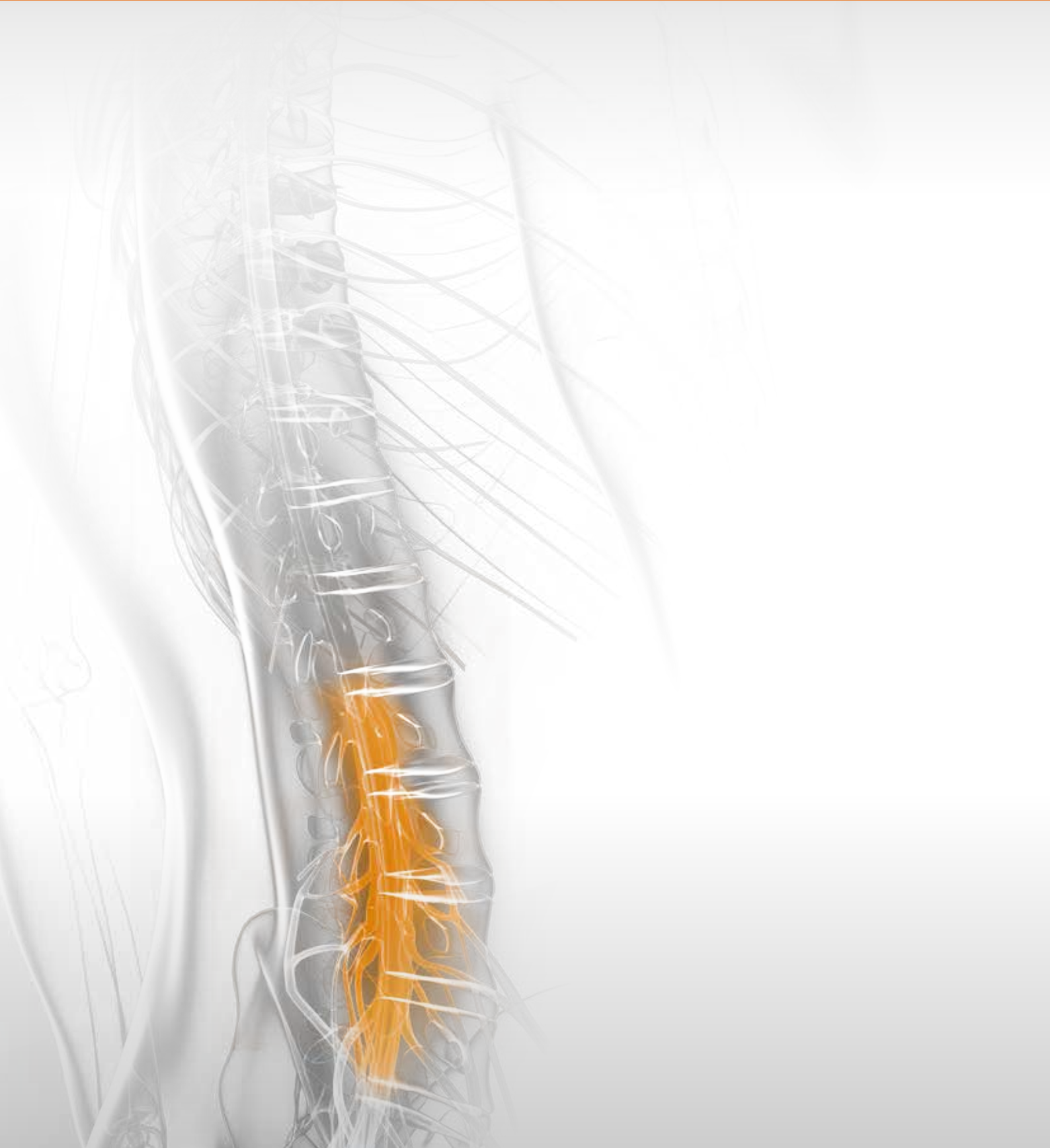


Takes the pressure



## **VERTEBRIS stenosis**

Full-endoscopic, interlaminar decompression  
in case of lumbar spinal canal stenosis



