JMISST
Journal of Minimally Invasive Spine Surgery and Technique

Video

J Minim Invasive Spine Surg Tech 2024;9(2):183-185
eISSN: 2508-2043
https://doi.org/10.21182/jmisst.2024.01494

Interlaminar Approach in the Lumbar Spine

Dongkyu Kim, Jeong-Yoon Park

Department of Neurosurgery, The Spine and Spinal Cord Institute, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Received: May 28, 2024
Accepted: July 15, 2024

Corresponding Author:
Jeong-Yoon Park
Department of Neurosurgery, The Spine and Spinal Cord Institute, Gangnam Severance Hospital, Yonsei University College of Medicine, 211 Eonju-ro, Gangnam-gu, Seoul 06273, Korea
Email: spinepjy@gmail.com, spinepjy@yuhs.ac

Herein, we describe the surgical techniques of endoscopic interlaminar approach in the lumbar spine through a video presentation of cases involving 3 patients. In every procedure using the interlaminar approach, the lower margin of the lamina should be first identified and used as a surgical landmark. Laminectomy with drilling begins from the lower margin of the lamina and continues upward along the ligamentum flavum. The laminectomy ends when the drill meets the midline cleft of the ligamentum flavum. Once the midline cleft has been detected, an additional bony work-up is performed to detach the lateral and lower margins of the ligamentum flavum. Then, the ligamentum flavum is removed and the thecal sac is exposed. Full exposure of the lateral margin of the thecal sac and ipsilateral traversing root is required. For cases that require contralateral decompression, an additional contralateral bony work-up and decompression of the contralateral traversing root are performed. Decompression of the contralateral exiting root can also be performed with the advantage of a wide endoscopic view angle. Retraction of the thecal sac and traversing root exposes the surface of the disc, and discectomy can be performed. Before the termination of surgery, surgeons should always confirm sufficient decompression of the nerve roots and hemostasis.

Key Words: Lumbar spine, Interlaminar approach, Unilateral biportal endoscopy, Minimal invasive surgery

WRITTEN TRANSCRIPT

0:00 Interlaminar Approch in Lumbar Spine With Biportal Endoscopic Spine Surgery

In this video article, we will describe the technique of endoscopic interlaminar approach in lumbar spine through 3 cases of patients.

0:10 Case #1 Presentation

Case #1: A 59-year-old female patient presented with both leg pain that lasted for 2 years. Magnetic resonance imaging (MRI) showed severe stenosis of L4–5 level. We planned to perform unilateral biportal endoscopy (UBE) surgery with bilateral decompression.

0:30 Case #1 Video: Initial Landmark and Laminectomy

This is the surgical view of left side approach for L4–5 level. The lower margin of lamina should be identified first and will be used as a surgical landmark [1,2]. Once the soft tissue around the lower margin of lamina has been dissected, drilling of lamina begins from the lower margin and continues upward along the ligamentum flavum. The surgeon should always be concerned about the midline orientation during this process. The laminectomy continues until the drill meets the midline cleft of the ligamentum flavum.

1:02 Case #1 Video: Ligamentum Flavum Detachment and Bony Work-up

Once the midline cleft has been detected, it is detached using

double ended retractor. Additional drilling of the medial surface of facet is performed for full exposure of thecal sac. Sufficient drilling during this process is crucial for free manipulation of thecal sac later in the procedure. When drilling the contralateral bony surface, a root retractor can be applied to protect the ligamentum flavum and the underlying thecal sac. The lateral margin of ligamentum flavum is detached using double ended retractor.

1:46 Case #1 Video: Detachment of Lower Margin and Removal of Ligamentum Flavum

For the exposure of lower margin of ligamentum flavum, the upper margin of L5 lamina is identified. The upper margin of lamina is drilled until the lower margin of ligamentum flavum is exposed. Using a blunt hook or Kerrison punch, a total detachment and removal of ligamentum flavum is performed. The thecal sac is now fully exposed.

2:28 Case #1 Video: Contralateral Traversing Root Decompression

Since this case requires bilateral decompression, a sufficient contralateral decompression is required. To safely decompress the contralateral side, an osteotome instead of drill can be safely used to cut down the contralateral inner part of the bone. The decompression of contralateral traversing nerve root is performed.

2:51 Case #1 Video: Coagulation of Annulus

Once the lateral margin of the thecal sac is fully exposed, we expose the surface of disc space by pushing the thecal sac with root retractor. Since this case does not have a herniated disc pathology, we only performed coagulation of bilateral side of the annulus.

3:24 Case #1 Video: Termination of Surgery

Before the termination of surgery, surgeon should confirm that thecal sac and both traversing nerve roots have been sufficiently decompressed by gently assessing the roots [3,4]. The assessment of hemostasis should be confirmed by pausing the water irrigation and check for any areas of fresh bleeding. One drainage line is inserted and the surgical procedure is terminated.

3:50 Case #1 Postoperative MRI

Post operative MRI showed sufficient decompression of thecal sac in L4–5 level.

