RICHARD WOLF

spirit of excellence

Small incision, big results

VERTEBRIS stenosis

Full-endoscopic, interlaminar decompression for lumbar spinal canal stenosis

VERTEBRIS stenosis

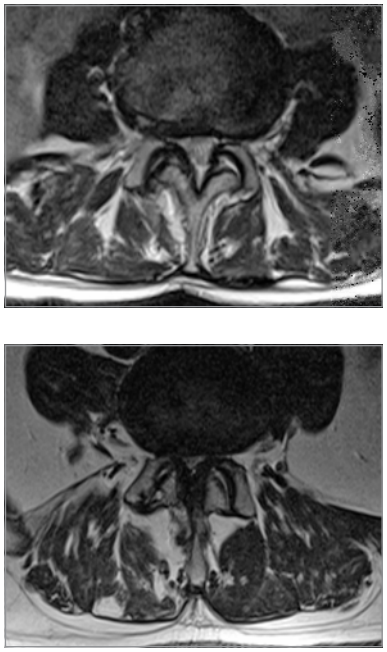
Full-endoscopic Spine Instrumentation

Contents

VERTEBRIS stenosis

Introduction

Degenerative stenosis of the lumbar spinal canal with compression of neural elements arise as a result of bony, disk, capsular or ligament structures. Depending on localization and spread, they can lead to classic symptoms in the lower extremities. Pain in the back tends to be attributed to secondary degenerative phenomena, e.g. segmental instability or deformity. There is no clear correlation between the extent of the stenosis shown by imaging and the clinical symptoms. Apart from spinal disk herniations, lateral and central spinal canal stenoses form the most frequent causes.



Lateral and central spinal canal stenosis of the lumbar spine.

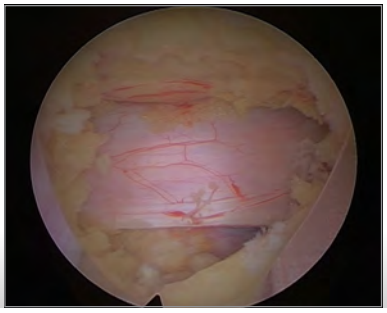
A surgical procedure may be necessary after conservative measures have been exhausted or neurological deficits occur. When this is the case, the pathology and symptoms must be taken into account and decompression operations, fusions, or a combination of both procedures must be considered. Today, EBM criteria appear to provide certainty that decompression procedures can improve radicular symptoms and neurogenic claudication. The extent of decompression required from a technical perspective and the conditions under which an additional fusion is necessary have not been definitively described.

Conventional decompression operations on the lumbar spine demonstrate good results. However, consequences and problems associated with these operations are known. Attempts were therefore made right from the start of spine surgery to modify existing operating procedures. Up to the present day, the primary focus continues to be on reducing the invasiveness of surgery and improving the intraoperative view.

Minimally invasive techniques can reduce the trauma and consequences due to the operation. At the same time, visualization and illumination during the operation can be optimized. Appropriate instrument sets for decompression of lumbar spinal canal stenosis were developed on the basis of experiences derived from full-endoscopic operations on spinal disk herniations of the cervical and lumbar spine, offering the possibility of endoscopic bone resection. Since a more extensive bone or ligament resection is frequently necessary here, a large endoscope with a correspondingly large intraendoscopic working channel and larger instruments were necessary. Full-endoscopic, interlaminar access is used routinely, while the transforaminal/extraforaminal access is reserved for specific individual cases.

A range of endoscopes is available to match different pathologies

Spinal canal decompression with interlaminar access



Intraoperative site after decompression

Today, the instrument sets available permit a full-endoscopic approach under visualization, depending on the indication criteria, which is equivalent to conventional operations. While lateral, stenosis with symptoms on one side can be frequently operated using the basic instrument set, the larger Stenosis System can be used to operate on advanced cases or central stenosis. It is always important to consider whether a stabilizing measure is necessary in addition to decompression.