# VERTEBRIS stenosis

## Full-endoscopic spine instrumentation

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# VERTEBRIS stenosis

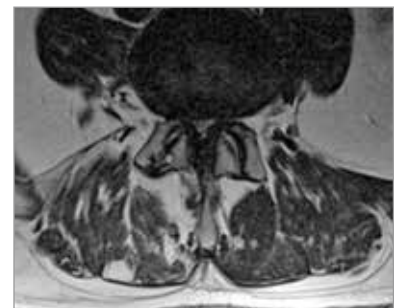
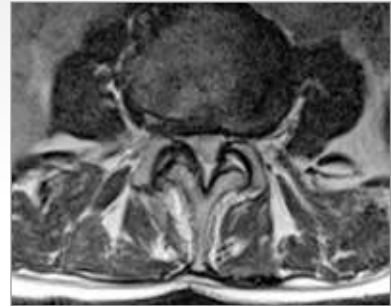
## Introduction

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.

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 intra-operative 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.



**Lateral and central spinal canal stenosis of the lumbar spine**



**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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St. Anna Hospital Herne/Marien Hospital Herne University Hospital/Marien Hospital Witten  
Director: Prof. Dr. med. Georgios Godolias

# VERTEBRIS stenosis

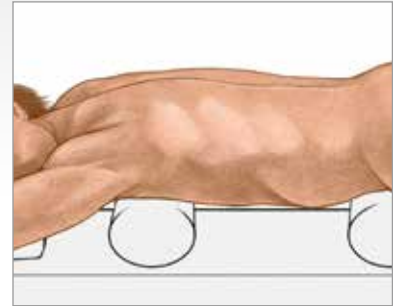
## Full-endoscopic, interlaminar decompression

### Positioning

The patient is placed on an operating table with an X-ray transparent top in the prone position with pelvic 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

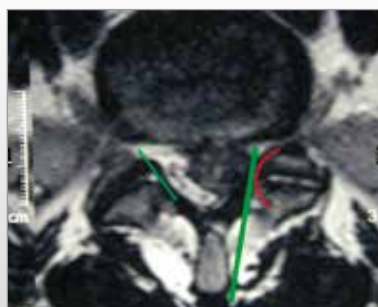
Using image intensifier control, the access is determined on the basis of anatomical landmarks in the AP X-ray view and taking account of the pathology. The port must be maximally medial in the interlaminar window in order to permit easier lateral access below the obliquely positioned zygoapophyseal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



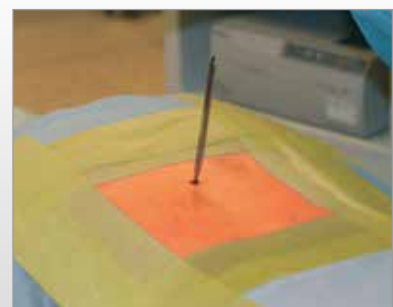
Marking the entry point on the skin



Entry point should be in a maximally medial position



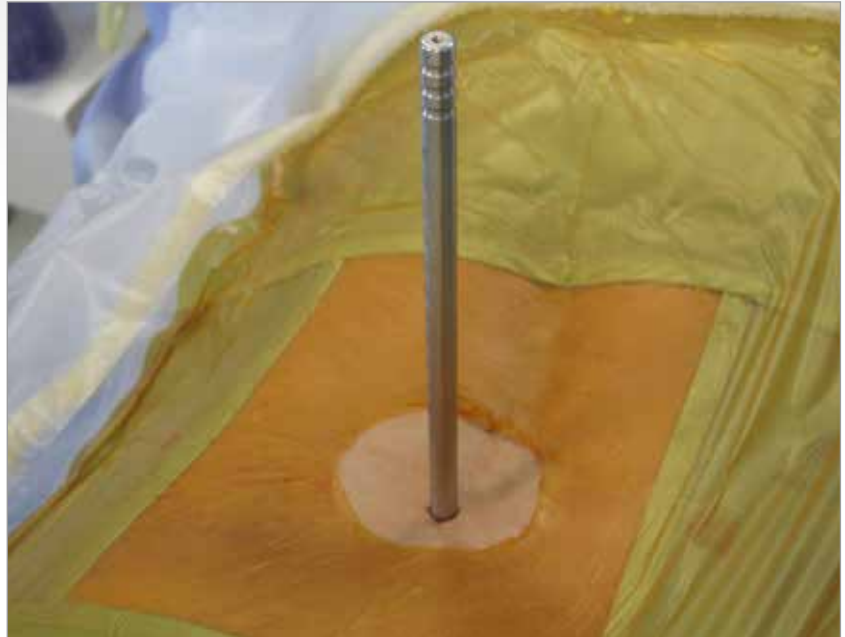
Access below the zygoapophyseal joints should be possible



