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Lumbosacral Pain Relief And Functional Improvement After Transforaminal Epidural Steroid Injection

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Abstract

Introduction: Transforaminal epidural injection with steroids has shown promise in improving the pain and functional ability in patients with radicular backache.

Aim: The aim of the study was to compare pain relief and improvement in the Oswestry disability index before and after transforaminal steroid injection.

Material and methods: The cross-sectional study enrolled 100 prospective patients with radicular backache from the year 2016 to 2018 at bone and joints hospital Srinagar Kashmir. After obtaining consent, Visual Analogue Scale (VAS) and the Oswestry disability questionnaire was explained and administered. All the patients received transforaminal epidural steroid injections. Both pre and post-injection, VAS and Oswestry disability measurements were obtained. Paired t-test was used to compare the outcomes before and after treatment.

Results: The VAS score at baseline showed a significant improvement [5.90 ± 1.22 vs 2.19 ± 1.29 (P<0.02)] after one hour and [5.90 ± 1.22 vs 2.23± 1.29 (P<0.02)] after six months of transforaminal steroid injection. The Oswestry disability index significantly improved from [32.89± 7.98 vs 11.32 ± 4.6 (P<0.01)] at one week and [32.89± 7.98 vs 16.1± 5.03 (P<0.02)] at six months of follow up.

Conclusion: Transforaminal steroid injections are effective in improving pain and functional scores in properly selected patients with radicular backache. Multi-centric larger studies are warranted to evaluate the long-term benefits of this procedure.

Keywords: Lumbo-sacral pain; Transforaminal; Steroid; Visual analogue score; Straight leg raise test

Introduction

Worldwide, pain in the lower back region is one of the common reasons for absenteeism from work affecting 80% of the population during their life span[1, 2]. Lumbo-Sacral nerve root (sciatica) pain is less common with a prevalence of 9.9% to 25% compared to low back pain. Sacral nerve root is characterized by back pain radiating up to the toes of the affected dermatome and is associated with varied neurological findings[3]. Sciatica leads to poor quality of life, consumes more health care resources and is associated with more pain and disability[4].

Mechanical compression, the release of neurochemical substances and inflammatory mediators are the various triggers of radicular pain in sciatica[1]. Although, the initial management of radiculopathy is similar to non-specific low back pain[5, 6], however, surgery and spinal injections are more specific for this group[4]. An epidural steroid injection can be achieved by transforaminal, caudal and interlamenar approaches. The transforaminal approach has the advantage of minimal risk of dural puncture, better delivery of medication at the site of involvement and increased spread in the epidural

space[7, 8]. Randomized clinical trials and reviews have reported transforaminal epidural steroid injection (TFESI) to be efficacious in radiculopathy[7, 9]. The current study evaluated pain relief and Oswestry disability index after transforaminal epidural steroid injection in patients with radiculopathy.

Patients And Methods

The study was conducted at bone and joints hospital Srinagar Kashmir. The study period extended from the year 2016 to the year 2018. The cross-sectional study enrolled one hundred prospective patients after fulfilling the inclusion criteria. Patients above 18 years of age, having low backache with pain radiation along a radicular distribution months who have failed conservative therapy for the last three months. Additional inclusion criteria included disc herniation on MRI and symptoms suggestive of sensory impairment in the affected limb. Patients with spinal deformity, degenerative spine, previous lumbar surgery, pregnancy and poorly controlled diabetes (HbA1c > 7) were excluded.

Pre-Procedure Preparation

All the patients of sciatica underwent radiographs of lower spine, lateral, flexion extension views and MRI spine. The baseline investigations included (CBC, KFT, Serum electrolytes of sodium and potassium, BT, CT) viral serology (HBV, HCV, and HIV) and HBA1c and fasting blood sugar in diabetics patients. After obtaining the informed consent, a peripheral line using 18 G cannula was secured and patient was reassured.

Procedure

All procedures were performed in operation theatre with monitors attached (NIBP, SPO2, ECG), resuscitation equipment's ready. The patient was put in prone position with pillow underneath the lower abdomen. Under the fluoroscopic guidance, the area was prepared by povidone iodine and draped in standard manner. Under all aseptic conditions the overlying skin around the target area was anesthetized with 2ml of 1% lidocaine. The level of epidural injection was determined by the MRI finding and physical examinations.

