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Case report

Technical considerations in transforaminal endoscopic discectomy with foraminoplasty for the treatment of spondylolisthesis: Case report

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1. Introduction

Degenerative lumbar spondylolisthesis is the slipping of one vertebra past its normal alignment to its adjacent vertebra as a result of the degenerative wear of the facet joint that normally helps keep the two vertebrae aligned. The resulting misalignment can result in canal and foraminal narrowing. Patients can complain of mechanical back pain, claudication symptoms, and radicular symptoms. For patients with radicular complaints that result from narrowing of the foramen or a combination of foraminal narrowing and disc bulging the only surgical options have been lumbar laminectomy and lumbar fusion. The authors present here a case report describing an ultra-minimally invasive endoscopic transforaminal technique in an awake patient utilizing a posterolateral approach for (1) removal of the ventral superior articular process (foraminoplasty), (2) transforaminal intracanal access for removal of a lumbar disc herniation, and (3) reduction of the superior endplate to treat lumbar radicular symptoms that resulted from a grade II spondylolisthesis.

2. Case report

History. A 62-year-old former National Football League (N.F.L.) player presented complaining of right low back pain radiating to the buttocks, posterior thigh, lateral calf, and top of foot. The patient was noted on physical exam to have a partial right foot drop. The patient was treated by another physician for over 5 years with multiple epidural steroid injections offering only temporary relief. Review of the magnetic resonance imaging (MRI) showed a grade II spondylolisthesis at L5-S1 with a right neural foraminal disc herniation and osteophytic ridge complex (Fig. 1) resulting in impingement on the L5 exiting nerve root. Grade II spondylolisthesis is more frequently related to limited range of motion rather than spinal instability [1]. Flexion and extension X-rays showed no instability at the L5-S1 level.

Operation. The patient underwent an awake left L5-S1 transforaminal endoscopic foraminotomy and discectomy. The patient was positioned in the lateral decubitus position with the operating table reversed and the flank over the break in the table. A roll was placed under the flank to open the disc space and lower the iliac crest, facilitating entrance to the neuroforamina. Anesthesia consisted of mild sedation using versed and fentanyl and 1% lidocaine local anesthetic. The level of anesthetic was titrated so the patient was able to communicate with the surgeon throughout the procedure. The authors feel that this is the safest way to prevent nerve injury.

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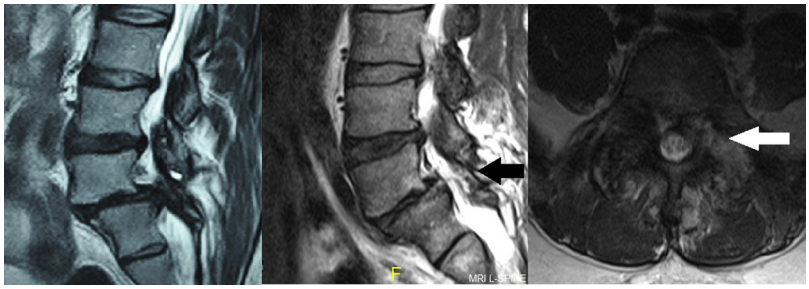

Fig. 1. Preoperative sagittal T2 (left) and 6 month postoperative sagittal (middle) and axial (right) T2 MRIs showing the preoperative pathology and postoperative resolution of neural compression (arrows) at L5-S1.

The Joimax TESSYS® endoscopic system was used for the procedure. Entry was established at the L5-S1 foramen entering through the skin 12 cm lateral to the midline. Using anteroposterior (AP) and lateral fluoroscopy, as well as tunnel view, a 25 cm 18 gauge needle was placed in the L5-S1 disc through Kambin's triangle between the exiting L5 nerve and the traversing S1 nerve (Fig. 2 illustrates the access portion of the procedure). An AP fluoroscopic view was used to verify that the tip of the needle was not past the medial border of the pedicle. This ensured that the needle was not in the central spinal canal, avoiding the dural sac. A guidewire and curved dilator were used to negotiate the superior endplate or any bone spurs in the trajectory of the endoscope. The approach is essentially a Seldinger approach using a flexible wire and small curved dilator to negotiate the obstructed foramen so that sequential reamers can next be used to enlarge the foramen by removing the ventral aspect of the SAP and endplate. The beveled working cannula, 8.0 mm in outer diameter, was then placed over the sequential dilators. Rotating the beveled cannula and endoscope allowed for 360° visualization of the annulus and exiting and traversing nerve roots. The endoscope used had an optical angle of 30°. The beveled end of the working cannula was also used as a nerve root retractor.

