MEDICAL SCIENCE

Short term functional outcome of transforaminal epidural steroid injection in the treatment of lumbar disc prolapse

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To Cite:
Muralidharagopalan NR, Vasudevan D, Nizar AM. Short term functional outcome of transforaminal epidural steroid injection in the treatment of lumbar disc prolapse. *Medical Science* 2023; 27: e259ms3064.
doi: https://doi.org/10.54905/disssi/v27i136/e259ms3064

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Peer-Review History
Received: 02 May 2023
Reviewed & Revised: 06/May/2023 to 08/June/2023
Accepted: 10 June 2023
Published: 12 June 2023

Peer-review Method
External peer-review was done through double-blind method.

Medical Science
pISSN 2321–7359; eISSN 2321–7367

ABSTRACT

Introduction: Low back ache is one of the most common causes of physical constraints at work, affecting around 80 percent of the population. Mechanical low back ache and disc prolapse are more seen in younger population while lumbar spinal stenosis and lumbar spondylosis are more common in middle-aged and older patients. The purpose of the study was to determine the short-term functional outcome following Bupivacaine & Triamcinolone through transforaminal route in chronic disc prolapse. Time between onset of symptoms and injection ranged between 2 -12 months. *Methodology:* A prospective study of 30 patients with chronic low back ache with radiating pain who were well distributed based on age, sex, gender, radiating side and root involved. Patients were treated by transforaminal epidural injection under fluoroscopy guidance with combination of Triamcinolone and bupivacaine. *Results:* Post injection, functional outcomes were evaluated using VAS, LBPRS and ODI score at 2 weeks, 6 weeks, 3 and 6 months. *Conclusion:* In our study, there was a statistically significant improvement in the 6-month post TFESI VAS score, ODI score and LBPRS scores compared to the baseline. In conclusion, bupivacaine with triamcinolone is safe and effective in the treatment of chronic disc prolapse patients.

Keywords: Sciatica, Lumbar disc, TFESI, bupivacaine, triamcinolone, steroid

1. INTRODUCTION

Low back ache is a common cause of physical constraints at work, affecting around 80 percent of the population (Dagenais et al., 2008). Mechanical compression causes radicular pain, which is accompanied by the release of inflammatory neurochemicals at the target site. Steroids, local anaesthetic drugs or a mixture of the two can be injected into the epidural space via a caudal transforaminal or interlaminar route. The transforaminal approach

provides an excellent target-specific method for delivering medications to the epidural space and also to the dorsal root ganglion (Van-Boxem et al., 2010; Konstantinou et al., 2013). This study was done to analyze the outcomes of injection, a review of technique and to identify complications so as to improve on the way we manage chronic lumbar radicular pain.

Aim

Determine the short-term functional outcome following bupivacaine and triamcinolone through transforaminal route in chronic lumbar intervertebral disc prolapse

Objectives

To determine the efficacy of TFESI in chronic low back-ache. To ascertain abilities of early return to work, to avoid surgeries in lower back pain not amenable to conservative treatment.

2. MATERIALS AND METHODS

Patients admitted to the Orthopaedics Department of Saveetha Medical College Hospital between August 2020 and April 2023, with a diagnosis of chronic lumbar disc prolapse with matching clinical signs and not resolving with conservative options. Patients were functionally evaluated using ODI (Oswestry Disability Index), LBPRS (Lower back pain rating scale) and VAS (Visual Analogue Scale). Patients were admitted and treated by transforaminal epidural steroid injection under fluoroscopy guidance. Patients were given combination of steroid (Triamcinolone acetate) with local anaesthetic agent (bupivacaine).

