

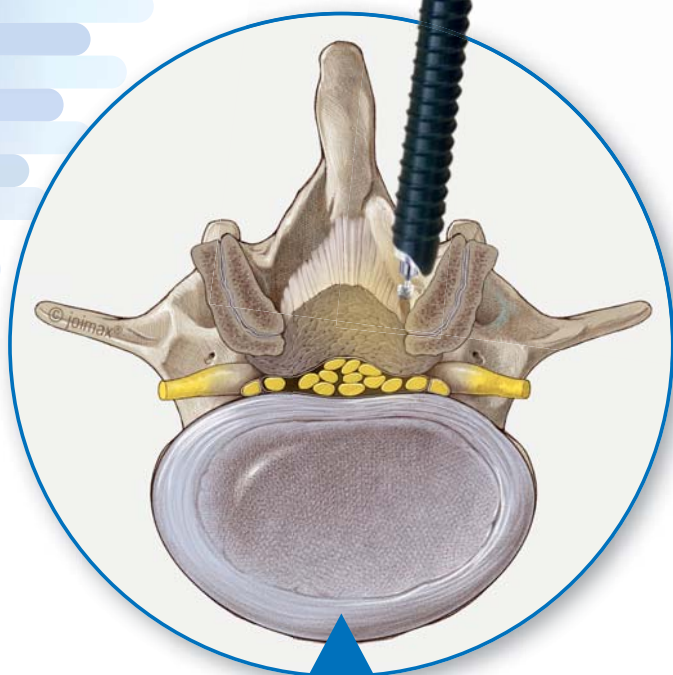


iLESSYS[®] + iLESSYS[®] *Delta*

Interlaminar Endoscopic Surgical System



**INTERLAMINAR
ENDOSCOPIC ACCESS**
FOR THE TREATMENT OF HER-
NIATED DISCS AND STENOSIS



MINIMALLY INVASIVE ENDOCOPIC SURGERY TECHNIQUE - IN THE AREA OF THE DORSAL SPINAL CANAL

Endoscopic surgery has been a routine procedure in laparoscopy and arthroscopy since the 1980s. In neuro and cardiac surgery, endoscopic minimally invasive techniques were first introduced in the 1990s.¹

The last decade has seen a significant evolution of the minimally invasive procedures for spinal surgery with less post-operative complications, reduced collateral damage due to least necessary tissue destruction. Therefore, faster recovery is possible.² Ongoing technological advances have resulted in increasingly sophisticated surgical approaches for disease-specific treatment and ultimately allowed endoscopic spinal surgery to become a reality.

The iLESSYS® method uses an interlaminary access path to remove disc herniation or treat stenosis. As an endoscopic minimally invasive surgical procedure, it is less traumatic than microsurgical techniques. The minimal diameter of the joimax® Laminoscope® (endoscope) and the working tube protect the structures along the access path and in the spinal canal. The optics provide a constant excellent direct view of all structures at the site of the surgery. The iLESSYS® method is an exceptionally minimally invasive surgical technique for pathologies of the dorsal spinal canal.

Interlaminary access is particularly suitable for spinal disc sequester and herniations which are difficult to reach via a transforaminal approach. These include sequestered herniated discs dorsal to the dura, pathologies at L5/S1, for example, when the iliac crest line is high, or for cranially sequestered herniations.

FOR THE TREATMENT OF DORSAL AND DORSO LATERAL SPINAL STENOSIS

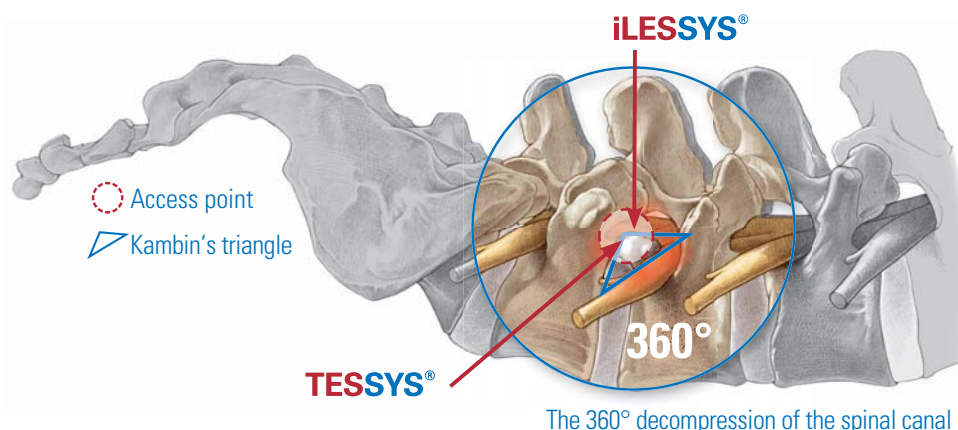
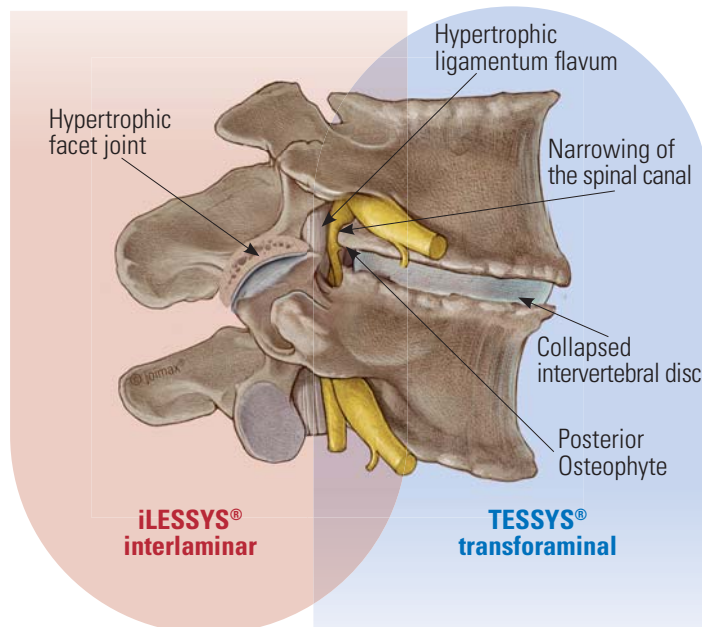
For treatment of stenosis, the different access paths to the spinal canal and to the

