

Endoscopic Spine Surgery: From Innovation to Evidence Based Practice

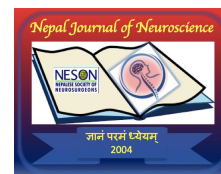
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Date of Submission: 20th August 2026

Date of Acceptance: 5th September 2026

Date of Publication: 15th September 2026



Editorial

Endoscopic spine surgery has reached a decisive stage in its evolution. What began as a technically demanding alternative to conventional decompression has developed into a broad family of uniportal and biportal procedures for lumbar disc herniation, spinal stenosis, selected cervical and thoracic pathology, and increasingly complex decompression and fusion strategies. The central question is therefore no longer whether endoscopic spine surgery can be performed, but when it should be performed, by whom, and with what level of evidence, training, quality assurance, and accountability. This transition from innovation to evidence based practice is the defining challenge for the next phase of the field.

The historical trajectory is instructive. Early randomized work demonstrated that full endoscopic lumbar discectomy could achieve clinical results comparable to microsurgical discectomy while reducing approach-related tissue trauma and facilitating rehabilitation.¹ Over subsequent years, refinements in optics, irrigation systems, drills, radiofrequency devices, working channels, and surgical anatomy expanded the indications of endoscopy. The emergence of unilateral biportal endoscopy (UBE) further altered the technical landscape by separating visualization from instrumentation and allowing surgeons to use familiar spinal instruments under continuous endoscopic visualization.

The contemporary evidence is increasingly substantive. Systematic reviews comparing biportal endoscopic decompression with microscopic techniques generally report similar long term pain and disability outcomes, with potential

advantages in hospital stay, early recovery, and selected perioperative parameters.^{2,3} A multicenter randomized non inferiority trial comparing biportal endoscopic and microscopic discectomy for single level lumbar disc herniation found biportal surgery to be non inferior at 12 months, with similar secondary clinical outcomes and adverse events.⁴ A larger meta analysis of 3,673 biportal cases also documented significant improvements in pain and disability with an overall complication profile comparable to established approaches, while appropriately emphasizing the need for prospective comparative studies.⁵

More recent evidence reinforces both the promise and the limits of the technology. A 2026 meta-analysis restricted to randomized trials of full endoscopic versus microscopic lumbar discectomy found comparable decompressive efficacy and patient reported outcomes. Endoscopy was associated with lower blood loss, fewer wound related complications, and earlier return to work, but also greater fluoroscopic exposure and no consistent long term superiority in pain or disability.⁶ This distinction is important. Evidence based adoption should not confuse statistical differences with clinically meaningful superiority, nor should minimally invasive access be treated as an end in itself. The goal remains maximal neural decompression and durable symptom relief with the least necessary collateral tissue injury and the lowest reasonable procedural risk.

It is in this context that UBECON-II Nepal 2026, held in Kathmandu from 27 to 29 August 2026 as a Chapter Conference of ISUBE-SSEA, carries significance beyond the successful conduct of an academic meeting. Such a conference represents the regional maturation of endoscopic spine surgery. For Nepal and the wider South and Southeast Asian region, the next responsibility is to convert enthusiasm, technical exchange, and live surgical learning into reproducible standards of care. Conferences should become platforms not only for demonstrating technique, but also for discussing indications, contraindications, complications, learning curves, credentialing, reporting standards, and research methodology.

The learning curve deserves particular attention. Endoscopic surgery changes depth perception, triangulation, orientation, hemostasis, instrument handling, and complication management. In UBE, continuous saline irrigation introduces additional considerations related to pressure, fluid extravasation, visualization, and epidural bleeding. Uniportal procedures can impose constraints related to working-channel geometry and fluoroscopic dependence. These are not arguments against endoscopy; they are reasons to develop structured training pathways. Cadaveric laboratories, simulation, stepwise mentorship, proctorship, case selection criteria, competency-

Access this article online

Website: <https://www.nepjol.info/index.php/NJN>

DOI: <https://doi.org/10.3126/njn.v23i3.99657>

HOW TO CITE

Kafle, P. (n.d.). Endoscopic Spine Surgery: From Innovation to Evidence Based Practice. NJNS.2026;23(3):1-2



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ISSN: 1813-1948 (Print), 1813-1956 (Online)



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based assessment, and transparent conversion thresholds should be regarded as patient-safety requirements rather than optional educational enhancements.

Evidence based practice also requires discipline in patient selection. The mere technical possibility of performing an endoscopic procedure does not establish its superiority for every pathology. Conventional microscopic or open surgery remains appropriate in many circumstances, particularly where anatomy, instability, deformity, extensive multilevel disease, tumor, infection, trauma, or surgeon experience favors another approach. The mature endoscopic surgeon should therefore be defined not by the number of endoscopic operations performed, but by the ability to select the operation that best matches the pathology and the patient.

A further priority is data. The global literature on endoscopic spine surgery has expanded rapidly, but contemporary evidence syntheses continue to reveal heterogeneity in techniques, comparators, study design, follow up, and outcome reporting.⁶ Regional societies and chapter conferences are well positioned to establish prospective registries using standardized outcome measures such as the Oswestry Disability Index, visual analogue or numeric pain scores, return to-work metrics, reoperation rates, dural tears, neurological deficits, infection, hematoma, radiation exposure, and procedure-specific complications. Minimum follow up standards and consistent definitions would allow meaningful benchmarking across surgeons and institutions.

For countries such as Nepal, local evidence is especially important. Outcomes reported from high volume centers in technologically mature health systems may not fully translate to different referral patterns, disease severity, imaging access, operating-room infrastructure, implant economics, rehabilitation pathways, or follow up constraints. High-quality prospective cohorts and pragmatic comparative studies from South Asia can therefore make a genuine contribution to the international literature. The region should not remain only a recipient of endoscopic innovation, it should become a producer of evidence.

Endoscopic spine surgery is no longer a fringe technique, but neither should it be protected from the standards applied to established surgery. Its future will be determined by rigorous indications, reproducible training, complication transparency, cost conscious implementation, and comparative outcomes that matter to patients. The most credible advocates of endoscopy will be those willing to define where it works, where it does not, what its learning curve costs, and how its results compare with the best conventional alternatives.

UBECON-II Nepal 2026 therefore arrives at an appropriate moment. The field has moved from asking whether endoscopic spine surgery is innovative to asking whether that innovation can be standardized, measured, taught safely, and justified by evidence. The answer will depend less on the size of the incision than on the quality of the science. The next chapter of endoscopic spine surgery should be written not by novelty alone, but by data, judgment, and patient-centered outcomes.

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