



E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2019; 5(4): 561-564
© 2019 IJOS
www.orthopaper.com
Received: 21-08-2019
Accepted: 25-09-2019

Dr. Eswara Reddy G
Assistant Professor, Department
of Orthopaedics, Sri Devaraj Urs
Medical College, Tamaka, Kolar,
Karnataka, India

Dr. Manoj Kumar R
Assistant Professor, Department
of Orthopaedics, Sri Devaraj Urs
Medical College, Tamaka, Kolar,
Karnataka, India

Dr. Nagakumar JS
Professor, Head of the Unit,
Department of Orthopaedics,
Sri Devaraj Urs Medical College,
Tamaka, Kolar, Karnataka,
India

Corresponding Author:
Dr. Manoj Kumar R
Assistant Professor, Department
of Orthopaedics, Sri Devaraj Urs
Medical College, Tamaka, Kolar,
Karnataka, India

Effectiveness of epidural steroid injection in the management of lumbar prolapsed intervertebral disc using interlaminar and transforaminal route

Dr. Eswara Reddy G, Dr. Manoj Kumar R and Dr. Nagakumar JS

DOI: <https://doi.org/10.22271/ortho.2019.v5.i4j.1735>

Abstract

Introduction: In the conservative management of lumbar intervertebral prolapsed disc, the epidural steroid injection is one of the important modality. There is a controversy with respect to decrease the pain and how much improvement in the function of daily activities.

Aim: The purpose of this study was to assess the efficacy of steroids via transforaminal and interlaminar epidural route and to compare their results.

Materials and Methods: A prospective study of 64 patients with prolapsed lumbar intervertebral disc diagnosed in MRI were included and treated with epidural steroid methyl prednisolone via interlaminar and transforaminal routes 32 each by using computer generated randomization by using our hospital software ie., R L Jalappa Hospital, Tamaka, Kolar, Karnataka, India between April 2018 to May 2019. Pre injection and post injection Japanese Orthopaedic Association (JOA) Score was calculated and effectiveness of the medication was calculated for each route. The data was compared by ANOVA and LSD method to prove the significance. Average follow-up was six months.

Results: At six months after epidural steroid injection, both interlaminar and transforaminal routes were found to be effective in improving the JOA Score (Interlaminar in 87.5% and transforaminal in 96.875%). Transforaminal route was significantly more effective than interlaminar route ($p=0.03$) at 6 months after injection.

Conclusion: For patients having lower back pain with or without radiculitis diagnosed in MRI with prolapsed lumbar intervertebral disc can be managed conservatively by using epidural steroid injection and is satisfactory in our study. Both interlaminar and transforaminal routes are effective. By transforaminal route we obtained best result.

Keywords: prolapse, disc, steroid, transforaminal, interlaminar

Introduction

Low back pain has a high prevalence and approximately 40% of cases of low back pain are associated with lumbosacral radicular pain, a condition caused usually by nerve root irritation and inflammation from herniated intervertebral disks [1]. Lumbosacral radicular pain is characterized by pain arising in the back and radiating into the lower limbs in the distribution of one or more spinal nerves [2]. More than half of the patients report a decrease in their daily activities and their ability to work [3]. Conservative and surgical treatments have been used with varying success. Conservative management includes physiotherapy and pharmacotherapy [4].

Surgical treatment in the form of discectomy has advantages and disadvantages like persistence of back pain, infection, postoperative adhesions and mechanical instability. Solberg *et al.* in their study, reported a 4% risk of worsening of symptoms after a lumbar discectomy [5]. Epidural steroid injection is used in an attempt to decrease radicular pain due to prolapsed intervertebral disc. Even then the evidence for benefit from epidural steroids is unclear by many studies. (Fig 1)