foramen are an excellent alternative to the conventional microsurgical technique, which usually cannot avoid removing parts of the lamina, ligamenta flava and/or parts of the facet joint. iLESSYS® Delta is particularly suitable for the treatment of extensive stenosis. Due to the larger diameter of the working tube, more powerful punches and special diamond shaver blades can be used under endoscopic view.

TESSYS® AND iLESSYS®: 2 ACCESSES – 1 TARGET

TESSYS® and iLESSYS® provide two alternative endoscopic minimally invasive access points to the spinal canal. The combination of both methods provides surgeons with the option of a 360° decompression of the spinal canal. All areas can be accessed, from the foramen to the area ventral and dorsal of the spinal cord and exiting nerves.

Problems with degenerative diseases



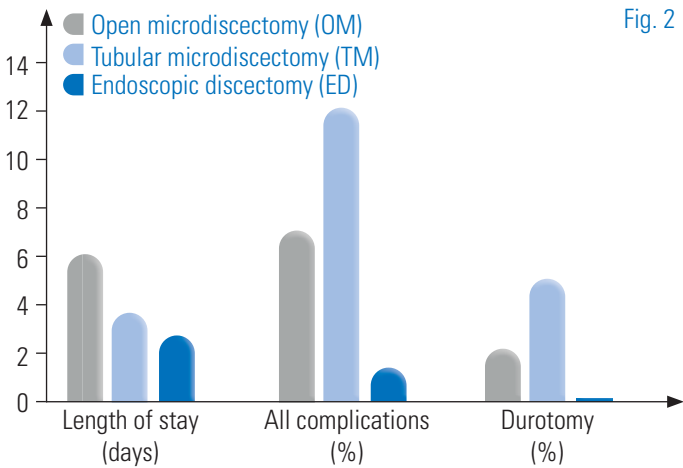
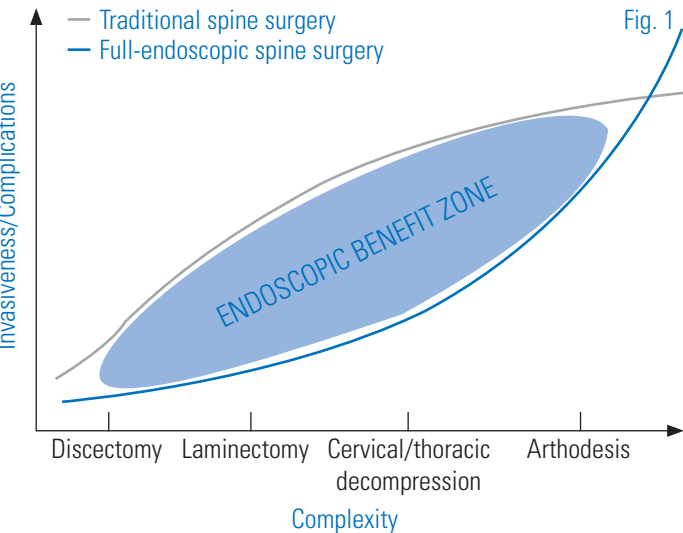
The 360° decompression of the spinal canal

THE CLINICAL RESULTS

SUPPORT ENDOSCOPY

There is now plenty of clinical evidence supporting the benefits of endoscopic treatment of the spinal column compared to microsurgery. The risk of infection is much lower and a faster return to work is evident. ^{3,4} (Fig. 1).

Clinical data is now available for an increasing number of endoscopic methods and approaches. For example, clinical results for the treatment of central stenosis by means of interlaminary endoscopic access now show that the VAS values for pain and the rating of the Oswestry Disability Index as standard for functional restrictions are considerably reduced. ⁵ A Meta-analysis including 26 studies with a total of 2577 patients compares outcomes of endoscopic discectomy (ED), open microdiscectomy (OM), and tubular microdiscectomy (TM). The analyses demonstrates, that results for ODI, return to work, complication rate and inflammatory reactions are significantly better in patients undergoing ED when compared with OM. (Fig. 2).³ Spinal stenosis is classified based on the morphological characteristics (Fig. 3).⁶



THE BENEFITS OF ENDOSCOPIC SURGERY TECHNIQUES ARE OBVIOUS:

- Tissue-conserving surgical access due to gradual dilation
- Continuous visual endoscopic monitoring during the OR
- Minimal destabilization and traumatization
- Minimal bleeding, therefore hardly any scar formation
- Reduced risk of infection
- Short recovery time and rapid return to everyday life

