

Uniportal Full Endoscopic Lumbar Fusion Surgery

Advancements in [endoscopic spine surgery](#) techniques have led to more minimally invasive options for lumbar spine surgery ¹⁾.

Uniportal Full [Endoscopic Lumbar Fusion Surgery](#) (UFELF) is a [minimally invasive spine surgery](#) technique used to treat various lumbar spine [conditions](#), such as [degenerative disc disease](#), [spondylolisthesis](#), and [spinal stenosis](#). This technique involves accessing the lumbar spine through a single, small incision using an [endoscope](#), which allows for better visualization and precision during the procedure.

Key Features of UFELF:

[Minimally Invasive Approach:](#)

A single, small incision reduces tissue damage, blood loss, and scarring compared to traditional open surgery. Minimally invasive techniques typically lead to quicker recovery times and less postoperative pain. Endoscopic Visualization:

The use of an endoscope provides high-definition, magnified views of the surgical area, enhancing precision. Real-time imaging allows for better maneuverability and accuracy during the procedure. Fusion Procedure:

Involves removing the diseased or damaged disc and replacing it with a bone graft or interbody cage to facilitate fusion between the adjacent vertebrae. Screws and rods may be used to stabilize the spine while the fusion occurs. Indications:

UFELF is indicated for patients with conditions like herniated discs, degenerative disc disease, spinal stenosis, and certain cases of spondylolisthesis. Patients who have not responded to conservative treatments such as physical therapy, medications, or injections may be candidates. Benefits of UFELF: Reduced Recovery Time: Patients often experience faster recovery and shorter hospital stays compared to traditional open lumbar fusion surgery. Lower Risk of Complications: The minimally invasive nature of the procedure reduces the risk of infection, blood loss, and other complications. Improved Outcomes: Enhanced precision and reduced tissue damage contribute to better overall outcomes, including pain relief and improved function. Procedure Overview: Preoperative Planning:

Detailed imaging studies, such as MRI and CT scans, are performed to plan the surgical approach. Patients undergo preoperative assessments to ensure they are suitable candidates for the procedure. Surgical Technique:

The patient is positioned, and a small incision is made to insert the endoscope and surgical instruments. Diseased disc material is removed, and an interbody cage or bone graft is inserted to facilitate fusion. Screws and rods may be placed to stabilize the spine. Postoperative Care:

Patients are monitored in the hospital for a short period before being discharged. Physical therapy and rehabilitation are typically recommended to aid in recovery and restore function. Considerations: Surgeon Expertise: The success of UFELF heavily relies on the surgeon's expertise and experience with endoscopic techniques. Patient Selection: Not all patients are suitable candidates for UFELF; careful patient selection is crucial for optimal outcomes. Long-term Outcomes: While short-term

benefits are well-documented, long-term outcomes and comparisons with traditional fusion techniques continue to be studied. Conclusion: Uniportal Full Endoscopic Lumbar Fusion Surgery offers a minimally invasive alternative to traditional lumbar fusion, with potential benefits including reduced recovery time, lower complication rates, and improved patient outcomes. As with any surgical procedure, it is important for patients to discuss the potential risks and benefits with their healthcare provider to determine the best treatment approach for their specific condition.

Objective: To elucidate the positional relationship between surgical instruments and nerve roots during full endoscopic [facet](#)-sparing (FE fs-TLIF) and facet-resecting (FE fr-TLIF) lumbar interbody fusion and propose safe instrumentation insertion procedures and recommend cage glider designs aimed at protecting nerve roots.

Summary of background data: [Endoscopic](#) surgical techniques are increasingly used for minimally invasive [lumbar fusion](#) surgery with FE fr-TLIF and FE fs-TLIF being common approaches. However, the risk of nerve root injury remains a significant concern during these procedures.

Methods: Eight experienced endoscopic spine surgeons performed uniportal FE fr-TLIF and FE fs-TLIF on cadaveric lumbar spines, totaling 16 surgeries. Post-operation, soft tissues were removed to assess the positional relationship between the cage entry point and nerve roots. Distances between the cage entry point, traversing nerve root, and exiting nerve root were measured. Safe instrumentation design and insertion procedures were determined.

Results: In FE fr-TLIF, the mean distance between the cage entry point and traversing nerve root was significantly shorter compared to FE fs-TLIF (3.30 ± 1.35 mm vs. 8.58 ± 2.47 mm, respectively; $P < 0.0001$). Conversely, the mean distance between the cage entry point and the exiting nerve root was significantly shorter in FE fs-TLIF compared to FE fr-TLIF (3.73 ± 1.97 mm vs. 6.90 ± 1.36 mm, respectively; $P < 0.0001$). For FE fr-TLIF, prioritizing the protection of the traversing root using a two-bevel tip cage glider was crucial. In contrast, for FE fs-TLIF, a single-bevel tip cage glider placed in the caudal location was recommended.

Conclusion: This study elucidates the anatomical relationship between cage entry points and nerve roots in uniportal endoscopic lumbar fusion surgery. Protection strategies should prioritize the traversing root in FE fr-TLIF and the exiting root in FE fs-TLIF, with corresponding variations in surgical techniques.

Level of evidence: V ²⁾

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Kim M, Kim HS, Oh SW, Adsul NM, Singh R, Kashlan ON, Noh JH, Jang IT, Oh SH. Evolution of Spinal Endoscopic Surgery. *Neurospine*. 2019 Mar;16(1):6-14. doi: 10.14245/ns.1836322.161. Epub 2019 Mar 31. PMID: 31618807; PMCID: PMC6449828.

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Hsu YC, Liu YF, Chang CJ, Hsiao YM, Huang YH, Liu KC, Chen CM, Kim HS, Lin CL. How to Prevent Nerve Root Injury in [Uniportal](#) Full Endoscopic Lumbar Fusion Surgery? Insights from a Cadaveric Anatomical Study with Simulation Surgery. *Spine (Phila Pa 1976)*. 2024 Jun 13. doi: 10.1097/BRS.0000000000005066. Epub ahead of print. PMID: 38872241.

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