

## EFFICACY OF TRANSFORAMINAL EPIDURAL STEROID INJECTION IN LUMBOSACRAL RADICULOPATHY

Saheel Majid<sup>1</sup>, Dinesh K. Yadav<sup>2</sup>, Suhail M. Vakil<sup>3</sup>, Zameer Ali<sup>4</sup>, Tauseef A. Bhat<sup>5</sup>, Ayaz Ali<sup>6</sup>, Shafaqat Rashid<sup>7</sup>, Shabir A. Dhar<sup>8</sup>

<sup>1</sup>Associate Professor, Department of Orthopaedics, SKIMS Medical College, Bemina, Srinagar.

<sup>2</sup>Post Graduate, Department of Orthopaedics, SKIMS Medical College, Bemina, Srinagar.

<sup>3</sup>Registrar, Department of Orthopaedics, SKIMS Medical College, Bemina, Srinagar.

<sup>4</sup>Registrar, Department of Orthopaedics, SKIMS Medical College, Bemina, Srinagar.

<sup>5</sup>Registrar, Department of Orthopaedics, SKIMS Medical College, Bemina, Srinagar.

<sup>6</sup>Registrar, Department of Orthopaedics, SKIMS Medical College, Bemina, Srinagar.

<sup>7</sup>Registrar, Department of Anaesthesia, SKIMS Medical College, Bemina, Srinagar.

<sup>8</sup>Assistant Professor, Department of Orthopaedics, SKIMS Medical College, Bemina, Srinagar.

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### ABSTRACT

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#### BACKGROUND

Lumbosacral radiculopathy is a common medical and socioeconomic problem with a lifetime prevalence estimated to be around 40%-60%. In 1930, Evans reported that sciatica could be treated by epidural injection. The use of epidural corticosteroid injection for the treatment of axial and radicular back pain was first reported in 1953. Lumbar Transforaminal Epidural Steroid Injections (TFESIs) are performed to provide symptomatic relief in patients with radicular pain. A transforaminal epidural steroid injection (TFESI) using a small volume of local anaesthetic will anaesthetize the spinal nerve and also partially anaesthetize the dura, the posterior longitudinal ligament, the intervertebral disc and facet joint. For these reasons, fluoroscopy-guided TFESI has become the preferred approach to epidural space.

#### AIMS AND OBJECTIVES

To study the role of transforaminal epidural steroid injection in management of radiculopathy.

#### SETTINGS AND DESIGN

This prospective study was conducted in the Department of Orthopaedics, SKIMS Medical College and Hospital, Bemina, Srinagar, J and K, India, for a 2-year period from November 2012 to October 2014; 110 cases, both male and female in the age group of 20-60 years having back pain with radiculopathy of varied types and duration without neurodeficit were enrolled in the study.

#### MATERIALS AND METHODS

After selecting a patient for giving transforaminal block, we used a local anaesthetic (2% Xylocaine). Contrast media, e.g. Iohexol was used to demarcate the correct positioning of the needle. A spinal needle (20-25 gauge) and 5mL syringe were used to deliver the drug.

#### CONCLUSION

Transforaminal epidural steroid injections with long acting anaesthetic is an excellent form of conservative treatment in management of low back ache with radicular pain. It is relatively safe, simple, economical and shortens the time of recovery from severe pain, avoids risks and complications of surgery and also avoids long periods of bed rest.

#### KEYWORDS

NSAID-Non-Steroidal Anti-Inflammatory Drugs, TFESI-Transforaminal Epidural Steroid Injection, SLRT-Straight Leg Raising Test, VAS-Visual Analogue Score, SNRB-Selective Nerve Root Block.

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#### INTRODUCTION

Low back pain combined with radicular pain remains one of the most challenging musculoskeletal problems for therapeutic management in modern society.<sup>1</sup>

This malady results from nerve root impingement and/or inflammation that causes neurologic symptoms in the

distribution of the affected nerve root(s). Lumbosacral radiculopathy is a common medical and socioeconomic problem with a lifetime prevalence estimated to be around 40%-60%.<sup>2,3,4</sup> Several methods of treatment for radiculopathy have been discussed in literature. These include conservative methods like rest, manipulation, NSAIDs, opioids and surgeries like Laminectomy, Laminotomy and Fenestration procedures. The treating Orthopaedist is left with little room to manoeuvre between purely conservative and surgical methods.

In 1930, Evans reported that sciatica could be treated by epidural injection. The use of epidural corticosteroid injection for the treatment of axial and radicular back pain was first reported in 1953.<sup>5</sup>

Lumbar transforaminal epidural steroid injections (TFESIs) are performed to provide symptomatic relief in

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Corresponding Author:

Dr. Suhail Maqbool Vakil,

R/O: B-12, Budshah Nagar,

Natipora, Srinagar-190015.

Jammu & Kashmir, India.

