A Fixed Left-Sided Surgeon Position in Unilateral Biportal Endoscopic Surgery for Lumbar Disc Herniation: A Technical Note with Variations According to Herniation Type

Aurore Sellier[1,2], Francois Lechanoine[3], Guillaume Lonjon[4], Louis-Marie Terrier[2,5], François-Xavier Ferracci[2,5], Philippe Cam[2,5], Anthony Melot[2,5], Joseph Cristini[2,5] on behalf of Spine Research Community (SRC) and of the European Society of Unilateral Biportal Endoscopy (ESUBE

BACKGROUND: **Unilateral biportal endoscopy (UBE) is increasingly used for the treatment of lumbar disc herniation. In this bimanual technique, adapting surgeon positioning according to herniation laterality may negatively affect ergonomics and operating room workflow. The feasibility and clinical impact of a fixed surgeon-positioning strategy independent of herniation laterality remain insufficiently documented.**

RESEARCH QUESTION: **Can a fixed surgeon positioning strategy be safely and effectively applied across all lumbar disc herniation types in UBE?**

METHODS: **A standardized left-sided surgeon positioning strategy is described for the treatment of lumbar disc herniations, including central, paramedian, foraminal, extraforaminal, and calcified or migrated herniations. Interlaminar, transforaminal, and extraforaminal approaches are detailed, with technical adaptations allowing maintenance of a constant left-sided surgeon position. This strategy was evaluated in a retrospective consecutive case series including all patients who underwent UBE for symptomatic lumbar disc herniation between August 2024 and December 2024, with a 3-month follow-up.**

RESULTS: **Sixty-seven patients were included. Left-sided disc herniations accounted for 57% of cases (n = 38), while right-sided herniations represented 43% (n = 29). The standardized left-sided surgeon positioning strategy was feasible in all cases, with no conversion to open surgery and no change in surgeon position. Mean operative time was 35 ± 11 minutes for left-sided herniations and 42 ± 14 minutes for right-sided herniations ($P = 0.021$).**

CONCLUSIONS: **Maintaining a constant left-sided surgeon position in UBE allows safe decompression across the full spectrum of lumbar disc herniation types without compromising surgical access or visualization.**

INTRODUCTION

Unilateral biportal endoscopy (UBE) has gained increasing popularity in the treatment of degenerative spinal conditions due to its minimally invasive nature and improved ergonomics, offering magnified visualization and a relatively short learning curve.[1-4]

In conventional open lumbar microdiscectomy, the approach is typically ipsilateral to the herniation, ensuring direct access to the nerve root compression. In UBE, however, operating from the herniation side introduces an additional challenge due to bimanual instrumentation. For right-sided herniations, right-handed surgeons must operate with their nondominant hand, disrupting ergonomics and increasing procedural

Key words
- Endoscopic spinal surgery
- Enhanced rehabilitation after surgery
- Lumbar canal stenosis
- Unilateral biportal endoscopy

Abbreviations and Acronyms
OR: Operating room
PLL: Posterior longitudinal ligament
SAP: Superior articular process
TP: Transverse process
UBE: Unilateral biportal endoscopy

From the [1]Department of Neurosurgery, Toulon Hyeres Saint Jean Private Hospital, Toulon, France; [2]Department of Neurosurgery, Monticelli Private Hospital, Ramsay Santé, Marseille, France; [3]Department of Neurosurgery, Maria Cecilia Hospital, Cotignola, Italy; [4]Department of Orthopedic Surgery, Orthosud, Clinique St-Jean Sud de France, Santecite Group, St Jean de Vedas, Montpellier Metropole, France; and [5]Department of Neurosurgery, Clairval Private Hospital, Ramsay Santé, Marseille, France

*To whom correspondence should be addressed: Aurore Sellier, M.D.
[E-mail: aurore.sellier@live.fr]*

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complexity. Furthermore, switching the approach side according to herniation laterality necessitates repeated adjustments to the operating room (OR) setup, which may disrupt operating workflow.

Recent literature has highlighted the heterogeneity of portal placement in unilateral biportal endoscopic surgery, reflecting the lack of procedural standardization in current practice.[5] In addition, existing publications have not specifically addressed surgeon positioning as an independent parameter.[5-13] This technical note describes a fixed left-sided surgeon positioning strategy for UBE, supported by our clinical experience. The originality of this work lies in the systematic customization of the surgical approach according to herniation type, including a dedicated additional step addressing the posterior wall and posterior longitudinal ligament (PLL) when indicated.

For standardization purposes, the ergonomic considerations are illustrated for right-handed surgeons, with the surgeon positioned on the left side; this purely technical setup can be directly mirrored for left-handed surgeons by reversing the surgeon's position and working corridors.

TECHNICAL NOTE

Perioperative Considerations

In the craniocaudal plane, magnetic resonance imaging determines whether the herniation is at the disc level (30%), migrated cranially (15%) or caudally (55%).[11] In the axial plane, it identifies whether the herniation is paramedian, foraminal, or extraforaminal. The annulus is assessed to distinguish between protrusion (broad base, no rupture), extrusion (narrow base with annular rupture) and sequestration (no continuity with the disc).[14] For paramedian herniations, the relation to the nerve root is evaluated to determine whether the fragment lies at the shoulder or axilla. The relationship to the PLL is also analyzed to classify the herniation as subligamentous, transligamentous, or extruded. Computed tomography is useful for assessing bony anatomy, including interlaminar space, facet joints and ligamentum flavum hypertrophy, which may impact the extent of resection (Figure 1).

OR Setup, Anesthetic Considerations, and Patient Positioning

The OR setup is standardized for all lumbar UBE procedures, as previously described.[2] Regardless of the herniation side, the

