

**Research Article**
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## Therapeutic Role of Transforaminal Steroid Injection for the Management of Radicular Pain: Survival Rate in Patients with Radicular Pain Secondary to Degenerative Lumbar Pathology

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### ABSTRACT

**Background:** The effectiveness of transforaminal epidural steroid injection (TFESI) as a therapeutic tool for radicular pain (RP) in the short term has been demonstrated, however, in the medium or long term it is controversial.

**Objectives:** The objective of this work is to evaluate its usefulness as a therapeutic tool through survival analysis.

#### Study Design:

**Method:** Retrospective evaluation of 93 patients with RP secondary to degenerative pathology (DP) of the lumbar spine, submitted to TFESI, by the same spine surgeon, analyzing demographic variables and clinical results according to McNab score, as well as analysis of survival rate of TFESI using Kaplan Meier curve.

**Results:** Of the 93 patients, 59% was male and 41% female, with a mean age of 64 years, with an average follow-up of 27 months. The most frequently infiltrated level was L4-L5 (55.9%) and sciatica was the most common symptom (88.1%) of the patients. The most frequent diagnosis found was disc herniation in 51.6%. 87% of the patients reported improved their symptoms according to the McNab Score, indicating excellent, good or fair results. Only 12.9% indicates poor results. 12.9% of the patients required surgery or a second TFESI within the first three months. The survival rate obtained in our study was of 81% at 51 months.

**Conclusion:** The results obtained in our study showed favorable results with a survival rate of 81% at 51 months for the TFESI, suggesting its efficacy for the management of RD in the medium and long term, thus being able to avoid more invasive procedures with their potential risks.

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### Introduction

Approximately 40% of cases of low back pain are associated with radicular pain (RP), which is defined as pain of dermatomeric

distribution in the leg secondary to compression or inflammation of a lumbosacral spinal nerve root (radiculopathy) due to degenerative pathology (DP) that up to 90% are due to intervertebral disc prolapse [1, 2].

The injection of steroids into the epidural space of the lumbar spine is a diagnostic and therapeutic modality for RP that involves

the administration of this drug, associated or not with a local anesthetic, through three different routes; caudal (through the base of the spine), interlaminar (through the posterior region) or transforaminal (through the nerve foramen, adjacent to the disc) [3]. Although this method has demonstrated its usefulness as a short-term therapeutic procedure, its efficacy in the medium or long term is controversial [4, 5].

The objective of this study is to assess the usefulness as a therapeutic tool of the transforaminal epidural steroid injection (TFESI) in the lumbar region in patients with RP, secondary to DP, by means of an analysis of their survival rate.

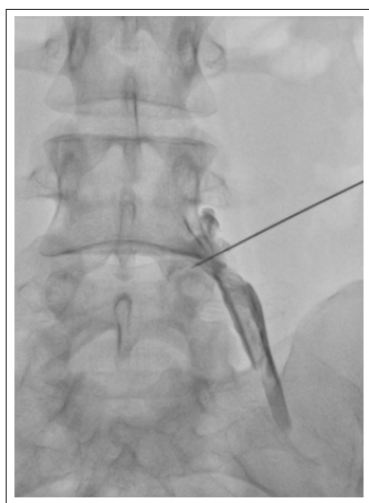
**Method**

Retrospective evaluation of 93 patients with RP undergoing IETF, by the same experienced spine surgeon, between April 2016 and January 2020.

Patients older than 18 years old with RP secondary to DP (e.g., degenerative disc disease, herniated disc, facet arthropathy and / or degenerative spondylolisthesis) who developed foraminal and / or recess stenosis at the lumbar level, diagnosed by magnetic resonance imaging, and who had a period of minimum follow-up of 6 months were included. Patients who presented a significant motor deficit ( $\leq$  M3), spondylolisthesis grade 2 or greater (according to Meyerding’s classification), symptomatic multilevel radiculopathy, concomitant pathology of non-degenerative origin, peripheral neurological disease and / or psychiatric pathology were excluded.

In all cases, the IETF was indicated after the lack of response with conservative treatment (oral analgesia and physical therapy) for at least 3 months.

The same steroid solution (3 mg of Betamethasone Acetate) was applied to all patients, through percutaneous and transforaminal route guided under fluoroscopy in anteroposterior and lateral projection and prior to confirmatory radiculography with contrast agent (Fig. 1), according to standardized technique.