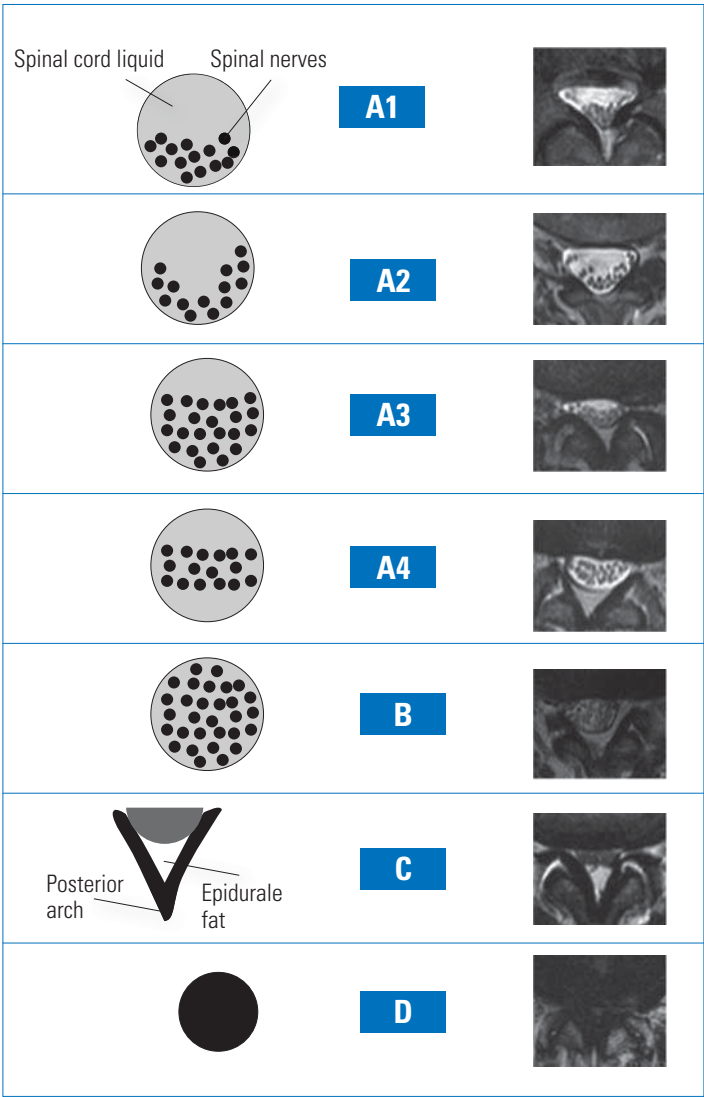
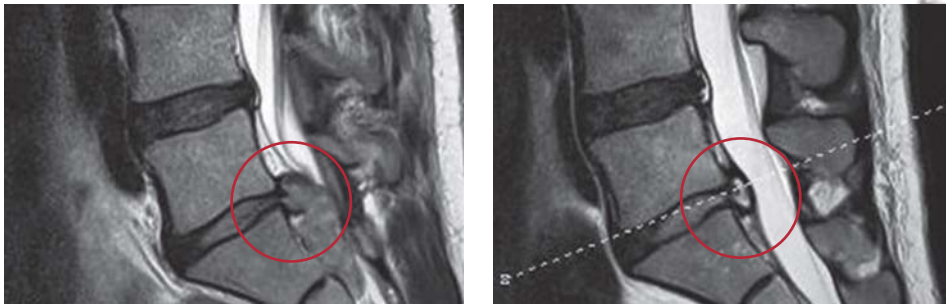


Fig. 3: Description of morphological classification of spinal stenosis⁶

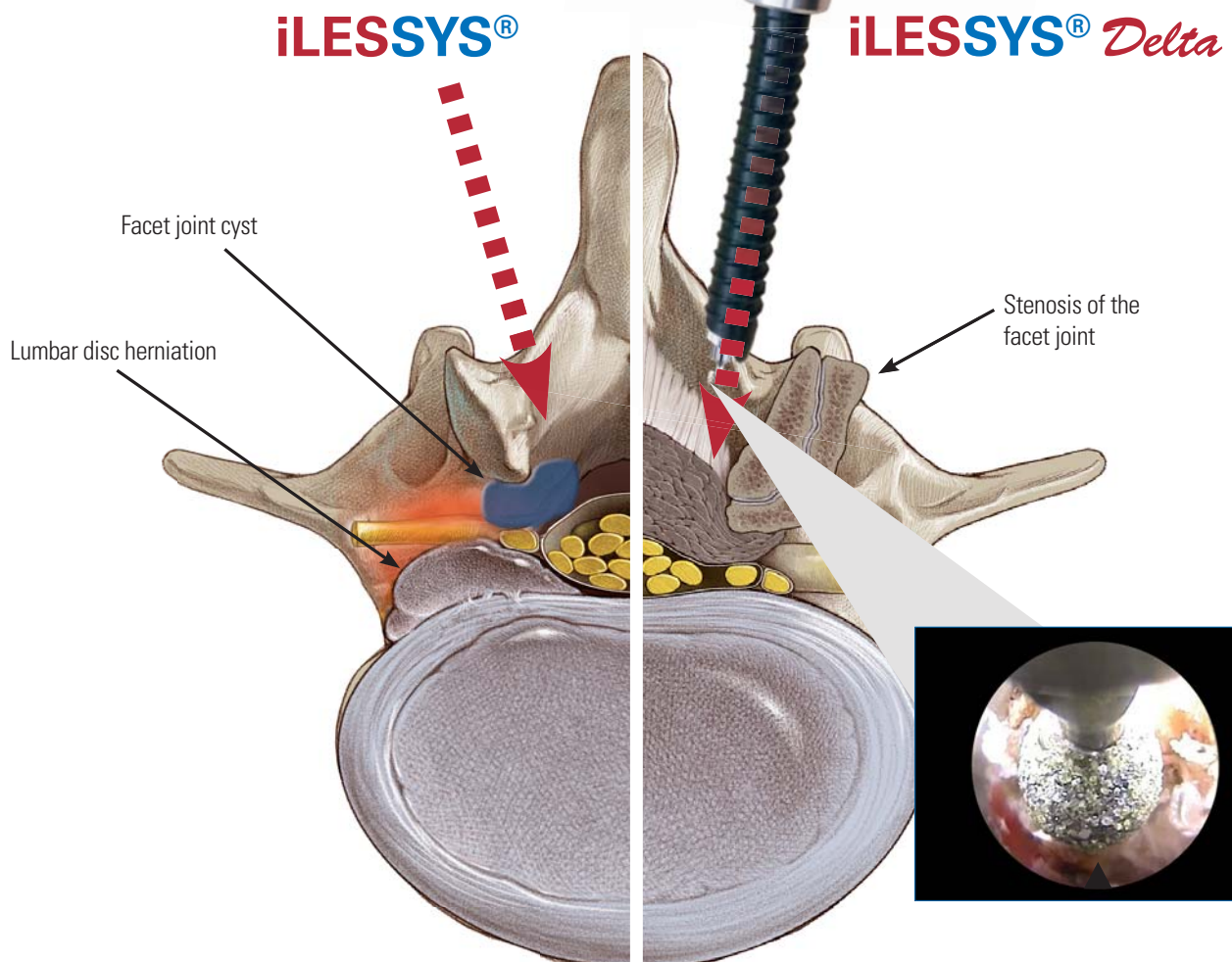
iLESSYS® was developed for endoscopic, interlaminary decompression. Due to the large interlaminary window, it is especially suitable for the lower lumbar spinal column. Considered indications are pathologies in the dorsal spinal canal, in the recessus and in the area of the medial zone of the foramen intervertebrale. This includes central stenosis, dorsal facet joint cysts, and sequestered herniations dorsal or lateral to the dura. Pathologies at L5/S1 which are difficult to access transforaminally are also good indications for interlaminary access.