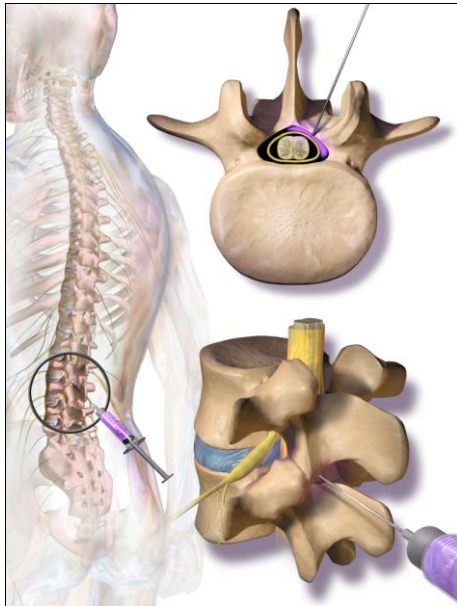


Fig 1: Schematic diagram for epidural steroid injection

Aims and Objectives

The purpose of this study was to assess the functional efficacy of steroids via transforaminal and interlaminar epidural route and to compare their results. This will probably help to suggest most effective route of drug administration in alteration of pain and to establish treatment protocol for definitive use.

Material and Methods

A prospective study of 64 patients with prolapsed lumbar intervertebral disc diagnosed in MRI were included and treated with epidural steroid methyl prednisolone via interlaminar and transforaminal routes 32 each by using computer generated randomization by using our hospital software i.e., R L Jalappa Hospital, Tamaka, Kolar, Karnataka, India between April 2018 to May 2019. Written informed consent obtained from each patient and then enrolled in the study based on inclusion and exclusion criteria. Local hospital ethics committee approval for the study was granted prospectively. Pre injection and post injection Japanese Orthopaedic Association (JOA) Score was calculated and effectiveness of the medication was calculated for each route. The data was compared by ANOVA and LSD method to prove the significance. Average follow-up was six months. We excluded the patients having history of allergic reaction to local anaesthetic or corticosteroids, post traumatic or infectious aetiologies, cauda equina syndrome, motor deficit, medical comorbidities, tumours and malformation deformities.

Injection technique

Interlaminar epidural steroid injection: (Fig 2) It was given in sitting position. The local area was cleaned and sterilized. Spinous processes of the superior and inferior lumbar vertebrae were identified and the Tuohy needle was advanced through the ligaments, with the opening facing laterally. Confirmation of the space was made by the loss of resistance sign followed by confirmation by contrast medium injection. While injecting the solution, the needle was rotated through 90 degrees either upwards or downwards depending on the area to be blocked. After the injection, patients were assessed at 1, 2 and 4 week, 3 month and 6 months. Rate of improvement (RI) = Post-injection score – pre-injection score

/ 29 – Pre-injection score \times 100. The results were classified as; Excellent (Rate of improvement 90% and above), Good (Rate of improvement of 75 – 89%), Fair (Rate of improvement of 50% - 74%) and Poor (Rate of improvement \leq 49%). The cases with good, fair and excellent results were considered to be effective in relieving the pain by that route of medication. The total score was analyzed by ANOVA and LSD method and the p-value was assessed.

Transforaminal epidural steroid injection: (Fig 3) It was given in prone position on a radiolucent table. The involved neural foramen on the symptomatic side was approached by the posterolateral extrapedicular approach using an 18-gauge spinal needle. Under fluoroscopic guidance, the target site was located and the entry site was marked on the skin at a point between 5 to 8cm from the midline. After sterile preparation, draping and local anaesthesia, the spinal needle was inserted and the correct position of the tip of needle underneath the pedicle in the superior part of the foramina was confirmed on both AP and lateral fluoroscopic projections. A 1 to 2ml of isovist-300 was injected to visualize the posterior annular boundary and the corresponding nerve root. After an adequate flow of contrast medium to the target area has occurred and no blood or CSF was aspirated, the solution was injected.



Fig 2: Sitting position for interlaminar epidural steroid injection

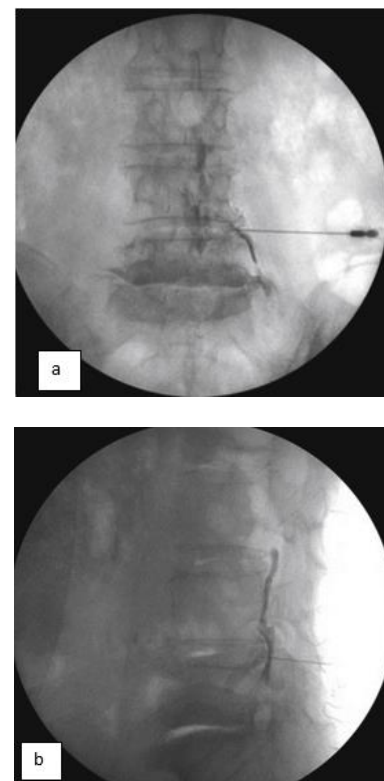


Fig 3: C-Arm pics of transforaminal injection AP and Lateral views (a, b)

Table 1: Route of administration with medication

Route of injection	Medication
Interlaminar	2% xylocaine (4 ml) + methyl prednisolone 80 mg (2ml).
Transforaminal	2% xylocaine (1 ml) + methyl prednisolone 40 mg (1 ml).