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Director: Prof. Dr. med. Georgios Godolias

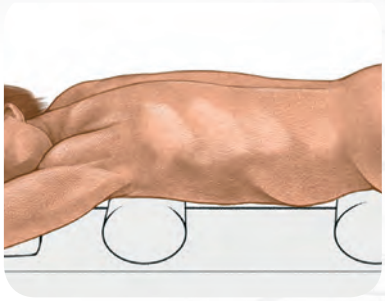
VERTEBRIS stenosis

Full-endoscopic, interlaminar decompression

Positioning

The patient is placed on an operating table with an X-ray transparent top in the prone position with pelvis and thorax support pillows. A C-arm image intensifier is required during the procedure.

Prone position with pelvic and thorax pillows

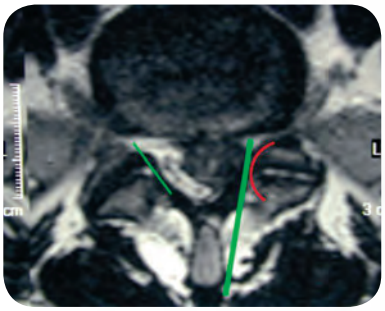


Determination of interlaminar access

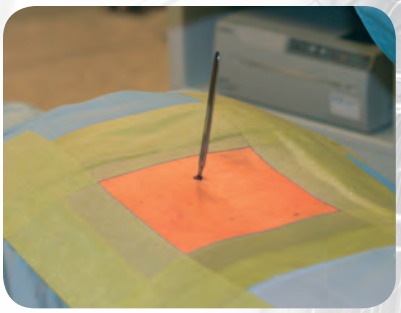
Using image intensifier control, the access is determined on the basis of anatomical landmarks in the posterior-anterior beam path and taking account of the pathology. The port must be maximally medial in the interlaminar window in order to permit easier lateral access below the obliquely positioned zygoapophyseal joints.

Marking the entry point on the skin

Entry point should be in a maximally medial position



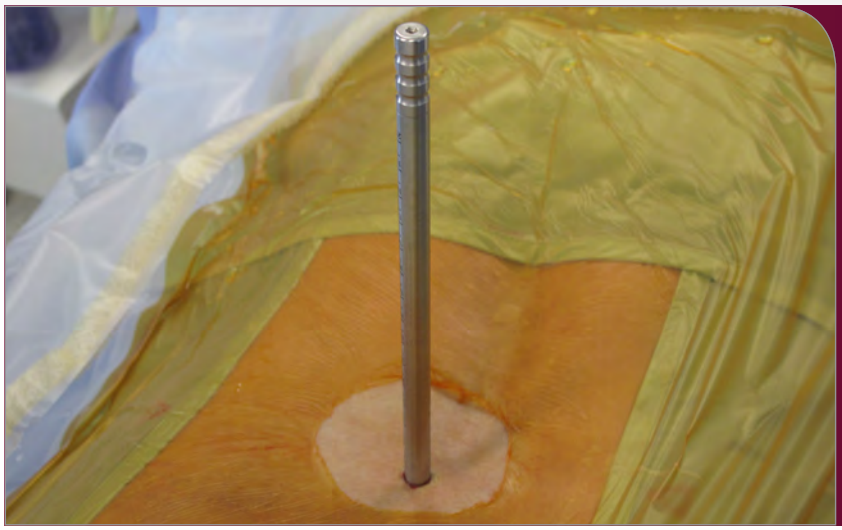
Access below the zygoapophyseal joints should be possible



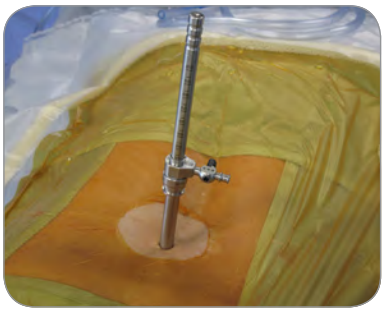
Skin incision

Performance of interlaminar access

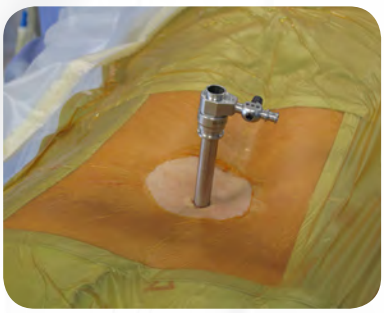
After determining the entry point on the skin and performance of the skin incision, the dilator is inserted up to the ligamentum flavum or to the zygoapophyseal joints under posterior-anterior image intensifier control. The subsequent procedure is then performed in the lateral beam path. The working sleeve with oblique opening is pushed over the dilator toward the ligament and the dilator is removed. The endoscope is introduced and the ongoing intervention carried out under continuous visualization and irrigation.



