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## Takes the pressure

# VERTEBRIS lumbar

Full-endoscopic decompression of the lumbar spine – Interlaminar and trans-/ extraforaminal technique

# VERTEBRIS lumbar

Full-endoscopic Spine Intrument Set

## Contents

# VERTEBRIS lumbar

## Foreword

Musculoskeletal pain ranks among the most frequent reasons for seeking medical help. Degenerative diseases of the spine form a daily focus. The therapy encompasses medical and socioeconomic challenges.

After conservative measures have been exhausted, surgical intervention may be necessary in circumstances of exacerbated pain or neurological deficits. In spite of good therapeutic results from conventional operations, consecutive damage may result from traumatization. It is therefore important to continuously optimize the procedures and workflows. The latest research results and technical innovations need to be critically assessed and used constructively in order to facilitate the best treatment strategies. The aim in this process of continuous improvement is to minimize the trauma induced by the operation and negative long-term effects while observing existing quality standards.

Minimally invasive techniques allow tissue damage and its consequences to be reduced. Endoscopic operations carried out during a continuous flow of fluid demonstrate advantages which these procedures standard practice in many areas. Over the past 20 years, transforaminal procedures with posterolateral access have been used in the area of the lumbar spine. The working area is mainly intradiskal, as well as involving an intraforaminal and extraforaminal approach. Since 1998, our Center for Spine Surgery and Pain Therapy has therefore been developing a transforaminal and an interlaminar access in order to reach the spinal canal full-endoscopically. These expand the indication spectrum and permit an equivalent approach in vision that is comparable with conventional operations taking account of the indication criteria, which offer all the advantages of a genuine, minimally invasive procedure.

Problems on the technical side emerged as a result of the availability of optical systems with a small intraendoscopic working channel and the correspondingly restricted repertoire of instruments. Insurmountable difficulties were liable to arise in respect of the resection of hard tissue, the resection of hard tissue, the surgical access passage, and mobility. Adequate work on the pathology was technically limited and had to be carried out in part without direct visualization. The developed of new rod-lens telescopes with an intraendoscopic 4.1 mm working channel and hence new instruments, as well as shavers and burrs was therefore necessary. This enabled working under continuous, excellent visual conditions. Adequate bony resection was also facilitated for the first time. This expanded the principal indication spectrum to spinal disk herniations, spinal stenoses and stabilizing methods.

**Lateral access for the full-endoscopic transforaminal operation**

**A continuous flow of fluid permits outstanding intraoperative visual conditions**

Full-endoscopic surgery on the lumbar spine has now achieved an established status within the overall concept of surgery. Taking due account of the indication criteria, it provides an adequate and safe complement or alternative to conventional surgery. Full-endoscopic operations are also possible on the cervical and thoracic spine.

A change is taking place for the first time as a result of the latest technical developments and new access passages, which appears to be the start of a radical new departure comparable with the establishment of arthroscopic interventions in joints. Nevertheless, conventional and maximally invasive operations will continue to be indispensable in spine surgery today and in the future. Surgeons must be able to perform such operations so that they are in a position to deal safely with any problems and complications that may emerge during full-endoscopic interventions as in any other invasive procedure.

The development of full-endoscopic methods should not be evaluated as a replacement for existing standard operations but as a complementary procedure and alternative within the overall concept of spine surgery.

Dr. med. Martin Komp

Priv.-Doz. Dr. med. habil. Sebastian Ruetten

**The telescopes in the current generation have a large 4.1 mm intraendoscopic channel**

**The development of new instruments offers expanded opportunities for implementation**


**Center for Spine Surgery and Pain Therapy**
Head: Priv.-Doz. Dr. med. Sebastian Ruetten

ST. ELISABETH GRUPPE
KATHOLISCHE KLINIKEN RHEIN-RUHR

**Center for Orthopedics and Traumatology**
**of the St. Elisabeth Group – Catholic Hospitals Rhein-Ruhr**
**St. Anna Hospital Herne | Marien Hospital Herne University Hospital | Marien Hospital Witten**
Director: Priv.-Doz. Dr. med. Sebastian Ruetten

# VERTEBRIS lumbar

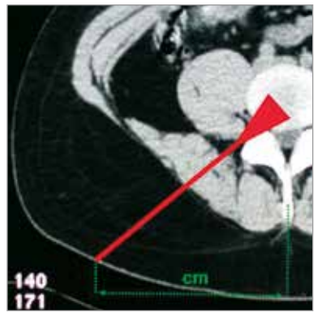
## The full-endoscopic transforaminal and extraforaminal technique

Details of percutaneous operations on lumbar disks to achieve intradiskal decompression were published at the beginning of the 1970s. Optical systems dedicated to inspection of the intervertebral space following an open operation have been used since the early 1980s. A full-endoscopic approach was subsequently developed using a transforaminal technique. In anatomical terms, this means accessing the intervertebral disk in a posterolateral to lateral approach within the area of the intervertebral foramen between the exiting and traversing spinal nerves without the need for resection of bony or ligament structures. The entry point in the skin for the surgical access passage is defined in centimeters from the midline. The applications are generally carried out for intradiskal or extradiskal foraminal therapy. Intradiskal volume and pressure reduction is intended to achieve reduced compression due to the intervertebral disk. Removal of the intraforaminal and extraforaminal intradiskal material is technically possible. Sequestered material located within the spinal can generally only be resected retrograde intradiscally through the annulus defect. This is carried out within the scope of an "In-out technique".

Nucleus material is located within the spinal canal posterior to the annulus level in the anterior epidural space medial to the medial pedicle line. It frequently reaches to the mid-line or the contralateral side. Clinical experience indicates that the annulus defect is frequently smaller than the diameter of the sequester volume. Furthermore, there is no continuous connection intradiskally in the majority of cases. In cases of advanced disk degeneration or older spinal disk herniations, the sequester frequently does not comprise a contiguous substance. Removal in such cases is not possible in a single piece. These factors frequently prevent the retrograde resection carried intradiskally of sequestered nucleus material. Direct access to the extradiskal ventral epidural space with continuous visualization is hence necessary for adequate decompression.