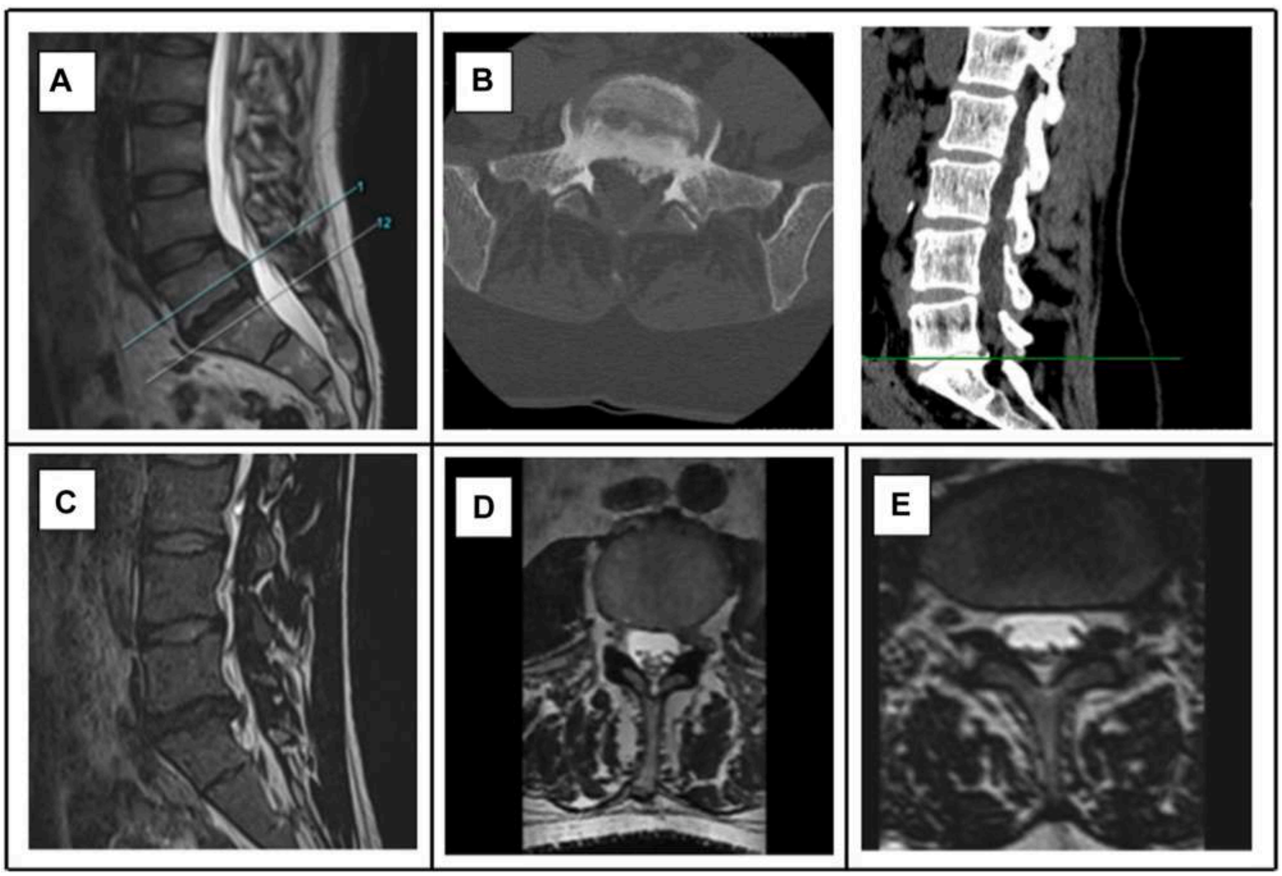

Figure 1. Preoperative radiological imaging illustrating the main types of lumbar disc herniations relevant for surgical planning (**A**) Sagittal T2-weighted MRI showing an upward migrated disc fragment at the L5–S1 level. (**B**) Left paramedian calcified disc herniation at L5–S1, demonstrated on CT scan in sagittal and axial views. (**C**) Disc protrusion without annular rupture at L5–S1 on sagittal T2-weighted MRI. (**D**) Left foraminal disc herniation at L3–L4 on axial T2-weighted MRI. (**E**) Left extraforaminal disc herniation at L4–L5 on axial T2-weighted MRI. CT, computed tomography; MRI, magnetic resonance imaging.

surgeon and assistant stand on the patient's left, with the instrument table positioned perpendicular to the legs. Adequate space must be preserved on the opposite side to allow anteroposterior and lateral fluoroscopic views.

Under general anesthesia with endotracheal intubation, the patient is positioned prone on thoracic and iliac bolsters with a 5—10° head-up tilt to reduce intracranial pressure. Hands are positioned in front of the body. Systolic blood pressure is kept below 100 mmHg to optimize visibility. Neuromuscular blocking agents are administered preoperatively to reduce muscle spasms during radiofrequency use, and epinephrine is added to the irrigation fluid to limit bleeding. Temperature is closely monitored to avoid hypothermia due to irrigation; a warming blanket covers the torso, and another is placed under the leg.[15]

Surgical Approaches

We describe the 3 main lumbar UBE approaches and their technical variations, enabling management of the full spectrum of lumbar disc herniation patterns, while maintaining a standardized left-sided surgeon position. The interlaminar approach is suitable for central, paramedian, and foraminal herniations. The extraforaminal route is used for far lateral and laterally extended foraminal herniations. The transforaminal approach is preferred for foraminal herniations at fused levels. Each approach follows the same standardized steps: incision, exposure, laminotomy, flavectomy, herniectomy, cauterization, hemostasis, and closure, as illustrated in **Figure 2**.

Interlaminar Approach. The target disc level and the midline are first identified under fluoroscopic guidance. The docking point is then marked, ipsilaterally to the lesion. This fixed reference point corresponds to the spino-laminar junction of the superior vertebra.[2] It is consistently used regardless of the direction or extent of disc migration, allowing reproducible triangulation of the endoscope and instruments through the interlaminar space during the initial phase (**Figure 3**).

For left-sided paramedian herniations, the 2 skin incisions are placed equidistantly above and below the docking point, approximately 1 cm lateral to the midline. For right-sided paramedian herniations, both incisions are systematically shifted 5 mm caudally and moved medially closer to the midline (**Figure 4**). This adjustment compensates for the natural divergence of the surgeon's hands and the lateral drift of the instruments. Tilting the operating Tables 5—10° toward the surgeon enhances ergonomics by restoring a more vertical hand position.

In both cases, the 2 incisions are typically spaced at least 3 cm apart. A wider separation is advised in patients with higher body mass index to optimize triangulation and instrument handling.

For right-sided foraminal disc herniations, decompression is performed via a contralateral interlaminar approach (**Figure 5**). Skin incisions are made on the left side, lower than usual, and a left partial laminotomy is performed. The surgical trajectory then proceeds cranially and obliquely to the right, following a sublaminar path toward the right foramen.

