Concomitant Epidural and Longitudinal Anterior Spinal Artery Contrast Spread in a Lumbar Transforaminal Epidural Steroid Injection

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Introduction

Transforaminal epidural steroid injections (TFESIs) are commonly performed to treat radicular pain and are generally regarded as safe procedures. Traditionally, the supraneural, subpedicular approach targeting the area between the pedicle and nerve root has been regarded as the optimal approach in order to avoid nerve injury. Despite this, the subpedicular area has been shown to be highly vascularized and contains the highest percentage of arteries.

The anterior-superior quadrant contains the majority of the thoracolumbar radicular branches which supply anterior radiculomedullary arteries (ARMAs). The ARMAs communicate with longitudinal anterior spinal arteries that supply the spinal cord.

The most well-known ARMA is the Artery of Adamkiewicz, which is the largest intradural blood supply to the anterior spinal cord. The vertebral levels of ARMAs vary, some studies show 83.9% arise from T12-L3 and 85% from T9-L2.

Intravascular injection has been estimated to occur between 8.1% and 12% of all fluoroscopically guided lumbar TFESI.

Case Presentation

A 78-year-old female with a remote history of L3-4 decompression and fusion presented due to several months of low back and radicular leg pain radiating bilaterally from the gluteal region through lateral thigh to the knee. On examination, right hip flexor strength and patellar reflexes were diminished. There was no pain with provocative hip maneuvers or range of motion. There was significant right sided paraspinal tenderness to palpation and a positive right femoral nerve stretch test.

MRI revealed moderate L2-L3 central canal narrowing, ligamentum flavum infolding, moderate bilateral foraminal narrowing, and a grade I retrolisthesis. The patient failed conservative treatment strategies and elected to undergo a TFESI. An L2-L3 subpedicular supraneural right sided TFESI was performed using a 22 gauge 5 cm Quincke needle. Needle placement was performed using multiplanar fluoroscopic imaging with precise guidance to the 6 o'clock position under the L2 pedicle. Live iodinated contrast injection was then performed with results shown in image to the right. The patient suffered no adverse events. The patient had transient relief with the injection and later elected to undergo surgical management.

Figure 1. Needle positioning for right-sided L2-L3 TFESI

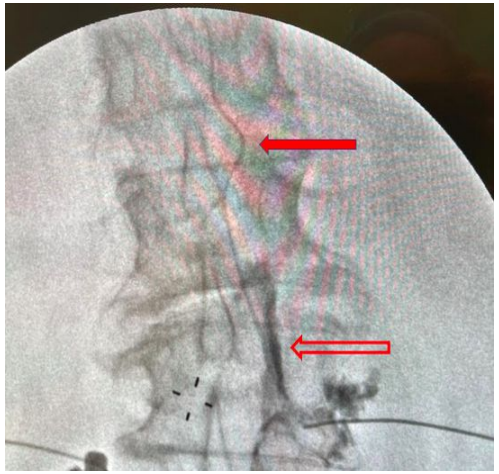

Figure 2. Live contrast spread during a right sided L2-L3 TFESI above the level of the L3-L4 fusion. The solid arrow displays central arterial contrast spread and the hollow arrow indicates epidural contrast spread. The artery is presumed to be a central longitudinal anterior spinal artery as it spans at least 3 vertebral levels.

Discussion

During a lumbar TFESI, it is possible to have an inadvertent arterial injection while at the same time having the desired epidural contrast spread, despite the needle being optimally placed using a subpedicular supraneural approach. It emphasizes the importance of necessary precautions to detect arterial uptake, particularly contrast medium injection under real-time live fluoroscopy with an anteriorposterior (AP) view before the delivery of corticosteroid and local anesthetic. If real-time live fluoroscopy were not used, the artery may not have been visualized as arterial flow can easily spread multiple vertebral levels quickly. In this case, the optimal epidural flow at the targeted level may have distracted the physician from the vascular flow multiple vertebral levels away. Moreover, a still shot depicting the optimal epidural flow without the arterial flow would have created a false sense of safety and may have encouraged continuation of the procedure with delivery of injectate.

Conclusion

During initial live contrast injection, the observation for vascular flow should be prioritized above optimal spread of into the epidural space, choosing safety before efficacy. When digital subtraction imaging is used there is up to 60% sensitivity to vessel detection compared to 20% sensitivity with aspiration alone.

This case demonstrates a unique contrast pattern during a lumbar TFESI which reinforces the necessary safeguards to prevent neurologic complications.

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