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CLINICAL AND FUNCTIONAL OUTCOME OF SINGLE LEVEL DISC PROLAPSE TREATED WITH TRANSFORAMINAL STEROID VERSUS CAUDAL STEROID.

Orthopaedics

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ABSTRACT

Objective - To determine the efficacy of fluoroscopic guided transforaminal steroid versus caudal steroid. **Materials And Methods -** A total of 90 patients were studied who had complaints of low back ache with radiculopathy and MRI evidence of disc prolapse. Out of this group, patients were randomly assigned to two groups each having 45 patients. First group received transforaminal steroid injection, second group received caudal steroid injection. All patients were followed up for 12 months, and the results were compared using change in Visual Analogue Scale score and Oswestry Disability Index (OSD). **Results -** The change in pain scores was statistically different at 1 and 6 month interval such that a higher change was observed by transforaminal route as compared to the caudal. For OSD, a greater change was seen in transforaminal at all intervals as compared to the caudal. **Conclusion -** In current study, transforaminal steroid injection group has better symptomatic improvement for both short and long term as compared to caudal steroid injection group.

KEYWORDS

Low back pain - Radiculopathy - single level disc prolapse - Transforaminal - Caudal Epidural steroid.

INTRODUCTION

Low back pain is one of the major causes of morbidity and economic burden in the population. One of the major causes of low back pain is intervertebral disc prolapse. Traditional medical treatment for patient with low back pain includes analgesics, life style modification, education, exercises, lumbar traction, and manual manipulation, application of heat, cryotherapy, and ultrasonography [1, 2]. Steroids are commonly used to reduce inflammation in epidural space [3–6]. Epidural injections are one of the common modalities of treatment for low back pain particularly originating from disc prolapse. Epidural steroid injection can be given in lumbar epidural space via transforaminal and caudal route and each of which have different efficacy rate [7–9]. With the help of fluoroscopy, we can target the site of lesion, which results in improvement of outcome. In 1998, Lutz et al. [10] studied the efficacy of fluoroscopic guided transforaminal epidural steroid injection as a treatment for single level disc prolapse with radicular symptoms and confirmed it with magnetic resonance imaging, documenting herniated nucleus pulposus causing foraminal stenosis.

In a systematic review to evaluate the effect of therapeutic transforaminal lumbar epidural steroid injections by Laxmaiah Manchikanti in 2012, it was said that the evidence is good for radiculitis secondary to disc herniation with local anaesthetics and steroids and fair with local anaesthetics only [11]. Benny B in a comprehensive literature review concluded that there was strong evidence for transforaminal injections in the treatment of lumbosacral radicular pain both for short-term and long-term relief [12]. Riew KD article supported use of selective nerve root injections of corticosteroids in patients who have lumbar radicular pain at one or two levels prior to be considered for operative intervention [13].

We have used the grading system for disc prolapse on magnetic resonance imaging as suggested by Wildermuth et al. [14] in our study. The purpose of this study was to prospectively evaluate the efficacy of fluoroscopically guided epidural steroid injections.

The TF approach is perhaps most favoured because the injection site is adjacent to nerve root, and only a small amount of medication is required for injection [15]. The caudal route is both the easiest and safest route and also seems to provide the most favourable analgesic effects. However this approach requires relatively large volumes of medication and is less specific to the site of pathology [16]

According to study by Prashant Chandrakant kamble and Ayush sharma, short term effect in terms of change in pain and OSD was comparable across the groups, transforaminal group on average felt better as they showed no significant increase in pain score over 1 and 6 months follow up and a greater decrease in OSD at all time compared to interlaminar and caudal routes [17]

According to systematic review and meta-analysis by Jun Liu transforaminal and caudal are similarly effective in managing lumbosacral radicular pain [18]

MATERIALS AND METHODS

Patients were selected on OPD basis from June 2023 - May 2024 after taking a written informed consent.

Inclusion criteria

1. Patients who did not responded to conservative line of management (Physiotherapy, NSAIDS)
2. Patients with low back pain (discogenic) with radicular symptoms.
3. Clinical and radiological correlation of nerve root compression.
4. No H/O prior lumbar surgery.
5. No H/O prior epidural injection.