3:58 Case #2 Presentation

Case #2: A 58-year-old male patient presented with both leg pain that lasted for 3 years. MRI imaging showed stenosis of L4–5 level and right foraminal disc and bony spur. We planned to perform UBE surgery by left approach, and perform bilateral decompression and additional right L4–5 foraminotomy.

4:24 Case #2 Video: Ligamentum Flavum Removal

The surgical process until the removal of ligamentum flavum is similar with the previous video.

4:35 Case #2 Video: Bony Work-up of Contralateral Foramen

After removal of ligamentum flavum, a thorough bony work-up is required for sufficient decompression of contralateral foramen. An osteotome can be also used to safely cut down the contralateral inner part of the bone.

5:14 Case #2 Video: Contralateral Exiting Nerve Root Decompression

After complete removal of ligamentum flavum and epidural fat, the exiting L4 nerve root is exposed. Foraminal discectomy is then performed. In addition to discectomy, an osteotome is used to remove the bony spur that caused the foraminal stenosis. A thorough foraminotomy is performed with Kerrison punch. The procedure is completed with additional coagulation around the disc space and exiting foramen.

6:20 Case #2 Postoperative MRI

Postoperative MRI imaging showed sufficient central decompression of L4–5 thecal sac with removed right foraminal disc.

6:29 Case #3 Presentation

Case #3: A 35-year-old male patient presented with right buttock and leg pain that lasted for 6 months. MRI imaging showed severe herniated lumbar disc of L5–S1 level in central to right location. We planned to perform UBE surgery and discectomy by right approach.

6:51 Case #3 Video: Laminectomy and Ligamentum Flavum Removal

The difference of right approach is that since the endoscope views the surgical area from caudal to cranial direction, the lamina angle appears more steeper compared to the left approach. The rest of the procedure is identical with left approach, with lower margin of the lamina being the first surgical landmark and drilling is done until the midline cleft of liga-

https://doi.org/10.21182/jmisst.2024.01494

mentum flavum is found. The ligamentum flavum is removed and the thecal sac is exposed. The lateral margin of the thecal sac should be fully exposed for free manipulation of thecal sac.

7:32 Case #3 Video: Discectomy

The axilla of traversing root is identified and retracting it will expose the disc space underneath. After coagulation of the annulus, the initial incision is made into the disc [5,6]. The disc is being removed with pituitary forcep. Further retraction of thecal sac and pushing the medial portion of annulus will squeeze the ruptured disc particle out of the incision site. The main herniated disc particle is being removed. Thorough removal of remaining disc and annulus fibrosus is done for prevention of future relapse. The procedure is completed with additional coagulation around the disc space. The surgeon confirms that the traversing nerve root is sufficiently decompressed.

8:53 Case #3 Postoperative MRI

Post operative MRI showed well decompressed status of thecal sac with removed herniated disc in L5–S1 level.

NOTES

Conflict of Interest

JYP, a member of the Editorial Board of *Journal of Minimally Invasive Spine Surgery & Technique*, is the corresponding author of this article. However, he played no role whatsoever in the editorial evaluation of this article or the decision to publish it. Author has no conflict of interest to declare.

Funding/Support

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Informed Consent

This study was approved by the Institutional Review Board of Yonsei College of Medicine, Gangnam Severance (3-2024-0215). Patients were not required to give informed consent to the study because the analysis used anonymous clinical data. Written informed consent was waived by the Ethics Committee of the Gangnam Severance hospital.

ORCID

Dongkyu Kim https://orcid.org/0000-0001-6509-1167
Jeong-Yoon Park https://orcid.org/0000-0002-3728-7784

REFERENCES

1. De Antoni DJ, Claro ML, Poehling GG, Hughes SS. Translaminar lumbar epidural endoscopy: anatomy, technique, and indications. Arthroscopy 1996;12:330–4.
2. DeAntoni D, Claro M, Poehling G, Hughes S. Translaminar lumbar epidural endoscopy: technique and clinical results. J South Orthop Assoc 1998;7:6–12.
3. Soliman HM. Irrigation endoscopic decompressive laminotomy. A new endoscopic approach for spinal stenosis decompression. Spine J 2015;15:2282–9.
4. Min WK, Kim JE, Choi DJ, Park EJ, Heo J. Clinical and radiological outcomes between biportal endoscopic decompression and microscopic decompression in lumbar spinal stenosis. J Orthop Sci 2020;25:371–8.
5. Lee JS, Kim HS, Jang JS, Jang IT. Structural preservation percutaneous endoscopic lumbar interlaminar discectomy for L5-S1 herniated nucleus pulposus. Biomed Res Int 2016;2016:6250247.
6. Ruetten S, Komp M, Godolias G. A new full-endoscopic technique for the interlaminar operation of lumbar disc herniations using 6-mm endoscopes: prospective 2-year results of 331 patients. Minim Invasive Neurosurg 2006;49:80–7.