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 AP X-ray view control. The subsequent procedure is then performed in the lateral X-ray view. 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.



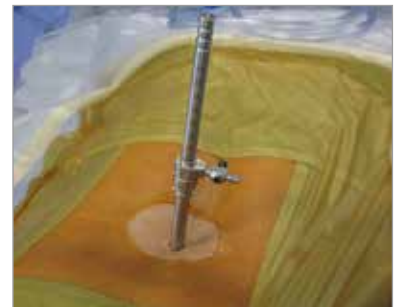
Insertion of the dilator, operating sleeve and endoscope



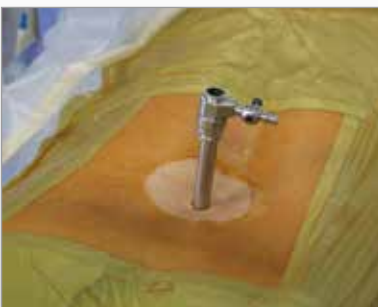
Positioning of the dilator on the zygoapophyseal joint under x-ray control in AP view



Control the position of the dilator in the lateral X-ray view



Insert the working sleeve over the dilator



Positioned working sleeve



Working sleeve on the ligamentum flavum in the lateral X-ray view



# 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



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.



**Bone resection by using a punch on the cranial lamina**



**Lateral bone resection**



**Bone resection on the caudal lamina**



**Site after ipsilateral decompression**



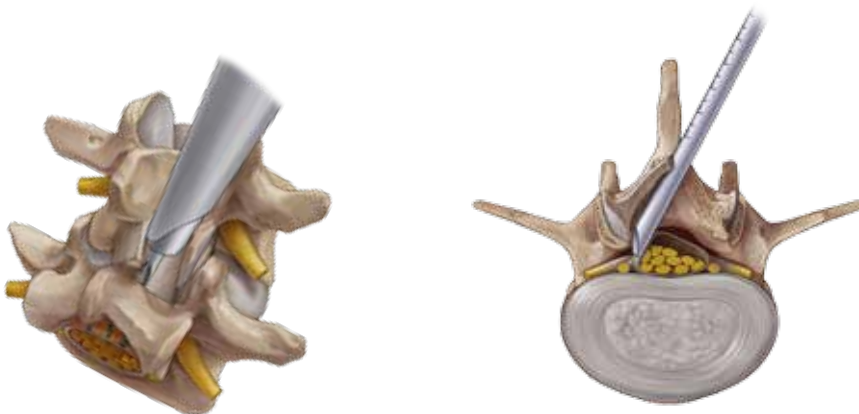
**A range of burrs and bone punches is available for bone resection. They can be introduced through the intraendoscopic working channel**

