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THE EFFICACY OF TRANSFORAMINAL EPIDURAL STEROID INJECTION (TFESI) IN SINGLE LEVEL LUMBAR DISC HERNIATION

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ABSRACT

Purpose: Aim of our study is to evaluate the effectiveness of transforaminal epidural steroid injection (TFESI) in patients who have radicular leg pain due to single level lumbar disc herniation and whose complaints did not regress with conservative treatment methods and do not require surgery.

Materials and Methods: 378 patients who were applied TFESI for radicular leg pain between March 2017 and May 2018 were analyzed retrospectively.

Results: The beginning VAS scores of patients were 8.35 ± 0,75. The VAS score regressed to 4.02±1.77, and 3.89±1,85 in third week and third month respectively after injection. ODI scores of patients regressed from the beginning value of 51.60 ± 6.14 to 28.22 ± 14.57 third week value after injection.

Conclusion: TFESI shows effective outcomes in pain reduction and functional improvement in patients with radiculopathy which is caused by lumbar disc herniation at short and middle-term follow-up period.

Keywords: Low back pain, radicular leg pain, transforaminal epidural steroid injection, epidural steroid injection

Level of Evidence: Retrospective clinical study, Level III

INTRODUCTION

Low back and radicular leg pain due to lumbar disc herniation are serious health problems can affect daily physical activities. Most of these patients respond to conservative methods like bed rest, anti-inflammatory drugs, muscle relaxants, physioterapy and corset. 5-8 % of the patients do not respond to these conservative methods [5,24].

Epidural steroid injection (ESI) is a minimal invasive treatment method for patients who did not get benefit from conservative treatments and do not require surgery [3]. Different methods can be applied for epidural steroid injection such as caudal, transforaminal or interlaminar. Transforaminal route is the most preferred one because of anatomical closeness to affected nerve root and need less medication dose [2]. Transforaminal epidural steroid injection (TFESI) is an effective treatment method that enables delivering medications to anterior epidural space via a spinal needle with guideless of fluoroscopy [6,13-14,16,21,23].

In this study, we aimed to evaluate the effectiveness of TFESI in patients who have radicular leg pain due to single level lumbar disc herniation and whose complaints did not regress with conservative treatment methods and do not require surgery.

Materials&Methods

378 patients who were applied TFESI for radicular leg pain between March 2017 and May 2018 at our clinic were analyzed retrospectively. The age of the patients was between 21 and 85. Written informed constents of all patients were taken before the procedure.

Patient Inclusion Criterias

Patients who have radicular leg pain at least one month and pain does not relieve

with conservative methods like medical and physical therapy, have single level disc herniation as bulging or protrusion at lumbar MRI scan and do not have neurological deficit are included to study.

Patients who have multiple level and extrude or sequester disk herniation's at lumber MRI scan, have neurological deficit in examination and need surgical intervention, have contraindicated situations like pregnancy, sepsis, coagulopathy, anticoagulant and antitrombositic drug use, have infection at needle entrance area, have lumbar disc surgery story and allergy story to drugs we use during treatment, have received this injection treatment before were not included to study.

TFESI Procedure

After venous cannulation, patients were taken prone position on operation table. After monetarization of blood pressure, pulse oximeter and ECG, lumbar procedure entrance area is covered following sterility rules after cleaning with iodine based antiseptic solution. After vertebra level determination with anterior-posterior (A-P) positioned C-armed fluoroscopy (GE Brivo OEC 785, Beijing, China), the fluoroscope was brought into an approximate 15-20 degree oblique position to obtain an image of intervertebral foramina at the level. At the same time care was taken to vertebral end plates are seen like one line. Then local anesthesia (1 mg, %1 lidocaine) was applied to entrance skin and subcutaneous region. TFESI was performed by using preganglionic approach which was described by Lee et al. [13-14].

