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Case Report

Transforaminal epidural steroid injection can result in further neurological injury in a patient with severe foraminal stenosis and nerve impingement

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Abstract

Background: Chronic low back pain (LBP) is highly prevalent and costly in our society. The use of epidural steroid injections (ESIs) for the treatment of radicular LBP is very widespread and continues to rise. The most popular injection is the lumbar/sacral transforaminal epidural steroid injection (TFESI). Here, we present a serious neurological complication resulting from such a TFESI that was only reversed by timely neurosurgical intervention.

Case Description: A 49-year-old male presented with a 5-year history of progressive neurogenic claudication and right lower extremity pain/radiculopathy. He had previously received multiple lumbar ESIs and other conservative therapy. Due to a recent exacerbation of his radiculopathy associated with MRI-documented lumbosacral spondylosis, he underwent a right L5/S1 TFESI under fluoroscopic guidance. This resulted in acute right lower extremity weakness accompanied by a right-sided foot drop and sphincter dysfunction. Although the follow-up MRI was noncontributory, the EMG showed L5/S1 denervation, and the patient underwent an L4–5, L5–S1 laminectomy with discectomies at the L4–5 and L5–S1 levels. Immediately after the surgery, the patient's weakness and sensory deficits improved. Two years later, the patient continued to do well without evidence of recurrence of signs or symptoms of lumbosacral radiculopathy.

Conclusion: Patients should be counseled about the risk and benefits of TFESI. Surgical treatment may be warranted in patients who develop acutely progressive worsening following these non-FDA (Food/Drug Administration) approved injections.

Key Words: Chronic, complications, discectomy, foraminotomy, laminectomy, low back pain, non-FDA (Food/Drug Administration) approved, transforaminal epidural steroid injections

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INTRODUCTION

Many patients with degenerative lumbar disc disease (DDD) are treated with non-FDA (Food/Drug Administration) approved transforaminal epidural steroid injection (TFESI). In theory, TFESIs have the advantage of resulting in greater flow into the anterior epidural space versus midline ILESI approach that predominantly results in posterior flow. However, TFESIs are correlated with various major adverse events that are typically unreported or underreported, and include: spinal cord infarction, paralysis, weakening of discs, and discitis.[2,5,6] Here, we present a patient who developed the acute onset of right lower extremity paresis/foot drop following a lumbosacral TFESI requiring emergency decompression.

CASE REPORT

A 49-year-old male presented with a 5-year history of progressive neurogenic claudication and right more than left lower extremity L4–S1 radiculopathy. The lumbar MRI showed significant disc herniations at the L4–5 and L5–S1 levels contributing to moderate central/foraminal stenosis [Figure 1]. He underwent a right L5/S1 TFESI performed under fluoroscopic guidance (e.g., injection of 3 ml water soluble, iodine-based contrast with 1 ml of 10 mg/ml dexamethasone and 1 ml of 1% PF lidocaine) [Figure 2]. Immediately following the injection, he developed right lower extremity weakness/numbness on the right and a partial right foot drop with urinary frequency. Although the repeat MRI with contrast showed no new findings, the EMG demonstrated acute denervation potentials in L5–S1 distributions. An emergent laminectomy L4–S1 and L4–5 and L5–S1 discectomies were performed; there were no indications to perform a fusion (e.g., as recommended by second opinion surgeon). Immediately postoperatively, the motor deficit improved, and at 2-year follow-up, the patient was asymptomatic.

DISCUSSION

Despite the recent increase in the number of TFESI being performed, the true incidence of complications is unknown as these are largely unreported or underreported. Here we present a major neurologic deficit resulting from an L5–S1 TFESI as consequence of direct nerve root/spinal cord injury, and/or vascular injury.