# 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.










**Situs after over-the-top decompression**










# VERTEBRIS stenosis







## Endoscope and Accessories

Endoscope	
VERTEBRIS Discoscope and Accessories	
	<b>PANOVIEW PLUS DISCOSCOPE BNDL</b> , consisting of: 892109205 Discoscope 20° Ø 9.3 mm, SL 177 mm, 8792.452 sealing top adaptor, 89.02 sealing cap, 15479.006 membrane, 9500.113 replacement O-ring, 6.03 cleaning brush..... 8921092051
	<b>ENDOSCOPE ADAPTOR</b> ..... 892009000
	<b>FIBER LIGHT CABLE BNDL</b> , consisting of: 80663523 fiber light cable Ø 3.5 mm, TL 2.3 m, 8095.09 adaptor endoscope side, 8095.07 adaptor projector side..... 806635231
	<b>INSTRUMENT SIEVE – VERTEBRIS STENOSIS</b> , consisting of: sieve basket base, sieve basket lid, 2x locking mechanism, instrument carrier, top, incl. set of silicone holders, instrument carrier, base, incl. set of silicone holders, additional level incl. set of silicone holders, L x W x H: 500 x 150 x 250 mm ..... 85841223

Retainer arm system	
	<b>SUPPORT ARM ADAPTOR</b> ..... 892009070
	<b>SUPPORT ARM UNIVERSAL</b> ..... 898004717
	<b>CLAMP SOCKET</b> insulated, for mounting to OP table (standard rail)..... 8840.9722







## Access and Working Instruments

Access instruments	
<b>Dilators</b>	
	<b>DILATOR</b> ID 1.1 mm, OD 9.4mm, for single-stage dilatation, TL 235 mm ..... 892209510
	<b>STEP-DILATOR BNDL</b> , consisting of: ..... 8922095000
	<b>DILATOR</b> ID 1.1 mm, OD 3.9 mm, for multi-step dilatation, TL 310 mm ..... 892209505
	<b>DILATOR</b> ID 4 mm, OD 5.9 mm, for multi-step dilatation, TL 285 mm ..... 892209507
	<b>DILATOR</b> ID 6 mm, OD 6.9 mm, for multi-step dilatation, TL 260 mm ..... 892209508
	<b>DILATOR</b> ID 7 mm, OD 9.4 mm, for multi-step dilatation, TL 235 mm ..... 892209515
<b>Working sleeve</b>	
	<b>WORKING SLEEVE</b> ID 9.5 mm, OD 10.5 mm, TL 120, distal end beveled, graduated ..... 892209010
	<b>FLUSHING ADAPTOR WORK. SLEEVE</b> OD 10.5 mm ..... 892209310

Working instruments	
<b>Auxiliary instrument</b>	
	<b>DISSECTOR</b> Ø 2.5 mm, WL 350 mm, atraumatic ..... 8792.591
	<b>PROBE WITH FLEXIBLE TIP BNDL</b> , consisting of: 15570644 sheath tube Ø 2.5 mm, SL 290 mm, 892506625 probe insert Ø 2 mm, 892500600 spring handle ..... 892506925
	<b>FACE MILLER</b> Ø 4 mm, WL 350 mm, sharp ..... 89260.1114
<b>Tube sheath punches</b>	
	
	<b>PUNCH</b> Ø 5.4 mm, WL 340 mm, TL 490 mm, with irrigation connection ..... 892409020
	<b>PUNCH</b> Ø 5.4 mm, WL 340 mm, TL 490 mm, with irrigation connection ..... 892409035





# VERTEBRIS stenosis

## Access and Working Instruments

Working instruments	
Kerrison punches	
	
	<b>KERRISON PUNCH</b> 5.5 X 4.5 mm, WL 380 mm, 60°, TL 460 mm, hinged pushrod ..... 892409445
	<b>KERRISON PUNCH</b> 5.5 X 4.5 mm, WL 380 mm, TL 460 mm, hinged pushrod ..... 892409945
Micro punches and rongeurs color coding for easy identification of instrument diameter	
	
	<b>RONGEUR</b> ● Ø 3 mm, WL 290 mm, color code red, TL 388 mm, with irrigation connection ..... 89240.3003
	<b>RONGEUR</b> ● Ø 4 mm, WL 290 mm, color code yellow, TL 400 mm, with irrigation connection ..... 89240.3004
	<b>PUNCH</b> ● Ø 3 mm, WL 290 mm, color code red, TL 388 mm, with irrigation connection ..... 89240.3023
	<b>PUNCH</b> ● Ø 4 mm, WL 290 mm, color code yellow, TL 400 mm, with irrigation connection ..... 89240.3024