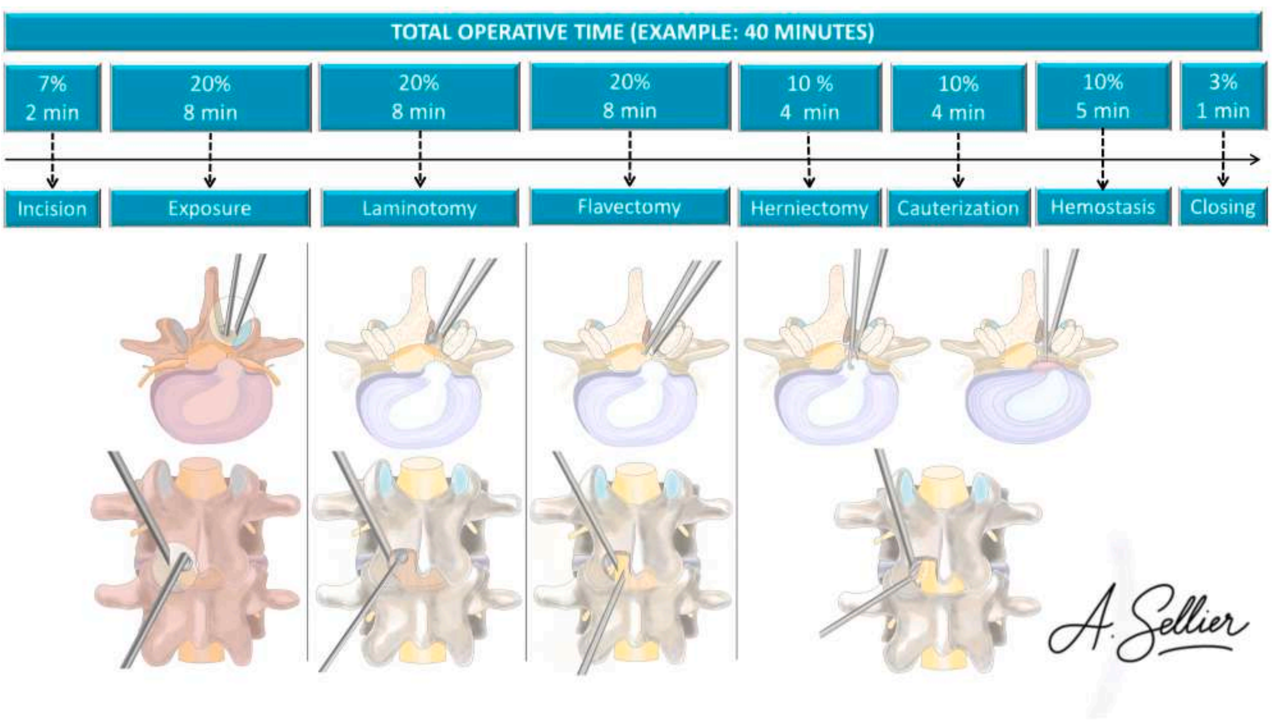

Figure 2. Operative workflow for UBE discectomy (digital illustrations by A. Sellier). Breakdown of total operative time for a standard 40-minute procedure, divided into sequential steps: incision, exposure, laminotomy, flavectomy, herniectomy, cauterization, hemostasis, and closure. Illustrations depict a left-sided interlaminar approach, but the same surgical sequence applies to transforaminal and extraforaminal approaches. UBE, unilateral biportal endoscopy.

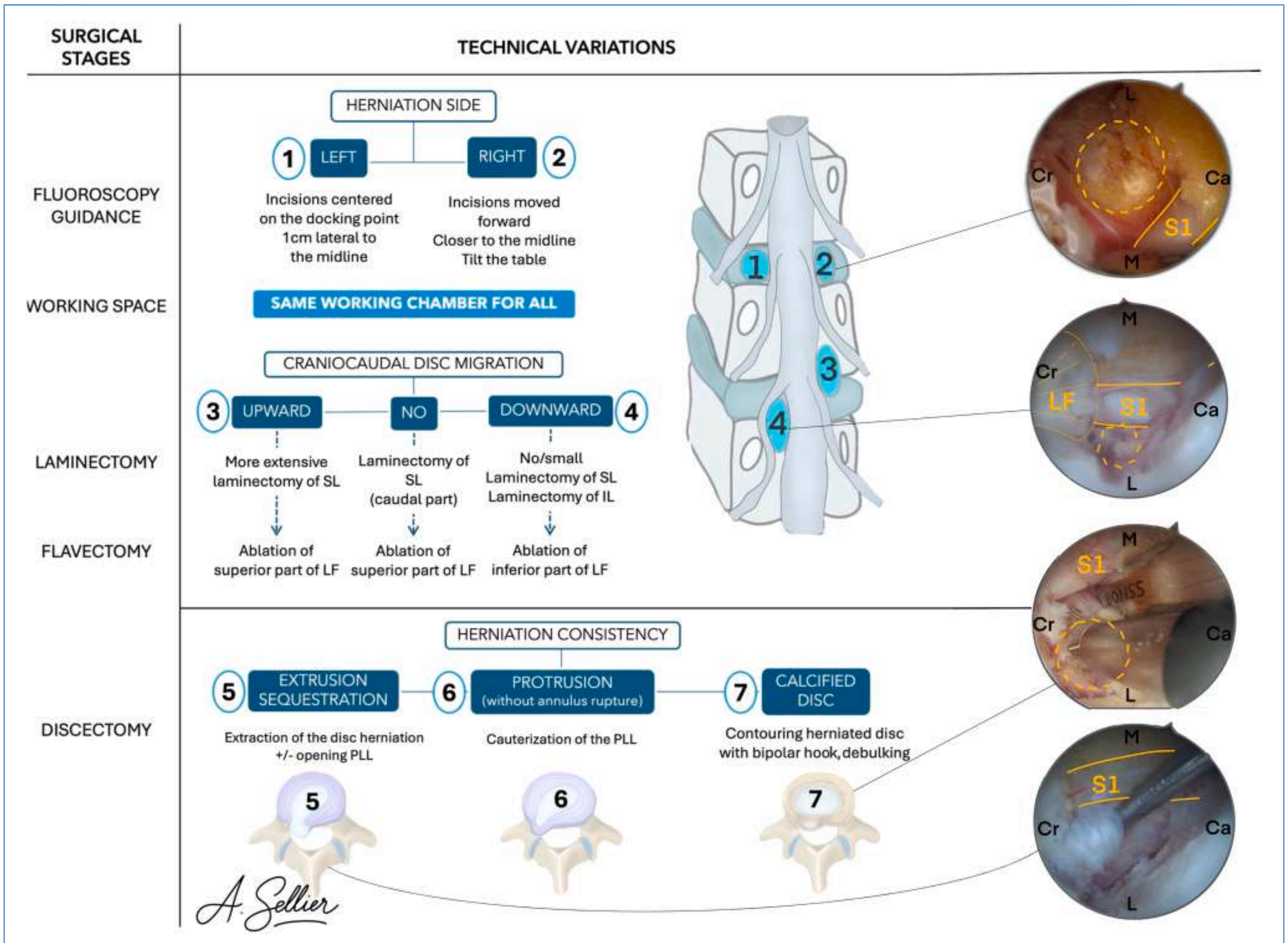

Figure 3. Flow chart illustrating technical variations of the interlaminar approach according to the paramedian herniation type and side. (1) Nonmigrated left-sided lumbar disc herniation. (2) Nonmigrated right-sided lumbar disc herniation, with an illustration of the intraoperative endoscopic view demonstrating clear visualization despite the surgeon being positioned on the left side. (3) Cranially migrated disc herniation. (4) Caudally migrated disc herniation, with an intraoperative endoscopic view illustrating preservation of the superior portion of the ligamentum flavum. (5) Extruded or sequestrated disc herniation, with an illustrative intraoperative view of a free sequestrated fragment. (6) Disc protrusion without annular rupture. (7) Calcified disc herniation, with an illustrative intraoperative view showing debulking of the calcified disc using a bipolar hook. LF, ligamentum flavum; S1, S1 nerve root; SL, superior lamina; IL, inferior lamina; PLL, posterior longitudinal ligament. Orientation of the endoscopic view: M, medial; L, lateral; Cr, cranial; Ca, caudal. The *dotted yellow circle* represents disc herniation.