The most frequent localization of lumbar disk herniations relates to the lower levels. The diameter of the intervertebral foramen decreases from the cranial to caudal position. An additional constriction can be caused by degenerative changes. These anatomical conditions frequently prevent extradiskal access to the anterior epidural space with full visualization when using the posterolateral access passage particularly at the lower levels. There are also technical limits

**The established posterolateral access is measured in centimeters from the midline**




**The working area is primarily intradiskal in the posterolateral access**

to a lateral alignment of the endoscope in order to reach the spinal canal tangentially after implementing the access as a result of the approach access passage within the soft tissue and the zygoapophyseal joint. The predictable adequate decompression by means of the posterolateral access may therefore be significantly restricted.

The new transforaminal passage has therefore been developed in the past several years. *

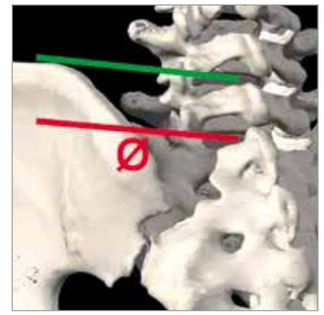
This approach does not entail measurement in centimeters being carried out to define the entry point in the skin, but involves an individual anatomical determination under radiographic control. The access permits the spinal canal to be reached tangentially and hence affords direct visualization of the epidural space with a continuous flow of fluid for purposes of adequate decompression. A broad but clearly defined indication spectrum is provided in conjunction with the newly developed endoscopes designed with a large working channel and the corresponding new instruments, shavers and burrs.

Mobility in a caudal direction to the middle of the pedicle and in a cranial direction to the commencement of the pedicle serves as a guide for decompression within the spinal canal. Constricted foramina no longer constitute restrictions but can be expanded. The pelvis can prevent the necessary lateral access so that the center of the cranially positioned pedicle should be reached maximally in the orthograde lateral beam path. At the upper levels, there are limits to the laterality of the access due to the organs of the thorax and abdomen. The increase in size of the foramen in a cranial direction and the possibility of bone resection achieves a larger radius of action so that the access can be selected less laterally. There are no restrictions for intraforaminal and extraforaminal decompression. Selection of a lateral access is also attempted here in order to be able to pass under the exiting spinal nerves atraumatically. The surgical access method for intraforaminal or extraforaminal spinal disk herniations and in foraminal stenoses may vary from the conventional approach in order to avoid damaging the dislocated nerves or exiting nerves which cannot be localized with certainty. This relates to the extraforaminal access.

In the case of the intradiskal approach, e.g. in the case of fusions or infections, the posteriolateral access is frequently necessary. The access always depends on the target point and takes into account individual pathology and anatomy. Outside the indication criteria, there are well-defined limits to the transforaminal procedure.

* see literature

**The lateral transforaminal access allows the spinal canal to be reached in the caudal levels**



**The pelvis can prevent the necessary lateral transforaminal access at the lower levelsn**

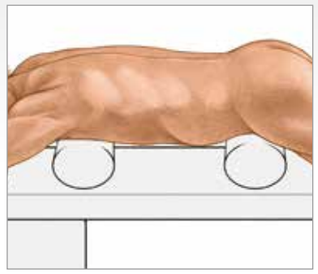

**The lateral transforaminal access shifts the working area into the spinal canal working area**

# VERTEBRIS lumbar

The full-endoscopic **transforaminal** technique

## Positioning

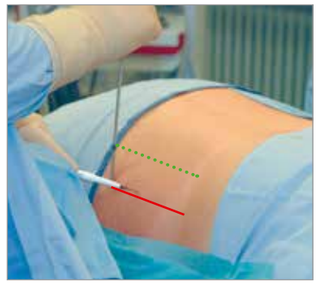
The patient is in the prone position lying on a hip and thorax roll on an X-ray permeable table. Application of a C-arc is required during the operation.

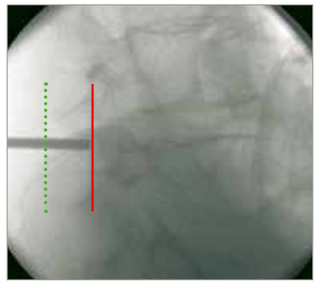


**Prone position with pelvic and thorax rolls**

## Determination of the lateral access

The access is determined under image intensifier control on the basis of anatomical landmarks in the orthograde lateral and posterior-anterior beam path and taking account of the pathology. Posterior limitation of the facet joints (red line). It is recommended to mark the posterior limitation of the spinous process (green line) as entry point of the puncture cannula. Depending on the level, injury to the abdominal organs must be excluded.



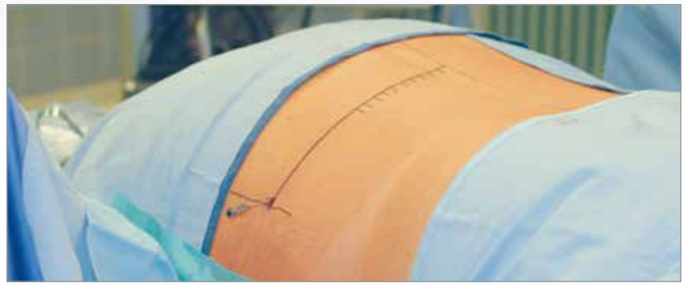


**Determination of the maximum anteriority on the basis of individual anatomical landmarks and drawing the entry line in the skin – posterior limitation of the facet joints (red line)**

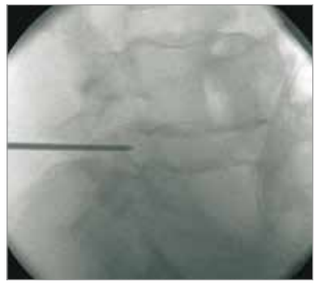
**Establishment of the spinal disk level in the orthograde posterior-anterior beam path and definition of the entry point**

## Implementation of the lateral access

After determining the entry point in the skin and carrying out a stab incision, a spinal cannula is inserted under lateral image intensifier control and with conservation of the neural structures. The positioning in relation to the spinal canal is carried out individually in relation to the spinal canal. The guide wire is then inserted and the spinal cannula is removed.