Exclusion criteria

1. Patients having clinical and radiological evidence of instability, e.g. spondylolysis or spondylolisthesis.
2. Patients with spinal fracture.

This was a prospective, single centre, randomized, and double blinded clinical trial. A total of 90 patients who fulfil the above-mentioned inclusion criteria were enrolled in the study and were randomly assigned one of the treatment modality. An independent resident doctor performed randomization using a computer generated randomization schedule.

All procedures were performed by single investigator and followed by other investigators. The investigators did not have access to the randomization sequence. The assessors and patients were blinded to the assigned treatment modality.

Out of 90, 48 were females; median age of the patients was 52 years (mean age 51.2358). All patients underwent MRI imaging before procedure. Our institutional ethical committee reviewed and approved the procedures. All patients after pre- and post-epidural steroid injection were analysed by VAS (Visual Analogue Scale) score and

Oswestry Disability index.

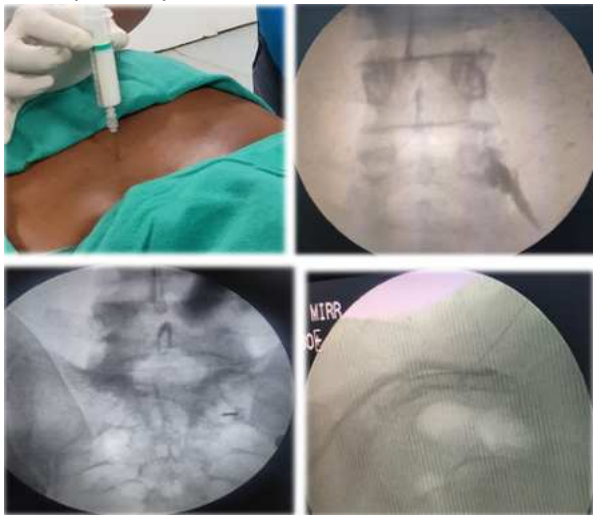

Fig.1 Fluoroscopy and clinical images of needle position for transforaminal and caudal injections.

Technique

45 patients received transforaminal, 45 patients received caudal injection. Patients were placed in prone position on radiolucent table under all aseptic precautions. 23-gauge 12 cm long spinal needle was advanced into the region of involved nerve root under fluoroscopic guidance. We used the technique described by Bogduk et al. [19]. Technique involved use of safe triangle, which was composed of roof formed by pedicle, tangential, base that corresponded to exiting nerve root and the lateral border of vertebral body. Needle positioning was confirmed by fluoroscopy in anteroposterior, and lateral views (Fig. 1). To confirm epidural flow of injection, 1 ml of contrast material (Iohexol) was injected before drug injection [20]. A combination of methylprednisolone 80 mg with 2 ml of lignocaine was used.

For caudal epidural steroid injection, we have given injection in sacral hiatus with patient in prone position. Injection was given by 23-gauge spinal needle that was introduced through sacrococcygeal ligament into epidural space under fluoroscopic guidance. To confirm epidural flow of injection, 1 ml of contrast material (Iohexol) was injected before drug injection. A combination of methylprednisolone 80 mg with 2 ml of lignocaine is given. For the drug to reach proximally a 10 ml of distilled water is injected. All these patients were taken to re covery area and they were asked to report their back pain and leg pain (radicular pain) compared on VAS (Visual Analogue Scale) score and Oswestry disability index score at 1 h post-injection period. Then these patients were asked to follow-up in our spine clinic at an interval of around 1 and 6 months consecutively. Patients who failed to respond to the treatment or patients whose response deteriorated received additional injection of same injection, dose, and approach. Maximum 3 injections were used per patient, with a minimum interval of 2 weeks between subsequent injections, if required. Patients who did not respond to three injection or developed cauda equine or progressive neurological deficit were considered for surgery.