Insertion of the dilator, ...



... operating sleeve ...



... and endoscope

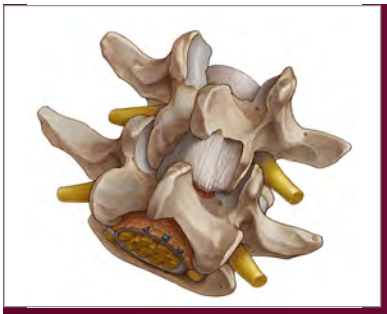
VERTEBRIS stenosis

Full-endoscopic, interlaminar decompression

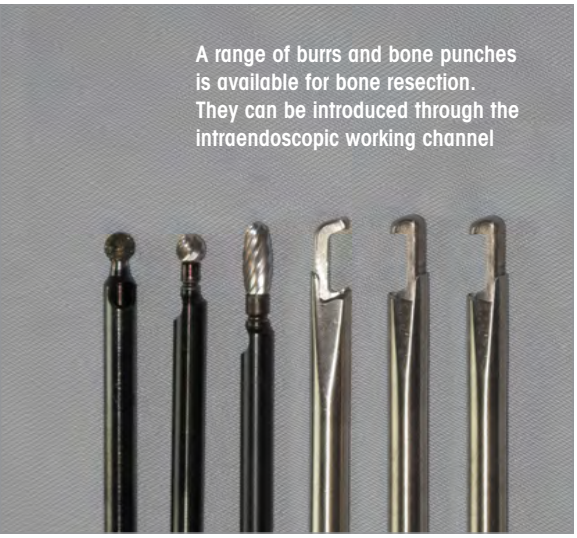
Ipsilateral, decompression on one side

After the access has been created, the bony structures are exposed. It may be helpful to start decompression at the caudal end of the descending facet. Depending on the pathology, decompression is then commenced with resection of parts of the medial descending facet, the cranial and caudal lamina, and the ligamentum flavum. The extent of decompression generally continues cranially at least until the tip of the ascending facet and caudally to half of the pedicle. The medial portions of the ascending facet and the ligamentum flavum are then resected until sufficient decompression of the neural structures can be clearly seen

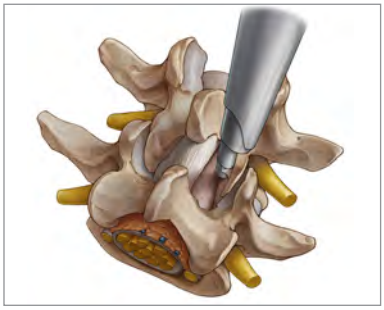
It may be helpful to start decompression at the caudal end of the descending facet



The extent of bone resection must generally reach from the tip of the ascending facet to the middle of the caudal pedicle



A range of burrs and bone punches is available for bone resection. They can be introduced through the intraendoscopic working channel