After passing skin and subcutaneous tissues, quince 22 G 90 mm spinal needle (Egemen International, İzmir, Turkey) was guided into the intervertebral foramen. Fluoroscope was positioned laterally to confirm needle is in foramen. When sufficient depth had been reached and it was decided that the point of needle was in suitable position at the foramen fluoroscope was positioned A-P and 0,5 cc contrast solution (Omnipaque 300; iohexol, 300mg iodine/ml, Amsterdam Health, Princeton, NJ, USA) was injected to check typical anterior epidural spread (Figure 1).

When the contrast distribution to anterior epidural space was suspicious, needle was positioned again because of the possibility of intravascular injection. Procedure was stopped when contrast distribution was not appropriate again at the second injection. Mix solution of 40 mg (1 ml) methylprednisolone acetate (Depo-Medrol, Pfizer Ilac Ltd Sti, Luleburgaz, Kırklareli, Turkey) and 10 mg (2 ml) bupivacaine hydrochloride (Marcaine %0.5, Astra Zeneca, Istanbul, Turkey) were given slowly in 1-2 minutes to appropriate contests distributed patients. Patients were monitored 1-2 hours in the recovery room for the early signs of complications. Then the patients were discharged from hospital with control suggestions.

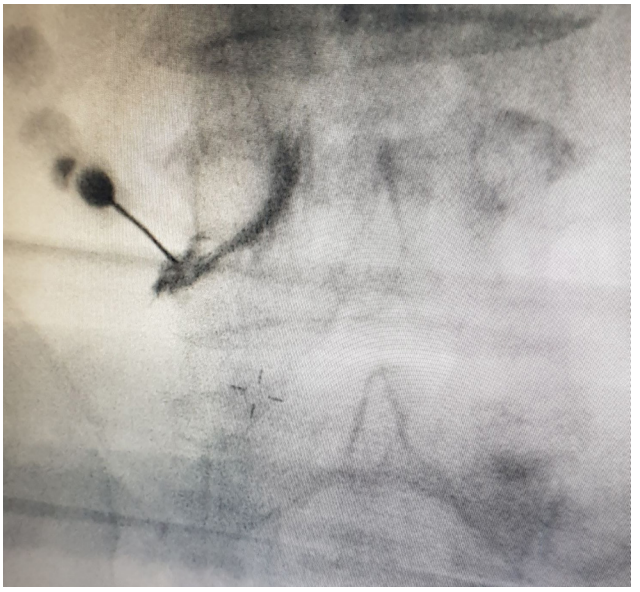

Figure-1. Contrast distrubition at anterior epidural space for showing nerve root trace.

Assessment protocol

Visual analog scale (VAS) of patients were assessed for pain score. VAS is a 100 mm straight horizontal line. The ends are defined as the extreme limits with 0 representing no pain and 10 representing the worst pain imaginable. Restriction changes of patients in daily routine activities were assessed with Oswestry Disability Index (ODI).

In this study we investigated the effectiveness of TFESI in single level lumbar disc herniation's with radicular leg pain by comparing VAS and ODI scores between pre-injection (VAS-0) (ODI-0), third week (VAS-3w) (ODI-3w), third month (VAS-3m) (ODI-3m) and sixth month (VAS-6m) (ODI-6m) after injection.

Statistical Analysis

Descriptive statistics were used for continuous variables (mean, standard deviation, minimum, maximum, median). The paired t-test was used to compare the pre-injection and post-injection results of average pain. A probability (p) value of <0.05 was considered statistically significant. All statistical analyses were performed using the IBM, SPSS Statistics version 22 (IBM corp. 2013).

RESULTS

378 patients were involved to our study in 14 months. 13 patients required surgery because of neurogical deterioration

during the follow-up period. 3 patients were removed from the study due to suspicion of intravascular injury by needle malposition and 25 patients did not come to control. Demographic datas and beginning VAS and ODI scores did not show statistically significant difference between study group and the patients who were removed from study. A total of 337 patients were included in the study. 138 (% 40.9) of the patients were male, 199 (% 59.1) of the patients were female and the mean age was 46,28 ± 11,67 years. Lumbar disc herniation was detected at L4-5 level most frequently (Table-1). There was no significant difference in VAS/ODI scores according to the level of lumbar disc herniation.