## PowerDrive ART1 – Universal Motor System



Universal Motor System			
Burs for Power Stick M5			
	<p><b>BURR OVAL</b> 5.5 mm, color code violet, WL 290 mm, with lateral protection, for use with motor handpieces M5/0 and M5/3, for extraction of bony structures in endoscopic spine surgery</p>	<p>reusable Pack = 1 PC...899751505</p>	<p>single use Pack = 5 PCS...499751505</p>
	<p><b>OFF-CENTER BURR OVAL</b> 5.5 mm, color code violet, WL 290 mm, with lateral protection, for use with motor handpieces M5/0 and M5/3, for extraction of bony structures in endoscopic spine surgery</p>	<p>reusable Pack = 1 PC...899751555</p>	<p>single use Pack = 5 PCS...499751555</p>
	<p><b>BURR ROUND</b> 5.5 mm, color code royal blue, WL 290 mm, without protection, for use with motor handpieces M5/0 and M5/3, for extraction of bony structures in endoscopic spine surgery</p>	<p>reusable Pack = 1 PC...899751305</p>	<p>single use Pack = 5 PCS...499751305</p>
	<p><b>DIAMOND BURR ROUND</b> 5.5 mm, color code light turquoise, WL 290 mm, without protection, for use with motor handpieces M5/0 and M5/3, for extraction of bony structures in endoscopic spine surgery</p>	<p>reusable Pack = 1 PC...899751405</p>	<p>single use Pack = 5 PCS...499751405</p>



# VERTEBRIS stenosis

## PowerDrive ART1 – Universal Motor System

Universal Motor System	
Articulated burrs for Power Stick M5	
	<p><b>TIPCONTROL ARTICULATING BONE BURR BNDL</b>, consisting of:            899753754 articulating burr Ø 4 mm,            499751704 burr insert round Ø 3.5 mm,            15261106 irrigation adaptor M5,            15372005 wrench, 15336058 drive shaft M5 .....899753794</p>
	<p><b>TIPCONTROL BURR INSERT</b>            round, Ø 3.5 mm, Pack = 5 PCS,            for use with the articulating TipControl burr,            for extraction of bony structures, in endoscopic spine surgery,            sterile, for single use .....499751704</p>
Tip Control Nucleus Resector	
	<p><b>TIPCONTROL NUCLEUS RESECTOR</b>            articulating, Ø 5.5 mm , Pack = 3 PCS, WL 350 mm,            for use with motor handpieces M5/0 and M5/3,            for soft tissue extraction, in endoscopic spine surgery,            sterile, for single use .....499751005</p>
Motor handles – Power Stick M5	
	<p><b>POWER STICK M5/0</b>            motor handpiece max. 16000 rpm, with fixed connection cable,            for use with rotation tools, control by footswitch.....8995500001</p>
	<p><b>POWER STICK M5/3</b>            motor handpiece max. 16000 rpm, with fixed connection cable,            for use with rotation tools, with three function buttons,            control optionally by footswitch.....8995500031</p>