MRI before (left) and 2 months after surgery (right)

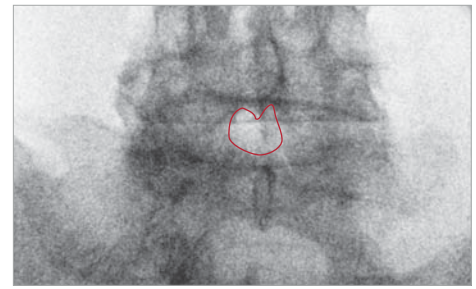
iLESSYS® MAIN INDICATIONS

- Lumbar herniated discs dorsally and laterally to the spinal nerves
- Spinal stenosis grade A1-4
- Hypertrophic ligamentum flavum
- Facet joint cysts

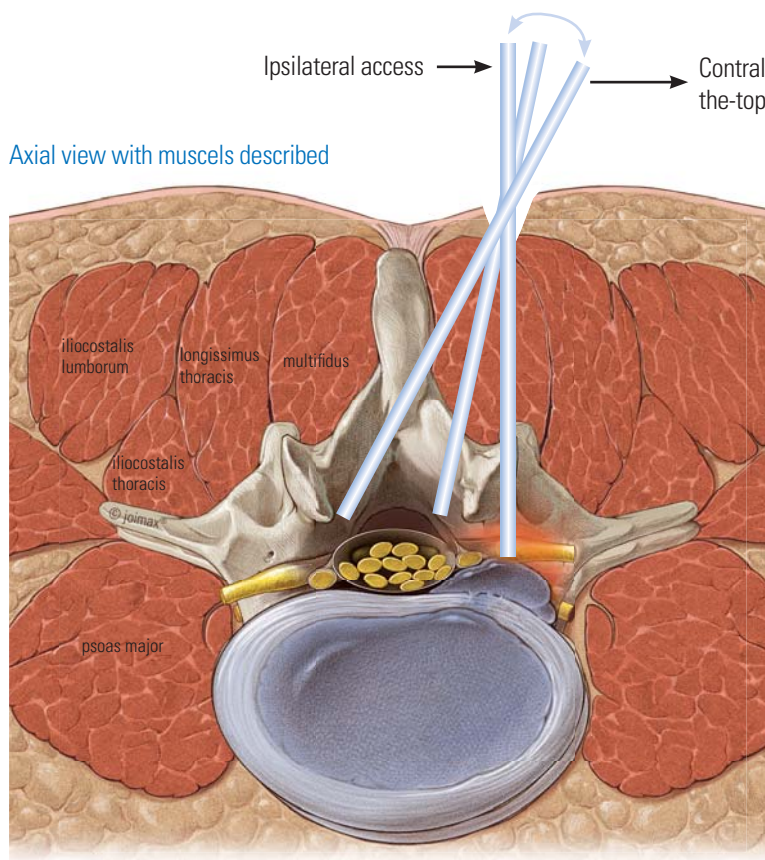


The instrument set of iLESSYS® Delta has been developed to enable more comprehensive removal of bone structures due to its larger working tube. The most important indication for iLESSYS® Delta surgery is the dorsal and dorsolateral endoscopic treatment of spinal stenosis. Both ipsilateral and contralateral access are possible under full endoscopic view (over-the-top technique).

The iLESSYS® Delta instrument set can also be used on the cervical spine to treat dorsal and foraminal pathologies. Access and indications are the same as for the Frykholm access. Alternatively, the special instrument set CESSYS® Dorsal with a smaller endoscope is available.



Dorsal X-ray before (above) and after the operation (below)



