This study was conducted Department of Physical Medicine & Rehabilitation at BSMMU, Dhaka, from May 2020 to April 2021. The clinical histories and physical examinations of all patients were exhaustive. Imaging studies of the lower back (lumbosacral spine) were performed for all patients. Participants were chosen based on their diagnosis of a prolapsed lumbar disc as the source of their back discomfort. All of the eligible participants were given information about the study. Participants in the study signed a consent form indicating their willingness to participate. As a result, 152 patients participated in this research.

Patients having MRI-detected single or multiple-level disc herniation, symptoms of nerve root inflammation, No significance clinically improvement with eight weeks of conservative management, and the patient having never had lumbar surgery were included in this research. Movement Disorders, Syndrome of the Cauda Equina, Uneven Segmentation, and Imaging Findings of Migrating or Sequestered Hernia; Corticosteroid or local anesthetic allergy history were excluded.

Twelve participants were initially included in the trial but did not show up for any treatments and were excluded from the study. Patients Were assigned a pre-injection score. Patients were injected randomly into the epidural space using the coccygeal, transforaminal, or interlaminar approach (Table I).

After cleaning the area and superficial sterilizing the incision site, 1 ml of 2 percent lignocaine was injected to numb the skin and subcutaneous tissue. The standard lumbar puncture needle with a stylet was then thirsted in at a 45-degree angle to the surface, right below the hiatus, and into the bone. Then it was retracted slightly, turned so that its flat side was facing up, and moved forward into the sacral canal. A fluoroscopic image intensifier validated the needle's insertion site in the canal. After making sure no CSF or blood was leaking out, the stylet was removed. The solution was injected at the rate of 5 to 10 ml/min. If a blood vessel was punctured, the needle was withdrawn a few mm, and the solution was injected.

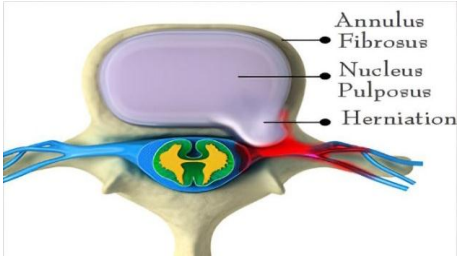

Figure I: Intervertebral disc

Source:(*https://www.medindia.net/patients/patientinfo/prolapse-of-intervertebral-disc.htm)*

the entrance point was pinpointed to be between 5 and 8 centimeters from the body's midline.

Figure II: (a,b) A patient's clinical image demonstrating a left-sided SLR of 30 degrees; (c,d) In this MRI of the same patient, we can see that the L4-L5 disc has prolapsed, causing left-side compression of the L5 nerve root.

Results

There were 152 individuals enrolled in the study, but 12 did not show up for the procedure for unclear reasons; therefore, 140 patients were considered for the interpretation of the findings, 95 of whom were male and 45 females. The highest average score was noted six months after injection for all three groups.

Table I: Acquiring a higher quality JOA report.

	A gradual rise in JOA scores			
	Pre-injection	**At one month**	**At six months**	**At one year**
Caudal 53	15.39	23.08	24.30	24.02
Transforaminal 62	15.57	24.42	26.65	26.55
Interlaminar 25	15.33	22.61	25	24.72

Typical Results on the JOA.

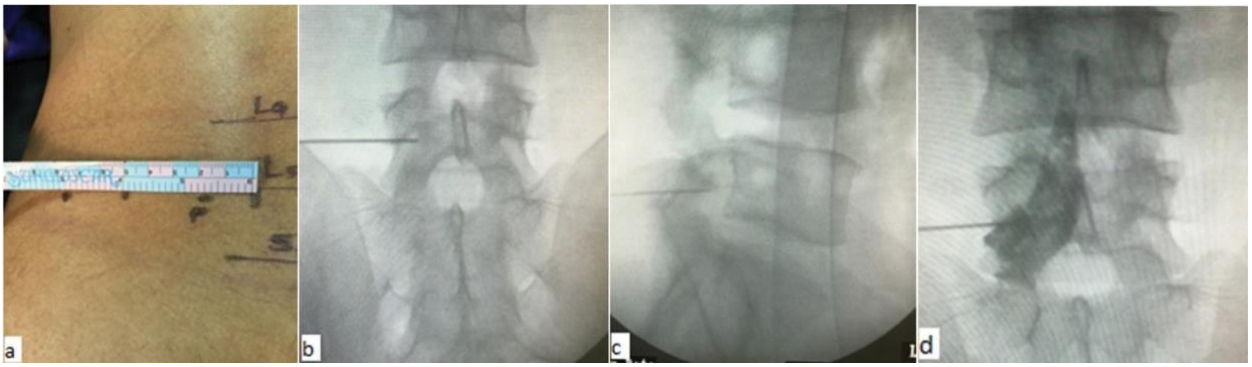

Fig III: Injection method utilizing the transforaminal space: a) a delineated point of the entrance between; b)and c) The AP and lateral views confirmed the needle's position.; d) a radiopaque dye injected into the epidural space, which then stains the root as it leaves the body.

The Rate of Improvement (RI) in the JOA score at 12 months post-injection shows the therapeutic response (Table II). For the transforaminal group, the success rate was highest, with 15 patients (37.5% of the total) exhibiting excellent, 16 patients (40%) showing good, five patients (12.5% of the total) showing fair, and onlyfour patients (10%) showing the poor rate of improvement.

Table II: Differences in the degree to which patients' JOA scores improved after a year.