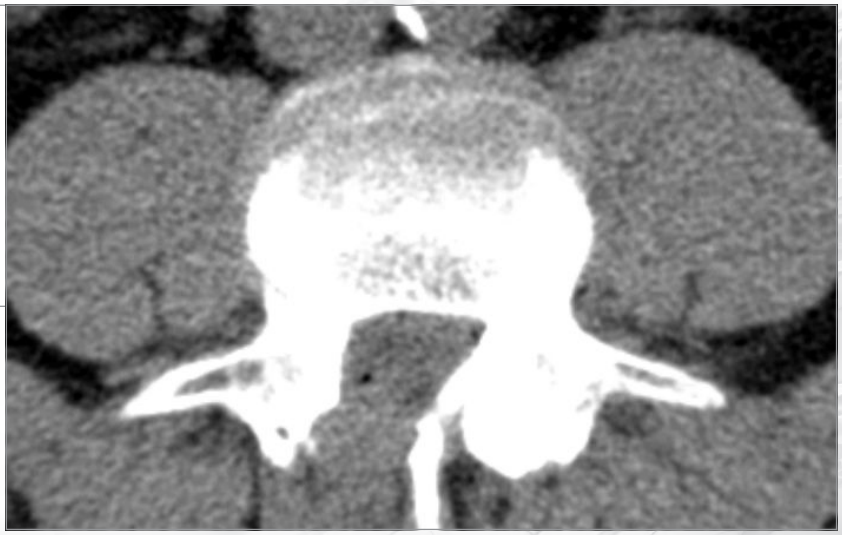


Resection of medial portions of the ascending facet

Removal of protruding annulus and osteophytes

cranially, caudally and laterally. In the case of a central stenosis, the ligamentum flavum generally needs to be resected medially to the midline. Finally, it may be necessary to remove protruding annulus parts and osteophytes in the ventral epidural space. If the patient experiences bilateral symptoms of a lateral stenosis, "over the top" access using the undercutting technique to the opposite side is not carried out. An independent contralateral access is used to retain the median portions of the ligamentum flavum and leave the spinal canal untouched here.

Site after ipsilateral decompression

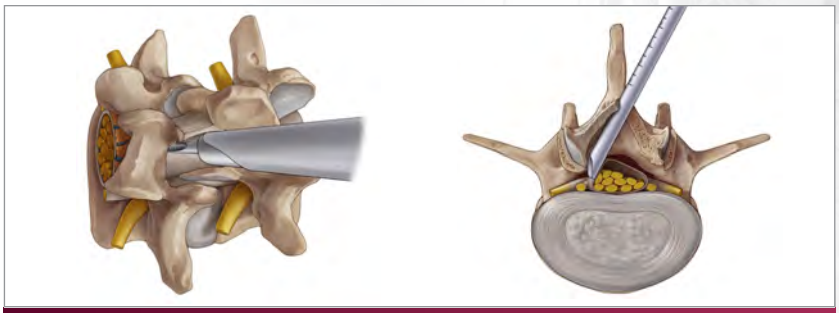


VERTEBRIS stenosis

Full-endoscopic, interlaminar decompression

Contralateral decompression in over-the-top technique

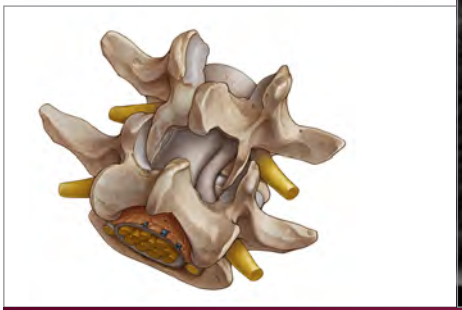
If bilateral symptoms occur with a central stenosis, a unilateral approach is carried out with "over-the-top" access using the undercutting technique to the opposite side. For this purpose, bone in the ventral area of the spinous process is resected until the contralateral side can be accessed dorsally up to the dura of the spinal cord. If possible, the ligamentum flavum is initially left in place to protect the dura and bony decompression is again carried out by laminotomy and partial facetectomy. The ligamentum flavum is then completely resected. Finally, the contralateral recess needs to be extended. The decompression is completed when the dura and the spinal nerves have been clearly decompressed.



Entrance on the contralateral side

Decompression contralaterally including recess

In general the sealing caps for endoscope and working sleeve should only be used briefly if bleeding obscures visibility since when operations last a long time and the drainage of fluid is prevented without being noticed, the consequences of volume overload and elevated pressure within the spinal canal and the associated and neighbouring structures should not be ignored. An extended and uninterrupted excessive retraction of the neural structures with the working sleeve in a medial direction must be avoided particularly in cranial areas, or only carried out intermittently, in order to avoid the risk of neurological damage. Experience indicates that as with all new techniques there is generally an enhanced risk of problems occurring during the learning curve.