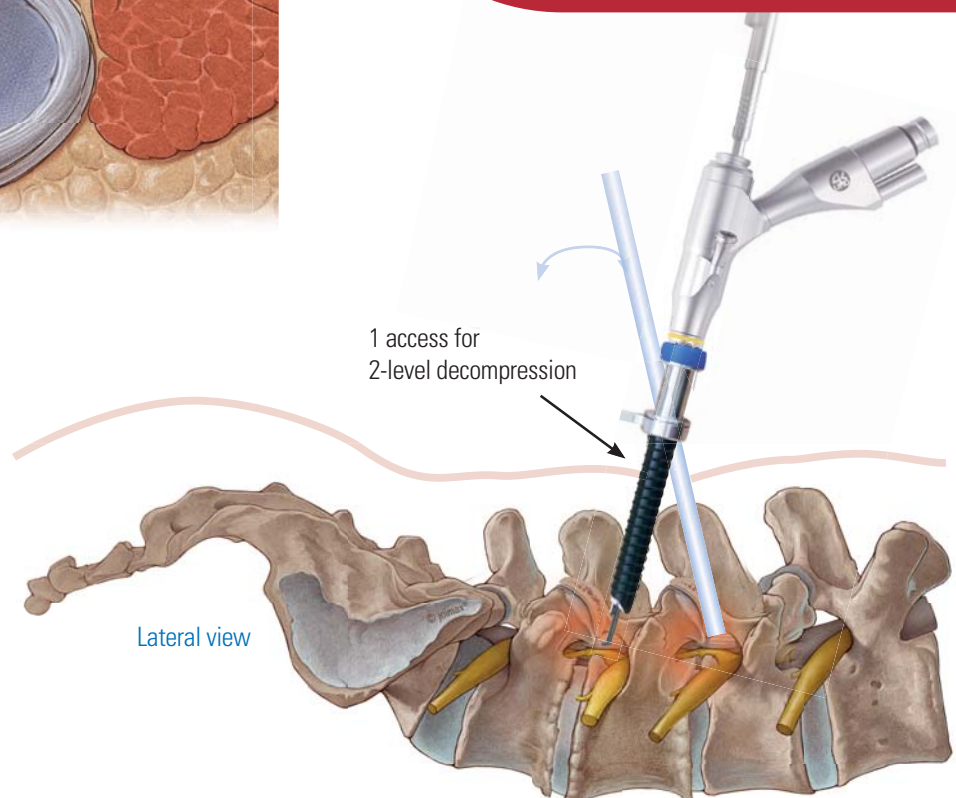
Axial view with muscles described

iLESSYS® Delta MAIN INDICATIONS

- Lumbar central stenosis and recessus stenosis
- Spinal stenosis of all grades (A-D)
- For massive bony decompression
- Cervical foraminal herniated discs and dorsal stenosis with myelopathies

„OVER-THE-TOP“ TECHNIQUE

The over-the-top or cross-over technique allows a bilateral decompression via unilateral endoscopic surgery access. After extension of the interlaminar window, a look at the opposite side is given. So, it is possible to reach the other side of the spinal canal with the instruments, without the need for a second skin incision or a wider new access. Thus, in this minimally invasive procedure the surgeon works crosswise (cross over).

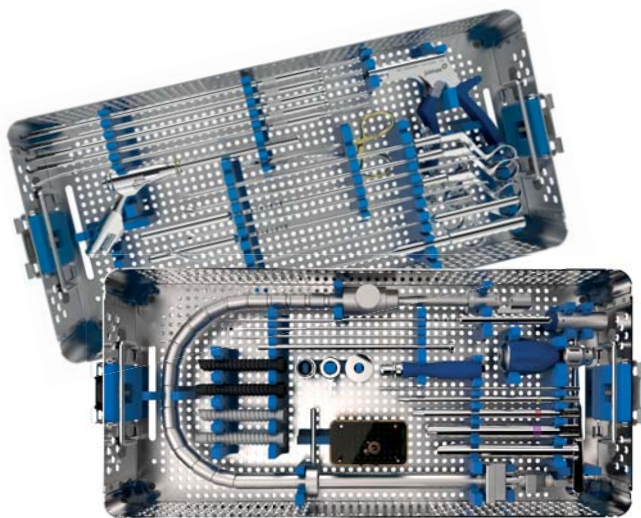


Lateral view

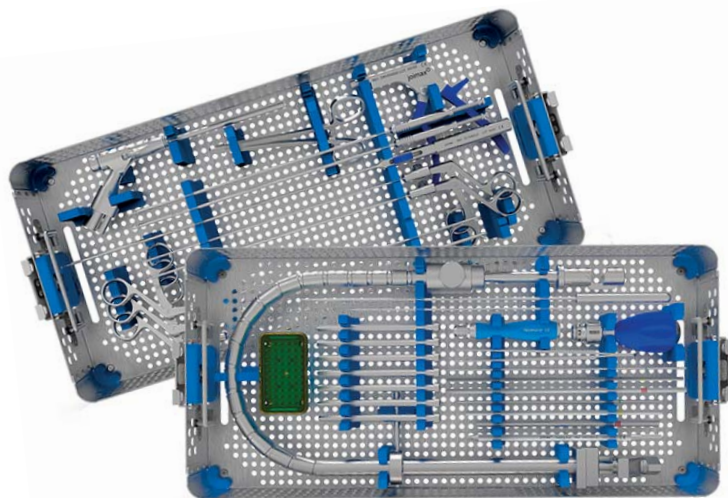
1 access for
2-level decompression

TWO COMPACT INSTRUMENT SETS WITH EASY HANDLING

The iLESSYS® Instrument set contains all the instruments required for safe, interlaminary, minimally invasive access to the spinal canal and for removal of disc tissue, bone spurs, or scar tissue (grasping, cutting, and punching forceps).



iLESSYS® Delta Instrument set



iLESSYS® Instrument set

iLESSYS® Delta was specially developed for more extensive decompressions. The larger working tube allows the use of more powerful punches and large shaver blades for the bone resection.

In both sets the access instruments are color-coded for easier handling.

