International Journal of Research in Orthopaedics
Phunde R et al. Int J Res Orthop. 2023 Jul;9(4):765-769
http://www.ijoro.org

DOI: https://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20231999

Original Research Article

The outcome of transforaminal epidural steroidal injection in patients with lumbar canal stenosis: a study of 49 patients

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Received: 21 April 2023
Revised: 31 May 2023
Accepted: 03 June 2023

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ABSTRACT

Background: Lumbar canal stenosis is a disease of advanced age, commonly seen in individuals >60 years of age. The disease begins with neurogenic claudication and is progressively associated with weakness in the lower limbs. Often, these patients also have radiculopathy, which may be due to a contribution of foraminal stenosis and facet arthropathy.
Methods: This research has been conducted on a sample of patients presenting to our tertiary care center with lumbar canal stenosis to evaluate the outcome of transforaminal epidural steroidal injection and to determine the therapeutic response of the patient in response to the epidural steroidal injection. A sample of 49 patients presenting with neurogenic claudication of 6 weeks duration (minimum) in correspondence with MRI finding suggestive of lumbar canal stenosis were chosen after obtaining informed consent for the procedure transforaminal epidural steroidal injection under fluoroscopy. Pre- and post-NRS scores were recorded at 2 instances.
Results: The mean and standard deviation of pre-procedural and immediate post-procedural NRS scores were found to be 7.02±1.62 and 3.12±1.2 respectively. The mean and standard deviation of the 1-month post-procedure NRS was found to be 3.27±1.56. Considering successful treatment as more than 50% reduction in the NRS score at 1 month when compared to the pre-treatment NRS score, the successful outcome of the study was 63.26%.
Conclusions: In our study, we have evaluated the effect of TEFSI in patients with lumbar canal stenosis presenting with neurogenic claudication and radiculopathy. Our study assessed pre-procedure, immediate post-procedure, and 1-month post-procedure NRS score following TEFSI. NRS score was assessed based on a questionnaire. The reduction of NRS score was equally seen in all patients irrespective of age, sex, and complaints.

Keywords: Kambin's triangle, Lumbar canal stenosis, Numeric rating scale, Transforaminal epidural steroidal

INTRODUCTION

Lumbar canal stenosis is a disease of advanced age, commonly seen in individuals >60 years of age. The disease begins with neurogenic claudication and is progressively associated with weakness in the lower limbs. Often, these patients also have radiculopathy, which may be due to a contribution of foraminal stenosis and facet arthropathy.[1]

Increased prevalence has been noted for patients with low back aches amongst all the age groups. The underlying etiology and pathology vary with age with herniated disc syndromes being common in younger patients and degenerative conditions including lumbar spinal stenosis and degenerative spondylolisthesis in older patients. Treatment basket ranges from analgesics, non-steroidal anti-inflammatory drugs, narcotics, physical therapy, corsets, epidural steroidal injection, decompression, and stabilization procedure.[2] Spinal stenosis is defined as the narrowing of the spinal canal (<10 mm antero-posterior diameter on axial CT) with compression on neural structures by bone and surrounding soft tissues. Failure of conservative treatment has led to the development of

treatment by epidural steroids. In the spine patient outcomes research trial, Tosteson et al found that patients receiving surgical treatment for spinal stenosis without degenerative spondylolisthesis achieved significant improvements in all primary outcomes compared to those undergoing non-surgical treatment. However, for patients with mild to moderate stenosis who are not candidates for surgery, the epidural steroid has come out to be a better alternative. In patients with chronic low back ache secondary to spinal stenosis, epidural steroids are one of the commonly performed interventions with great outcomes.[3]

We aimed to evaluate the short-term outcome of transforaminal epidural steroidal injection in patients with lumbar canal stenosis and assessed the difference in outcomes between different age groups and sex.

METHODS

Study design

A prospective, interventional study of 1-year duration of patients presented to KEM Hospital in the year 2021-2022. A total of 49 patients (using Cochrane formula) diagnosed with lumbar canal stenosis between the age window of 40 to 79 years were enrolled for the research. A clinical radiological analysis of patients aged 40-79 years with complaints of neurogenic claudication of 3 months' duration in whom conservative treatment had failed was included in the study. Patients with evidence of myelopathy, lumbar spine infection, history of spinal surgery, peripheral neuropathy, coagulopathy, fracture spine and associated neurologic deficit were not included. The study was carried out after obtaining approval from ethics committee.