Post procedure, functional assessment was done at 2 weeks and 6 weeks, 3 months, 6 months. Functional evaluation was performed using ODI, LBPRS and VAS score and compared to scores taken prior to the procedure. Single surgeon administered the injection and follow up was done by the resident. The outcomes were statistically analyzed and results tabulated. Clearance from the institutional ethical committee was obtained for the study

Inclusion criteria

Patients aged 18-80 years
Patients of either sex
Patients willing for follow up
Patients clinically diagnosed with lumbar disc prolapse with matching radiological findings.
Patients willing to undergo the procedure

Exclusion criteria

Patients with congenital deformities of the hip, spine and knee joint
Patients with established neurological deficits
Pregnant patients
Patients with Disc Prolapse following acute trauma
Patients age less than 18 years of age
Patients undergone previous spine surgeries including laminectomy and lumbar fusion
Patients with prior spine injections at same site
Patients having failed back syndrome

Technique

Patient was placed in prone position on a fluoroscopy compatible surgical table. Under sterile aseptic precautions, parts were painted and draped. Under fluoroscopy guidance, level was marked using sterile marker. Entry Point was infiltrated using 2% lignocaine. 22 spinal gauge needles was inserted along the planned track until contact with bone is made at junction of inferior edge of superior articular process and superior edge of transverse process. AP, lateral view was taken to confirm placement of needle in safe triangle formed by pedicle, exiting nerve root and lateral border of vertebral body. The stylet was removed.

At the nerve root level, 0.2 ml of iohexol nonionic contrast agent was injected after positioning the needle. Root flow was checked under fluoroscopy. Needle placement was readjusted if no root flow present. Adequate flow of contrast to target site was documented. Aspiration performed to ensure absence of blood or cerebrospinal fluid. 1 ml of triamcinolone (each ml containing 40

mg) along with 2 ml of bupivacaine was injected. Injection was limited to 2 levels to avoid systemic adverse effects of steroids. After the procedure SLRT (straight leg raising test) was performed after turning the patient supine.

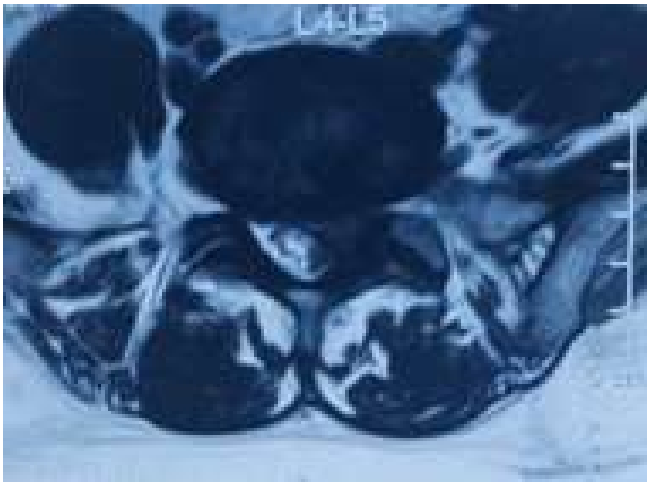

Figure 1 Shows the axial section of a chronic intervertebral disc prolapse at the L4- L5 level

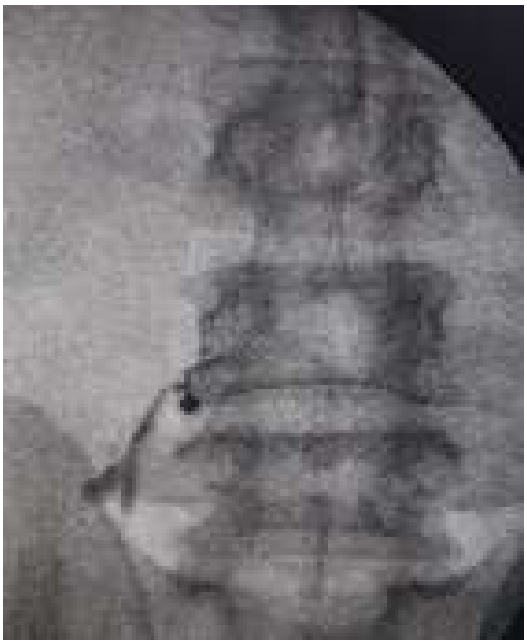

Figure 2 Shows the fluoroscopy picture of AP view of LS spine showing smooth flow of contrast and correct needle placement.