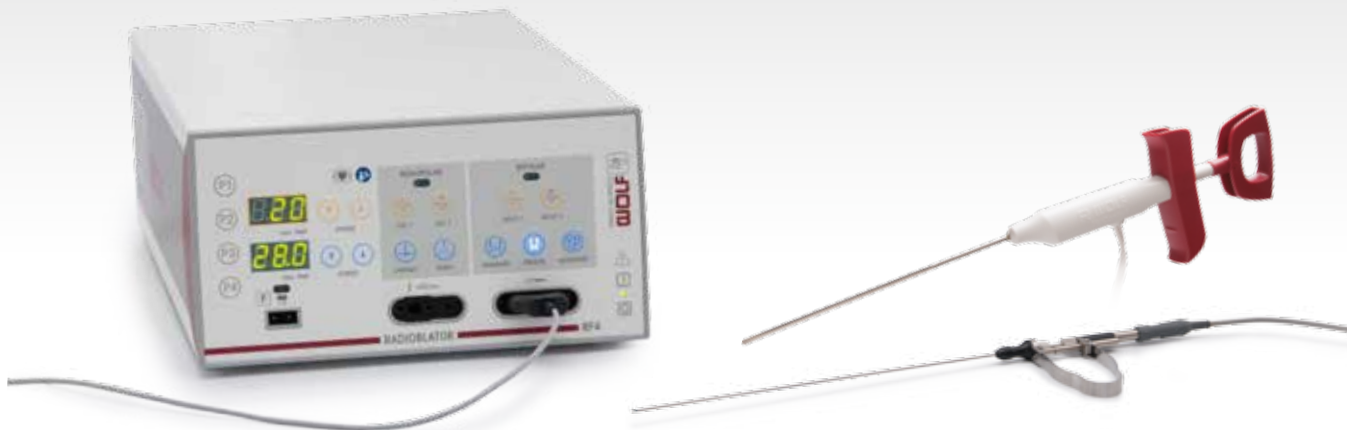







## PowerDrive ART1 – Universal Motor System

<b>Universal Motor System</b>	
<b>PowerDrive ART1</b> Universal Motor System: autom. handle and tool recognition, storage function of user-specific parameters and memory function for tools	
	<b>POWERDRIVE ART1 MOTOR SYSTEM 2304 BNDL</b> , consisting of: 2304.001 Motor Control Unit 2304, 103.701 CAN-BUS connection cable, 2440.03 power cable, power supply unit 230 V, 50/60 Hz ..... 23040011
	<b>POWERDRIVE ART1 MOTOR SYSTEM 2304 BNDL</b> , consisting of: 2304.001 Motor Control Unit 2304, 103.701 CAN-BUS connection cable, 2440.03 power cable, power supply unit 100 V, 50/60 Hz ..... 23040021
	<b>POWERDRIVE ART1 MOTOR SYSTEM 2304 BNDL</b> , consisting of: 2304.001 Motor Control Unit 2304, 103.701 CAN-BUS connection cable, 2440.03 power cable, power supply unit 110 V, 50/60 Hz ..... 23040041
	<b>POWERDRIVE ART1 MOTOR SYSTEM 2304 BNDL</b> , consisting of: 2304.001 Motor Control Unit 2304, 103.701 CAN-BUS connection cable, 2440.03 power cable, power supply unit 115 V, 50/60 Hz ..... 23040061
	<b>POWERDRIVE ART1 MOTOR SYSTEM 2304 BNDL</b> , consisting of: 2304.001 Motor Control Unit 2304, 103.701 CAN-BUS connection cable, 2440.03 power cable, power supply unit US 120 V, 50/60 Hz ..... 23040071
	<b>POWERDRIVE ART1 MOTOR SYSTEM 2304 BNDL</b> , consisting of: 2304.001 Motor Control Unit 2304, 103.701 CAN-BUS connection cable, 2440.03 power cable, power supply unit 127 V, 50/60 Hz ..... 23040121
	<b>POWERDRIVE ART1 MOTOR SYSTEM 2304 BNDL</b> , consisting of: 2304.001 Motor Control Unit 2304, 103.701 CAN-BUS connection cable, 2440.03 power cable, power supply unit 240 V, 50/60 Hz ..... 23040141
	<b>FOOTSWITCH 2 PEDALS</b> for Power Drive ART1 Motor Control Unit (2304) ..... 2304.901












