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Technical Notes & Surgical Techniques

Fully-endoscopic lumbar laminectomy for central and lateral recess stenosis: Technical note

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ABSTRACT

Background: Lumbar central and lateral recess stenosis that results from a degenerative bulging of the disc and overgrowth of the facet is a very common cause for lumbar claudication and radiculopathy in the elderly. The standard surgical treatment for symptomatic lumbar central and lateral recess stenosis often requires a laminectomy. The evolution of minimally invasive techniques have created advantages for patients undergoing surgery and the authors present here a novel technique for endoscopic access to the central and lateral recess pathology that is truly minimally invasive and offers several advantages to minimally invasive spine surgeon.
Methods: 14 cases were performed, 10 at L4–5 and 4 at L5-S1, for the treatment of central and lateral recess stenosis. The technique was similar to that performed for minimally invasive lumbar laminectomies with a tubular retractor except, after percutaneous access to the pathological level, a cannulated 11.5 mm tubular retractor was inserted and then a 10 mm outer diameter laminoscope with a 6 mm working channel and 15° lens was inserted. Specialized endoscopic drills, forceps, and kerrison rongeurs were used to remove bony pathology and ligamentum flavum under direct visualization.
Results: Following surgery, the patients' symptoms showed immediate regression with continued relief at 6 month and 1 year follow up visits.
Conclusions: The availability of endoscopes with larger working channels (laminoscopes) and larger endoscopic instruments and drills now makes treating significant central and lateral recess lumbar stenosis with endoscopic techniques more feasible.

1. Introduction

Traditional open and minimally invasive posterior approaches to surgically treating central and lateral recess stenosis entail performing a modest laminotomy or laminectomy with removal of overgrown ligamentum flavum and a portion of the medial facet joint in order to decompress the central canal, the traversing, and, sometimes, exiting nerve roots. A posterior endoscopic approach is a more minimally invasive version of the microscopic or microendoscopic approach which also both involve a direct posterior decompression of the lamina and medial portion of the junction of the inferior articulating (IAP) and superior articulating processes (SAP). Here the authors describe and illustrate a step-by-step technique for performing a fully endoscopic lumbar laminectomy, and discuss the current advantages and disadvantages involved in the procedure.

2. Clinical series

In this small clinical series, 14 patients were treated: patients treated were symptomatic from lumbar central and lateral recess stenosis as evidenced by their MR studies (Fig. 1A–B), clinical presentation and physical exam. Only single level cases were performed. Each patient had previously undergone physical therapy and interventional pain management prior to considering surgery. Endoscopic decompressions were performed in 8 male and 6 female patients. Table 1 lists the patient demographics and outcomes. Patient ages were between 59 and 8^2 with an average age of 69. Ten cases were performed at L4–5 and 4 cases were performed at L5-S1.

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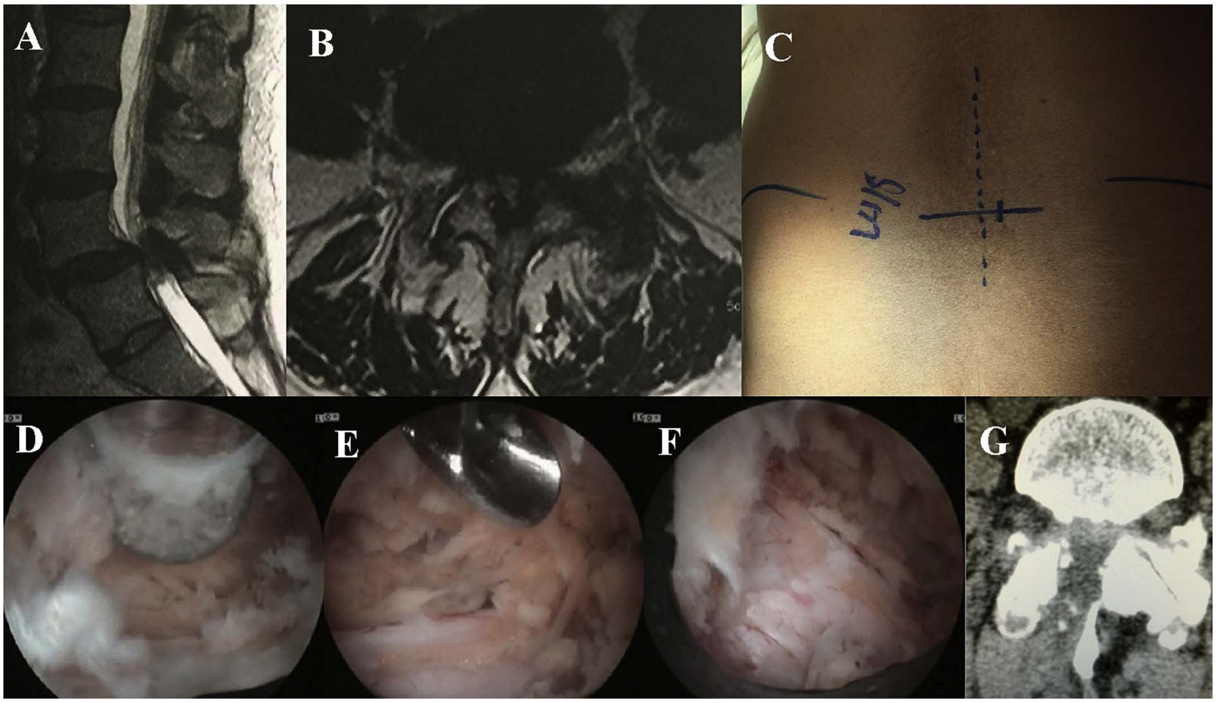