E-mail: suhailvakil1@yahoo.com

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patients with radicular pain.<sup>6,7</sup> Radicular pain manifests when adhesions and inflammation in the epidural space stimulate nerve roots. Steroid containing injections are thought to reduce pain due to their anti-inflammatory properties and membrane stabilising effects. They have also been proved to be effective as a non-surgical option.<sup>8,9</sup> The goal is to deliver steroids and anaesthetics into the epidural space around the spinal nerves and other spinal structures. A transforaminal injection is an approach towards the epidural space via the intervertebral foramen where the spinal nerves exit.<sup>10,11,12,13</sup> The epidural space has been accessed inferiorly through the caudal approach or posteriorly through the inter laminar approach.

A transforaminal epidural steroid injection (TFESI) using a small volume of local anaesthetic will anaesthetize the spinal nerve and also partially anaesthetize the dura, the posterior longitudinal ligament, the intervertebral disc and facet joint.<sup>14</sup> For these reasons, fluoroscopy-guided TFESI has become the preferred approach to epidural space.

Fluoroscopically guided transforaminal injection serve as an important tool in the non-surgical management of lumbosacral radiculopathy secondary to herniated nucleus pulposus.

#### AIMS AND OBJECTIVES

To study the role of transforaminal epidural steroid injection in management of radiculopathy.

#### MATERIALS AND METHODS

This prospective study was conducted in the Department of Orthopaedics, SKIMS Medical College and Hospital, Bemina, Srinagar, J and K, India, for a 2-year period from November 2012 to October 2014; 110 cases, both male and female in the age group of 20-60 years having back pain with radiculopathy of varied types and duration without neurodeficit were enrolled in the study.

The patients were assessed in terms of gait, posture, onset, duration, radiation and character of pain. The patients were subjected to thorough history, physical examination and a detailed neurological examination. The patients underwent various clinical tests followed by radiological investigations like X-rays and MRI to support our diagnosis, which was formulated on clinical basis. Patients also underwent tests like Bleeding Time (BT), Clotting Time (CT) to rule out any bleeding disorders. All these tests were done on OPD basis and the patients did not require hospitalisation. The required block was given in Operation Theatre under C-arm guidance.

#### Inclusion Criteria

1. Leg pain greater than back pain.
2. Symptoms greater than 6 weeks.
3. MRI documented herniated nucleus pulposus.
4. Less than 50% narrowing of the intervertebral foramen.
5. Constant radicular pain without sensory or motor deficit.

#### Exclusion Criteria

1. Back pain with neurodeficit.
2. Acute pain of less than 2 weeks' duration.
3. Any bleeding disorders.
4. Patient on anticoagulants.

5. Back pain due to massive disc.
6. Previous surgery.
7. Severe central or foraminal stenosis.
8. Progressive neurodeficit.
9. Prior epidural steroid injection.

#### MATERIALS USED

After selecting a patient for giving transforaminal block, we used a local anaesthetic (2% Xylocaine). Contrast media, e.g. Iohexol was used to demarcate the correct positioning of the needle. A spinal needle (20-25 gauge) and 5mL syringe were used to deliver the drug.

#### PROCEDURE

The patient was placed prone on the radiolucent operative table. The area of injection was prepared with isopropyl alcohol and povidone-iodine several segments above and below the interspace to be injected. The patient was draped in a sterile fashion. Under antero-posterior fluoroscopic guidance, the target interspace was identified. The soft tissues over the lateral border and the midway between the two adjacent transverse processes at the target interspace were anaesthetized with Xylocaine 2%. A 4<sup>3/4</sup> inch, 22-gauge spinal needle was taken and advanced within the anaesthetized soft tissue under fluoroscopy until contact was made with the lower edge of superior transverse process near its junction with superior articular process. The spinal needle was retracted 2-3mm and redirected towards the base of appropriate pedicle and advanced slowly to the 6'o clock position of the pedicle under fluoroscopy. The C-arm was adjusted to the lateral position to confirm the position. Then we returned C-arm to the AP view. The stylet was removed. 1mL of non-ionic contrast was injected slowly to produce a perineurosheathogram. After an adequate dye pattern was observed, a 2mL volume containing 1mL of 2% preservative free Xylocaine and 1-2mL of dexamethasone was injected.

The S1 nerve root when required was also injected using the transforaminal approach. After placing and preparing the patient as above, the C-arm was directed so that the fluoroscopic beam would be in a cephalocaudal and lateral to medial direction and the anterior and posterior S1 foramina are aligned. The soft tissues and dorsal aspect of sacrum were anaesthetized with 2-3mL of 2% preservative free Xylocaine without epinephrine. A 22-gauge spinal needle was inserted and advanced within the anaesthetized soft tissue tract under fluoroscopy until contact was made with the posterior sacral bone slightly lateral and inferior to S1 pedicle. The spinal needle was walked off the sacrum into the posterior S1 foramen to the medial edge of pedicle. The C-arm was adjusted to a lateral projection to confirm the position and then returned to the anteroposterior view. The stylet was removed; 1mL of non-ionic contrast (Iohexol) was injected slowly to produce a perineurosheathogram. After an adequate dye pattern of S1 nerve root was obtained, a 2mL volume containing 1mL of 2% of preservative free Xylocaine and 1-2mL of dexamethasone was injected.