**Inserted spinal cannula**



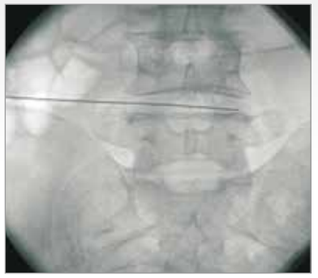
**At the start of the spinal canal, the spinal cannula contacts the posterior annulus in the medial pedicle line**

**The spinal cannula is pushed in the posterior annulus in the direction of the spinal canal**

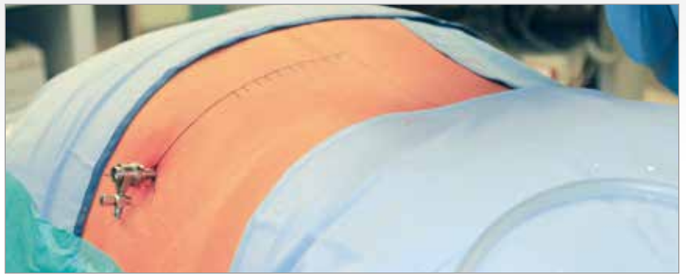
# VERTEBRIS lumbar

## The full-endoscopic **transforaminal** technique

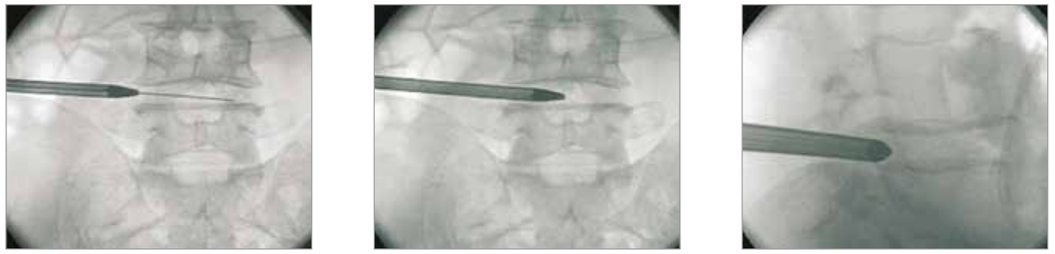
The dilator is initially inserted along the guide wire by means of rotating movements initially as far as the foramen and after removal of the guide wire it is inserted in the spinal canal depending on the pathology.
The beveled working sleeve is then pushed along the dilator and the dilator is removed. All the work stages must be carried with protection of the neural structures.



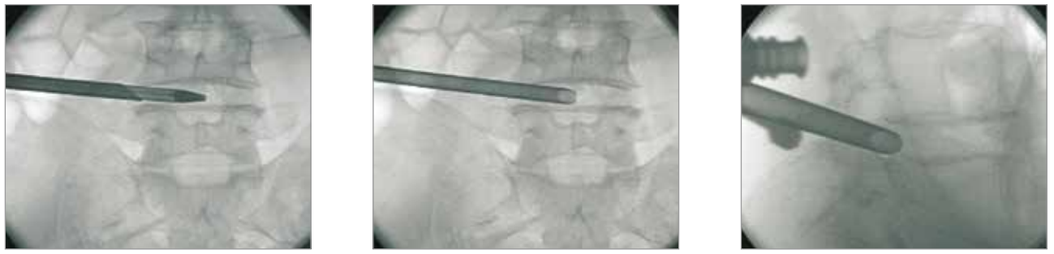
**The guide wire is positioned and the spinal cannula is removed**



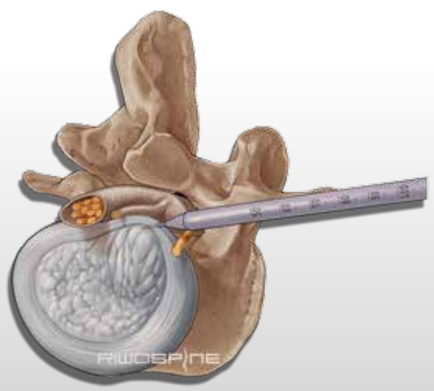
**Lateral transforaminal access**

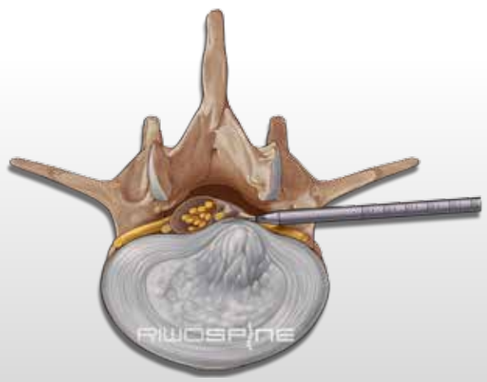


**The dilator is inserted along the guide wire and in the final position is located in the spinal canal or posterior annulus defect**



**The working sleeve is positioned along the dilator and the dilator is removed; the beveled opening is located within the spinal canal posterior to the annulus**





# VERTEBRIS lumbar

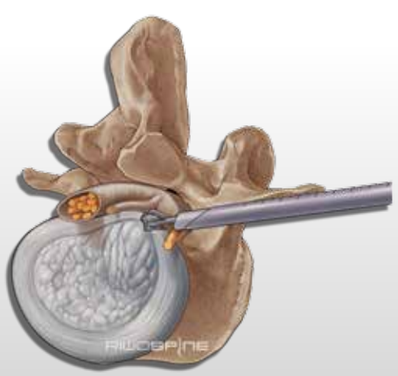
The full-endoscopic **transforaminal** technique

## Operating procedure

The endoscope is inserted through the working sleeve. The operation is carried out in vision using different instrument sets positioned through the intraendoscopic working channel and with a continuous flow of liquid.

The locking caps for the telescope 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 neighboring structures cannot theoretically be completely excluded. Experience indicates that generally speaking there is an increased risk of complications occurring when all new procedures are carried out, in particular during the learning curve.