The herniation was located under direct visualization protruding from the annulus of the disc (Fig. 3). Large and small portions of the herniation were removed with forceps graspers until the neural foramen was open enough for structures to be identified clearly. The bipolar radiofrequency wand was used for further blunt dissection and hemostasis (Fig. 3). The superior articulating process (SAP) was identified and the exiting nerve root was seen at its apex. At this point, more herniation was then seen medial to the SAP which was previously not directly accessible due to the large SAP and hypertrophy of the ligamentum flavum.

Partial flavectomy and facetectomy were performed under endoscopic visualization using the trephine instruments and kerrison rongeur. The trephine is used to remove overriding SAP that impinges the foramen, and once removed, the kerrison punch is used to bite and remove the ligamentum flavum thereby exposing the decompressed nerve root. Using the Joimax Shrill® shaver-drill system (Fig. 4), an additional 2–3 mm of bone was removed from the base to the apex of the SAP, allowing the remaining hypertrophied ligamentum flavum contributing to stenosis to be visualized and then removed using the biting forceps, kerrisons and radiofrequency. The area was decompressed and the exiting and traversing

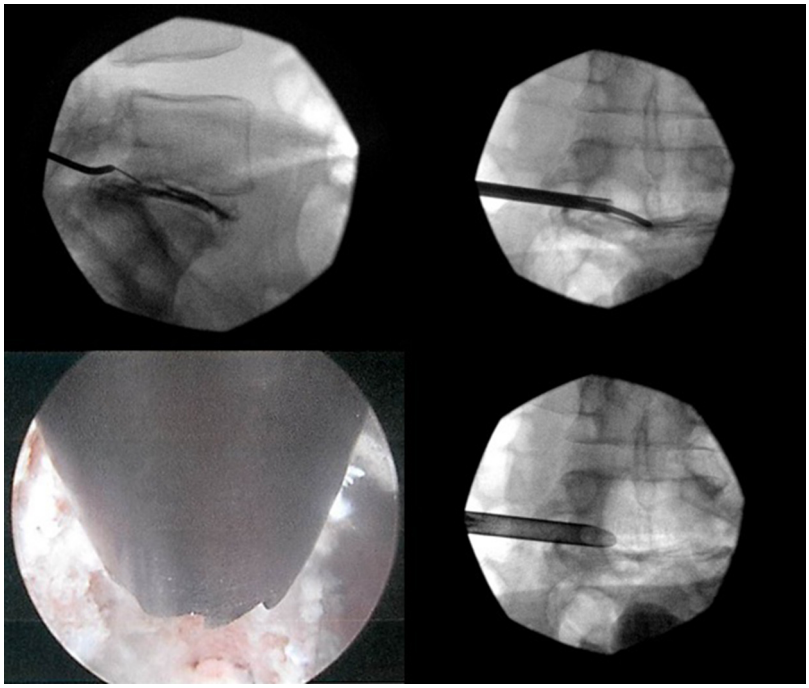

Fig. 2. Intraoperative lateral fluoroscopic image showing the K-wire and bent dilator navigating entrance into the foramen at L5-S1 (top left). AP fluoroscopic image showing a small reemer being introduced over the bent dilator into and through the foramen, stopping at the medial border of the pedicle (top right). Endoscopic view of the endoscopic reemer removing additional bone from the ventral border of the SAP (bottom left). AP fluoroscopic view showing the beveled working cannula docked in the foramen with direct access to canal pathology (bottom right).