Fig. 1. Lumbar 4–5 endoscopic laminectomy. A. T2 weighted sagittal MR image displaying the L4–5 stenosis. B. T2 weighted axial MR image displaying the L4–5 central stenosis and bilateral foraminal narrowing. C. Intraoperative photograph of the patient positioned prone with the midline marked (vertical dotted), the L4–5 disc space marked (horizontal solid), and the incision marked (1 cm solid vertical 1 cm line just off midline to the right). D. Endoscopic photograph of a high speed endoscopic drill with 4.5 cm head removing laminar bone. E. Endoscopic photograph of an endoscopic kerrison rongeur removing lateral recess bone. F. Endoscopic photograph of decompress thecal sac. G. Postoperative axial CT image at the level of the L4–5 disc space demonstrating the decompression.

Table 1
Endoscopic Laminectomy Patient Data.

Age	Sex	Operation	Pre-Op VAS	Post-Op VAS	Complications
82	F	L4–5 laminectomy	8	3	
81	F	L5-S1 laminectomy	6	1	
79	M	L4–5 laminectomy	7	2	
75	F	L4–5 laminectomy	7	1	Repeat open surgery for microsurgical dural repair with fat graft and 3 days bedrest.
74	M	L5-S1 laminectomy	5	1	
74	M	L5-S1 laminectomy	8	1	
72	F	L5-S1 laminectomy	7	0	
69	M	L4–5 laminectomy	7	2	
68	M	L4–5 laminectomy	8	0	
64	F	L4–5 laminectomy	6	2	
60	M	L4–5 laminectomy	8	3	
59	M	L4–5 laminectomy	6	2	
57	F	L4–5 laminectomy	7	2	
52	M	L4–5 laminectomy	6	0	

3. Operative technique

For the endoscopic lumbar laminectomy procedure, the patients were positioned in the prone position on a Kambin frame with flexed hips and knees. The procedure was done under general anesthesia. The Joimax iLESSYS® Delta endoscope was used for the procedure. AP and lateral fluoroscopy were used intermittently throughout the cases. A 1 cm incision was made 1–2 cm's lateral of midline (location determined by fluoroscopy) with a scalpel (Fig. 1C and Fig. 2A). Under fluoroscopic guidance, a Jamshidi needle and then sequential dilators were used to target the spinolaminar junction of the superior lamina as a starting point and the final 11.5 cannulated tubular retractor was “screwed” into place (Fig. 2B,C). The cannulated outer lining of the retractor made the use of a holding arm not necessary and allowed continuous manipulation of the retractor possible (Fig.2C–E). The tubular retractor used was made from a plastic material that was radiolucent. The retractor did not obscure any bony landmarks but its position could be determined from the outline of the image obtained of the air in the retractor (Fig. 2C). At this point the Joimax® rigid laminoscope with a 10 mm outer diameter and 6 mm working channel was inserted through the tubular retractor (Fig. 2D–F). Under endoscopic view, decompression could be achieved using the high speed endoscopic drill (“Shrill” from Joimax®) with 4.5 mm outer diameter heads (Figs. 1D and 2H). Straight and bendable graspers (Fig. 2G) were used to remove bone fragments and ligamentum flavum and endoscopic kerrison punches with 1.5 and 3.0 mm footprints were used to remove additional bone and ligament (Figs. 1E and 2E). In order to avoid a dural tear, meticulous dissection of the interface between the ligamentum flavum and dura was performed with a blunt ball probe. Also, the irrigation pressure could be turned up to effectively retract the dura away from the ligamentum flavum when decompression was performed with the kerrison punches. Hemostasis was achieved with a radiofrequency probe. In each case at the end of the decompression the thecal sac and traversing nerve root could be seen, well decompressed