Table-1. Demographics and clinical data of study population (n=337)

		Male (n=138, 40.9 %)	Female (n=199, 59.1 %)
Age		45.33 ± 11.5	47.11 ± 11.7
Level	**L3-L4**	6 (4.34 %)	6 (3.01 %)
	L4-L5	77 (55.79 %)	139 (69.84 %)
	L5-S1	55 (39.85 %)	54 (27.13 %)

Evaluation after TFESI

VAS and ODI scores at the beginning and 3 week, 3 months, 6 months after injection were assessed. These VAS and ODI scores are shown at **Table-2**. We found that the beginning VAS scores of patients were 8.35±0,75. The VAS score regressed to 4.02±1.77, and 3.89±1,85 in third week and third month respectively after injection. This regression in VAS score was found to be statistically significant (p=0.001).

At the same time, it was shown that ODI scores of patients regressed from the beginning value of 51,60±6,14 to 28,22±14,57 third week value after injection. This regression between this time period was statistically significant (p=0.001). In contrast to the third month VAS score, the third month ODI score was found to be minimally increased when compared to the third week results (Table-2). But this ODI changes between 3 week and 3 month wasn`t found to be statistically significant (p=0.073).

DISCUSSION

In our study, the regression of third week and third month VAS and ODI scores were found statistically significant than pre-injection scores. Sixth month VAS and ODI scores were seen close to pre-injection scores. These results showed that, TFESI is an effective treatment at short and middle term but the efficacy of TFESI is decreasing at long term.

Generally, it is considered that radicular leg pain is related with direct nerve root pressure by herniated intervertebral disc in lumbar disc herniations [22,25]. Although mechanical press to nerve root leads to local axonal injury and ischemia, disc damage related inflammatuar mediator releases are important impacts which were shown in many studies [10]. Degenerated disc especially nucleus pulposus is biologically active tissue and can trigger inflammatory process [11]. After inflammatory mechanisms are shown to be play an important role in the radicular leg pain pathophysiology in lumbar disc herniations as well as mechanical nerve root press, the reason of ESI is explained [1]. Because of being minimal invasive rather than surgery, epidural steroid injections are used in treatment of appropriate patients who don't answer conservative methods [4,16,18,20].

Although TFESI is a minimal invasive treatment, it is not totally safe because of side effects and complications. Major complications are death, paraplegia, discitis, nerve injury, spinal cord infarct, dural sac injury and intrathecal or vascular injection [4,7,9,15]. In addition, minor complications are increasing headache, dizziness, nausea and vomiting [8,17]. In our study we did not see any major complications but dizziness, nausea and vasovagal reaction were detected in 18 patients in our study.

Table-2. Comparison of the results of TFESI between pre-post injection. VAS: visual analog scale, ODI: Ostwestry disability index

	Pre-Injection	**Post-Injection**			**p**
		3 weeks	**3 months**	**6 months**	
VAS	8.35(0.75)	4.02 (1.77)	3.89 (1.85)	7.2 (0.94)	0,001
ODI	51.3 (6.14)	29.09 (14.36)	30.69 (12.76)	48.65 (5.69)	0,001

The effectiveness of TFESI differs at some studies. Although there are some studies which show TFESI is effective more than 6 month [19, 23], some of the other studies show TFESI is effective in first 3 months and then rebound effect starts [12]. In our study, we observed this treatment is effective up to 3 months, but the effect of TFESI decreases in 3-6 months period by looking VAS and ODI scores. So there was similar rebound effect like some other studies.

Our study had some limitations. The study was not prospective and there was no control group. Only lumbar disc herniation patients were included to study. The other reasons of radicular leg pain like spinal stenosis, spondylolisthesis and multilevel disc herniation could be included study for more effective results. Further studies will be needed for these. But we consider we gave important information's about the effectiveness of TFESI in a wide patient population.

Conclusion

Our study found that; TFESI shows effective outcomes in pain reduction and functional improvement in patients with radiculopathy which is caused by lumbar disc herniation at short and middle-term follow-up period.

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