Traffic light principle

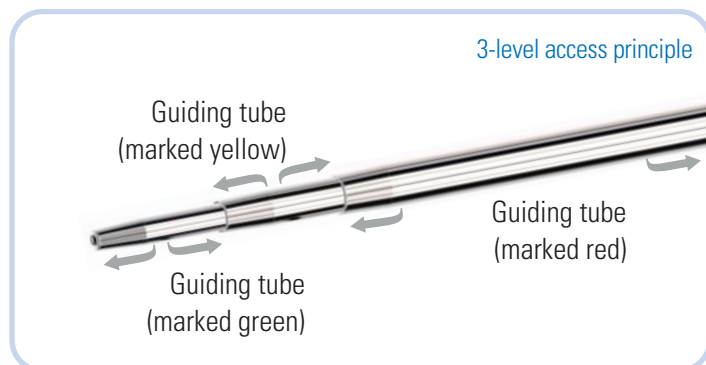
- Red:** Largest diameter, is introduced via „Yellow“.
- Yellow:** Medium diameter, is introduced via “green”.
- Green:** Smallest diameter, is introduced first.

Color-coded instruments



THREE STEPS TO THE GOAL

Access is via a 3-level dilation principle. Under X-ray control, the soft tissue is gradually dilated as far as the ligamentum flavum. Under endoscopic view, the ligamentum flavum is opened and disc tissue removed. If necessary, bony structures of the lamina can be removed using reamers.





FOR A PERFECT VIEW:

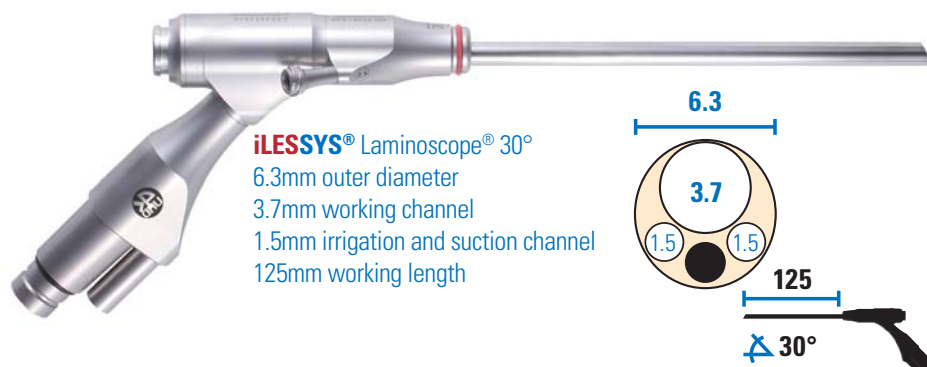


joimax® LAMINOSCOPIES®

The Laminoscopes® are available in a modern combo version with single-cable technology or an ocular version with standard ocular connector.

Combo version: User-friendly combined camera cable adapter for camera and light source using single-cable technology. Designed for all generations of joimax® combo camera heads.

Ocular version: Two-cable technology; camera and light source have separate cables; developed for connection to most standard camera and light-source systems.

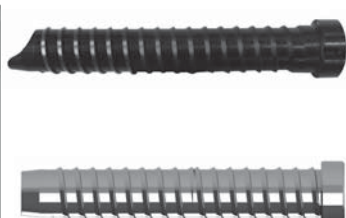


The ocular version of the Laminoscope® has different standard adapters for connection to camera and light-source systems

DISTANCE RINGS FOR WORKING TUBES



The distance ring slides onto the endoscope before it is inserted into the working tube. As a result, the endoscope is aligned with the working tube or stands a few millimeters back. This ensures better orientation and easier handling as the endoscope is held at a fixed position.



The iLESSYS® Delta **Working Tubes** are available in two materials and two tip configurations (90° and 45° opening):

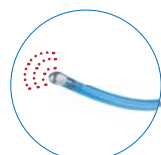
- stable, durable stainless steel or plastic (PPSU)
- Working tube with thread for optimum fixation in the tissue



REMOVE AND CLOSE:

RF PROBES VAPORFLEX® AND LEGATO®

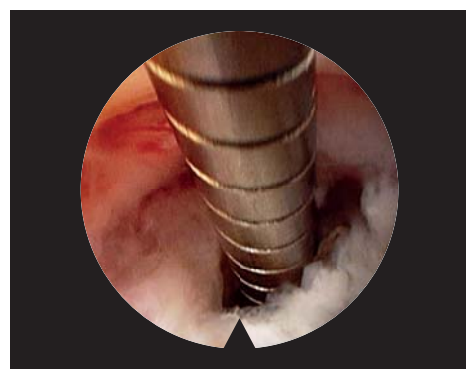
Using the bipolar Vaporflex® and Legato® RF probes, tissue (e. g. scar tissue) can be removed and bleeding stopped. Annular ruptures up to 3mm long are easy to seal by means of tissue shrinking. The ergonomic handles can be reused and are connected with the bipolar disposable probes.



Legato® probe bipolar



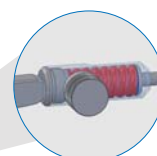
Vaporflex® probe bipolar



PRECISE AND DURABLE:

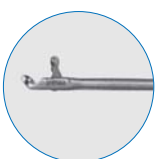
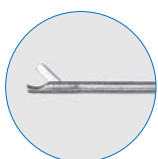
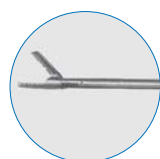
FORCEPS WITH SURGE PROTECTION

The forceps are equipped with the patented „Luer Overload Protection System – LOPS“. This prevents over-tensioning of the forceps and guarantees a longer service life.