Data

Oswestry Disability index score (OSD) EVALUATION

	Pre-injection OSD mean SD	post-injection OSD at 1 h mean SD	Follow up OSD at 1 month mean SD	Follow up OSD at 6 month mean SD	Repeated injection	surgery
Transforaminal (45)	35.5 2.4	12.5 1.1	14.9 1.2	15.3 1.7	6 (13.33 %)	4 (8.88 %)
Caudal (45)	36.6 2.1	15.1 1.3	20.1 1.4	21.4 1.5	8 (17.77 %)	6 (13. 33 %)

VAS (Visual analogue scale)

	Pre-injection VAS mean SD	post-injection VAS at 1 h mean SD	Follow up VAS at 1 month mean SD	Follow up VAS at 6 month mean SD	Repeated injection	surgery
Transforaminal (45)	7.8 0.7	2.0 0.6	2.3 0.8	2.6 0.8	6 (13.33 %)	4 (8.88 %)
Caudal (45)	7.9 0.7	2.6 0.8	3.4 1.1	3.9 1.0	8 (17.77 %)	6 (13. 33 %)

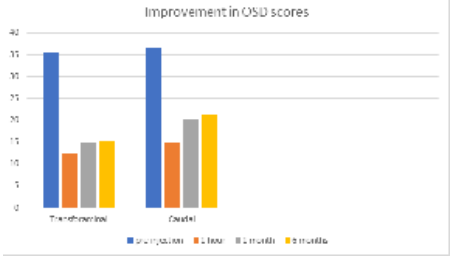

Fig. 2 Improvement of Oswestry Disability index (OSD) scores after either transforaminal and caudal injection methylprednisolone 80 mg to epidural space. Data are shown as mean+SD. Results achieved are shown in bar diagram with descending order of improvement (TF > Caudal).

METHODS

Change in pain scores and Oswestry Disability Index (OSD) from baseline was calculated and compared across the routes using non-parametric tests (Mann–Whitney U test). To adjust for multiple comparisons, the p value was estimated as 0.01.

	Transforaminal	Caudal
Pain scores		
Change in 1 h	6 [4, 7][a]	5 [3, 7][a]
Change in 1 month	5 [4, 8][a]	5 [2, 7][b]
Change in 6 months	5 [3, 7][a]	4 [2, 8][b]
OSD scores		
Change in 1 h	23 [21, 26][a]	21 [18, 24][b]
Change in 1 month	21 [18, 24][a]	16 [15, 20][b]
Change in 6 months	20 [18, 25][a]	15 [13, 18][b]

The numbers represent the median of change in the scores from baseline. Th numbers in brackets are the range of scores. Assignment of different alphabets in the superscript (a, b and c) signifies statistical significance at $p < 0.01$. assignment of same alphabet signifies no statistical significance.

RESULTS

The change in pain scores was statistically different at 1 and 6-month interval such that a higher change was observed by transforaminal route as compared to other.

For Oswestry Disability Index (OSD), a greater change was seen in transforaminal at all times as compared to other.

Limitations

Limitation of the study includes unavailability of a long-term follow-up and lack of documentation regarding additional therapy in each group like analgesic and physiotherapy which might had an effect on pain and disability scores.

DISCUSSION

Analysis of our procedure indicates that the two methods of treatment were effective in reducing pain score and OSD in patients with low back pain (discogenic) with radicular symptoms.

While short-term effect in terms of change in pain and OSD was comparable across the groups, transforaminal group on average felt better as they showed no significant increase in pain score over 1- and 6-month follow-up and a greater decrease in OSD at all time compared to caudal route. Improvement was not much different between two groups immediately 1 h after injection, indicating that short-term treatment effect was mainly because of local anaesthetic agent. More targeted delivery of local steroid and local anaesthetic along the inflammed spinal nerve is most likely explanation for better outcome on long-term basis.

The 2 most common causes of complications of ESIs are related to inaccurate needle placement and medicine administration. Both types of injections may cause complications such as headache, soreness at the injection site, and toxicity [21].

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Conflict of interest None of the authors have any potential conflict of interest.

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