**Figure 1:** Intraoperative image of confirmatory radiculography prior to steroid injection

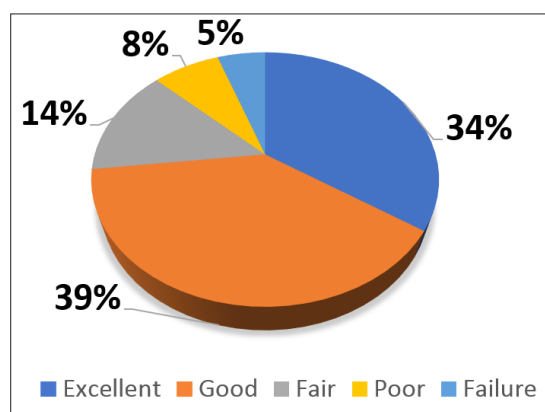
Demographic data of the sample were collected from the clinical record, as well as the clinical results reported by the patients based on the McNab score. TFESI’s survival rate was analyzed using a Kaplan Meier curve, considering as event or failure; surgery or the requirement of a new TFESI in the short term (1 to 3 months).

**Results**

Of the 93 patients analyzed in our study, 59% (n: 55) of the sample was male and 41% (n: 38) female, with a mean age of 64 years (range: 20-91 years) at the moment of the intervention and with an average follow-up of 27 months (range: 6.7 - 51.1).

The most frequently infiltrated level was L4-L5, representing 55.9% (n: 52) of the sample, followed by segment L5-S1 in 31.18% (n: 29) and L3-L4 in 9, 6% (n: 9). Sciatica was the most common symptom, present in 88.1% (n: 82) of the patients. The most frequent diagnosis found was disc herniation in 51.6% (n: 48), followed by degenerative disc disease associated with variable degrees of spondyloarthritis in 24.7% (n: 23) and degenerative spondylolisthesis in third place, representing 16.1% (n: 15).

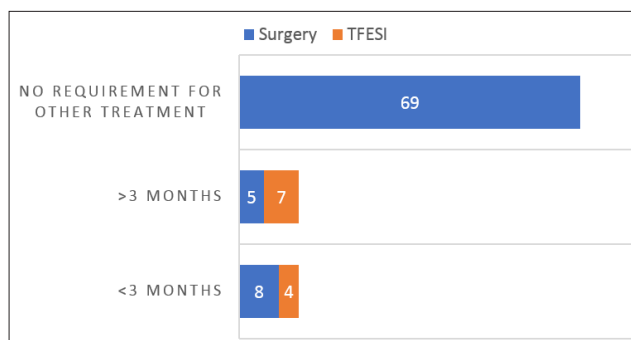
87% (n: 81) of the patients reported having improved their symptoms according to the McNab Score after the TFESI, indicating excellent, good or fair results and only 12.9% (n: 12) poor results, at the end of the period follow-up. (Graph 1)



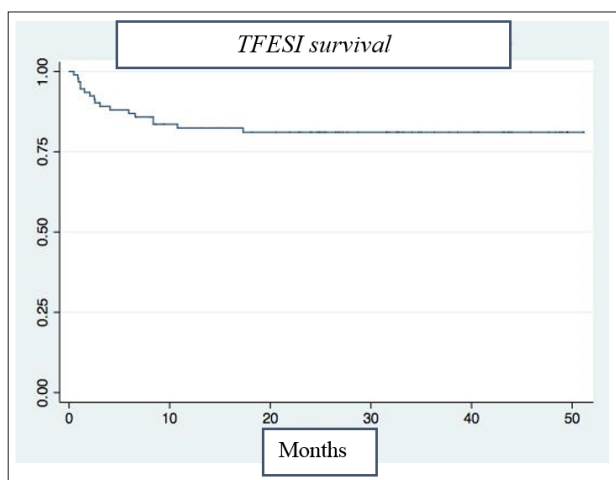
**Graph 1:** Patients reported outcomes according to the McNab Score

Of the total sample, 12 patients (12.9%) required surgery or a second TFESI within the first three months after the procedure was performed, interpreting these as “failure”. During the period after the first three months to one year, 5 subjects opted for a surgical resolution and 7 for a second TFESI, of which none underwent surgery. No patient underwent a third TFESI (graph 2). The survival rate obtained in our study was of 81% at 51 months, in patients with RP secondary to lumbar DP. (Graph 3)

No complications were reported in relation to the procedure.



**Graph 2:** Patients who did not require another intervention compared to those who did (either surgery or new TFESI) within the first 3 months or after this



Graph 3: TFESI survival according to Kaplan-Meier curve

### Discussion

The TFESI is a popular technique in the management of patients with RD, which has shown good results in the short and medium term and even suggesting an ability to avoid more invasive procedures [6-10].