Results

A total of 64 patients were included in the study and were considered for the interpretation of the findings of which 22 were males and 42 were females. The maximum patients were in the age group of 30 to 45 years. The patients were divided into two groups to receive epidural steroid injection by either transforaminal or interlaminar route, by the method of simple randomization computer generated numbers.

A 32 patients received steroid by transforaminal route and 32 patients by the interlaminar route. The average JOA score before injection and at successive visits collected. The highest average score was noted at 6 month after injection for all three groups. Response to the therapy in aspect of Rate of Improvement (RI) in JOA score at 6 months after injection is shown in table 3.

The transforaminal group gave the results with 13 (40%) patients shows excellent, 15 (46%) shows good, 3 (9%) shows fair and 1 (3%) patient shows poor rate of improvement. The interlaminar group gave the results with 9 (28%) patients shows excellent, 11 (34%) shows good, 8 (25%) shows fair and 4 (12.5%) shows poor rate of improvement.

Transforaminal group showed the maximum improvement (96.875% of percentile improvement) followed by interlaminar group (87.5% of percentile improvement) shown in table 4. This data was subjected to statistical analysis using ANOVA and LSD technique. At 6 months, ANOVA method showed a significant difference in the rate of improvement of JOA score by two routes of injection with probability value (p-value) of 0.00. When subjected to LSD, the analysis showed a significant difference in rate of improvement of JOA score at 6 months between interlaminar and transforaminal routes with a p-value of 0.03 shown in table 5.

1. Subjective symptoms (9 points)

a. Low back pain

None (3), occasional mild pain (2), frequent mild or occasional severe pain (1), frequent or 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 metres although it results in pain, tingling and /or muscle weakness (2), Unable to walk more than 500 metres owing to leg pain, tingling and/or muscle weakness (1), Unable to walk more than 100 metres owing to leg pain, 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 one hour), 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)

Japanese Orthopaedic Association (JOA) Score. A normal person has JOA Score of 29.

Table 2: Gender distribution

Gender	Transforaminal route	Interlaminar route
Male	14	11
Female	18	21

Table 3: Rate of Improvement

Route	Excellent	Good	Fair	Poor
Transforaminal	13 (40.625%)	15 (46.875%)	3 (9.375%)	1 (3.125%)
Interlaminar	9 (28.125%)	11 (34.375%)	8 (25%)	4 (12.5%)

Table 4: Rate of effectiveness

	Transforaminal route	Interlaminar route
Effective	96.875 %	3.125%
Not effective	87.5%	12.5%

Table 5: Statistical methods

Statistical method	Method	Mean difference / Mean square at 3 month	Mean difference / Mean square at 6 month	Standard error at 3 month	Standard error at 6 month	p-value at 3 month	p-value at 6 month
Anova	Efficacy of steroid	72.865	84.765	2	2	0.063	0.000
LSD	Transforaminal and interlaminar	1.43	1.85	0.76	0.82	0.084	0.030

Discussion

Epidural steroids are believed to act by inhibiting the synthesis or release of the inflammatory substances thereby, reducing the intraneural oedema and venous congestion [6]. There are many ways of giving epidural injection via caudal, transforaminal, intraforaminal, perforaminal and interlaminar. Controversy also exists regarding the most effective route of injecting the drug. Ackerman and Laxmaiah *et al.* found no difference between the efficacy of caudal, transforaminal and interlaminar epidural steroid injections [7]. Contradictory to this, William *et al.* study shows results after a follow-up of 1 year; Caudal group: complete pain relief in 3.33%, partial pain relief in 53.33%, no pain relief in 43.33%

[8] Interlaminar group: complete pain relief in 10%, partial pain relief in 50% and no pain relief in 40%. Transforaminal group: complete pain relief in 30%, partial pain relief in 53.33% and no pain relief in 16.66%. They concluded that transforaminal route was more effective than caudal or interlaminar route.