Patented LOPS forceps system

iLESSYS® FORCEPS

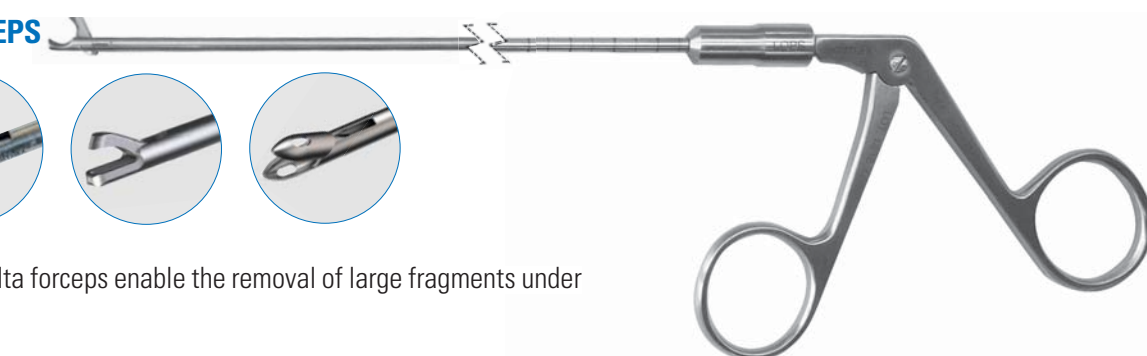
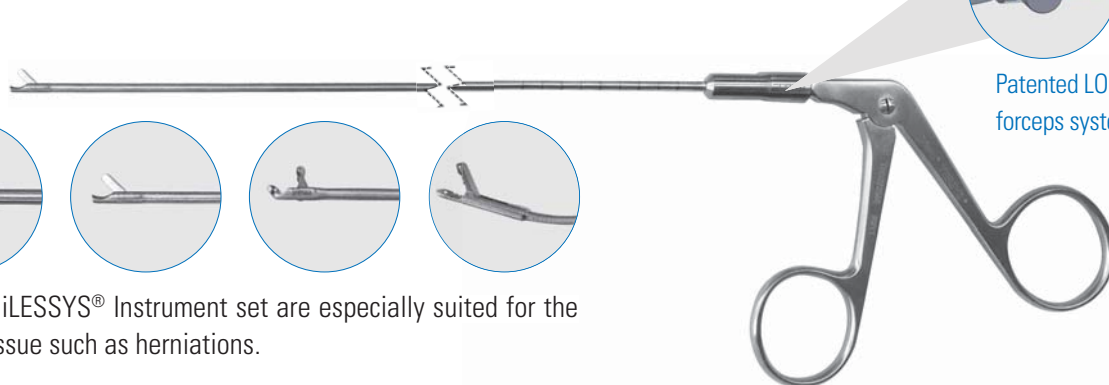


The various forceps in the iLESSYS® Instrument set are especially suited for the effective removal of soft tissue such as herniations.

iLESSYS® Delta FORCEPS



The powerful iLESSYS® Delta forceps enable the removal of large fragments under endoscopic view.



MULTIFUNCTIONAL AND SAFE: **SHRILL®** SHAVER DRILL SYSTEM

The Shrill® multi-functional milling and resection system was developed for removal of soft tissue and bone, especially when working near to the spinal column. It ensures safe and tissue conserving work in the immediate vicinity

of the nerve, with optimal visibility. Different shaver blades are available that can be attached to the handpiece with an easy-to-use, quick-connect system.



Deflector Shaver Blade – Controlled deflection for the ideal working position



COLOUR CODING OF THE ATTACHMENTS FOR EASY RECOGNITION:

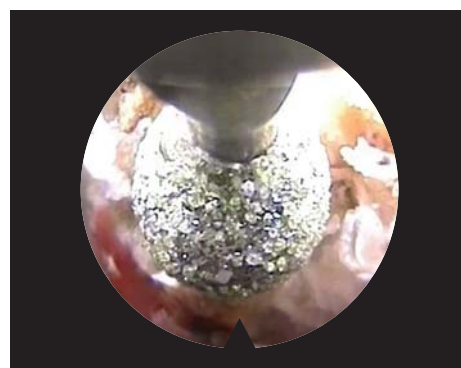
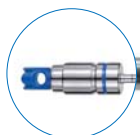
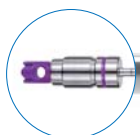
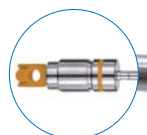
Dark yellow: for working on bone close to the nerve, e.g. a Diamond Abrasor

Red/Purple/Blue: for removal of bone, e.g. an Acorn Trimmer

THREE SPECIAL SHAVER BLADES FOR EXTENSIVE DECOMPRESSION WITH **iLESSYS® Delta**

For extensive removal of osseous structures under endoscopic view, three larger Shrill® Shaver Blades (milling cutters) with 4.5mm outer diameter are available:

- Diamond abrasor for bone resection
- Olive cutter (reamer) for bone resection, with protective lip on one side
- Bullet-Tip Cutter (milling cutter) for bone resection



STRONG AND VARIABLE: **ENDO-KERRISON PUNCHES**

The **Endo-Kerrisons** are used to remove bone, joint capsule tissue, ligamentum flavum, etc. under endoscopic view. The shaft can be replaced and is available in different versions. The punch can be assembled in 8 positions.



40°



90°



90° curved



INSTRUMENTS FOR CONTRA-LATERAL USE



The **Endo-Curette** (above) is used for to remove hypertrophic bone structures, e.g. Over-the-top.

The **Endo-Elevators** (below) is used for raising e.g. the yellow ligament when going for the contralateral side



PRACTICAL AND CONSISTENT: THE DISPOSABLE ACCESS KITS

Disposable products are required in all operations. Aiming to make work easier, joimax® has developed a special disposable sterile instrument set so the instruments needed are guaranteed to be available while simultaneously saving time and simplifying the process of endoscopic surgery.

The **disposable access kit** contains all the disposable products you need during surgery: puncture needles, needles, reamers, syringes, dishes, skin marker, scalpel, guide wire and a sealing cap for the endoscope.



Disposable access kit with color-coded reamers in different sizes

The **needle-wire-set** contains a siliconized needle for an easy access through the tissue and a NiTiNol wire which functions as a guide wire during the surgery.