After incising the skin and the fascia transversely, serial dilators are used to create a cranial viewing portal for the endoscope and a caudal working portal for the instruments, facilitating palpation of bony landmarks and paraspinal musculature detachment from the lamina. A 30-degree endoscope is introduced with continuous low-pressure irrigation (<40 mmHg). A tong-shaped retractor is placed in the working portal to ensure proper fluid outflow.

Soft tissues are cleared from the lamina using a radiofrequency wand to establish the working chamber. During this step, the assistant places a hand on the patient's leg to monitor for any involuntary muscle contractions. Clear identification of critical anatomical landmarks, including the superior and inferior laminae, the base of the spinous process, and the articular process, is mandatory before proceeding.

The superior and inferior borders of the lamina are gently drilled using a 4 mm burr, followed by careful removal of the ligamentum flavum with Kerrison punches. Bone and ligament resection can be adjusted according to the direction of disc migration. In upward migrated herniations, the superior lamina is drilled more extensively while the inferior portion of the ligamentum flavum is preserved. In downward-migrated cases, the superior lamina and upper ligamentum flavum are preserved, and exposure is achieved through the inferior lamina of the lower vertebra. This selective preservation of the ligamentum flavum facilitates potential reoperations and contributes to maintaining segmental stability.

The nerve root is identified and gently mobilized to expose the herniated disc. A nerve root retractor is positioned to protect the nerve during fragment removal. In most cases, the ruptured disc

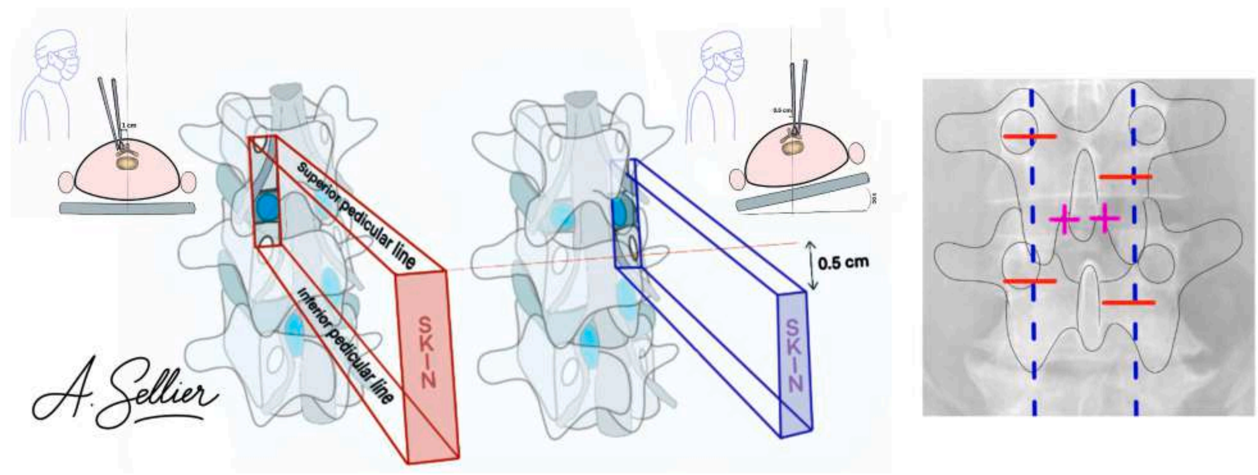

Figure 4. Right and left interlaminar approaches to paramedian disc herniation. On the left, schematic drawings (digital painting by A. Sellier) illustrate left (*red*) and right (*blue*) working corridors for interlaminar approaches. For right-sided approaches, skin incisions are shifted medially and caudally, with table tilting to enhance ergonomics. On the right, fluoroscopic guidance depicts mediopedicular lines (*blue dashed lines*), skin incisions (*red lines*), and docking points (*pink crosses*). The working corridors correspond to the cylindrical operative space defined by the skin incisions and docking points.

material extrudes spontaneously. In cases of disc extrusion without ligamentous penetration, the PLL is incised using an Indian knife, and the herniated fragment is removed with a pituitary forceps. When the annulus is preserved in front of the disc protrusion, decompression may be achieved by simple cauterization of the PLL without incising the disc. In this scenario, the bipolar hook set to minimal power is particularly useful for gently retracting the ligament and decompressing the nerve while minimizing the risk of recurrence.

For calcified herniations, the bipolar hook allows for precise contouring of the calcified fragment, facilitating mobilization and debulking. A small hook may be used to retrieve migrated fragments.

Adequate decompression and hemostasis are confirmed before wound closure.

Transforaminal Approach. The transforaminal approach provides direct access to the foraminal zone. It is similar to the endoscopic transforaminal lumbar interbody fusion approach and is ideal for decompressing foraminal disc herniations at fused levels, after anterior lumbar interbody fusion for example, where facet resection does not compromise stability.[16] It also allows access to the spinal canal and the contralateral side (**Figure 5**).[5]

Under anteroposterior fluoroscopic guidance, the docking point is located on the middle portion of the isthmus, just below the superior pedicle. Two skin incisions are made to form an isosceles triangle with this point, aligned along the lateral pedicular line. These incisions are placed more laterally than those used for the interlaminar approach, but more medially than for the extraforaminal approach. A bipolar radiofrequency probe is used under continuous irrigation to create a clean working chamber and effective hemostasis prior to bone resection.