In our study, after a follow-up of 6 month, in the interlaminar group, 87.5% patients were relieved of pain while 12.5% showed no relief. In transforaminal group 96.875% patients were relieved of pain whereas only 3.125% patients didn't show relief. A successful outcome was observed in 92.187% of the total patients enrolled. The JOA score improved and highest score was achieved at 6 months after injection.

The precise delivery of the medication at the exact site of pathology may be the reason for higher efficacy of the transforaminal route. Each method of doing a lumbar epidural steroid injection may have their own complication and hence maintaining a strict protocol during these procedures is mandatory. In addition to minor adverse reactions, major complications due to needle placement, steroid itself and other drugs used in the formulation has been reported. Dural puncture can cause headache and nausea after the procedure [9] Infection after the procedure although rare, is a possibility and strict asepsis should be maintained during the procedure. Histamine release from the contrast or steroid can cause sudden hypotension and hence an intravenous line should always be maintained prior to the procedure. The transforaminal method carries a risk of trauma to the nerve root during needle placement. This method also includes the risk of paraplegia if an inadvertent, intra-arterial injection of particulate steroid occurs into a radicular artery that reinforces the blood supply of the lower end of the spinal cord [10] None of the patients from interlaminar and transforaminal groups had an infection, headache or a reaction to contrast material and medication used.

The limitations of this study are short follow-up period, small sample size, no control group and no blindness. However, further studies on a larger population and longer follow-up is recommended.

Conclusion

Epidural steroid injection in the management of prolapsed lumbar intervertebral disc causing low back and radicular pain is satisfactory in the current study. Among the two injection techniques the best results obtained by transforaminal route. Our results show the use of epidural steroid is supportive treatment option for intervertebral disc prolapse. It helps in early recovery. We recommend transforaminal epidural injection is effective for immediate pain relief for patients with lumbar pain with without radicular pain due to disc prolapse.

Financial support and sponsorship

Nil

Conflicts of interest

There are no conflicts of interest

References

1. Cohen SP, Bicket MC, Jamison D, Wilkinson I, Rathmell JP. Epidural steroids: a comprehensive, evidence-based review. *Reg Anesth Pain Med.* 2013; 38:175-200.
2. Olmarker K, Størkson R, Berge OG. Pathogenesis of sciatic pain: a study of spontaneous behavior in rats exposed to experimental disc herniation. *Spine (Phila Pa 1976).* 2002; 27:1312-7.
3. Heliovaara M, Knekt P, Aromaa A. Incidence and risk factors of herniated lumbar intervertebral disc or sciatica leading to hospitalization. *J Chronic Dis.* 1987; 40:251-8.
4. Vos T, Flaxman AD, Naghavi M, Lozano R, *et al.* Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012; 380(9859):2163-96.
5. Tore KS, Oystein PN, Kristin S, Dag H, Tor I. The risk of "Getting Worse" after lumbar microdiscectomy. *Eur Spine J.* 2005; 14(1):49-54.
6. Ritesh Arvind Pandey, Efficacy of Epidural Steroid

- Injection in Management of Lumbar Prolapsed Intervertebral Disc. *Journal of Clinical and Diagnostic Research.* 2016; Vol-10(7):RC05-RC11.
7. Laxmaiah M, Vijay S, Vidyasagar P, Frank JE, Joshua A. Comparison of the efficacy of Caudal, Interlaminar, and Transforaminal epidural Injections in managing lumbar disc herniation: Is one method superior to the other? *Korean J Pain.* 2015; 28:11-21.
8. Ackerman WE, Ahmad M. The efficacy of lumbar epidural steroid injections in patients with lumbar disc herniations. *Anaesth Analg.* 2007; 104:1217-22.
9. Chou R, Atlas SJ, Steven MPH, *et al.* Nonsurgical interventional therapies for low-back pain. A review of the evidence for an American Pain Society Clinical Practice guideline. *Spine.* 2009; 34:1078-93.
10. Wybier M, Gaudart S, Petrover D. Paraplegia complicating selective steroid injections of the lumbar spine. Report of five cases and review of the literature. *Eur J Radiol.* 2009; 59:1539-47.