Methodology

Presenting complaint was neurogenic claudication. The patient enrolled after following inclusion and exclusion criteria.[4] The patients were advised of lumbar spine x-rays: antero-posterior view and lateral view and flexion and extension views.

All patients with a positive finding on x-ray and clinical findings got an MRI lumbar spine with whole spine screening done. In case of MRI suggestive of lumbar spinal stenosis patients were treated conservatively (6 weeks) as 1st line of management. If the treatment was successful no further treatment was given. If there was failure of conservative management/recurrence of symptoms TEFSI procedure was employed. All patients were evaluated and enrolled and the level of TEFSI was selected based on clinical and radiological analysis (MRI).

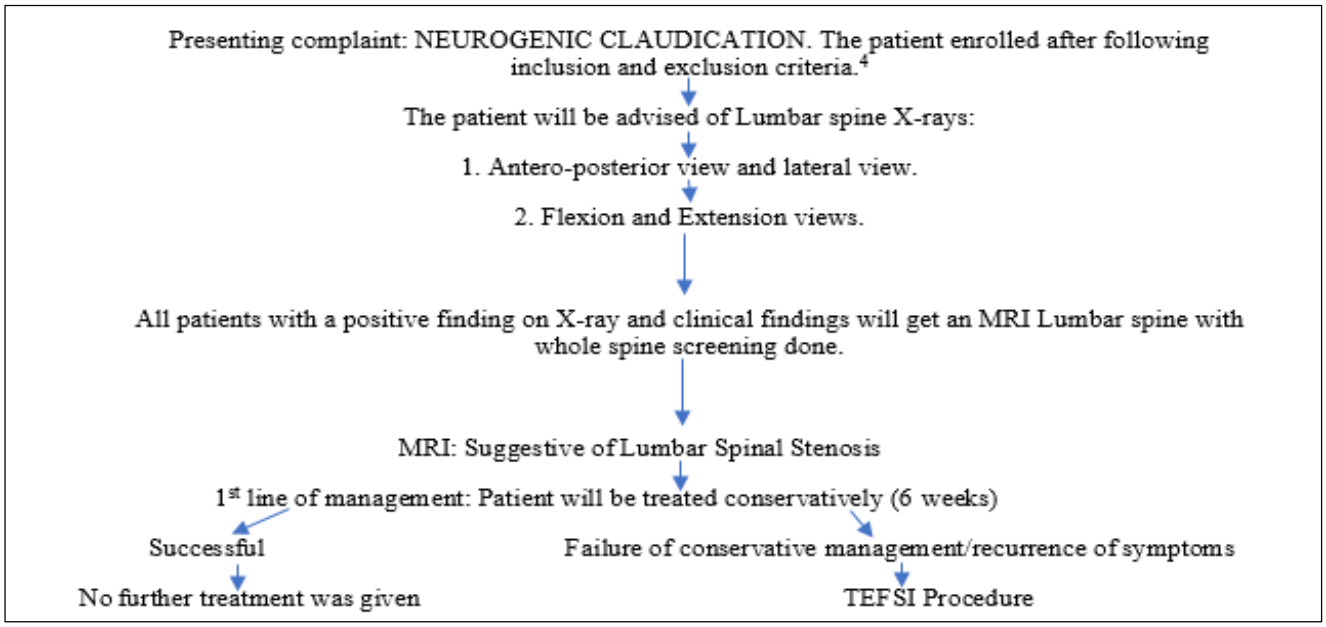

Figure 1: Methodology.

Procedure

Patients were placed in the prone position. Under strict sterile, aseptic precautions, the patients were scrubbed and draped, and the procedure was carried out under fluoroscopic guidance. At that location, a 90 mm 23-gauge spinal needle was inserted into the skin toward the lateral lower part of the superior articular process and the process was touched. The needle was then advanced up to 1 mm until loss of bony resistance was felt. On anteroposterior view, the needle tip was seen just lateral to the line passing through the medial border line of the superior and inferior pedicle. After the final location of the needle was secured, 1 cc of non-ionic contrast Iomeprol solution agent was

administered to observe diffusion location and scope of the contrast agent, and then 2 cc of the prepared agent (0.5% bupivacaine 1 ml + 1 ml of triamcinolone acetate 40 mg/ml) was administered.