Vascular insult

Intra-arterial injection of particulate steroids (insoluble steroid) or direct arterial injury has been described as potential causes of devastating neurological injuries resulting from TFESI. Kennedy *et al.* reported two cases of bilateral lower extremity paralysis with neurogenic bowel/bladder dysfunction following lumbar TFESI.[7] They attributed these devastating injuries to an intra-arterial injection of a particulate steroid solution into a low-positioned artery of Adamkiewicz. Other experts suspect that the intravascular injection of epidural steroids is higher than detected and may be as high as 11.2% for TFESI.[3]

Direct nerve injury and spinal cord injury

In the current case, dexamethasone, a nonparticulate steroid was used and resulted in nerve root rather than a spinal cord injury. The authors attributed this patient's neurological deficit to an acute increase in mass effect attributed to the volume of injectate resulting in ischemia. In the lumbar region, acute forceful injection of a solution into a neural foramen can lead to further entrapment of a compromised nerve root. Furthermore, an inadvertent intraneural injection cannot be ruled out. Other pathology, such an acute epidural abscess would take a longer period to become symptomatic.[4]

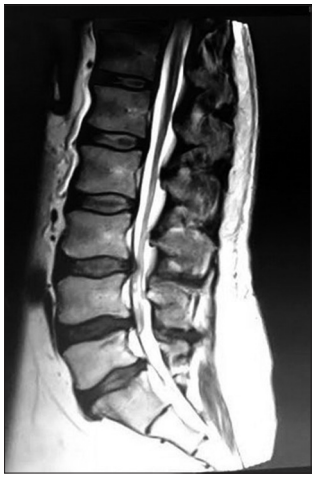

Figure 1: T2 weighted lumbar sagittal MRI view demonstrating spinal stenosis at L4-L5 and L5-S1

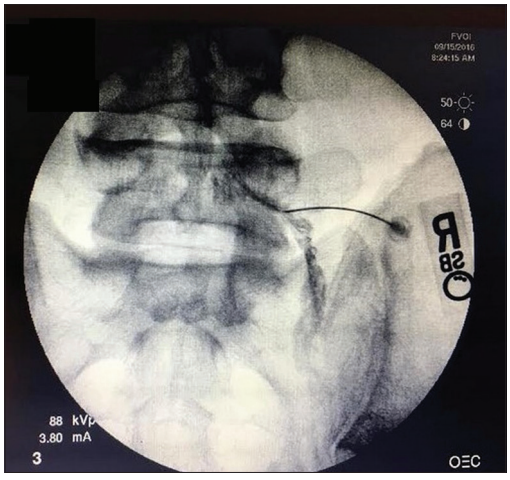

Figure 2: PA x-ray of lumbar spine demonstrating adequate contrast spread at the right L4 nerve root

Table 1: Red flags for epidural steroid injection

Coexisting spinal stenosis
Large Disc Extrusion
Significant Root compression
Progressive Dermatomal sensory or Motor myotomal deficits
Any sphincteric involvement regardless of severity

Table 2: Technical aspects while performing Epidural steroid injection

Awake patient for immediate feedback
Medication given in slow increments
Stopping injection if there are parestesias
Using small volume if there is spinal stenosis

Lessons learned and avoidance of complications

The available literature shows conflicting results regarding the superior efficacy of TFESI versus ILESI for back pain of any cause, and further note their lack of FDA approval for safety/efficacy in the spine at any level.[1,8] Additionally, the complication rates for TFESI are much higher than for the interlaminar approach. Patients undergoing TFESI require surgical intervention up to 18.9% of the time within 6 months of these injections versus 4% for the interlaminar group at 1 year.[8]

Notably, we would recommend TFESI be avoided when there is evidence of acute/subacute worsening of neurologic symptoms/signs. Furthermore, patients undergoing TFESI should be told about its potential risks and benefits, along with the lack of FDA approval for insufficient documentation of safety/efficacy. In all cases, one should employ the smallest dose possible, and avoid an intra-arterial injection; of interest, a negative aspiration does not guarantee that the needle is not intravascular.[1] If a patient develops any paresthesia/pain, the epidural injection should be terminated. These patients should not only be observed for longer periods postinjection, but with/without neurological worsening, should undergo immediate MRI examinations to rule out an epidural hematoma (e.g., within <24 h to avoid permanent neurological deficits/infarction) [Tables 1 and 2]. Here, our patient benefited from an emergent laminectomy and recovered full preoperative function.

CONCLUSIONS

Lumbar TFESI had no documented long-term safety/efficacy and are not FDA approved for use in the spine at any level. Furthermore, the risks/complications are typically unreported or underreported. Here we present a patient who following an L5–S1 TFESI developed acute right-lower extremity numbness/weakness/foot drop, and benefited from emergent laminectomy/surgical intervention, recovering full preoperative function.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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