	Caudal	Interlaminar	transforaminal
Rate of Improvement (RI)	21(25.61%)	4 (22.22%)	4 (10.00%)
in JOA score at one year after injection	31(37.80%)	6 (33.33%)	5 (12.50%)
	22(26.83%)	5 (27.78%)	16 (40.00%)
	08 (9.76%)	3 (16.67%)	15 (37.50%)

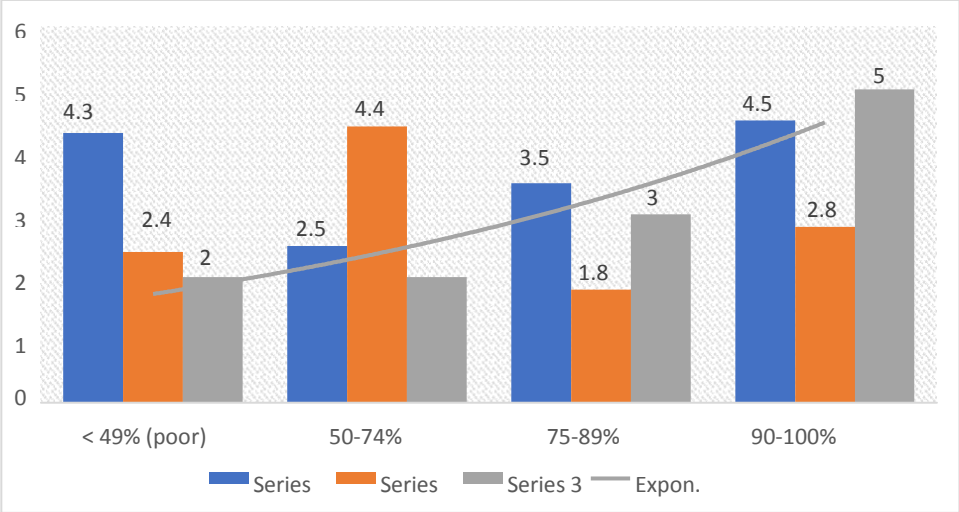

Fig IV: Different patient subgroups showed statistically significant increases in JOA scores after 12 months.

The interlaminar group (77.7% of percentile improvement). The caudal group showed the least percentile improvement of 74.3%.

Table III: Efficacy of improving JOA score after one year for different routes of epidural injection.

Route of injection	Effective	Not effective
Caudal	61 (74.39%)	21 (25.60%)
Interlaminar	14 (77.78%)	4 (22.22%)
Transforaminal	36 (90%)	4 (1%)

The JOA scale ranges from a low of 0 to a high of 17 based on how well a person performs in each of its six subtests (upper- and lower-extremity motor function, sensory function in the trunk, sensory function inthe legs, and bladder control).

1. Subjective symptoms (9 points)

a. Low back pain

None (3), occasional mild pain (2), frequent mild or occasionally severe pain (1), frequentor continuous severe pain (0)

b. Leg pain and/or tingling

None (3), occasional slight symptom (2), frequent slight or occasional severe symptom(1), frequent or continuous severe symptom (0)

c. Walking capacity

Normal (3), Able to walk more than 500 meters, although it results in pain, tingling and /or muscle weakness (2), Unable to walk more than 500 meters owing to leg pain, tingling and/or muscle weakness (1), Unable to walk more than 100 meters owing to legpain, tingling and/or muscle weakness (0)

2. Objective findings (6 points)

a. SLR test

Normal (2), 30° to 70° (1), < 30° (0)

b. Sensory disturbance

None (2), slight disturbance (1), marked disturbance (0)

c. Motor disturbance

Normal (grade 5) (2), slight weakness (grade 4) (1), marked weakness (grade 3) (0)

3. Restriction of ADL (14 points)

Turn over while lying, standing, washing the face, leaning forwards, sitting (about onehour), lifting or holding heavy objects, walking:

No restriction (2), moderate restriction (1), severe restriction (0) for each item

4. Bladder function (-6 points)

Normal (0), mild dysuria (-3), severe dysuria (-6)

Figure V: Japanese Orthopaedic Association (JOA) Score. A normal person has JOA Score.

Discussion

At first, it was thought that the prolapsed disc was the root cause of the discomfort in the back and legs since it was mechanically squeezing the nerve roots. Now, it is widely recognized that pain is caused by leaking of the nucleus pulposus contents, which in turn creates an inflammatory

reaction in the disc itself, around the facet joint, and chemical neuro-radiculitis due to the creation of different inflammatory mediators.[4] Epidural steroids inhibit the synthesis or release of inflammatory substances, thereby reducing intraneural edema and venous congestion. The current literature reports conflicting results. They are efficient in alleviating sciatic discomfort. Throughout his research, Abdi S. discovered substantial evidence for short-term pain relief and moderate evidence for long-term pain relief by the use of epidural steroids.[5] Boswell et al., in their review, found strong evidence for whereas there is strong evidence for the efficacy of transforaminal epidural steroids in treating lumbar disc prolapse-related pain; the evidence for caudal epidural steroids is somewhat weaker.[6] Similar results were reported by many other studies.[7] Recent investigations and evaluations have shown mixed results for their effectiveness, leaving treating physicianspuzzled.[8]

Conclusion

The current study successfully manages low back pain and Radiculopathy due to a prolapsed lumbar intervertebral disc by injecting methylprednisolone in the epidural space. Although all three injection methods work, the transforaminal approach yields the most desirable outcomes. The results suggest a more rational use of the epidural steroid, which should give better results. The transforaminal injection method yields the most favorable outcomes, but all three methods are highly efficient. It is not a new technique but deserves wider use and scientific assessment.

Conflict of interest: None declared

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