**The lateral access permits working the spinal canal in vision**



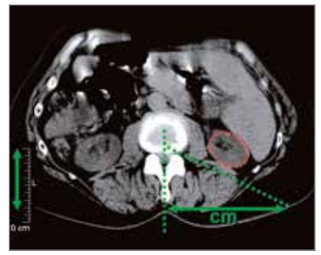
## Implementation of the posterolateral access

In intradiskal operations, prevention of a lateral access through the pelvic or for avoidance of injuries to the abdominal or thoracic organs at the cranial levels, a more posterior to postero-lateral access may be necessary.The entry point in the skin is determined by the pathology and anatomy, and can be measured in centimeters from the midline. Alternatively it is localized by adequate positioning of the inserted spinal cannulas. The subsequent stages with insertion of the guide wire, the dilator, the operating sleeve and then the telescope are not different from the procedure already described.

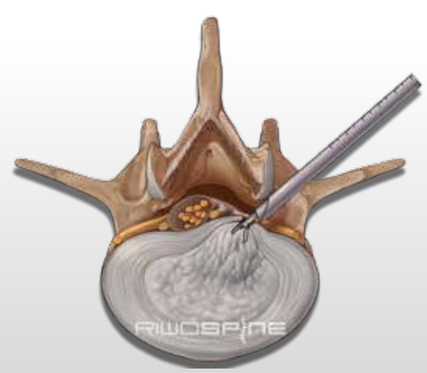
**Measurement of the entry point in centimeters laterally from the midline**

**The inserted spinal cannulas in the desired target point can determin the localization of the stab incision**

**Operation with posterolateral transforaminal access**



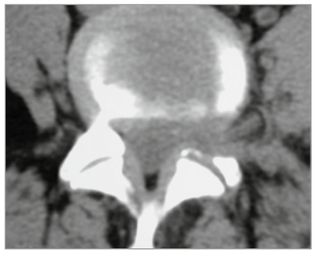

**The maximum laterality of the access can be measured on the basis of a preoperative CT scan in order to avoid injury to organs**



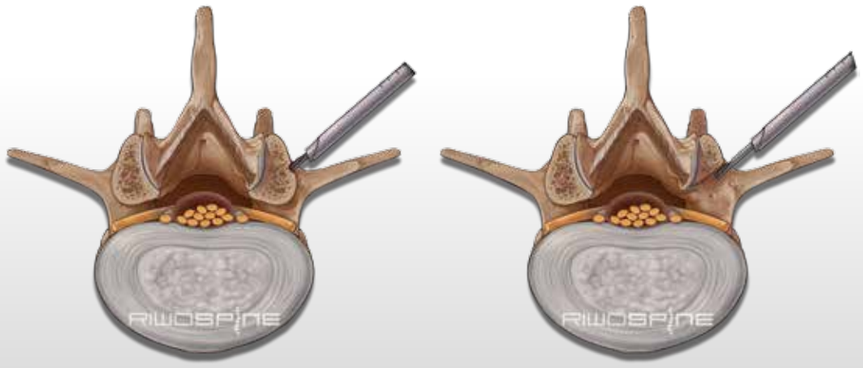
## Implementation of bony resection

Bone resection may be necessary in order to expand mobility within the spinal canal or if there are problems during access. This may be the case e.g. in degenerative and position-related foramen stenosis or during an operation on recess stenosis. The entry point into the skin is possible from posterolateral to lateral. After the transforaminal or extraforaminal access has been implemented, the bony structures have to be dissected for this. This generally involves resection of the anterior structures of the ascending facets. If a resection of the structures of the caudal pedicle is carried out, it is important to take account of the fact that this is a support structure. Extensive resections can lead to biomechanical weaknesses and to pedicle breaks.

A range of burrs or bone punches is available for bone resection



An opening of the joint cannot always be avoided in order to reach medial edge of the ascending facet




Bone resection generally relates to the anterior structures of the ascending facets

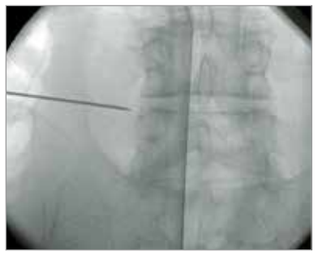


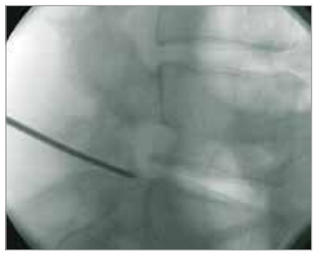


## Implementation of the extraforaminal access

In the case of intraforaminal and extraforaminal spinal disk herniations and foraminal stenoses, there may be an increased risk of injury to the exiting nerves during the passage through the foramen with the access instrument set. The extraforaminal access may be necessary here. The entry point into the skin is possible from posterolateral to lateral. The spinal cannula is not guided through the foramen into the spinal canal but on the caudal pedicle of the level to be operated. This is the safest zone in relation to the exiting nerves and an access-related risk is avoided. The guide wire, dilator and operating sleeve are then also inserted on to the pedicle up to the bony contact. The anatomical structures of the caudal foramen and the exiting nerve can then be dissected in vision and the surgical intervention can be carried out with conservation of the nerves.


The caudal pedicle is a safe zone in relation to the exiting nerve





Insertion of the spinal cannula on to the caudal pedicle


Dissection of the anatomical structures of the caudal foramen and the exiting spinal nerve

# VERTEBRIS lumbar

## The full-endoscopic interlaminar technique

Direct access to the epidural space with continuous visualization is hence necessary for adequate operations within the spinal canal. A lateral access is necessary for this when using the full-endoscopic transforaminal technique. The bony and neural boundaries of the neuroforamen define limits for mobility and hence also in relation to the indication criteria. Furthermore, the necessary lateral access in the lower levels may be prevented by the pelvis. On the basis of our experience, these restrictions encompass a spectrum of pathologies which are not operable using the full-endoscopic transforaminal approach due to technical limitations.