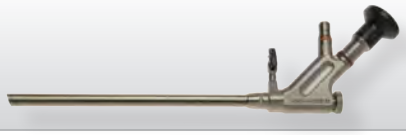


Site after over-the-top decompression

VERTEBRIS stenosis

Endoscope and accessories

Endoscope



Discoscope
PANOVIEW Plus Discoscope 20°, working channel ID 5.6 mm, OD 9.3 x 7.4 mm, WL 177 mm (892109205)..... 892109205

Endoscope adapter
for distance control 892009000

Fiber light cable
D 3.5 mm, WL 3 m 806635301

Reprocessing Tray
ffor transport and sterilization of Vertebris Stenosis instruments width 10.4" x length 21.2" x height 4.6" 88090009

Retainer arm systems

Retainer arm adapter
for fixing the endoscope in combination with universal retainer arm (898004717) or LEYHLA articulated arm (8766.951) 8840.9722

Universal retainer arm
max. retaining force 90N, joint radius 420 mm 898004717

Clamp socket
electrically insulated to 4.5 KV AC, for attaching to the operating table (standard rail) 8840.9722

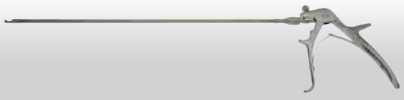
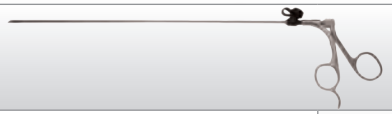
LEYHLA articulated arm
for attaching to the operating table, fixing in place using 2 articulated arms is recommended..... 8766.951

Access and working instruments

Access instruments

	**Dilator** OD 9.4 mm, cannulated, for working sleeve OD 10.5 mm 892209510
	Step-dilator Set comprising: 8922095000
	Dilator OD 3.9 mm, cannulated, for working sleeve 892209505
	Dilator OD 5.9 mm, for working sleeve or dilator OD 7.0 mm 892209507
	Dilator OD 6.9 mm, for working sleeve or dilator OD 9.5 mm 892209508
	Dilator OD 9.4 mm, for working sleeve OD 10.5 mm 892209515
	**Working sleeve** OD 10.5 mm , WL 120 mm 892209010
	**Irrigation adapter** OD 10.5 mm 892209310

Working Instruments

	**Tube sheath punches**
	**Punch,** 2 mm cutting width, OD 5.5 mm, WL 340 mm, TL 490 mm 892409020
	**Punch,** 3.5 mm cutting width, OD 5.5 mm, WL 340 mm, TL 490 mm 892409035
	**Kerrison punches**
	**Kerrison punch 60°** 4.5 mm cutting width, D 5.5 mm, WL 350 mm, TL 460 mm 892409445
	**Kerrison punch 90°** 4.5 mm cutting width, D 5.5 mm, WL 350 mm, TL 460 mm 892409945
	**Micro punches and rongeurs** Color coding for easy identification of instrument diameter
	**Rongeur** OD 3 mm, WL 290 mm 89240.3003
	Rongeur OD 4 mm, WL 290 mm 89240.3004
	**Punch** OD 3 mm, WL 290 mm 89240.3023
	Punch OD 4 mm, WL 290 mm 89240.3024

VERTEBRIS stenosis

PowerDrive ART1 – Universal motor system

Universal motor system	
	Burrs for Power Stick M 5
	**Oval burr,** with side guard, OD 5.5 mm, WL 290 mm.....899751505
	**Oval burr, eccentric,** with side guard, OD 5.5 mm, WL 290 mm 899751555
	**Round burr,** OD 5.5 mm, WL 290 mm.....899751305
	**Round burr, diamond,** OD 5.5 mm, WL 290 mm 899751405
	Articulated burr – TipControl
	**TipControl® – Articulating bone burr, complete,** OD 4.0 mm, WL 290 mm outer sleeve (899753754) and inner sleeve (15336058) for Power Stick M5, set including burr insert, sterile, pack of 5 (499751704), key for inserting and removing the burr insert (15372005), irrigation adapter (15261106).....899753794
	Motor handles – Power Stick M5
	**Power Stick M5/0** Handle for shaver blades or burrs, operation with footswitch, sterilizable, max. speed 16,000 rpm, with fixed connection cable 89955.0000
	**Power Stick M5/3** Handle for shaver blades or burrs, operation with keypad or footswitch, sterilizable, max. speed 16000 rpm 89955.0003
	**Universal Connecting Cable** Required with 89955.0000 or 89955.0003.....8564.851
	**PowerDrive *ART1*** Universal motor system, set incl. power cable, Can Bus connection cable Technical Features: autom. handle and tool recognition, storage function, user-specific parameters, memory function for tools
	Power supply unit 120 V, 50/60 Hz 2304.0071
	**Double-pedal footswitch** for PowerDrive *ART1* (Series 2304).....2304.901