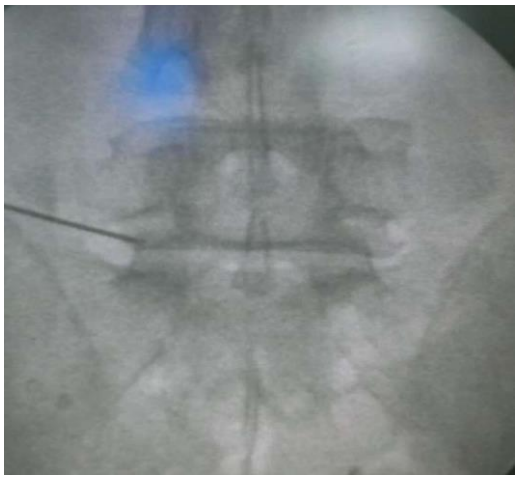

Figure 2: Anteroposterior fluoroscopy view of lumbar spine demonstrating needle position.

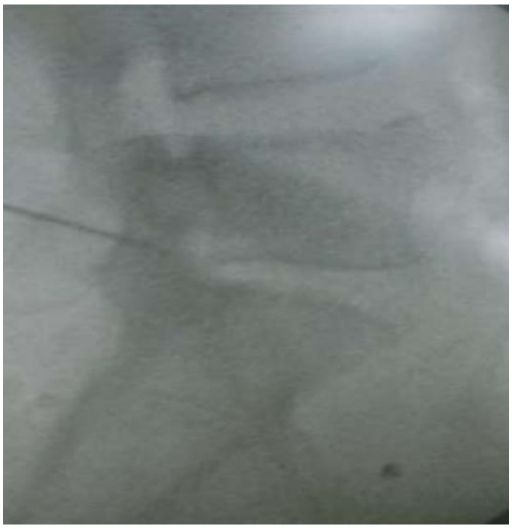

Figure 3: Lateral fluoroscopy view of lumbar spine demonstrating needle position.

The efficacy of transforaminal steroidal injection was assessed based on a questionnaire and calculating improvement in pre and post NRS scores.

RESULTS

The mean NRS score pre-procedure was 7.02 with a standard deviation of 1.62. The immediate post procedure mean NRS Score was 3.12 with a standard deviation of 1.2.

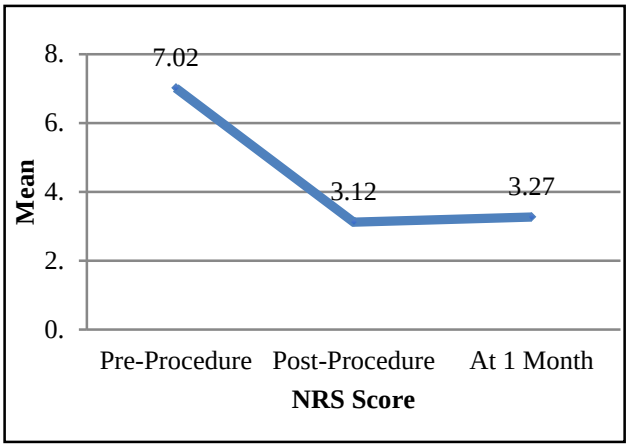

Figure 4: Graph demonstrating NRS at pre-procedure, post procedure and at 1 month.

The post procedure 1 month mean NRS score was 3.27 with a standard deviation of 1.56. The p value on comparing the NRS score was found to be <0.001 which was statistically significant. Our study sample showed a mean age of 62.92 with a standard deviation of 8.48 years. The p value considering the age and post-procedure change in NRS at 1 month was 0.390.

The p value was more than 0.05. This value was not statistically significant. Age does not influence the outcome of the procedure. Although females underwent the procedure in a greater frequency as compared to males- the p value considering the success of the procedure and the gender of the patient was found to be 0.459. This implies that gender does not influence the outcome of the procedure.

Table 1: Comparison of difference and percent change in NRS with age and gender (N=49).

Variables	Immediate post difference	At 1 month post difference	Immediate post-percent change	At 1 month post percent change
Age (years)				
41-50	3.50 (1.00)	3.50 (1.91)	63.33 (14.42)	61.66 (29.87)
51-60	4.15 (1.51)	3.62 (1.50)	57.58 (12.61)	50.96 (17.68)
61-70	4.09 (1.37)	3.83 (1.55)	54.65 (13.14)	50.92 (15.46)
71-80	3.22 (1.20)	3.89 (1.83)	51.54 (19.07)	63.67 (33.50)
P value	0.341	0.959	0.530	0.390
Gender				
Female	3.87 (1.29)	3.96 (1.58)	54.81 (13.72)	56.59 (21.35)
Male	3.92 (1.46)	3.58 (1.57)	56.23 (14.84)	51.99 (21.72)
P value	0.893	0.405	0.731	0.459

DISCUSSION

The goal was to carry out a study that could determine the efficacy of transforaminal epidural steroidal injection in patients with chronic lumbar radicular pain with MRI findings of lumbar spinal stenosis. The outcomes determined based on the NRS scale were efficacious in relieving our patients of radicular pain and improving their claudication distance. These were compared based on age and gender and the outcome remained the same with no gender and age bias.