Making use of anatomically preformed access areas is effective for reducing surgically related traumatization to the structures of the spinal canal. Alongside the intervertebral foramen, the sacral hiatus and the interlaminar window are located here. Resection of large pathologies is not possible in technical terms using epiduroscopy through the sacral hiatus. The surgical access through the interlaminar window is therefore used. This has been familiar in lumbar spine surgery for the longest and is frequently used. It has been described since the beginning of the 1920s. Alternative methods were subsequently developed, such as the posterolateral approach for taking biopsies from vertebras at the end of the 1940s or intradiskal decompression using chemonucleolysis in the early 1970s. Endoscopic inspections of the intervertebral space after open decompression were described during the early 1980s. The implementation of full-endoscopic operations concentrated on the transforaminal technique with posterolateral access.

Since the end of the 1970s, the microsurgical procedure using the microscope has also been developed and today this has achieved the status of "Gold Standard" for interlaminar decompression in the area of the spinal canal. Details of an endoscopically assisted technique known as a microendoscopic operation were published in the late 1990s. This relates to visualization of the opened operation site using an endoscope and a monitor.



Opening the spinal canal is necessary in the conventional method for reaching the epidural space. This generally involves incision of the ligamentum flavum and resection of bone. Adequate access must be created which ensures vision into the spinal canal and permits working with instruments. Problems may arise as a result of traumatization of the access passage, as a result of resection of stabilizing structures and in particular in relation to potential revisions resulting from scar formation. The microscope principally reduces the size of the access passage and creates very good light and envisioning conditions. Resection of structures of the spinal canal can generally not be avoided. Access using the microendoscopic method may be structured to be more gentle on tissue than the microscopic procedure. The advantage is in the smaller distance between the working area and the visualizing system. Visibility conditions and illumination are generally poor. This is not an endoscopic procedure in the true sense. Today, the microendoscopic access method and the microendoscopic operating procedure are partly combined. Overall, a larger access generally has to be selected with all procedures than would actually be necessary for actually working in the spinal canal.

In order to make use of the known advantages from the transforaminal operation and arthroscopy, the new fullendoscopic interlaminar access was developed over recent years.*

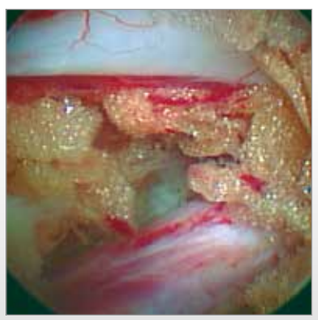
* see literature

# VERTEBRIS lumbar

## The full-endoscopic **interlaminar** technique

**Full-endoscopic interlaminar access**

**Handling the telescope using the joystick principle permits mobility**



**The interlaminar access guarantees outstanding visibility for the structures of the spinal canal**

The light and imaging system with 25° direction of view is located directly in the relevant working area so that traumatization can be minimized in the access passage and also in connection with the structures of the spinal canal. Working in a continuous flow of liquid provides excellent visibility conditions. Mobility for the new endoscope is achieved by handling with joystick technology. Protection of the neural structures is provided by manipulating the beveled operating sleeve like a nerve hook. In combination with the newly developed instrument sets, this represents a genuine minimally invasive procedure.

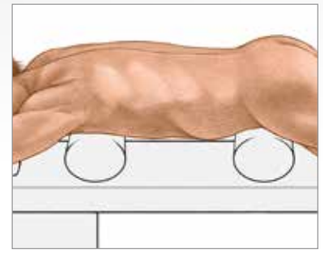
Indications primarily relate to pathologies within the spinal column. It is important to note that the size of the interlaminar window can prevent free passage of the endoscope. In this case, the bone can be cut until the target point is reached without opening the ligamentum flavum or damaging the zygoapophyseal joints. In most cases, bony resection should be avoided, although the pathology precludes this in the case of spinal canal stenoses. The incision in the ligamentum flavum can be reduced to a few millimeters because the elasticity of the intervertebral disc facilitates entry into the spinal canal. On the other hand, mobility to the other side is equivalent to conventional operations. In a craniocaudal direction, access along adjacent levels can be considered in order to minimize the resection of structures of the spinal canal. The full endoscopic interlaminar technique permits selective operation of pathologies within the spinal canal with minimized access-related traumatization. The transforaminal access is generally the most appropriate for intradiskal, intraforaminal or extraforaminal working. The transforaminal procedure has more restrictions compared with the interlaminar approach, although it provides the best tissue conservation. The anatomical and pathological conditions mean that the percentage of transforaminal to interlaminar procedures is approximately 40 to 60 in practice.



### Positioning

The patient is in the prone position lying on a pelvic and thorax roll on an X-ray permeable table.
Application of a C-arc is required during the operation.

**Prone position with pelvic and thorax rolls**

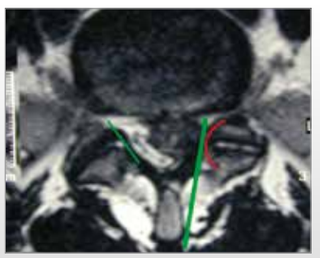


### Determination of the access

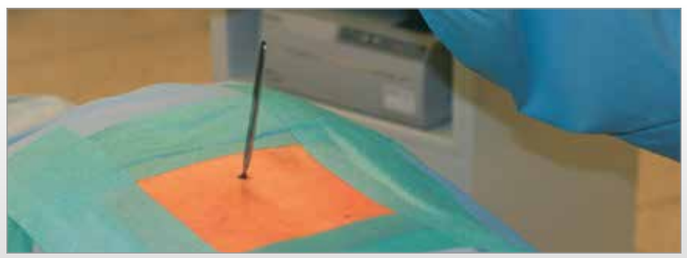
The access is determined under image intensifier control on the basis of the anatomical landmarks in the postero-anterior beam path and taking account of the pathology. It must be positioned maximally medially in the interlaminar window in order to permit entry under the obliquely positioned zygoapophyseal joints laterally.

