Unilateral Biportal Endoscopy (UBE)

- Does the number of drain tubes influence the formation of postoperative spinal epidural hematoma following biportal endoscopic unilateral laminotomy for bilateral decompression (BE-ULBD) in patients with two-level adjacent lumbar spinal stenosis? a prospective randomized study
- Early effectiveness of posterior 180-degree decompression via unilateral biportal endoscopy in treatment of lumbar spinal stenosis combined with MSU-1 lumbar disc herniation
- Unilateral biportal endoscopy for the treatment of symptomatic spinal epidural lipomatosis: a case report and literature review
- Impact of first ambulation time on unilateral biportal endoscopy in lumbar disc herniation: a systematic review and meta-analysis
- Perfusion pressure as a determinant of respiratory function outcomes in unilateral biportal lumbar endoscopic procedures
- Risk factors for recurrent lumbar disc herniation after unilateral biportal endoscopy: a retrospective study
- Advancements in Spinal Endoscopic Surgery: Comprehensive Techniques and Pathologies Addressed by Full Endoscopy Beyond Lumbar Disc Herniation
- Primer on Unilateral Biportal Endoscopic Spine Surgery: Technical Overview for Beginners

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Definition

> **Unilateral Biportal Endoscopy (UBE)** is a minimally invasive spinal surgery technique that uses two small incisions (portals) on the same side: one for an endoscope and one for surgical instruments.

It allows for excellent visualization and effective decompression with minimal tissue damage.

⚙ Indications

- Lumbar disc herniation
- Spinal canal stenosis
- Foraminal stenosis
- Bilateral decompression via unilateral approach

Technique Overview

Portal Placement:

- Two small incisions (~1 cm) on the same side of the spine
- One for endoscopic camera (viewing)
- One for surgical tools (working)

Irrigation: Continuous saline flow to maintain a clear field.

Steps:

1. Patient prone
2. Fluoroscopic marking
3. Serial dilation
4. Endoscopic visualization
5. Decompression (laminotomy, flavectomy, discectomy, etc.)

Advantages

- Less muscle trauma
- Better visualization than microscopy
- Faster recovery and less postoperative pain
- Can be performed under epidural or general anesthesia

Comparison Table

Technique	Ports	Visualization	Working Channel	Invasiveness
Microscopic Surgery	1	Microscope	Same	Moderate
Uniportal Endoscopy	1	Endoscope	Same	Minimally invasive
UBE	**2**	**Endoscope**	**Separate**	**Minimally invasive**

Coding (ICD-10-PCS)

Note: UBE is often coded as a **percutaneous endoscopic** procedure in ICD-10-PCS, even though it uses two portals.

Example (lumbar discectomy):

- **0SB64ZZ** – Excision of lumbar disc, percutaneous endoscopic approach

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Park et al. described the unilateral biportal endoscopic (UBE) technique for decompression of extraforaminal stenosis at L5-S1 and evaluate 1-year clinical outcomes. Especially, we evaluated compression factors of extraforaminal stenosis at L5-S1 and described the surgical technique for decompression in detail.

Thirty-five patients who underwent UBE decompression for extraforaminal stenosis at L5-S1 between March 2018 and February 2019 were enrolled. Clinical results were analyzed using the MacNab criteria, the visual analogue scale (VAS) for back and leg pain, and the Oswestry Disability Index (ODI). Compression factors evaluated pseudoarthrosis within the transverse process of L5 and ala of

sacrum, disc bulging with or without osteophytes, and the thickened lumbosacral and extraforaminal ligament.

The mean back VAS was 3.7 ± 1.8 before surgery, which dropped to 2.3 ± 0.8 at 1-year postoperative follow-up ($p < 0.001$). There was a significant drop in postoperative mean VAS for leg pain from 7.2 ± 1.1 to 2.3 ± 1.2 at 1 year ($p < 0.001$). The ODI was 61.5 before surgery and 28.6 ($p < 0.001$). Pseudoarthrosis between the transverse process and the ala was noted in all cases (35 of 35, 100%). Pure disc bulging was seen in 12 patients (34.3%), and disc bulging with osteophytes was demonstrated in 23 patients. The thickened lumbosacral and extraforaminal ligament were identified in 19 cases (51.4%). No complications occurred in any of the patients.

In the current study, good surgical outcomes without complications were achieved after UBE decompression for extraforaminal stenosis at L5-S1 [1) 2)]

Narrative reviews

A narrative_review presents a structured 10-tier progression model for mastering unilateral biportal endoscopy (UBE), a technique gaining momentum in minimally_invasive_spine_surgery. The framework serves as a training roadmap, beginning with basic lumbar decompression procedures and progressing toward advanced interventions such as transforaminal_lumbar_interbody_fusion (TLIF) and thoracic decompressions.

The authors suggest that surgeons must acquire competency in lumbar UBE before attempting cervical and thoracic levels, highlighting the anatomical and technical demands of more complex procedures. Each tier includes specific surgical targets and emphasizes core skills like safe nerve_root_mobilization, minimal spinal_cord manipulation, and effective foraminal_decompression.

The framework is informed by evidence from learning_curve analysis using cumulative sum (CUSUM) methodologies, aiming to enhance safety, reduce complications, and support adoption of UBE worldwide [3)].

Critical Review

Strengths:

- The **10-tier structure** is logically designed, covering increasing complexity across spinal regions.
- Grounded in **realistic training needs** for novice and intermediate surgeons.
- Incorporates modern **learning curve analytics**, such as cusum analysis, to support its recommendations.
- Bridges the gap between **technical skill acquisition** and **clinical outcome improvement**.

⚠ **Weaknesses:**

- As a narrative_review, it **lacks empirical validation** through clinical trials or prospective cohort data.
- It doesn’t provide **quantitative data** on how many cases are required to master each tier.
- The framework, while comprehensive, may be **challenging to implement** in low-resource

settings with limited access to advanced endoscopic tools or simulation labs.

 Implications for Practice: This tiered model can serve as a **template for UBE training programs**, particularly in academic centers aiming to structure minimally invasive spine fellowships. It promotes **progressive learning**, aligns well with surgical simulation, and could potentially reduce early complications associated with the steep UBE learning curve.

 Recommendation: Further studies are needed to validate this model through **multicenter trials**, **feedback from trainees**, and **long-term surgical outcomes**. If validated, it could become a **cornerstone of UBE education**.

1)
Park MK, Son SK, Park WW, Choi SH, Jung DY, Kim DH. Unilateral Biportal Endoscopy for Decompression of Extraforaminal Stenosis at the Lumbosacral Junction: Surgical Techniques and Clinical Outcomes. Neurospine. 2021 Dec;18(4):871-879. doi: 10.14245/ns.2142146.073. Epub 2021 Dec 31. PMID: 35000343.
2)
Lee CK, Kim I. Commentary on “Unilateral Biportal Endoscopy for Decompression of Extraforaminal Stenosis at the Lumbosacral Junction: Surgical Techniques and Clinical Outcomes”. Neurospine. 2021 Dec;18(4):880-881. doi: 10.14245/ns.2143268.634. Epub 2021 Dec 31. PMID: 35000344.
3)
Espinoza XAS, Pérez EG, Choi DJ. The unilateral biportal endoscopy journey: proposing a 10-tier difficulty progression framework for unilateral biportal endoscopy. Asian Spine J. 2025 Apr 7. doi: 10.31616/asj.2025.0064. Epub ahead of print. PMID: 40195633.