Regarding the efficacy of TFESI, the main purpose of steroid injection is to reduce the production and release of inflammation-related mediators. The nerve root compression induces the release of cytokines and inflammation-mediated cells, which plays a major role in causing radicular pain after lumbar foraminal stenosis.[5] The anti-inflammatory properties of steroids reduce inflammatory mediators, consequently inhibiting the processes leading to the occurrence of radicular pain. Furthermore, decreased inflammation can reduce the edema on the nerve root or tissues around the nerve root. Thus, making a space between the bony exit and the nerve root can reduce the degree of compression of the nerve root, venous engorgement, and arterial insufficiency. In addition, corticosteroids inhibit neural transmission within the nociceptive C-fibers.[6]

In a study conducted by Chang et al, 60 patients with chronic lumbar radicular pain were included in the study, and two groups were formed based on the severity of lumbar foraminal spinal stenosis and transforaminal epidural steroidal injections were received. A comparison between pre-treatment and post-treatment NRS scores at 1, 2 and 3 months was done. Reductions in the NRS scores over time were significantly larger in group A (p=0.023). Three months after treatment, 27 patients (87.1%) in group A and 11 patients (42.3%) in group B reported successful pain relief (pain relief of ≥50%).[4]

In a study conducted by Jang et al, five to seven years after the initial TFESI, the numeric rating scale (NRS) score had decreased from 6.7 to 3.7. Of the included patients, approximately 65% of the patients had an NRS score of ≥3, although roughly 15% of patients reported complete resolution of the initial pain. Approximately half of the included patients were currently receiving repetitive TFESIs every 2 to 6 months or were taking oral pain medications. Further, approximately 25% of the patients had undergone a surgical intervention; however, its outcome was poor.[7]

In a study conducted by Olguner et al, sixty patients (33.9%) were considered respondents and 117 patients (66.1%) were non-respondents in the entire study group. Patients with foraminal stenosis included the vast majority of the respondents and showed better results of pain relief as opposed to patients of other groups at the end of 12 months (p<0.001). Better results were seen in patients with foraminal stenosis as compared to spinal stenosis and herniated disk.[8]

In a study conducted by Botwin, there were a total of 34 patients who met our inclusion criteria for the treatment of unilateral radicular pain from degenerative lumbar spinal stenosis who underwent fluoroscopically guided lumbar transforaminal epidural injections. Patients with radiculopathy, who did not respond to physical therapy, anti-inflammatories, or analgesics, caused by degenerative lumbar stenosis and confirmed by magnetic resonance imagining received fluoroscopically guided lumbar transforaminal epidural steroid injections at the presumed symptomatic nerve root. The injectant consisted of 12 mg of betamethasone acetate and 2 ml of 1% preservative-free lidocaine HCL. Patients were evaluated by an independent observer and received questionnaires before the initial injection, at 2 months, and 12 months after the injections. Questionnaires included a visual analog scale, Roland 5-point pain scale, standing/walking tolerance, and patient satisfaction scale. Seventy-five percent of patients had successful long-term outcomes, reporting at least a >50% reduction between pre-injection and post-injection pain scores, with an average of 1.9 injections per patient. Sixty-four percent of patients had improved walking tolerance, and 57% had improved standing tolerance at 12 months.[9]

Limitations were small sample size and short follow up duration.

CONCLUSION

In our study, we have evaluated the effect of TEFSI in patients with lumbar canal stenosis presenting with neurogenic claudication and radiculopathy. Our study assessed pre-procedure, immediate post-procedure, and 1-month post-procedure NRS score following TEFSI. NRS score was assessed based on a questionnaire. The reduction of NRS score was equally seen in all patients irrespective of age, sex, and complaints.

ACKNOWLEDGEMENTS

Authors would like to thank Rathin Patel for his support.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Phunde R, Somani V, Bava SS, Jaiswal N, Gupta R. The outcome of transforaminal epidural steroidal injection in patients with lumbar canal stenosis: a study of 49 patients. Int J Res Orthop 2023;9:765-9.