**Marking the entry point on the skin**

**Entry point should be in a maximally medial position**



**Entry under the zygoapophyseal joints should be facilitated**



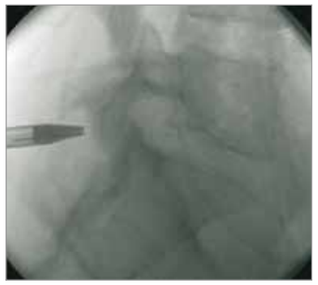
**Stab incision**

# VERTEBRIS lumbar

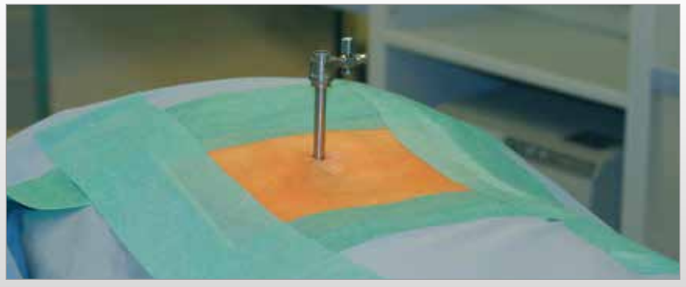
## The full-endoscopic **interlaminar** technique

### Implementation of the access

After determining the entry point in the skin and carrying out the stab incision, the dilator is inserted under posterior-anterior image intensifier control until the ligamentum flavum. The subsequent procedure is then performed in the lateral beam path. The working sleeve with oblique opening is pushed through the dilator toward the ligament and the dilator is removed.

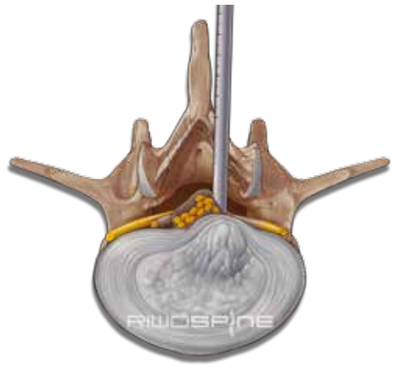


Insertion of the dilator and then the sleeve under image intensifier control to the ligamentum flavum



### Operating procedure

The endoscope is inserted through the working sleeve. The operation is carried out in vision using different instrument sets positioned through the intraendoscopic working channel and with a continuous flow of liquid. After opening the ligamentum flavum, it is possible to enter the spinal canal. Mobility for the telescope is achieved by handling the visual using the joystick principle. Protection of the neural structures is provided by the beveled working sleeve serving as a second instrument and through rotation.







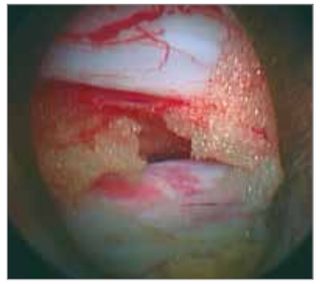
The beveled working sleeve can be used as a second instrument by rotation

# VERTEBRIS lumbar

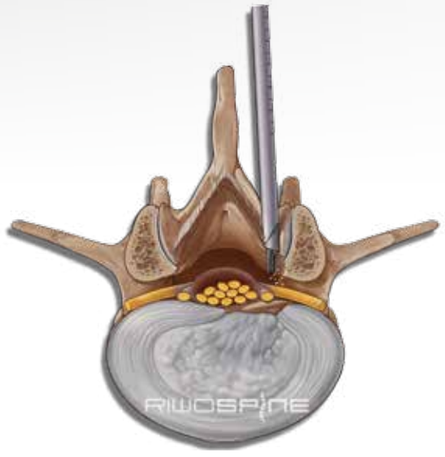
## The full-endoscopic **interlaminar** technique

The locking caps for the telescope 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 neighboring structures cannot theoretically be completely excluded. 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 generally speaking there is an increased risk of complications occurring when all new procedures are carried out, in particularly during the learning curve.

Opening of the ligamentum flavum



View of the axilla at L5/S1

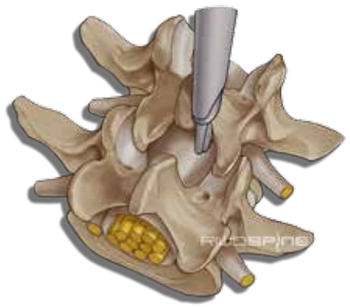




A necessary bone resection is possible with the instruments and burrs available

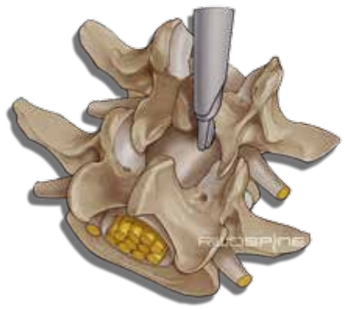

The interlaminar access permits working in the spinal canal in vision

## Implementation of bony resection

Bone resection may be necessary in order to expand mobility within the spinal canal or if there are problems during access. The may be the case e.g. in sequestered spinal disk herniations, small interlaminar windows or during an operation on recess stenosis. After the access has been implemented, the bony structures are dissected. It may be helpful to start decompression at the caudal end of the descending facets. Medial structures of the descending and ascending facets or the caudal and cranial laminas may be resected depending on the pathology.

