



## EFFECT OF LUMBAR TRANSFORAMINAL EPIDURAL STEROID INJECTIONS ON EXTRUDED LUMBAR DISC HERNIATION

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### ABSTRACT

**Objective:** Extruded lumbar disc herniation is a common disease involving back pain and radicular pain. Some cases require surgical intervention for persistent severe pain. In other cases, transforaminal epidural steroid injection is the treatment of choice. This study evaluated the effect of transforaminal epidural steroid injections for radicular pain caused by extruded disc herniation.

**Materials and Methods:** Patients not benefiting from previous medical treatments and those not wanting surgical intervention were included in this study. In total, 127 patients received transforaminal epidural steroid injections for the treatment of extruded lumbar disc herniation. All patients were regularly followed up for 12 weeks. Visual Analogue Scale (VAS) scores for radicular pain and neurologic examinations were recorded preprocedure and 12 weeks postprocedure, along with any complications.

**Results:** For radicular pain, the mean preprocedural and postprocedural VASs were  $85.81 \pm 6.64$  and  $22.81 \pm 3.52$ , respectively. Before treatment, 38 patients had a neurological deficit. At 12 weeks postprocedure, 17 of the 38 patients had no neurological deficit. No complications were noted. Four patients required surgical intervention for unrelieved pain or increased neurological deficit.

**Conclusion:** This study shows that transforaminal epidural steroid injections for extruded lumbar disc herniation effectively relieve radicular pain and may alleviate neurological deficit.

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### INTRODUCTION

Radicular nerve root pain is a common clinical problem and has considerable economic significance (Frymoyer, 1988). It is most commonly caused by mechanical compression of the nerve root by lumbar disc herniation or peripheral foraminal stenosis. Nerve root compression may stimulate inflammatory processes (Saal, 1995; Olmarker, 2002), providing a rationale for the use of corticosteroids to inhibit inflammation and alleviate pain.

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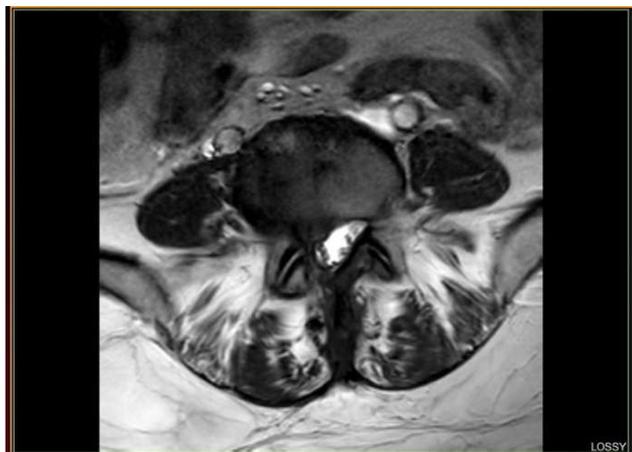
The transforaminal epidural injection of corticosteroids under fluoroscopic guidance delivers high concentrations of therapeutic agents to the site of pathology (Derby, 1992). The aim of this study was to evaluate the effect of lumbar transforaminal epidural steroid injections for the treatment of radicular pain caused by extruded lumbar disc herniation.

### MATERIALS AND METHODS

#### Patients

In total, 127 patients with lumbar or radicular pain because of extruded lumbar disc herniation, who did not benefit from previous medical treatments, or who did not want surgical

intervention despite neurological deficit, were included in this study. These patients were administered transforaminal epidural steroid injections between March 2012 and May 2017 at Algology Clinic, Ministry of Health, Arnavutkoy State Hospital in Istanbul, Turkey and Marmara Pain Center in Istanbul, Turkey. Injections were given on the basis of magnetic resonance imaging findings. All the patients were reexamined 12 weeks after the procedure. Preprocedural and postprocedural VAS scores for radicular pain, and preprocedural and postprocedural neurologic examinations were recorded, along with any complications. All the patients received oral and written information regarding the treatment of lumbar disc herniation using transforaminal epidural steroid injections, and written informed consent was obtained from each patient. The major presenting symptoms of patients were leg pain and low back pain. The mean duration of radicular pain before surgery was 6 months  $\pm$  0.3 months. Before injections, all patients received nonsteroidal anti-inflammatory or analgesic drugs. Inclusion was subject to each patient meeting the following criteria: radicular leg pain; magnetic resonance imaging (MRI) confirmation of extruded lumbar disc herniation (Figure 1); failure of conservative therapy after an adequate trial; and at least one site of transforaminal epidural steroid injection. Patients were excluded from the study if they had previous spinal surgery at the same level; isthmia or degenerative spondylolisthesis; bony midsagittal diameter of spinal canal  $<$  8 mm; dynamic instability determined by the presence of sagittal vertebral translation  $>$  3 mm and angulation  $>$  10° on dynamic radiography; cauda equina syndrome; or lumbar disc herniation in  $>$  1 level.



