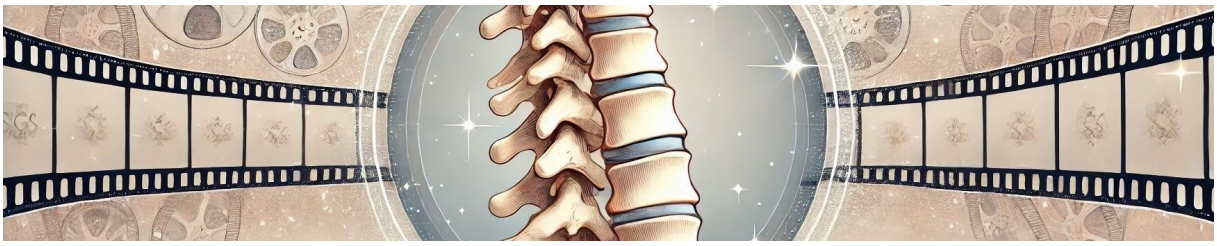

Abstracts of the 25th Annual Meeting of the Swiss Society of Spinal Surgery (SGS)

Endoscopy Session

A Cadaver-Based Study on the Use of an Entry Guidance Tool for Transforaminal Endoscopic Spine Surgery

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Objective: Endoscopic spine surgery, particularly Transforaminal Endoscopic Lumbar Discectomy (TELD), enables targeted decompression within Kambin's triangle. However, identifying the correct entry point can be challenging, especially for less experienced surgeons.
This study aims to validate a novel assistive tool designed to facilitate faster, safer access during TELD. The tool allows for adjustable angulation, helping to optimize trajectory by effectively eliminating one axis of complexity. It was developed to improve precision and reduce procedural difficulty, especially during early training.
Methods: A cadaver-based pilot study included three expert spine surgeons and four beginners. Each performed TELD access at the L3/4 level, first using the assistive tool after a standardized introduction, then repeating the procedure without the tool from the same side. Time to target zone and intraoperative radiation dose were measured. Additionally, participants were surveyed on handling and perceived usefulness of the tool.
Results: Experts reported an average of 133 endoscopic spine surgeries and 63 TELD procedures annually, with 8.7 years of experience. Beginners averaged 10 procedures per year, none of which were TELD, and had no prior experience. Using the tool, experts and beginners showed similar performance: access times averaged 209 s (± 74.6) and 351 s (± 165), and radiation doses 2113.1 mGy·cm² (± 127) and 3872.8 mGy·cm² (± 316), respectively. Without the tool, experts were faster, with mean times of 133 s (± 32.1) versus 222 s (± 48.8) for beginners ($p = 0.029$), though radiation exposure was similar (2288.2 vs. 2972.2 mGy·cm²).
Conclusion: First-time use of the assistive tool in a cadaver model led to comparable time and radiation outcomes between experts and beginners. Experts remained faster using their routine technique, as expected, but the tool helped close the performance gap for novices.
This preliminary cadaver setup provides valuable early data, though further refinement and repeated tool use may enhance results. Future clinical studies are needed to confirm long-term benefits and training potential in real-world settings.

Fluid Irrigation-Induced Pressure Changes During Lumbar Endoscopy: Insights from a Cadaver Model

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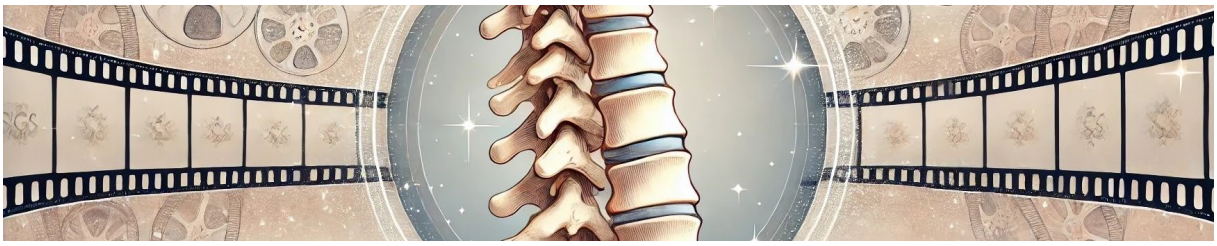
Objective: Interlaminar endoscopic lumbar discectomy (IELD) can sometimes lead to complications such as headaches, seizures, and even autonomic dysreflexia. These symptoms might be due to increased intracranial pressure, presumably induced by increased spinal intra-/epidural pressure caused by fluid irrigation. The precise mechanisms underlying these adverse events remain unclear.