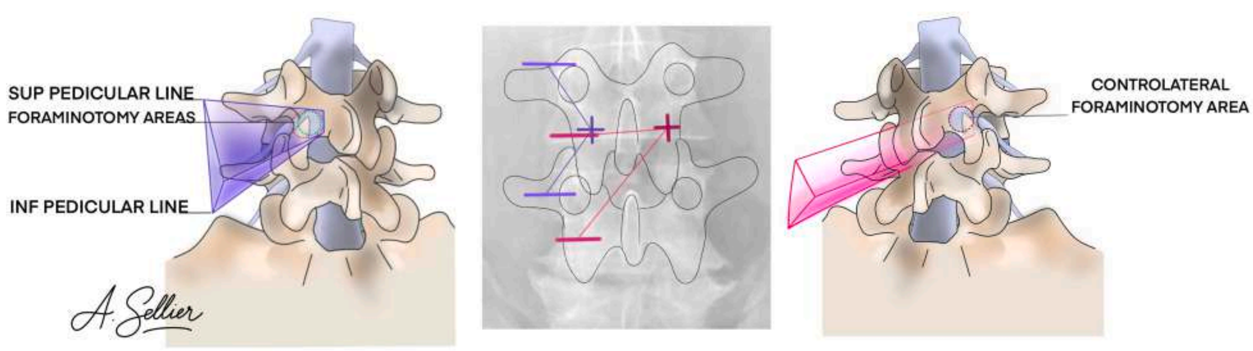

Figure 5. Approaches to the foramen. Lateral digital illustrations (by A. Sellier) depict 2 approaches: on the left, a transforaminal approach with a *violet* working corridor; on the right, a contralateral interlaminar approach with a *pink* working corridor. The central fluoroscopic image shows horizontal skin incisions (*violet lines* for transforaminal and *pink lines* for interlaminar) and docking points (*crosses*).

A unilateral facetectomy is then performed using a 4 mm burr to access the foraminal portion of the disc. The exiting nerve root is exposed in the hidden zone beneath the facet joint. Decompression is then carried out by removing posterior osteophytes and extracting herniated disc fragments that compress the root.

Extraforaminal Approach. L1—L5 Extraforaminal Approach

For extraforaminal access to the Kambin triangle at the L1 to L5 levels, skin entry points are determined by projecting the tips of the transverse processes (TP) under anteroposterior fluoroscopic guidance.[5] The docking point corresponds to the ipsilateral junction between the superior articular process (SAP) and the inferior TP (see **Figure 6**).[13]

An inverted U-shaped blunt dissection is performed using serial dilators in both portals to follow the contour of the distal TP, the lateral edge of the SAP, the isthmus and the IAP.[17] This technique allows for atraumatic muscle separation, accurate corridor creation, and adequate saline outflow through the biportal system. The working chamber is created by debriding the overlying soft tissues with the radiofrequency probe, in direct contact with bone. This step ensures safe dissection of the entry zone at the junction between SAP and distal TP. Careful attention must be paid to vascular anatomy, as injury to the facet joint artery can lead to challenging bleeding. To prevent retroperitoneal fluid retention, it is also essential to preserve the integrity of the intertransverse ligament.[13] A 4 mm diamond burr is then employed to drill the lateral portion of the SAP, until the lateral attachment of the ligamentum flavum becomes visible. The LF can then be carefully detached with a dissector or Kerrison rongeur, allowing exposure of the Kambin triangle and the exiting nerve root. The herniated fragment is approached from below the exiting nerve root, avoiding direct nerve manipulation. In far lateral disc herniation, the target zone lies in the axilla of the nerve root, where an annulotomy is performed to extract loose disc fragments. If bony exposure is insufficient or root mobilization is required, the superior TP can also be drilled to expand the working window. Note that foraminal herniations need more bone removal than extraforaminal ones.

For right-sided far lateral disc herniations, a wider bony resection is often necessary due to the more oblique trajectory required for contralateral access. The endoscope must be angled more medially to visualize the target area behind the right isthmus.

Particularities of the L5—S1 Extraforaminal Approach

The L5—S1 extraforaminal approach (**Figure 7**) poses unique anatomical challenges due to the narrow working corridor between the L5 TP and the sacral ala, compounded by frequent interference from the iliac crest.[10] These anatomical constraints limit access and make decompression at this level particularly demanding. Extraforaminal herniation or stenosis in this region, commonly known as far-out syndrome, can result in L5 radiculopathy.

Here, the docking point is the ipsilateral superior sacral notch, located at the junction between the S1 SAP and the sacral ala, visualized on anteroposterior fluoroscopy.[18] Skin incisions are placed equidistantly, approximately 3 cm apart and 1 cm laterally to the docking point. If the iliac crest impedes access to the caudal portal, it may be shifted medially to maintain optimal triangulation.

The working corridor is defined by 3 key bony landmarks: the L5 TP, the sacral ala, and the lateral surface of the S1 SAP. Bone resection is performed at the inferior edge of the L5 TP, the superior portion of the sacral ala, and the lateral aspect of the S1 SAP. Flavectomy exposes the L5 nerve root, and the herniated disc is then accessed and removed through the Kambin triangle.[7]

At L5—S1, nerve root decompression is extended to include resection of the lumbosacral and extraforaminal ligaments, which define the lateral boundary of the working space. The Sun's corridor provides a strategic route to access these structures and the superolateral aspect of the L5 nerve root. It is bounded superiorly by the L5 TP, laterally by the lumbosacral ligament, and inferiorly by the exiting L5 nerve root. This corridor allows minimizing manipulation of the dorsal root ganglion, whose disturbance is linked to a higher risk of postoperative neuropathic

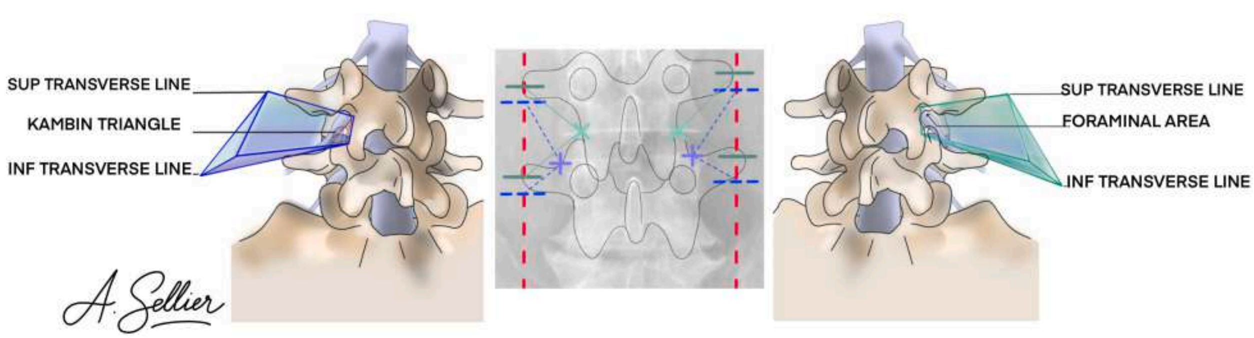

Figure 6. L1-L5 Extraforaminal approach. Left and right: digital illustrations (by A. Sellier) showing the approach to an extraforaminal herniation (left) and a foraminal herniation or stenosis (right), each with its triangular working corridor (*blue* and *green*, respectively). Center: fluoroscopic guidance with *red vertical dashed lines* indicating the transverse lines, *horizontal dashed blue lines* marking the skin incisions for extraforaminal access, and *solid green lines* for foraminal access.