**Figure 1.** Extruded lumbar disc herniation. Left: axial MRI, Right: sagittal MRI

## Procedure

Patients were placed in the prone position, and the procedure was performed using aseptic technique; 1% lidocaine was diffused at the needle insertion site. A 22-gauge Quincke spinal needle (Tae-Chang Industrial Co., Korea) was inserted using a preganglionic transforaminal approach under fluoroscopic guidance. A syringe with a filter needle (Donghwa C&M, Korea) was used to prepare the solution as dexamethasone was stored in glass ampoules. Approximately 1 mL of contrast media (Pamiray, Dongkook Lifescience, Korea) was used to confirm epidural spread, and 3 mL of 0.33% lidocaine (Lidocaine HCl, Huons, Korea) with 4 mg dexamethasone (dexamethasone disodium phosphate, Yuhan, Korea) were injected (Figure 2).



**Figure 2.** Lumbar transforaminal epidural steroid injection under C-arm guidance. Upper: Lateral view, Lower: Anteroposterior view

## RESULTS

Of the 127 patients in this study, 72 were male and 55 were female, with a mean age was 42.3 (range, 24–63) years. There were two extruded disc herniations at L2-L3, five at L3-L4, 67 at L4-L5, and 53 at L5-S1. All the patients reported radicular pain, and 38 had a neurologic deficit in knee flexion, knee extension, plantar flexion, or plantar extension. All the patients were treated using lumbar transforaminal epidural steroid injections.

All the patients received regular follow up for 12 weeks after the procedure. For extruded lumbar disc herniation patients, the mean preprocedural VAS for radicular pain was  $85.81 \pm 6.64$ , and postprocedural VAS was  $22.81 \pm 3.52$ . Preprocedurally, 38 patients had a neurologic deficit. At 12 weeks post procedure, 17 of the 38 patients had no neurologic deficit. No complications from the procedure were recorded. Four patients needed surgical intervention for unrelieved pain or increased neurological deficit. There were no major surgical complications. There were seven (5.5%) minor complications, including infection in two patients and cerebrospinal fluid fistula in five patients.

## DISCUSSION

Herniated nucleus pulposus or extruded lumbar disc herniation is one of the most common diseases that causes radicular pain and back pain. Some cases require surgical intervention because of persistent severe pain or neurological deficit. However, in most cases, pain can be relieved using conservative treatment, or in some cases, pain spontaneously resolves. Sometimes the pain can be unbearable, but the patient does not want surgical intervention. For these patients, appropriately performed transforaminal epidural steroid injections are clinically effective for treating lumbar and radicular pain (Kaufmann *et al.*, 2013; Ghahreman *et al.*, 2010; Vad *et al.*, 2002; Reiw *et al.*, 2006). Epidural injection of steroids and local anesthesia is believed to be a neural blockade which alters or interrupts nociceptive input, the reflex mechanism of the afferent fibres, self-sustaining activity of the neurons, and the pattern of central neuronal activities (Manchikanti, 2002; Dietrich & Smith, 2004). Corticosteroids have also been shown to reduce inflammation by inhibiting either the synthesis or release of a number of pro-inflammatory mediators and by causing a reversible local anesthetic effect (Dietrich & Smith, 2004; Tachihara *et al.*, 2008).

An extruded disc is defined by the presence of a herniated disc, where the diameter of the disc fragment from base to apex is wider than the width of the fragment at the base. For steroid injections, the surface area of extruded disc material is greater than that of lumbar disc herniation with a broader base. The effect of lumbar transforaminal epidural steroid injections for the treatment of radicular pain caused by extruded lumbar disc herniation has not been previously studied. Our study shows very good relief of radicular pain in patients with extruded disc herniation, 12 weeks after transforaminal epidural steroid injections. Transforaminal epidural injections result in a significant reduction of pain scores in patients with lumbar radiculopathy when compared with pain scores of patients receiving no treatment, conservative management without injection therapy, and lumbar interlaminar epidural injections (Parr *et al.*, 2009).

Transforaminal injection of steroids may be dangerous if carelessly performed. (Bogduk *et al.*, 2008; Kennedy *et al.*, 2009) Vigilance is essential to avoid unintended intra-arterial injection of particulate steroids. However, the risks are low, and transforaminal epidural steroid injections appear to be cost effective, particularly in comparison with the costs associated with surgical intervention. Furthermore, transforaminal epidural injections are always performed under fluoroscopy, which minimizes the risk of inaccurate needle placement (Fredman *et al.*, 1999; Kaufman *et al.*, 2013). In our study, no major complications and only seven (5.5 %) minor complications were noted. When considering the results of this study, transforaminal epidural steroid injections are a safe procedure for appropriate patients with extruded lumbar disc herniation, as well as an effective method to relieve radicular pain. In addition, this treatment may relieve neurological deficit.

**Disclosure:** The authors declare no conflicts of interest

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