Carried out a prospective, randomized, double-blind study, in which they found that the survival rate of TFESI reached one year, allowing to avoid surgery during this period of time in 29 of the 55 patients evaluated under a diagnosis of spinal stenosis and disc herniation, also demonstrating the superiority of the use of corticosteroids versus their control group with bupivacaine [11]. In 2006, these same authors evaluated the long-term results, performing a 5-year follow-up in these 29 patients who had avoided surgery, where of the 21 who returned for follow-up, only 4 had chosen to proceed with surgery, while the remaining 17 presented significant improvement in their symptoms [12].

In the study with a follow-up period also of 5 years, but with a more homogeneous sample composed of 39 patients with RP secondary to herniated disc, they found a high rate of success in the short-term (6 months), but it worsened at the end of the follow-up period, showing that 48.7% of the patients (n:19) had required surgery [13, 14]. In a contradictory way, another study with similar methodological characteristics (evaluation of 50 patients with RP secondary to herniated disc with a follow-up period of 5 years) showed that almost 25% of the patients undergoing TFESI had a complete resolution of pain, 60% mild persistence ( $VAS \leq 2$ ) and only 8% had required surgery [15].

The meta-analysis and systematic review by Bicket et al. found only a trend towards a reduction in surgical incidence in patients undergoing TFESI, only up to one year after the procedure and not beyond that [16].

Similarly, the meta-analysis published by the International Anesthesia Research Society, in 2016 showed that, out of 6 analyzed studies, only one demonstrated a significant reduction of surgical intervention in patients, also adding that these patients presented short follow-up periods that made it impossible to determine the actual survival rate of the TFESI's and their impact on the incidence of surgery [17].

Based on the available literature, the long-term TFESI's survival rate and effectiveness is debatable and contradictory. Several clinical variables such as duration and intensity of symptoms, and /

or radiological variables such as presence of osteophytes, location, size and type of disc prolapse, could influence the results obtained, perhaps justifying this disparity. In addition, the etiological cause of RP plays a role in the results of this procedure. Considering that most of the studies are carried out in patients with herniated disc and that the effects of steroids last from days to weeks, to attribute the clinical improvement in the medium- and long-term exclusively to the TFESI, would be an error [18]. Rather, this would represent the natural course of the pathology [12, 19-21]. However, the significant decrease of pain, especially during the acute period, might provide adequate conservative management, allowing for the natural and benign course of the pathology, not only from the herniated disc, but from the rest of the DP, and thus avoiding more invasive procedures such as surgery, which present a higher risk of complications, without offering better long-term outcomes [13, 22, 23].

We believe that our group of cases represents a valid image, regarding the usefulness and survival rate of the TFESI in patients with RP secondary to DP, however, the present study is not exempt from limitations such as its design, a retrospective review of medical records and therefore not blinded. The sample itself is made up of patients with different pathologies of the lumbar spine, thus being a non-homogeneous sample, in which an analysis performed according to subgroups of pathologies was not conducted either, which could have modified the results obtained. Finally, the absence of a control group prevented us from conducting a comparative analysis, as well as evaluating the placebo effect or the natural course of the pathology.

### Conclusion

The results obtained in our study show a survival rate of 81% at 51 months in this case series, along with favorable results (good and excellent) reported by patients in almost all the sample (87%) for TFESIs, suggesting that this procedure is effective in relieving symptoms for a sufficient period of time so that patients, in whom pain would have resolved naturally, can avoid major procedures and their potential risks.

This gives us an objective result that supports our conduct of performing TFESI for the management of RP secondary to DP in the absence of a formal indication for surgery.

### References

1. Ropper AH, Zafonte RD (2015) Sciatica. *N Engl J Med* 372: 1240-1248.
2. Konstantinou K, Dunn KM (2008) Sciatica: review of epidemiological studies and prevalence estimates. *Spine (Phila Pa 1976)* 33: 2464-2472.
3. Cohen SP, Mark C Bicket, David Jamison, Indy Wilkinson, James P Rathmell (2013) Epidural steroids: a comprehensive, evidence-based review. *Reg Anesth Pain Med* 38: 175-200.
4. Tak HJ, Jones R, Cho YW, Eun-Hyuk Kim, Sang-Ho Ahn (2015) Clinical evaluation of transforaminal epidural steroid injection in patients with gadolinium enhancing spinal nerves associated with disc herniation. *Pain Physician* 18: 177-185.
5. Kennedy DJ, Levin J, Rosenquist R, Virtaj Singh, Clark Smith, et al. (2015) Epidural steroid injections are safe and effective: multisociety letter in support of the safety and effectiveness of epidural steroid injections. *Pain Med* 16: 833-838.
6. MacVicar J, King W, Landers MH, Bogduk N (2013) the effectiveness of lumbar transforaminal injection of steroids: a comprehensive review with systematic analysis of the published data. *Pain Med* 14: 14-28.