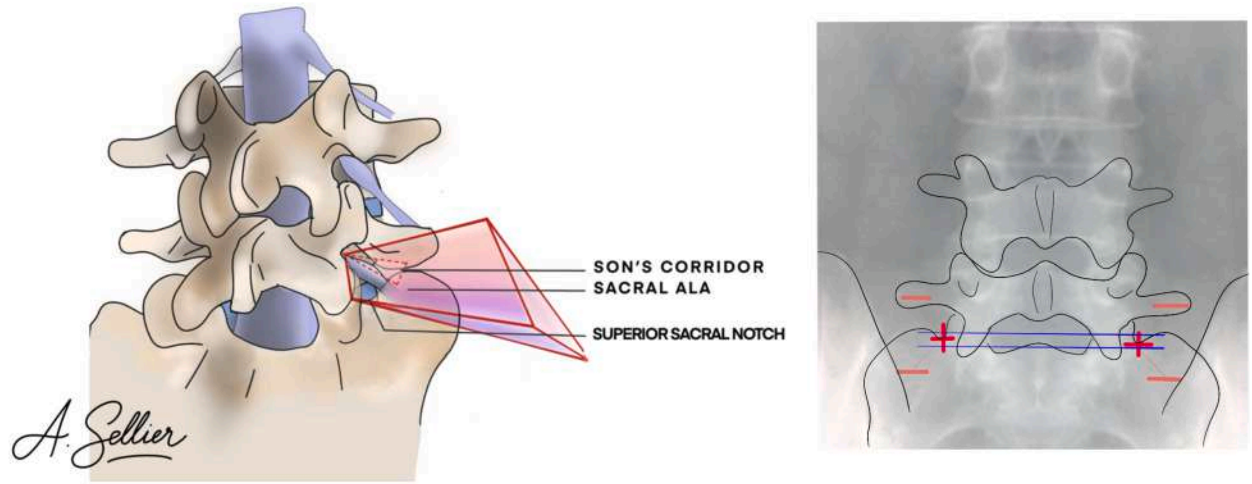

Figure 7. L5S1 extraforaminal approach. Left: digital illustration (by A. Sellier) of the L5–S1 extraforaminal approach using the Sun's corridor (*red triangular* working space). Right: fluoroscopic guidance with *horizontal blue lines* outlining the disc space, *horizontal orange lines* indicating the skin incisions, and *red crosses* marking the docking points.

pain.[10] It permits direct access to any compressive osteophytes along the inferolateral corner of L5 vertebral body.

METHODS

Every consecutive patient who underwent UBE surgery for lumbar disc herniation using a standardized left-sided approach between August 2024 and December 2024 was included. All procedures were performed by a high-volume, right-handed, experienced senior surgeon (J.C.). Inclusion criteria were patients operated on for a symptomatic lumbar disc herniation confirmed on preoperative imaging and refractory to conservative treatment. Patients with prior lumbar surgery at the index level were excluded.

Collected data included demographic characteristics, level and side of disc herniation, operative time, intraoperative complications, and early postoperative outcomes. Pain and disability were assessed using radicular and lumbar visual analog scales and the Oswestry Disability Index preoperatively and at 3 months.

Numeric variables were expressed as mean ± standard deviation, and categorical variables as absolute and relative frequencies. Patients were grouped according to the side of disc herniation. Statistical comparisons were considered exploratory. Continuous variables were compared using the unpaired Mann–Whitney *U* test, and categorical variables using the χ^2 or Fisher's exact test, as appropriate. A two-tailed alpha level of 0.05 was used. Statistical analysis was performed using EasyMedStat (version 4.2; www.easymedstat.com).

RESULTS

A total of 67 consecutive patients underwent unilateral biportal endoscopic surgery for lumbar disc herniation during the 5-month study period. The mean age was 52 ± 15 years, and 51% of patients were male (n = 34). Thirty-eight patients (57%) presented with left-sided disc herniations, while twenty-nine (43%) had right-sided herniations. Baseline demographic characteristics and operative data are summarized in **Table 1**.

The standardized left-sided surgeon positioning strategy was feasible in all cases. No conversion to open surgery was required, and no change in surgeon position was necessary. Mean operative time was 35 ± 11 minutes for left-sided herniations and 42 ± 14 minutes for right-sided herniations ($P = 0.021$).

Two intraoperative dural tears occurred (3%), both in the right-sided group, without postoperative neurological deficit. No recurrent disc herniation was observed during the follow-up period in either group.

Early clinical outcomes demonstrated improvement in radicular pain, lumbar pain, and functional disability at 3 months postoperatively in both groups (**Table 2**).

DISCUSSION

The present technical note is the first to propose a standardized surgeon-positioning strategy for UBE surgery in lumbar disc herniation, independent of disc herniation laterality.

In the current UBE literature, the surgeon position depends on the side and type of disc herniation. For paramedian and extraforaminal lumbar disc herniations, the surgeon is typically positioned ipsilateral to the lesion.[6,10,11-13,18] Conversely, a contralateral approach is generally favored for foraminal disc herniation to optimize visualization of the exiting nerve root and to minimize facet joint violation. Song et al. have even described a deliberate change in surgeon position during the procedure to achieve a contralateral working trajectory to treat bilateral foraminal stenosis.[11] In this setting, a contralateral approach has also been described for migrated disc herniations involving MacNab's hidden zone.[8,9]

Table 1. Clinical and Operative Data

	Total Population (n = 67)	Left-Sided Herniation (n = 38)	Right-Sided Herniation (n = 29)	*P* Value
Demographics				
Age, mean ± SD (years)	52 ± 15	50 ± 16	54 ± 15	NS
Sex, male	34 (51)	19 (50)	15 (52)	NS
Herniation characteristics				
Level				
L2-L3	4 (6)	0	4 (14)	NS
L3-L4	9 (13)	6 (16)	3 (10)	
L4-L5	25 (37)	14 (37)	11 (38)	
L5-S1	29 (43)	18 (47)	11 (38)	
Herniation type				
Paramedian	55 (82)	32 (84)	23 (79)	NS
Median	6 (9)	3 (8)	3 (10)	
Foraminal	3 (5)	1 (3)	2 (7)	
Extraforaminal	3 (5)	2 (11)	1 (6)	
Herniation variations				
Calcified	3 (5)	2 (11.1)	1 (6)	NS
Upward migration	6 (9)	2 (11.1)	4 (14)	
Downward migration	10 (15)	6 (16)	4 (14)	
Operative data				
Operative time, min (mean ± SD)	38 ± 13	35 ± 11	42 ± 14	0.021
Intraoperative complication				
Conversion to open surgery	0	0	0	NS
Dural tear	2 (3)	0	2 (7)	NS

Data are n (%) unless otherwise indicated.
SD, standard deviation; NS, not significant, $P > 0.1$.