**Fig. 1: Injection given between L4-L5 (AP view)**



**Fig. 3: Injection given between L4-L5 (Lateral view)**



**Fig. 2: After Injection of dye**



**Fig. 4: After Injection of dye**

After the procedure, the patients usually were observed for numbness in the dermatome supplied by the injected spinal nerve. Sometimes muscle weakness occurred in accordance with the innervations pattern.

All patients were put on a standardized program of physical therapy, which included procedures for local pain relief and reconditioning exercises for spinal muscle for at least 6 weeks after the procedure.

#### **FOLLOWUP AND ASSESSMENT**

Followup of patients was done at 1-week, 1-month and 6 months following the procedure. Assessment was done on the basis of following criteria:- Findings based on clinical examination. -modified Oswestry low back pain disability index,<sup>15,16,17</sup> -visual analogue score. -modified Macnab score,<sup>15,16,17</sup>

## DISCUSSION

In our study, 100 patients were taken for TFESI in the age group of 20-60 years. The mean duration of low back pain with radiculopathy was 17 months.

There were a total of 53 males and 47 females, which is a male percentage of 53% and a female percentage of 47%. This study shows that prevalence of low back pain with radiculopathy is more common in men because of their non-sedentary lifestyle in this part of the world as against the study of Hee Sung Jeong, et al. (2007), which shows female dominance (106 male and 133 females; mean age 49.8 years; range 13-82 years of age).<sup>18</sup>

SLRT: The average pre-injection SLR was 59.20°. There was a significant improvement in all the patients post injection as average SLR went up to 85.35° ( $p < 0.001$ ), standard deviation pre-injection SLR was 9.96 and post injection SLR was 4.56, hence it is proved that results following TFESI are excellent.

### Visual Analogue Score (Pain)

The average pre-treatment score was 5.51 and post treatment showed significant improvement following the procedure with score coming down to 1.63 ( $p < 0.001$ ) and standard deviation pre-injection was 1.16 and post injection was 0.88 at the end of third followup at 3 months. These results are comparable with the studies of Vad VB, Bhat et al. (1976).<sup>12</sup> who demonstrated successful outcome (Both pain radiation and improved function) in 84% of the patients. Another study by Ahadian, Farshad et al. shows that at the 12<sup>th</sup> post injection week VAS scores declined to 26.6%.

### Modified Oswestry low back pain disability questionnaire score (Functional disability)

The average pre-treatment score was 32.12 patients with TFESI, which improved to 10.80 post treatment ( $p < 0.001$ ), standard deviation pre-injection was 3.05 and standard deviation post injection was 2.59. This clearly shows that these procedures improve the functional ability in a person significantly though there is not much difference between the first and the last followup. These findings are statistically significant. The findings are comparable to J. Tudell RA (2001) who reported results of SNRB in 36 patients on the basis of various parameters on pain relief. Our study compares with Kawu, et al. (2012) who reported pre-injection ODI mean 31.2 and post injection ODI mean 12.2 ( $p < 0.01$ ).<sup>19</sup>

### Modified Macnab Scale

Approximately 63% of the patients had excellent, 33% good, 3% fair and 1% poor outcomes based on modified Macnab criteria.

## COMPLICATIONS

Vasovagal reactions occurred in 4% patients. The observation is in consonance with David J. Kennedy, et al. (2013).<sup>20</sup> who reported an incidence of 3.6% vasovagal reaction in their study. Another study done by Karaman, et al. reported a vasovagal reaction in 8.7% patients.<sup>21</sup>

Intravascular injection in 5% patients. The complication rate compares favourably well with the study of Karaman H, et al. (7.4% intravascular injection rate in their study).<sup>21</sup>

Disc entry was noted in 2% patients, which was noticed by the spread of medications to structures outside of the intended epidural target. Finn and Case, et al. (2005).<sup>22</sup> recounted a case of disc entry as a complication of transforaminal injection. Hong JH, et al. (2013).<sup>23</sup> published the overall incidence of Intradiscal injection to be 2.4%.

Nerve trauma, manifested by severe pain was noted in 3% patients. Bogduk et al. (2004) also reported this complication in their study without mentioning the percentage.<sup>24</sup>

## CONCLUSION

Transforaminal epidural steroid injections with long acting anaesthetic is an excellent form of conservative treatment in management of low backache with radicular pain. It is relatively safe, simple, economical and shortens the time of recovery from severe pain, avoids risks and complications of surgery and also avoids long periods of bed rest.

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