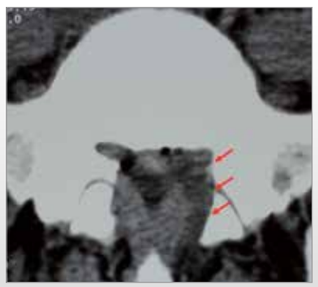


It may be helpful to start decompression at the caudal end of the descending facets



The extent of bony resection depends on the pathology

A range of burrs and bone punches are available for bone resection which can be inserted through the intraendoscopic working channel



Lateral bone resection is carried out on the floor of the spinal canal directly in the working area



RIWOSPINE
A Richard Wolf Company



## Trans- / extraforaminal technique – Access lateral

**Indication criteria:**

- Pathologies at level segment L4 / L5 and higher with localization intraspinal / intraforaminal / extraforaminal and intradiskal, at level L5 / S1 extraforaminal

**Technical specification VERTEBRIS lumbar 8 mm:**

- Access sheath OD 8.0 mm, working length 185 mm
- Working channel for instruments with outer diameter max. 4.0 mm
- Instruments with working length 360 mm

Access lateral

## Trans- / extraforminal technique – Access posterolateral

**Indication criteria:**

- Pathologies at level segment L4 / L5 and higher with localization intraspinal / intraforaminal / extraforaminal and intradiskal, at level L5 / S1 extraforaminal
- Specially developed **for tight anatomical conditions**

**Technical specification VERTEBRIS lumbar 7 mm:**

- Access sheath OD 7.0 mm, working length 185 mm
- Working channel for instruments with outer diameter max. 3.0 mm
- Instruments with working length 360 mm

Access posterolateral

## Interlaminar technique – Access posterior

**Indication criteria:**

- Pathologies at level segment L1 - S1, L4 / L5

**Technical specification VERTEBRIS lumbar 8 mm:**

- Access sheath OD 8.0 mm, working length 120 mm
- Working channel for instruments with outer diameter max. 4.0 mm
- Instruments with working length 290 mm
- Maximum mobility

Access posterior

# VERTEBRIS lumbar

Instrument Set for full-endoscopic **transforaminal and extraforaminal** technique

Instrument Set for full-endoscopic **transforaminal and extraforaminal** technique

## Endoscope and accessories

**PANOVIEW PLUS DISCOSCOPE**
25° Ø 6.9 mm, SL 207 mm, rigid, with lateral ocular lens
working channel Ø 4.1 mm, irrigation channel Ø 1.3 mm,
GL 321 mm, rod lens system ..... 89210.1254

**CONE ADAPTER** ..... 8791.751

**MEMBRANE ATTACHMENT** ..... 8792.451

**FIBER LIGHT CABLE BNDL** consisting of:
80663523 fiber Light Cable, Ø 3.5 mm, TL 2.3 m,
809509 adapter endoscope side,
809507 adapter projector side ..... 806635231

## Access instruments reusable

**DILATOR**
ID 1.3 mm, OD 6.9 mm,
for single-stage dilatation, TL 235 mm ..... 89220.1508

**WORKING SLEEVE**
ID 7 mm, OD 8 mm, TL 186 mm,
distal end beveled, graduated ..... 89220.1078

**FLUSHING ADAPTER**
For working sleeve Ø 8 mm ..... 89220.1308

**EXTENSION SLEEVE**
ID 7 mm, OD 8 mm, TL 155 mm ..... 89220.1408

**HAMMER** ..... 8866.956

## Acces instruments for single use

**PUNCTURE NEEDLE SET**
18G (OD 1.25 mm), WL 150 mm, Pack = 10 PCS, sterile ..... 4792.803
18G (OD 1.25 mm), WL 250 mm, Pack = 10 PCS, sterile ..... 4792.802
17G (OD 1.5 mm), WL 250 mm, Pack = 10 PCS, sterile, for single use ..... 492201215

## Instrument sieve

**INSTRUMENT BASKET VERTEBRIS LUMBAR**
Sieve for sterilization, consisting of: sieve basket base, sieve basket lid,
2x locking mechanism, instrument carrier top, incl. set of silicone
holders, instrument carrier bottom,
incl. set of silicone holders L x W x H: 530 mm x 250 mm x 150 mm ..... 85841217

## Working instruments

for application with endoscopes with working channel ID 4.1 mm (color coding ● ● ● )
and endoscopes with working channel ID 3.1 mm (color coding ● ● )

### Rongeurs, grasping forceps and punches with color coding for simple identification of the instrument diameter

**RONGEUR**, WL 360 mm, reusable
● Ø 2.6 mm, TL 460 mm, with irrigation connection ..... 8792.632
● Ø 3 mm, TL 457 mm, with irrigation connection ..... 89240.1003
● Ø 4 mm, TL 470 mm, with irrigation connection ..... 89240.1004

**RONGEUR**, extended jaw insert, WL 360 mm, reusable
● Ø 2.6 mm, TL 457 mm, with irrigation connection ..... 89240.1125

**RONGEUR**, curved upward, WL 360 mm, reusable
● Ø 2.5 mm, fits in ID 4 mm working channel, TL 457 mm,
with irrigation connection ..... 89240.1044

**RONGEUR**, articulating, WL 340 mm, reusable
● Ø 4 mm, articulating, TL 500 mm, with irrigation connection ..... 89240.1624

**NUCLEUS GRASPING FORCEPS**, WL 360 mm, reusable
● Ø 2.6 mm, TL 457 mm, with irrigation connection ..... 89230.1125
● Ø 3 mm, TL 457 mm, with irrigation connection ..... 89230.1003
● Ø 4 mm, TL 470 mm, with irrigation connection ..... 89230.1004

**PUNCH**, WL 360 mm, reusable
● Ø 2.6 mm, TL 460 mm, with irrigation connection ..... 8792.671
● Ø 3 mm, TL 457 mm, with irrigation connection ..... 89240.1023
● Ø 4 mm, TL 470 mm, with irrigation connection ..... 89240.1024

**PUNCH**, curved upward, WL 360 mm, reusable
● Ø 2.5 mm, TL 457 mm, fits in ID 4 mm working channel,
with irrigation connection ..... 89240.1034

**SHEATH TUBE PUNCH**, dismantling sheath, reusable
● Ø 3 mm, WL 360 mm, TL 450 mm, with irrigation connection ..... 89240.1903
● Ø 4 mm, WL 357 mm, TL 500 mm, with irrigation connection ..... 89240.1904

**SCISSORS**, WL 360 mm, reusable
● Ø 3 mm, TL 457 mm, with irrigation connection ..... 89240.1703

**DISSECTOR**
Ø 2.5 mm, WL 350 mm, atraumatic, reusable ..... 8792.591

**PROBE WITH FLEXIBLE TIP BNDL**, consisting of:
15570643 sheath tube Ø 2.5 mm, SL 350 mm,
892501625 probe insert Ø 2 mm,
892500600 spring handle ..... 892501925