7. Chou R, Robin Hashimoto, Janna Friedly, Rongwei Fu, Christina Bougatsos, et al. (2015) Epidural Corticosteroid Injections for Radiculopathy and Spinal Stenosis: A Systematic Review and Meta-analysis. *Ann. Intern. Med* 163: 373-381.
8. Jeong HS, Joon Woo Lee, Sung Hyun Kim, Jae Sung Myung, Joo Hyung Kim, et al. (2007) Effectiveness of Transforaminal Epidural Steroid Injection by Using a Preganglionic Approach: A Prospective Randomized Controlled Study. *Radiology* 245, 584-590.
9. Cyteval C, N Fescquet, E Thomas, E Decoux, F Blotman, et al. (2006) Predictive factors of efficacy of periradicular corticosteroid injections for lumbar radiculopathy. *AJNR Am. J. Neuroradiol* 27: 978-982.
10. Oliveira CB, Maher CG, Ferreira ML, Hancock MJ, Oliveira VC, et al. (2020) Epidural corticosteroid injections for lumbosacral radicular pain (Review). *Cochrane Database of Systematic Reviews* 4: CD013577.
11. Riew KD, Yin Y, Gilula L, Bridwell KH, Lenke LG, et al. (2000) The effect of nerve-root injections on the need for operative treatment of lumbar radicular pain. A prospective, randomized, controlled, double-blind study. *J Bone Joint Surg Am* 82: 1589-1593.
12. K. Daniel Riew, Jong-Beom Park, Yong-Sun Cho, Louis Gilula, Alpesh Patel, et al. (2006) Nerve Root Blocks in the Treatment of Lumbar Radicular Pain. A minimum five-year follow-up. *The Journal of Bone & Joint Surgery* 88: 1722-1725.
13. DJ Kennedy, PZ Zheng, M Smuck, ZL McCormick, L Huynh, et al. (2018) A minimum of 5-year follow-up after lumbar transforaminal epidural steroid injections in patients with lumbar radicular pain due to intervertebral disc herniation. *Spine J* 18: 29-35.
14. Kennedy DJ, Christopher Plastaras, Ellen Casey, Christopher J Visco, Joshua D Rittenberg, et al. (2014) Comparative effectiveness of lumbar transforaminal epidural steroid injections with particulate versus nonparticulate corticosteroids for lumbar radicular pain due to intervertebral disc herniation: a prospective, randomized, double-blind trial. *Pain Med* 15: 548-555.
15. Jang SH, Chang MC (2020) Follow-up of at least five years after lumbar transforaminal epidural steroid injection for radicular pain due to lumbar disc herniation. *Ann Palliat Med* 9: 116-118.
16. Bicket MC, Gupta A, Brown CH IV, Cohen SP (2013) Epidural injections for spinal pain: a systematic review and meta-analysis evaluating the “control” injections in randomized controlled trials. *Anesthesiology* 119: 907-931
17. Anuj Bhatia, David Flamer, Prakesh S Shah, Steven P Cohen (2016) Transforaminal Epidural Steroid Injections for Treating Lumbosacral Radicular Pain from Herniated Intervertebral Discs: A Systematic Review and Meta-Analysis. *Anesth Analg* 122: 857-870.
18. Schneider B, Zheng P, Mattie R, Kennedy DJ (2016) Safety of epidural steroid injections. *Expert Opin. Drug Saf* 15: 1031-1039.
19. Atlas SJ, Deyo RA, Keller RB, AM Chapin, DL Patrick, et al. (1996) The Maine Lumbar Spine Study, Part III. 1-year outcomes of surgical and nonsurgical management of lumbar spinal stenosis. *Spine (Phila Pa 1976)* 21: 1787-1795.
20. Atlas SJ, Keller RB, Chang Y, Deyo RA, Singer DE (2001) Surgical and nonsurgical management of sciatica secondary to a lumbar disc herniation: five-year outcomes from the Maine Lumbar Spine Study. *Spine (Phila Pa 1976)* 26: 1179-1187.
21. Atlas SJ, Keller RB, Wu YA, Deyo RA, Singer DE (2005) Long-term outcomes of surgical and nonsurgical management of sciatica secondary to a lumbar disc herniation: 10 year results from the maine lumbar spine study. *Spine (Phila Pa 1976)* 30: 927-935.
22. Kirkaldy-Willis WH, Wedge JH, Yong-Hing K, Reilly J (1978) Pathology and pathogenesis of lumbar spondylosis and stenosis. *Spine* 3: 319-328.
23. Wilby MJ, Best A, Wood E, Girvan Burnside, Emma Bedson et al. (2021) Microdiscectomy compared with transforaminal epidural steroid injection for persistent radicular pain caused by prolapsed intervertebral disc: the NERVES RCT. *Health Technol Assess* 25: 1-86.

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