In contrast, our strategy dissociates the choice of the surgical corridor from surgeon positioning. While the surgical approach itself remains adapted to the herniation lateralization, being ipsilateral for paramedian and extraforaminal herniations, or deliberately contralateral for foraminal decompression, the surgeon maintains a constant position for all procedures, regardless of herniation type or laterality. This constant positioning strategy allows him to consistently operate with the dominant hand, and with the instruments aligned with the disc axis. It also avoids the need to reconfigure equipment positioning between procedures. As a result, this strategy improves reproducibility and contributes to workflow standardization.

In our experience, maintaining a constant surgeon and equipment position was feasible for interlaminar, foraminal, and extraforaminal herniation without increasing perioperative complications or adversely affecting early clinical outcomes. Although a slight increase in operative time was observed for right-sided herniations, the difference was limited to approximately 5 min and did not carry clinical significance. Importantly, a comparable or greater time penalty would reasonably be expected when operating with the nondominant hand.

Beyond surgeon positioning, the novelty of our also lies in the systematic customization of the surgical corridor according to herniation characteristics, particularly through dedicated management of the posterior wall and PLL when required.

Several considerations should be acknowledged when interpreting these findings.

- This strategy does not eliminate the inherent learning curve associated with UBE, but it does not appear to introduce an additional technical burden. However, it was developed and evaluated by a high-volume, experienced surgeon and may therefore require prior familiarity with UBE techniques.
- Although maintaining a constant surgeon position may require minor ergonomic adaptations in specific configurations, particularly for right-sided pathology, this positioning strategy is consistent with established surgical practice. Most

Table 2. 3-Months Postoperative Outcome				
	Total Population (n = 67)	Left-Sided Herniation (n = 38)	Right-Sided Herniation (n = 29)	*P* Value
L-VAS				
Preoperative	6.2 ± 2.4	6.5 ± 2.2	5.9 ± 2.9	NS
3 months	3.4 ± 2.9	3.7 ± 3.1	2.9 ± 2.8	
R-VAS				
Preoperative	7.0 ± 2.7	7.0 ± 2.5	7.0 ± 3.1	NS
3 months	2.4 ± 2.5	2.3 ± 2.5	2.5 ± 2.6	
ODI				
Preoperative	45 ± 19	42 ± 21	48 ± 16	NS
3 months	15 ± 13	13 ± 11	18 ± 18	

Data are reported as mean ± standard deviation.
L-VAS, lumbar visual analog scale; R-VAS, radicular visual analog scale; ODI, Oswestry Disability Index; NS, not significant, $P > 0.1$.

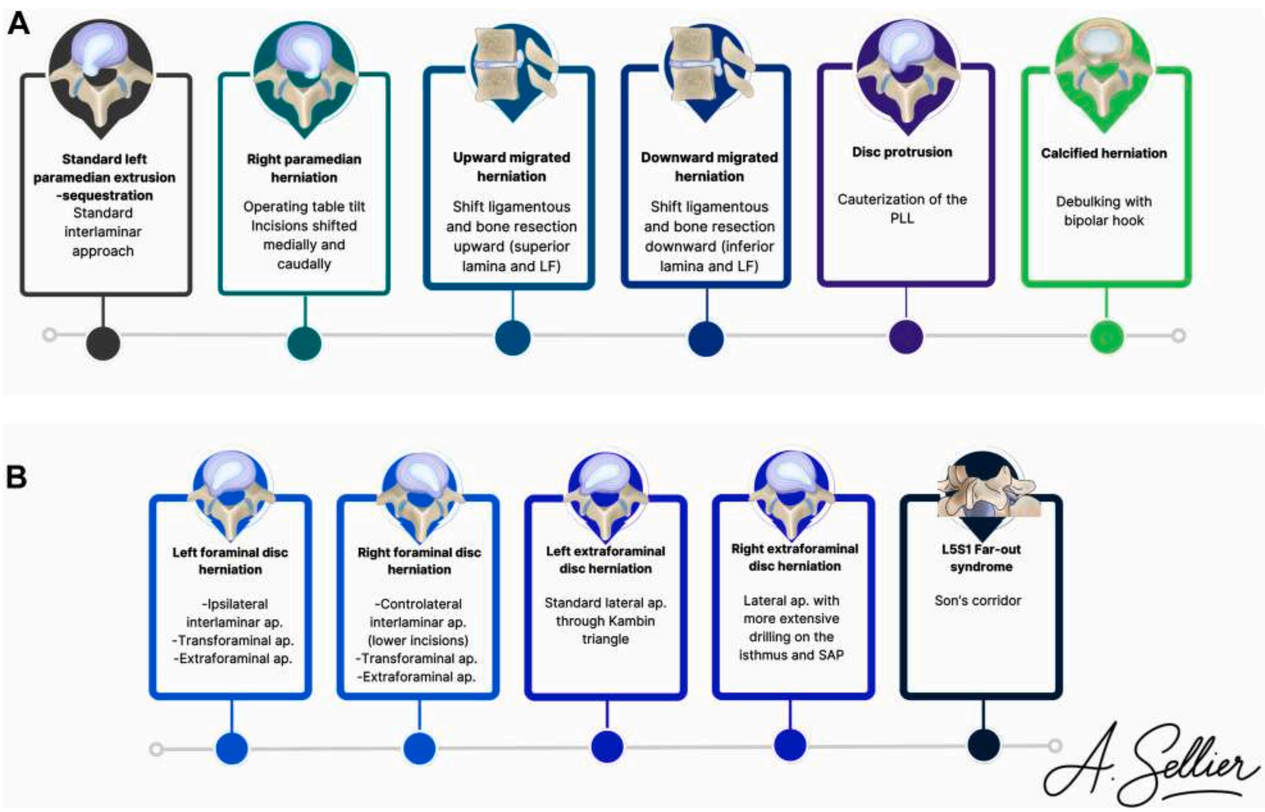

Figure 8. Summary of the UBE approach according to disc herniation type. (**A**) Central and paramedian herniations: adaptations based on side, migration pattern, and consistency. (**B**) Foraminal and extraforaminal herniations: selection of interlaminar, transforaminal, or extraforaminal approaches. UBE, unilateral biportal endoscopy.

right-handed surgeons routinely perform bilateral over-the-top decompression for lumbar spinal canal stenosis from the left side of the patient.[2,19-22] Maintaining a fixed position on one side of the patient is therefore familiar and ergonomically intuitive for many spine surgeons. In our experience, these ergonomic considerations did not translate into increased perioperative complications or adverse early outcomes.

