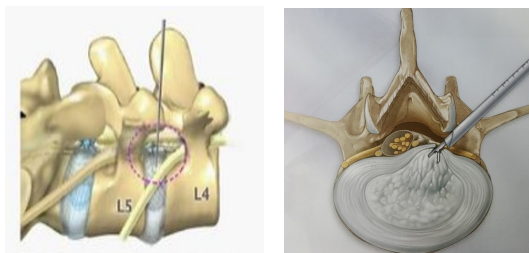


## Endoscopic Spine Surgery

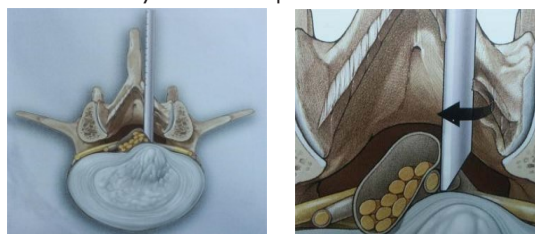
Parviz Kambin, an orthopedic spine surgeon, described reaching the disc space using an access needle under fluoroscopic imaging in 1973. This was followed by the placement of a guidewire and an endoscope. This access was between the inferior margin of the exiting nerve root, the lateral aspect of the traversing nerve bundle and the superior endplate of the caudal vertebrae and was later dubbed "Kambin's Triangle". Recent times have seen a resurgence of endoscopic application in discectomy, foraminotomy and fusion due to ergonomic designs and improved optics. Recent innovations from Spinendos have enabled superior visualization while reducing the diameter of the inner working channel to 4.3mm. Most importantly, Spinendos has patented numerous instruments to make the foraminoplasty safer including tissue protection tubes, depth restriction devices and side cutting rasps.

Enhanced Recovery After Surgery (ERAS) has enabled a marriage of technologies where minimally invasive access (endoscopic), superior pain control (long acting local anesthetics) and physiological alterations to bypass the stress response have reduced hospital stay. Although cost effective, true benefit is achieved when the surgical instruments are reusable rather than disposable.



### Endoscopic Transforaminal Techniques

Foraminal stenosis is typically from a disc herniation or a hypertrophied facet-ligament complex. After positioning the patient prone, the area of interest is localized using fluoroscopy. The endplates, midline and pedicle borders are identified. A spinal entry needle is used to enter the foramen and confirmed with fluoroscopy. Now the stylet is held in place while the inner needle is replaced with a guidewire. A 4mm skin incision is made around the guidewire to introduce a small dilator followed by a larger dilator. This creates a path for the working portal. The working portal is advanced while being carefully rotated, with the tip to dock near the pedicle base of the caudal vertebrae. A series of instruments specifically designed to shave the superior articulating facet through the endoscope can be used. Next an irrigating endoscope is inserted to visualize and orient oneself with the disc and exiting nerve root positions. In patients with disc herniations, many types of micro-endoscopic graspers can be used to remove the disc tissue. The surrounding soft tissue is cauterized using an endoscopic bipolar cautery when necessary. Foraminal stenosis from ligamental hypertrophy is addressed by then dissecting the ligament away from the dura and removal of the ligament with a variety of endoscopic instruments available.



### Endoscopic Interlaminar Techniques

Interlaminar procedures are usually performed at L5-S1 due to unique anatomy. The patient is positioned prone on a Wilson frame to achieve optimal flexion in order to open the interlaminar space. After localizing the level of interest with fluoroscopy, an entry needle is placed slightly cranially along the caudal lamina border, medial to the pedicle, under fluoroscopy. This places the needle lateral to the thecal sac and inferior to the axilla. The inner stylet is replaced by a guidewire, followed by dilators and then a working portal. Once this is all reconfirmed by fluoroscopy, the endoscope is introduced to visualize the lamina and ligamentum flavum. Ideally the interlaminar approach does not necessitate laminar resection but instruments are available for that purpose. The ligamentum is incised and separated from the underlying dura with multiple instruments. The ligamentum is then coagulated with bipolar cautery and removed using a series of endoscopic resection instruments. Any additional epidural venous bleeding is stopped by the same bipolar cautery. At this time, a blunt dissector is introduced to mobilize the dural sac from underlying soft tissues and the disc. Positive pressure irrigation at this point can also push the dural sac away from the working space. This is enabled with an irrigation pump attached to the side of the endoscope via tubing and a cap in the rear to restrict flow from the working channel. After identifying the exiting and the traversing nerves, the annulus is coagulated with a bipolar cautery and incised. This technique provides access to not only paracentral discs, but also lateral and migrated discs. This visualization is further assisted with the use of our 30 degree endoscope. A series of endoscopic instruments is used to remove the disc material and address the annulus. After satisfactorily addressing the stenosis, the site is examined carefully for additional fragments before withdrawing the scope. Many surgeons choose to inject a local anesthetic under direct visualization prior to closing.