# VERTEBRIS **stenosis**

## Radioblator RF 4 MHz – Multidisciplinary Radiofrequency Surgical System



Radiofrequency Surgical System	
TipControl RF Instrument, bipolar, sterile	
	<b>TIPCONTROL RF INSTRUMENT BIPO</b> Ø 2,5 mm, WL 280 mm for endoscopic spine surgery, flexible insert, integrated connection cable WL 3 m with device plug to Radioblator RF 4MHz, sterile, for single use .....4993691
	<b>TIPCONTROL RF INSTRUMENT BIPO</b> Ø 2,5 mm, WL 350 mm for endoscopic spine surgery, flexible insert, integrated connection cable WL 3 m with device plug to Radioblator RF 4MHz, sterile, for single use .....4993692
	<b>TIPCONTROL RF INSTRUMENT BIPO</b> Ø 2,5 mm, WL 280 mm for endoscopic spine surgery, flexible insert, integrated connection cable WL 3 m with device plug to US 2-PIN, sterile, for single use .....49936911
	<b>TIPCONTROL RF INSTRUMENT BIPO</b> Ø 2,5 mm, WL 350 mm for endoscopic spine surgery, flexible insert, integrated connection cable WL 3 m with device plug to US 2-PIN, sterile, for single use .....49936921
Ablation electrodes	
	<b>RF HOLLOW BALL EL. BIPO</b> Ø 2.9 mm, SL 330 mm, for endoscopic spine surgery, combinable with VERTEBRIS RF electrode handle 899364X00, for single use .....899364300
	<b>RF HOLLOW BALL EL. BIPO</b> Ø 3.4 mm, SL 330 mm, for endoscopic spine surgery, combinable with VERTEBRIS RF electrode handle 899364X00, for single use .....899364400
	<b>RF ELECTRODE HANDLE</b> 2 PIN internal bipo, integrated connection cable WL 3 m with device plug to 2 PIN international, combinable with RF hollow ball electrodes 899364X00, reusable .....899364200
	<b>RF ELECTRODE HANDLE</b> US 2 PIN bipo, integrated connection cable WL 3 m with device plug to US 2-PIN, combinable with RF hollow ball electrodes 899364X00, reusable .....899364100

## Radioblator RF 4 MHz – Multidisciplinary Radiofrequency Surgical System

Radiofrequency Surgical System	
TipControl RF Instrument, bipolar	
	<b>TIPCONTROL RF INSTRUMENT BNDL SHORT</b> , consisting of: 899351100 RF Electrode handle bipo, 899351010 sheath tube Ø 2.5 mm, SL 290 mm ..... 899351000
	<b>TIPCONTROL RF ELECTRODE BIPO</b> Ø 2.5 mm, WL 290 mm, for endoscopic spine surgery, flexible, Pack = 5 PCS, sterile, for single use..... 499351000
	<b>TIPCONTROL RF INSTRUMENT BNDL LONG</b> , consisting of: 899351100 RF Electrode handle bipo, 899352010 sheath tube long Ø 2,6 mm ..... 899352000
	<b>TIPCONTROL RF INSTRUMENT BNDL LONG</b> , consisting of: 899351100 RF Electrode handle bipo, 899352010 sheath tube long Ø 2.6 mm, SL 290 mm ..... 499352000
	<b>TIPCONTROL CONNECTION CABLE BIPO</b> WL 3 m, 2 PIN international plug, connection to EU flat plug, reusable..... 899351210
Accessories	
	<b>SHEATH TUBE</b> Ø 2.5 mm, SL 290 mm, compatible with TipControl handle bipolar, reusable..... 899351010
	<b>SHEATH TUBE</b> Ø 3 mm, SL 290 mm, compatible with TipControl handle bipolar, reusable..... 899351020
	<b>SHEATH TUBE</b> Ø 2.5 mm, SL 400 mm, compatible with TipControl handle bipolar, reusable..... 899352010
	<b>SHEATH TUBE</b> Ø 3 mm, SL 400 mm, compatible with TipControl handle bipolar, reusable..... 899352020
	<b>TIPCONTROL CONNECTION CABLE BIPO</b> WL 3 m, US 2 pin plug, connection to EU flat plug, reusable..... 899351220
Radioblator RF	
4 MHz working frequency – precisely focused and tissue preserving, monopolar and bipolar cutting and coagulation mode, program memory for 4 User Presets	
	<b>RADIOBLATOR RF 4 BNDL</b> , consisting of: 2330001 Radioblator RF 4, 2330901 footswitch 2 pedals, 2330045 connection cable mono WL 3 m, 2440.03 power cable ..... 2330001 1