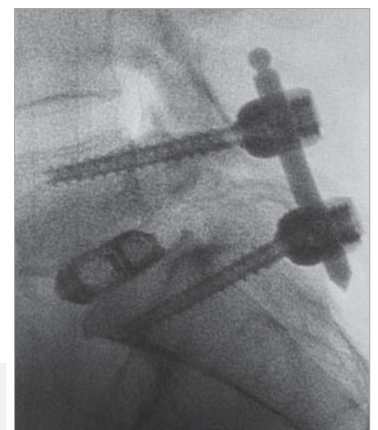


Individually packed sterilized needle-wire set



IDEAL ACCESS TECHNOLOGY FOR LUMBAR STABILIZATION

The iLESSYS® Delta system can also be combined with the EndoLIF® instruments for the insertion of joimax® cages. Thus, in addition to dorsal decompression, stabilisation is also possible – a so-called Endo-PLIF fitting.



IMPLANTATION OVER-THE-WIRE

joimax® ENDOSCOPIC TOWER | GENERATION 4

The expert solution for spinal surgery and neurosurgery. All devices work unisono with one another and are specifically designed for the treatment of sensitive structures.

1 **Vitegra®** Visual Integration System

FULLY INTEGRATED DIGITAL DOCUMENTATION SYSTEM

- Wireless tablet to control the system from everywhere
- Video and snapshot function via camera head buttons
- Multiple video inputs for different signal sources like endoscopic camera, X-Ray, ultrasound, microscope, OR camera
- Voice control and voice-over video function
- Easy export of all patient data via Blu Ray, USB, LAN, DICOM

2 **Camsource® LED** Camera & Light Source System



BRILLIANT IMAGES UP TO 4K

- Latest CMOS technology
- FHD/4K resolution via DVI, HD-SDI, 3G-SDI, or HDMI
- Integrated LED long-life light source, maintenance-free
- Combo and Ocular camera heads available

3 **Intracs® em** Integrated Navigation Tracking & Control System

WITH ELECTROMAGNETIC NAVIGATION EASY AND SAFE TO EVERY SPINAL TARGET

- Electromagnetic based tracking and guidance
- Instrument navigation directly at the tip
- Intuitive workflow and improved usability
- Significant reduction of X-Ray exposure

4 **Shrill®** Shaver Drill System

MULTI-FUNCTIONAL MILLING AND RESECTION SYSTEM

- Handpieces and shaver blades specially developed for spine surgery
- Safe removal of soft tissue and bone in cases of stenosis
- Suction function ensures an unobstructed and clear view of the operating field
- Vacuum effect due to specially protected design



3

7



1

2

3

4

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6

The image shows
one of various
mounting options.

5 **Endovapor® 2** Multi Radio Frequency System

COMBINES VARIETY OF DIFFERENT ELECTRO-SURGICAL MODES AND EFFECTS

- Specially integrated programs for spinal surgery, bipolar and monopolar
- All-in-one RF generator with interdisciplinary application
- 4 sockets: 2 x monopolar, 2 x bipolar
- Easy, intuitive touchpad operation
- Arc control for secure application
- Easy neutral electrode monitoring

6 **Versicon®** Versatile Irrigation Control

MULTI-RANGE IRRIGATION PUMP

- Integrated spine mode for low flow and pressure
- Permanent control of flow and pressure
- Rapidly insertable, disposable tubing set
- Replaceable patient line with check valve

7 **JFMS 2620 | 3220 | 314KB** MEDICAL FULL HD TFT SCREENS

- Full HD/4K resolution: 1920x1080 pixels
- Viewing angle vertical/horizontal 178°/178°
- Automatic signal recognition
- Touch control panel

REFERENCING LITERATURE

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4. Hasan S, Härtl R, Hofstetter C: The benefit zone of full-endoscopic spine surgery; In: Journal of Spine Surgery 2019; 5 (Suppl):S41-S56; <http://dx.doi.org/10.21037/jss.2019.04.19>
5. Komp M, Hahn P, Merk H, et al.: (2011) Bilateral operation of lumbar degenerative central spinal stenosis in full-endoscopic interlaminar technique with unilateral approach: prospective 2-year results of 74 patients. In: J Spinal Disord Tech 24:281-287. doi 10.1097/BSD.0b013e3181f9f55e
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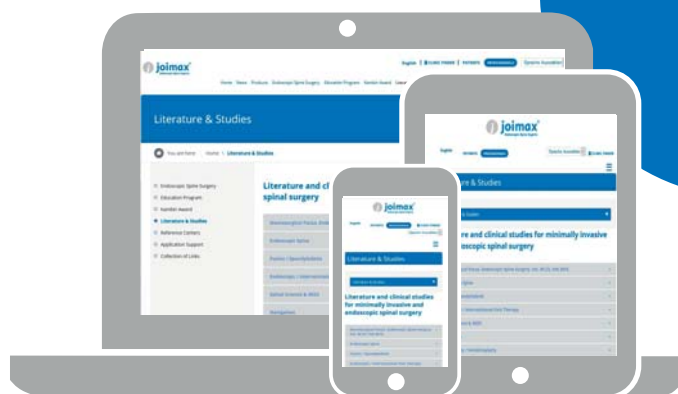
FURTHER READING

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- Hasan S et al. Comparison of full-endoscopic and minimally invasive decompression for lumbar spinal stenosis in the setting of degenerative scoliosis and spondylolisthesis. Neurosurgical Focus 46.5 (2019): E16.
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- Wagner R et al. Fully-endoscopic lumbar laminectomy for central and lateral recess stenosis. Interdisciplinary Neurosurgery 13 (2018): 6-9.

MORE LITERATURE AND STUDIES

On our website www.joimax.com you can view further studies on the following subspecialties of endoscopic spinal surgery:

- Endoscopic Spine
- Fusion / Spondylodesis
- Endoscopic / Interventional Pain Therapy
- Navigation



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