Post procedure protocol

All patients were mobilized the same day. Isometric lower back strengthening exercises were started the next day if tolerated.

Outcome measures

Functional outcomes were evaluated using VAS, LBPRS and ODI score at 2 weeks, 6 weeks, 3 months and 6 months.

Statistical analysis

Data was analyzed using SPSS 16(IBM) and Microsoft Excel (Microsoft).

3. RESULTS

The study was aimed to compare functional outcomes in the short-term following bupivacaine and triamcinolone through transforaminal route in chronic lumbar IVDP. 30 patients were enrolled for the study and treated by TFESI with bupivacaine and triamcinolone. Mean age was 49.4 ± 12.5 (Range: 20 – 70). The mean height was 167.33 ± 6.67 (Range: 155 – 178). The weight range

was 52 – 98 kg (70.3 ± 9.78). The BMI range was 20.9 to 30.9 (24.96 ± 2.12). We analyzed the effect of bike riding (18/30) and the association non-significant (p=0.645). Diabetes was the only co-morbidity associated and was found in 2 patients. 6 patients reported use of alcohol, 2 were smokers.

Occupation

Table 1 Occupation of subjects enrolled

Clerk	6	20.1
Engineer	8	26.8
Heavy labour	2	6.7
House wife	12	40.2
Unemployed	2	6.7
Total	30	100.0

Symptom duration

Time between symptom onset and injection ranged between 2 -12 months (Mean 6.23 months)

Level and side

Injection was administered on the Right side in 10 patients and on the left in 20 patients. L4 was injected in 12 patients and L5 in 18 patients.

Outcome measures

Visual analog scale scores were obtained (Table 2).

Table 2 Visual analog score

	Pre injection	8 hours f/u	2 weeks f/u	3 months f/u	6 months f/u
Mean	6.33	1.33	4.21	2.53	0.69
Std Dev	0.86	0.69	0.72	0.79	0.66
Min	5	0	3	1	0
Max	8	3	6	4	2

Sharp reduction in scores immediately post injection which is maintained increases slightly in 2 weeks and 3 months follow up and is maintained at 6 months follow up. ODI scores are tabulated (Table 3). ODI scores consistently decrease over the course of follow up and are maintained at 6 months follow up.

Table 3 ODI Scores

	Pre injection	2 weeks f/u	3 months f/u	6 months f/u
Mean	56.2	40.17	29.53	13.38
Std Dev	5.66	7.34	4.2718	2.92
Min	44	30	20	10
Max	68	58	38	20

LBPRS scores are in (Table 4). LBPRS depicted a declining trend throughout the 6 month follow up and the scoring became half in 3 months .

Table 4 LBPRS scores

	Pre injection	2 weeks f/u	3 months f/u	6 months f/u
Mean	96.93	75.92	50.84	29.53
Std Dev	10.00	6.80	8.16	6.03
Min	70	66	36	20
Max	112	98	65	40

4. DISCUSSION

Recently, backache has emerged as a serious global health issue. In the under 45 years' old population, The National Centre for Health Statistics has ranked the most frequent reason of limiting activity as back and spine problems. Almost 4/5th of these people have faced these symptoms at some stage of their lives, according to Hult, (1951). Andersson, (1981) states that low back ache affects a majority 61 percent of males and 66 percent of females. Mechanical low back ache and disc prolapse are more seen in younger population while canal stenosis and lumbar spondylosis are more common in middle-aged and older patients.

Patients handling heavy machinery like drilling equipment or carrying heavy loads had predisposition of getting back ache. Smoking cigarettes and usage of tobacco were more in lower back ache. Anxiety, depression and stressful job may be a causative factor (Davidson and Keating, 2002). Local anaesthetic Bupivacaine, with its anti-inflammatory action with triamcinolone provides fast pain relief, Research have demonstrated that pain relief provided by transforaminally administered corticosteroids, can minimize nerve root edema, improve microcirculation and reduction of prostaglandin synthesis and the anti-inflammatory effect of direct inhibition of C-fibre neuronal membrane excitation.