For Lumbar Roots

Under fluoroscopy guidance, 22 gauge spinal needle was advanced until contact was made with the lower edge of superior transverse process near the junction with superior articular process. The needle was retracted 1-2 mm and directed 6 ^{o}'clock position of the appropriate pedicle. The c-arm was then adjusted to lateral position to confirm needle position. The radiological position of the needle tip corresponded to the safe triangle in the sub-pedicular area. 1ml of iohexol was injected to produce peri-neurosheathogram. After an adequate dye pattern, a 2ml volume containing 1ml of triamcinolone and 1ml of 2% preservative free lignocaine was injected.

For S1 Root

The C-arm fluoroscopic beam was directed in cephalocaudal and lateral to medial direction (15 degree). The spinal needle was advanced in the same way as described above for lumber root until contact was made with sacral bone slightly lateral and inferior to S1-pedicle. The needle was walked off the sacrum and placed into the posterior S1-foramen to the medial edge of pedicle. The c-arm was adjusted laterally to confirm position. The dye and medication was injected in the same way as above.

Post-Procedure

After the completion of the procedure the patient was transferred to the recovery ward. The patient was assessed for pain relief and any motor and sensory deficit immediately and then 1hour after the procedure. One hour after the procedure the patient was assessed with special emphasis on pain relief, VAS, SLR and for other complications. The patient was discharged from recovery area 2 to 3 hours post procedure after meeting the discharging criteria of unaided walk, voiding his/her bladder without difficulty and an intact pre- injection neurological status. as at.

Ethics

This study protocol was approved by the institutional review board of Bone and joints hospital vide no 2334 dated 2020. The procedures involved in this study were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975 that was revised in 2013.

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Consent

All the participants consented to participate in this study. The purpose and procedures involved in the study was explained to every participant in the local language. The participants signed the consent form in the presence of two witnesses.

Statistical Analysis

Data analyses were carried out using SPSS® software for Windows (version 20.0, SPSS Inc, Chicago, IL, USA). The data were double-checked at entry. Frequencies and numbers were calculated. The outcome of VAS, ODI and SLR scores were recorded at baseline and after treatment. These scores are presented as mean and standard deviation. Paired *t*-test was used to compare outcomes before and after treatment. A *P*-value of < 0.05 was considered significant.

Results

Of the one hundred (100) patients enrolled, 55 (55%) were males and 45 (45%) were females. 33 (33%) were in the age of 41-50 years and 19 (19%) were in the age group of 51-60 years. The age range was between 20-60 years. 33 (33%) patients were having a sedentary lifestyle. 42 (42%) patients had symptoms of 3-6 months duration and 62 (62%) patients had involvement of the right side. In 72 (72%) patients, bending and in 52 (52%) patients, multiple factors were the common reasons for pain aggravation. Lateral disc herniation was observed in 84 (84%) cases. In 50 (50%) cases bulge was the most common finding (Table 1).

Table 1 Socio-demographic, clinical and radiographic features of the study population (n=100).

Characteristic	Number (n)	Percentage (%)
Gender		
Male	55	55
Female	45	45
Age group (years)		
< 30	27	27
31-40	21	21
41-50	33	33
51-60	19	19
Lifestyle		
Sedentary	33	33
Non-sedentary	67	67
Duration of symptom (months)		
3-6	42	42
6-9	28	28
9-12	19	19
12-18	6	6
>18	5	5
Side involved		
Right	62	62

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Left	38	38
Aggravating factors		
Bending	72	72
Walking	7	7
Standing	7	7
Coughing	8	8
Straining	4	4
Lying down	2	2
Multiple factors	52	52
Disc herniation		
Central	5	5
Lateral	84	84
Far Lateral	11	11
Type of herniation		
Bulge	50	50
Protrusion	42	42
Extrusion	8	8

The majority (91) patients received single, seven patients received two and two patients received three steroid injections respectively. The pre-injection/baseline SLR score of 56 ± 9.92, Visual Analogue scale score of 5.90 ± 1.22 and Oswestry disability index of 32.89± 7.98 were observed. The SLR score [56 ± 9.92 vs 84.3 ± 4.32(P<0.01)] and Visual Analogue scale score [5.90 ± 1.22 vs 2.19 ± 1.29 (P<0.02)] showed a significant improvement after one hour of injection respectively. Similarly, the Oswestry disability index improved significantly after one week and at six months of receiving the injection. (Table 2).