# VERTEBRIS **stenosis**

## FLUID CONTROL Arthro-Spine – Innovative Fluid Management System



### Fluid Management System

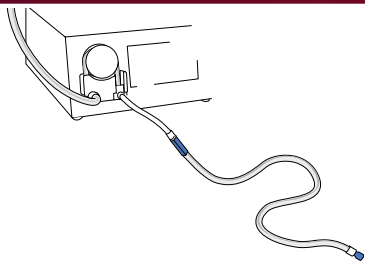
Fluid Control Arthro-Spine irrigation and suction pump with software module spine mode for arthroscopy and full-endoscopic spine surgery with automatic tube recognition



**FLUID CONTROL ARTHRO-SPINE 2204 BNDL**, consisting of:

- 2204101 Spine Mode software module,
- 2204001 Fluid Control Arthro-Spine suction and irrigation pump 200 mmHg,
- 8171223 irrigation tube set spike,
- 8170.401 vacuum tube,
- 4171.121 protection filter for gas filtration,
- 2440.03 power cable ..... 22040012

### Irrigation



#### Accessories – reusable

##### IRRIGATION TUBE SET SPIKE,

incl. 20 replacement sealing membranes, silicone,  
Pack = 1 PC, with 2 piercing spikes,  
20x reusable, for Fluid Control Arthro/Spine

2204 and Fluid Control Lap 2216 ..... 8171223

#### Accessories – for singel use, sterile

##### IRRIGATION TUBE SET SPIKE

L 3 m, with Y-piece, PVC, Pack = 10 PCS,

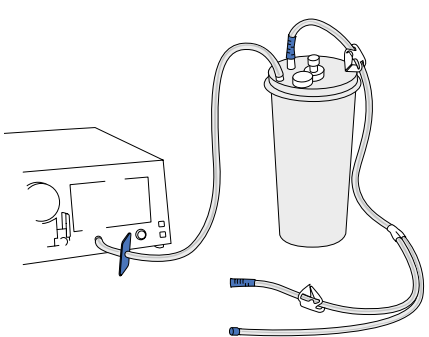
for Fluid Control Arthro/Spine 2204 and Fluid Control Lap 2216 ..... 4171223





##### IRRIGATION TUBE SET CARE LOCK

L 3 m, with Y-piece, PVC, Pack = 10 PCS,

for Fluid Control Arthro/Spine 2204 and Fluid Control Lap 2216 ..... 4171224

## FLUID CONTROL Arthro-Spine – Innovative Fluid Management System

Suction / Evacuation	
	Accessories – reusable
	<b>VACUUM TUBE,</b> silicon, for connection of vacuum (pump) with suction container .....8170.401
	<b>SUCTION CONTAINER,</b> 3 L, includes mounting bracket.....8170.981
	Accessories – for singel use
	<b>SUCTION CONTAINER,</b> 3 L, Pack = 2 PCS .....2215.971
	<b>TUBE SET,</b> L 5 m, with Y-piece, PVC, Pack = 10 PCS, sterile .....4170.901
	<b>PROTECTION FILTER FOR GAS FILTRATION,</b> sterile .....4171.121

Consumables and accessories	
	<b>MEMBRANE</b> ..... 15479006
	<b>SUCTION AND SCAVENGING ATTACHM.</b> ..... 15461034
	<b>REPLACEMENT O-RING</b> 15461,034, Pack = 10 PCS .....9500.113
	<b>O-RING</b> ..... 15364285



# Literature

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Operation of lumbar zygoapophyseal joint cysts using a full-endoscopic interlaminar and transforaminal approach: prospective 2-year results of 74 patients. *Surg Innov* 2014 Mar 25 (Epub ahead of print)

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