- For left-handed surgeons, the concept should logically be mirrored using a fixed right-sided position in order to preserve the same ergonomic principles.
- Finally, although feasibility was demonstrated across a broad spectrum of lumbar disc herniation patterns, the generalizability of this approach should be further assessed in larger, multicenter series.

CONCLUSION

UBE surgery for lumbar disc herniation can be systematically performed with the surgeon positioned on the same side of the patient, on the left side for right-handed surgeons and conversely on the right side for left-handed surgeons, without compromising visualization or access. This one-sided configuration enhances ergonomics, surgeon comfort, and OR workflow consistency for the entire surgical team.

Beyond surgeon positioning, this strategy relies on systematic customization of the surgical corridor according to herniation type, including a dedicated management of the posterior wall and PLL when indicated.

Successful application of this strategy requires meticulous preoperative planning and a thorough understanding of anatomical landmarks and potential pitfalls. An overview of the different surgical approaches according to the type and location of the disc herniation is provided in **Figure 8**.

CRediT AUTHORSHIP CONTRIBUTION STATEMENT

Aurore Sellier: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Data curation, Conceptualization. **Francois Lechanoine:** Writing – review & editing, Validation. **Guillaume Lonjon:** Writing – review & editing, Validation. **Louis-Marie Terrier:** Writing – review & editing, Validation, Conceptualization. **François-Xavier Ferracci:** Writing – review & editing, Validation. **Philippe Cam:** Writing – review & editing, Validation. **Anthony Melot:** Writing – review & editing, Validation. **Joseph Cristini:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Methodology, Data curation, Conceptualization.

REFERENCES

1. Ross N, Aleman C, Dhenin A, Vassal M, Lonjon G. Tubular versus unilateral biportal endoscopy: MRI analysis after unilateral laminectomy for bilateral decompression in lumbar spinal stenosis. *Eur Spine J*. 2025;34:2972-2980.
2. Sellier A, Lechanoine F, Lonjon G, et al. How to begin unilateral biportal endoscopy (UBE) for segmental lumbar degenerative disease: a step-by-step guide to perfect patient positioning and surgical approach, avoiding common pitfalls. *Neurosurg Rev*. 2024;47:593.
3. Kim S-K. Minimizing tissue injury and incisions in multilevel biportal endoscopic spine surgery: technical note and preliminary results. *Medicina (Mex)*. 2024;60:514.
4. Zhuang H-X, Guo S-J, Meng H, Lin J-S, Yang Y, Fei Q. Unilateral biportal endoscopic spine surgery for lumbar spinal stenosis: a systematic review and meta-analysis. *Eur Rev Med Pharmacol Sci*. 2023;27:4998-5012.
5. Wang Y, Maimaiti A, Tuoheti A, et al. The method of portal making in lumbar unilateral biportal endoscopic surgery with different operative approaches according to the constant anatomical landmarks of the lumbar spine: a review of the literature. *Glob Spine J*. 2024;14:1838-1861.
6. Ahn J-S, Lee H-J, Choi D-J, Lee K, Hwang S. Extraforaminal approach of biportal endoscopic spinal surgery: a new endoscopic technique for transforaminal decompression and discectomy. *J Neurosurg Spine*. 2018;28:492-498.
7. Park J-H, Jung J-T, Lee S-J. How I do it: L5/S1 foraminal stenosis and far-lateral lumbar disc herniation with unilateral bi-portal endoscopy. *Acta Neurochir (Wien)*. 2018;160:1899-1903.
8. Mumcu C, Naderi S. Unilateral biportal endoscopic discectomy via the contralateral approach in upward migrated foraminal disc herniations. *World Neurosurg*. 2025;197:123903.
9. Park YJ, Park MK, Son SK, Ko YS. Unilateral biportal endoscopic discectomy via the contralateral sublaminar approach for lumbar disc herniation with very high-grade migration: a technical note and case series. *World Neurosurg*. 2025;197:123939.
10. Park M-K, Son S-K, Park WW, Choi S-H, Jung DY, Kim DH. Unilateral biportal endoscopy for decompression of extraforaminal stenosis at the Lumbosacral junction: surgical techniques and clinical outcomes. *Neurospine*. 2021;18:871-879.
11. Chen W-C, Wang W-T, Pao J-L. Unilateral biportal endoscopic discectomy via translaminar approach for highly upward-migrated lumbar disc herniation: a technical note and preliminary treatment outcomes. *BMC Musculoskelet Disord*. 2024;25:722.
12. Shao R, Du W, Zhang W, et al. Unilateral biportal endoscopy via two different approaches for upper lumbar disc herniation: a technical note. *BMC Musculoskelet Disord*. 2024;25:367.
13. Reis JPG, Pinto EM, Teixeira A, et al. Unilateral biportal endoscopy: review and detailed surgical approach to extraforaminal approach. *EFORT Open Rev*. 2025;10:151-155.
14. Deyo RA, Mirza SK. Herniated lumbar intervertebral disk. *N Engl J Med*. 2016;374:1763-1772.
15. Sellier A, Lonjon G, Lechanoine F, et al. Letter to the editor. Enhanced recovery after surgery and unilateral biportal endoscopy. *J Neurosurg Spine*. 2025;42:799-801.
16. Heo DH, Son SK, Eum JH, Park CK. Fully endoscopic lumbar interbody fusion using a percutaneous unilateral biportal endoscopic technique: technical note and preliminary clinical results. *Neurosurg Focus*. 2017;43:E8.
17. Kerr H-L, Wadikhaye R, Sun GU, Park CW. Paramedian unilateral 'Bitubular' endoscopic access for a far lateral disc herniation: a novel approach for far lateral lumbar pathologies. *Neurospine*. 2024;21:1160-1167.
18. Ha JS, Sakhrekar R, Han H-D, et al. Unilateral biportal endoscopy for L5-S1 extraforaminal stenosis (far out syndrome) – technical note with literature review. *J Orthop Case Rep*. 2024;14:187-193.
19. Kaen A, Quillo-Olvera J, Park MK, et al. Five-step unilateral biportal endoscopic surgery for central lumbar canal stenosis: "Z" technique nuance. *Neurosurg Focus Video*. 2024;10:V3.

20. Hwa Eum J, Hwa Heo D, Son SK, Park CK. Percutaneous biportal endoscopic decompression for lumbar spinal stenosis: a technical note and preliminary clinical results. *J Neurosurg Spine*. 2016; 24:602-607.

21. Park J, Ahn D-K, Choi D-J. Treatment concept and technical considerations of biportal endoscopic spine surgery for lumbar spinal stenosis. *Asian Spine J*. 2024;18:301-323.

22. Park DK, Weng C, Zakko P, Choi D-J. Unilateral biportal endoscopy for lumbar spinal stenosis and lumbar disc herniation. *JBJS Essent Surg Tech*. 2023;13:e22.00020.

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