Ammendolia and Chow, (2015) found that there is no evidence for epidural injections without moderate- and high-grade evidence. On reviewing the literature, epidural steroids improved pain, function and life quality for around two weeks in a single experiment on comparison with exercise and physical therapy (Ammendolia and Chow, 2015). Roy et al., (2011) performed a prospective study of thirty patients with lumbosacral radiculopathy from a prolapsed disc. The improvement was assessed with VAS and a numeric rating scale, respectively (NRS) and sequentially followed up immediately, 24 hours, 4 weeks, 6 months and 1 year later. Pre injection VAS was 9.22, then 0.6 and increased to 1.8, 3.9 and 4.2 at follow-up (Roy et al., 2011).

Botwin et al., (2007) performed a prospective cohort study involving 34 patients who had lumbar canal stenosis and radicular pain bilaterally treated with epidural injections at the caudal level fluoroscopically guided at a multidisciplinary spine centre after conservative treatment failed. Prior to initial injection, an impartial observer assessed the patients and they completed questionnaires at 6 weeks, 6 and 12 months after the injections. VAS and ODI questionnaire were used for the survey. Favorable outcome was seen with 65 percent patients at six weeks, sixty two percent at 6 months and fifty four percent at 12 months, with at minimum 50 percent reduction in pre-injection and post-injection visual analogue pain scores. There was statistically significant improvement on ODI scores from baseline to post injection follow up (p values of 0.0001, 0.0095 and 0.00015) (Botwin et al., 2007).

The purpose of this study was analysis the short-term functional outcome following Bupivacaine & Triamcinolone through transforaminal route in chronic disc prolapse. Patients were well distributed based on age, sex, gender, radiating side and distribution of the nerve root. We evaluated 30 cases of chronic back with radiating pain treated by Bupivacaine & triamcinolone through transforaminal route. Serial functional outcome using VAS and ODI score at 2 weeks, 3 months and 6 months was evaluated. On observation, the overall mean age and standard deviation was 49.4 ± 12.5 years. The overall mean height and SD was 167.33 ± 6.67. The overall mean weight and SD was 70.3 ± 9.78. The mean BMI was 24.96.

17 patients were men and 13 females, most have left sided radiating pain and equal nerve root (L4 and L5) distribution. On next day of admission, patients underwent TFESI. There was a statistically significant improvement in the 6-month post TFESI VAS score, ODI score and LBPRS summary scores on comparing the pre TFESI scores. The average VAS score at pre TFESI and post TFESI at 2 weeks, 3 months and 6 months have come down from 6.33, 4.21, 2.53 and 0.69 respectively. The average ODI score have come down from 56.2, 40.17, 29.53 and 13.38 respectively. The average LBPRS score have come down from 96.93, 75.92, 50.84 and 29.53 respectively.

Lower back pain was more common among heavy laborers compared to the people with sedentary life style. No complications reported in the study. There was significant improvement in Pre and Post TFESI scores, quality of life & pain relief which statistically proven to be significant. Bupivacaine with triamcinolone is safe and effective in chronic disc prolapse patients. Limitations were the small sample size and short-term follow-up. Hence a larger study with longer follow-up is required to generalize the study findings for the population.

5. CONCLUSION

Transforaminal epidural steroid injections with a combination of Triamcinolone and bupivacaine provides a safe and effective option for treatment of patients with chronic lumbar intervertebral disc prolapse not responding to conservative management.

Authors Contributions

Niranjanan Raghavn Muralidharagopalan conceptualized the study, performed the interventions and contributed to writing the paper.

Damodharan Vasudevan performed the blinding, did the initial and follows up consultations of the patient and contributed to writing the paper

Abin Mahmood Nizar kept the records, invited the patients for appropriate follow up visits, helped in filling up the questionnaire and contributed to writing the paper.

Acknowledgement

We thank the participants who were all contributed samples to the study.

Ethical approval

The study was approved by the Medical Ethics Committee of Saveetha Medical College (IRB Approval no: SMC/IEC/2020/08/22).

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study.

Funding

This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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