Table 2 Straight Leg Raise, Visual Analogue Scale and Oswestry disability index score before and after transforaminal steroid injection (n=100)

Outcome	Mean baseline	Mean after one hour/One week (ODI)	Sig	Mean after 6 months	Sig
Straight leg raise test	56 ± 9.92	84.3 ± 4.32	0.01*	70.89 ± 3.82	0.03*
Visual analogue Scale	5.90 ± 1.22	2.19 ± 1.29	0.01*	2.23± 1.29	0.02*
Oswestry disability index score	32.89± 7.98	11.32 ± 4.6	0.01*	16.1± 5.03	0.01*

*significant paired *t*-test

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Vasovagal reaction 6 (6%), disc entry 4 (4%), Intravascular entry in 2 (2%) respectively were the complications observed after transforaminal steroid injection.

Discussion

Low back pain with radiculopathy results from multiple degenerative diseases of the spine. In most cases these episodes are self-limiting and resolve over time, however, in some cases, it can recur and become chronic causing significant pain affecting the routine activities. Simple analgesics, muscle relaxants and physiotherapy help relieve pain in most adult patients. In a significant number of patients, pain becomes chronic rendering them partially or completely disabled[10]. Treatment options include conservative management, interventional procedures like steroid injections and surgery. Interventional procedures help in improving pain and function and help the patient to participate in physiotherapy programs[11].

This prospective study recruited 100 patients with low back pain with radiculopathy. We evaluated the outcome of transforaminal steroid injections for improvement in pain using VAS and the disability status. The majority (55%) of the patients were males and 67% of the study population were having a non-sedentary lifestyle. Our study runs in conformity with a study conducted by **Botwin et al.** and **Hee Sun Jeong et al.** concerning gender[12]. A recent systemic review has shown males and 30-50 years age group as important risk factors for disc prolapse[13]. The reason could be that the male gender is frequently involved in heavy work and visits the medical facility more frequently than females. Furthermore, radiculopathy was more frequent with a non-sedentary lifestyle highlighting heavy work as one of the many reasons for the condition. In addition, the study observed bending and coughing as the main aggravating factors of pain as both activities involve some degree of physical activity. Physical activity worsens nerve compression and results in pain aggravation. The majority of the cases in our study had a symptom duration of 3-6 months (42%) followed by 6-9 months (28%). These findings are consistent with a study conducted by Vipul L. Kuvad[14].

A significant baseline pain relief improvement of 2.19 ± 1.29 was observed on the Visual analogue scale at one hour and 2.23± 1.29 after 6 months after the injection. The Oswestry disability index dropped to 11.32 ± 4.6 from 32.95 ± 8.26 after one week of steroid injection. These findings run in conformity to the results of some previous studies on transforaminal epidural steroid injection for radicular pain [7, 15, 16]. Furthermore, our study revealed a long-term benefit of pain relief and improvement in functional status up to six months of follow up, findings consistent with other reports[16-18]. The current study also revealed that the success rate was higher among patients who received more than one injection, these findings get support from the works of Lutz et al. and Riew et al[19, 20].

In addition to the dose of steroid, clinician's expertise, proper patient selection, duration of symptom, intervention approach, use of fluoroscopy and patients' psychological issues undergoing such treatment are other factors that influence short and long-term outcomes of the transforaminal epidural steroid injections[21]. Our study used fluoroscopy in patients' radicular pain from disc herniation to ensure maximal benefits.

The lack of placebo or control groups is the limitation of this study, however, an earlier clinical trial has revealed the placebo as significantly ineffective. So, the placebo group absence does not affect the clinical validity of our results.

Conclusion

The fluoroscopic-guided transforaminal epidural steroid injection is very effective in controlling pain and improving functional scores in patients with lumbosacral radiculopathy secondary to disc herniations. The short-term benefits were promising, however, larger studies with longer follow-ups are required to evaluate the long-term benefits of this procedure.

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