This study investigates the relationship between irrigation pressure and changes in intra- and epidural pressures during IELD.
Methods: To evaluate pressure dynamics, pressure sensors were inserted through a sacral approach to the L3/4 (lumbar), T8/9 (thoracic), and C5/6 (cervical) spinal levels in three human specimens. Additional sensors were placed in the epidural space at L3/4 and intracranially, with their placement confirmed via contrast-enhanced X-ray imaging. The dural sac was pre-pressurized with Ringer's solution to a physiological baseline of 15 cmH_2O. Using an interlaminar approach at L3/4, lumbar endoscopy was carried out while monitoring pressure responses to irrigation with both gravity-fed systems and endoscopic pump devices. Pressure changes were also recorded following a dural tear at L3/4.
Results: A linear relationship was found between irrigation pump pressure and intradural pressure at L3/4 for both pump systems (System I: $\rho = 0.94$, $p < 0.05$; System II: $\rho = 0.89$, $p < 0.05$). Similar patterns were observed at other spinal levels, including epidural and intracranial, with more significant pressure increases noted when the system was occluded and a dural tear was present. For instance, using System I, median intradural pressure at L3/4 rose by 1 mmHg at 30 mmHg pump pressure and by 8 mmHg at 120 mmHg. However, with a dural tear, the pressure rose to 9 mmHg at 30 mmHg and 35 mmHg at 120 mmHg.
Conclusion: Irrigation pump pressure during IELD shows a clear linear correlation with intra-, epidural, and intracranial pressures. In the absence of a dural tear and outflow occlusion, intradural pressure remains relatively stable, with increases not exceeding 25 mmHg even at high irrigation pressures (up to 120 mmHg). In contrast, the presence of a dural tear combined with high pump pressure and outflow occlusion, can lead to intradural pressure spikes up to 80 mmHg—levels that would be clinically deleterious. Surgeons should remain vigilant of these risks, particularly when dural integrity is compromised.

Adopting simultaneously biportal endoscopic discectomy and biportal endoscopic decompression after sixty: a surgeon's journey

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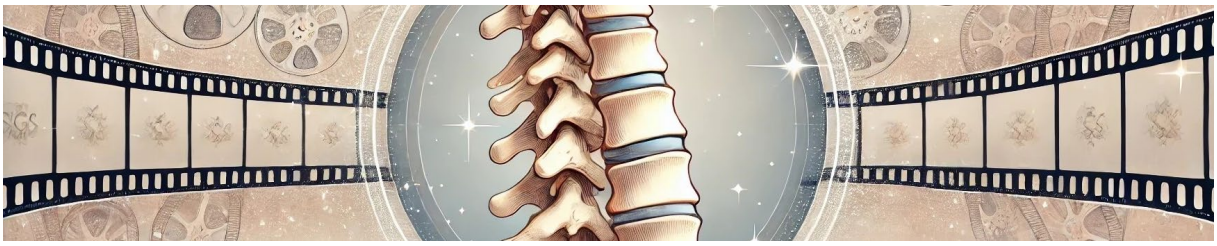
Objective: This study aimed to evaluate the operative time and complication profile of biportal endoscopy during a senior surgeon's initial learning curve involving both disc herniations and spinal stenosis cases and compare them to established microsurgical and tubular techniques, testing the hypothesis that the ability to learn new surgical techniques remains achievable and safe after the age of sixty.
Methods: Sixty patients were retrospectively reviewed and divided into three groups. The endoscopic group included the first 20 cases operated by a senior surgeon: nine underwent unilateral biportal endoscopic discectomy (UBE) for lumbar disc herniation (mean age 66), and 11 underwent unilateral biportal lumbar decompression (UBLD) for stenosis (mean age 70). Two historical control groups (20 patients each), matched for age, level, and diagnosis, underwent either microsurgical crossover single level lumbar decompression or tubular discectomy respectively.
Results: Operative times were significantly longer in the endoscopic group ($p < 0.001$), averaging 185 minutes overall (130 minutes for discectomy and 230 minutes for decompression). In contrast, tubular discectomy averaged 95 minutes and microsurgical decompression 108 minutes. However, a steeper improvement in operative time was observed with endoscopic decompression cases over time.
No complications occurred in the tubular or open surgery groups. In the endoscopic discectomy subgroup, no complications were noted. In the endoscopic decompression subgroup, there was one dural tear requiring conversion to open surgery, one iatrogenic spondylolysis, and two wrong-level surgeries (one of which was addressed intraoperatively). All complications occurred during the first four decompressions with none in the seven remaining patients. Despite this, all patients achieved satisfactory short-term outcomes. The complication rate during the learning phase remained within the range reported in the literature.
Conclusion: Despite age-related changes in cognitive and motor skills, senior surgeons can successfully adopt new, complex surgical techniques such as biportal endoscopy. While complication



rates were higher during the initial cases of decompression, they remained consistent with existing data. Structured mentorship and gradual case progression are critical. Combining discectomy and decompression early in training may help accelerate skill acquisition.