COMBIDRIVE EN – High-speed motor system

High-speed motor system

	Burrs with distal protection
	**Round burr, tungsten carbide,** burr ø 3.0 mm, WL 350 mm, single-use, sterile, pack of 5.....40990.3730
	Support sleeve, with distal guard, OD 4.0 mm.....82970.1330
	**Round burr, diamond,** burr ø 3.0 mm, WL 350 mm, single-use, sterile, pack of 5.....40990.3930
	Support sleeve, with distal guard, OD 4,0 mm.....82970.1330
	Burrs without distal protection
	**Round burr, diamond,** burr ø 3.7 mm, WL 350 mm, single-use, sterile, pack of 5.....40990.3940
	Support sleeve,open, extra visability, OD 4.0 mm.....88100.1340
	High-speed handpiece
	**Handpiece, angled, with adapter** 40,000 rpm, INTRA-interface.....82950.1301
	Electronic Motor
	**Electronic motor,** medium, with connecting cable.....80951.0002
	High-speed motor system COMBIDRIVE EN For use with high-speed accessories and accessories for Power Stick M5 (see page 14)
	**COMBIDRIVE EN Set** High-speed motor system incl. control unit, power cable, footswitch, electronic motor, connection cable, angled hand-piece and cleaning accessories.....20951.011

VERTEBRIS stenosis

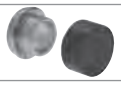
Radio frequency

RF Probes	
	**Bipolar accessories – ablation electrodes**
	**Bipolar hollow sphere electrode** distal head part D 2.9 mm, WL 330 mm, disposable 899364300
	**Bipolar hollow sphere electrode** distal head part D 3.4 mm, WL 330 mm, disposable 899364400
	**Electrode handle, bipolar** for mounting bipolar hollow sphere electrodes, fixed cable with international 2 PIN plug 899364200

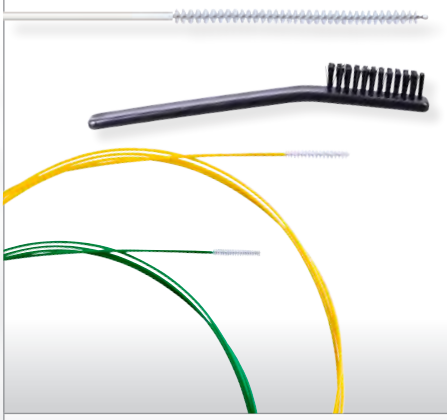
	Bipolar accessories – TipControl
	**TipControl RF Bipolar Instrument, short** WL 280mm, D 2.5mm, 3 m cable with international device plug, sterile, single use 4993692

Consumables and replacement parts

	for TipControl®:
	**Burr insert, sterile** (pack of 5) 499751704
	**Wrench** 15372005
	**Irrigation adapter,** complete (M5) 15261106

	**Sealing cap attachment** incl. 10 sealing caps (89.00) 8792.452
	**Sealing caps** opening 0.75 mm for instruments up to D 2.4 mm, black, pack of 10..... 89.00
	**Sealing caps** opening 2.7 mm for instruments over 3.4 to 5.1 mm, blue, pack of 10 ..... 89.02
	**Sealing membrane** 15479.006
	**Irrigation adapter** complete, rotatable..... 15461.034
	**O-rings** for irrigation toggle (15461.034) pack of 10 ..... 9500.113
	**Fog reduction agent** for endoscopes, disposable, pack of 10 ..... 102.02

Cleaning brushes



Cleaning brushes, single-use, pack of 10

	Brush Diameter (mm)	Brush Length (mm)	Overall Length (mm)	Item
Cleaning brushes for instrument lumen, disposable, 10/pkg	11	100	600	40601
	5	75	600	40605
	5	50	305	40606
	5	10	250	468691
	2	15	1200	7990001
	3	20	1200	7990002
	.85	10	1200	7990003
Utility brush for external surfaces, disposable, 3/pkg				40999012

O-rings
for irrigation adapter 892209310 15364285

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