# VERTEBRIS lumbar

## Instrument Set for the full-endoscopic **interlaminar** technique

### Endoscopes and accessories

**PANOVIEW PLUS DISCOSCOPE**
25° Ø 6.9 mm, SL 165 mm, rigid, with lateral ocular lens,
working channel Ø 4.1 mm, irrigation channel Ø 1,3 mm, TL 279 mm,
rod lens system ..... 89210.3254

**ENDOSCOPE ADAPTER** ..... 892009000

**CONE ADAPTER** ..... 8791.751

**MEMBRANE ATTACHMENT**
reusable ..... 8792.451

**FIBER LIGHT CABLE BNDL**
consisting of:
80663523 fiber light cable, Ø 3.5 mm, TL 2.3 m,
809509 adapter endoscope side,
809507 adapter projector side ..... 806635231

### Access instruments for discoscopes with 4.1 mm working channel

**DILATOR**
ID 1.3 mm, OD 6.9 mm, TL 235 mm, for single-stage dilatation,
reusable ..... 89220.1508

**WORKING SLEEVE**
ID 7 mm, OD 8 mm, TL 120 mm, distal end beveled, graduated,
reusable ..... 89220.3008

**FLUSHING ADAPTER**
for working sleeve, Ø 8 mm, reusable ..... 89220.1308

### Instrument sieve

**INSTRUMENT BASKET VERTEBRIS LUMBAR**
Sieve for sterilization, consisting of: sieve basket base, sieve basket lid,
2x locking mechanism, instrument carrier top, incl. set of silicone
holders, instrument carrier bottom,
incl. set of silicone holders L x W x H: 530 mm x 250 mm x 150 mm ..... 85841217



Instrument Set for the full-endoscopic **interlaminar** technique

### Working instruments – interlaminar

for application with endoscopes with working channel ID 4.1 mm (color coding ● ● ● ● )
and endoscopes with working channel ID 3.1 mm (color coding ● ● ● )

**Rongeurs, grasping forceps and punches with color coding for simple identification of the instrument diameter**

**RONGEUR**, WL 290 mm, reusable
● Ø 2.6 mm, TL 388 mm, with irrigation connection ..... 89240.2025
● Ø 3 mm, TL 388 mm, with irrigation connection ..... 89240.3003
● Ø 4 mm, TL 400 mm, with irrigation connection ..... 89240.3004

**PUNCH**, WL 290 mm, reusable
● Ø 2.6 mm, TL 388 mm, with irrigation connection ..... 89240.2225
● Ø 3 mm, TL 388 mm, with irrigation connection ..... 89240.3023
● Ø 4 mm, TL 400 mm, with irrigation connection ..... 89240.3024

**PUNCH**, curved upward, WL 360 mm, reusable
● Ø 2.5 mm, TL 457 mm, fits in ID 4 mm working channel,
with irrigation connection ..... 89240.1034

**SHEATH TUBE PUNCH**, dismantling tube sheath, WL 290 mm, reusable
● Ø 3 mm, TL 380 mm, with irrigation connection ..... 89240.3903
● Ø 4 mm, TL 441 mm, with irrigation connection ..... 89240.3904



**RONGEUR**, curved upward, WL 360 mm, reusable
● Ø 2.5 mm, fits in ID 4 mm working channel, TL 457 mm,
with irrigation connection ..... 89240.1044

**DISSECTOR**
Ø 2.5 mm, WL 350 mm, atraumatic, reusable ..... 8792.591

**DISSECTOR**
Ø 3 mm, WL 350 mm, atraumatic, reusable ..... 89250.1003

**DISSECTOR**
Ø 4 mm, WL 350 mm, atraumatic, reusable ..... 89250.1004

**EXPLORING HOOK**
Ø 2.5 mm, WL 290 mm, atraumatic, reusable ..... 89250.2125

### Accessories

**POSITIONING ROD**
Ø 5.0 mm, WL 400 mm, graduated, pointed, reusable ..... 8791.701

**SUCTION TUBE**
Ø 2.5 mm, WL 290 mm, reusable ..... 89270.2025

# VERTEBRIS lumbar

Instrument Set for the full-endoscopic **transforaminal posterolateral** technique

Instrument Set for the full-endoscopic **transforaminal posterolateral** technique

## Endoscopes and accessories

**PANOVIEW PLUS DISCOSCOPE**
25° Ø 5.9 mm, SL 207 mm, rigid, with lateral ocular lens
working channel Ø 3.1 mm, irrigation channel Ø 1.2 mm,
TL 321 mm, rod lens system ..... 89210.1253

**CONE ADAPTER** ..... 8791.751

**MEMBRANE ATTACHEMENT** ..... 8792.451

**FIBER LIGHT CABLE BNDL** consisting of:
80663523 fiber light cable, Ø 3.5 mm, TL 2.3 m,
809509 adapter endoscope side,
809507 adapter projector side ..... 806635231

## Access instruments reusable

**DILATOR**
ID 1.3 mm, OD 5.9 mm,
for single-stage dilatation, TL 225 mm ..... 8792.764

**WORKING SLEEVE**
ID 6 mm, OD 7 mm, TL 186 mm,
distal end beveled, graduated ..... 89220.1047

**FLUSHING ADAPTER**
for working sleeve Ø 7 mm ..... 89220.1307

**EXTENSION SLEEVE**
ID 7 mm, OD 8 mm, TL 155 mm, distal end straight ..... 89220.1407

**HAMMER** ..... 8866.956

## Access instruments for single use

**PUNCTURE NEEDLE SET**
18G (OD 1.25 mm), WL 150 mm, Pack = 10 PCS, sterile ..... 4792.803
18G (OD 1.25 mm), WL 250 mm, Pack = 10 PCS, sterile ..... 4792.802
17G (OD 1.5 mm), WL 250 mm, Pack = 10 PCS, sterile ..... 492201215

**INSTRUMENT BASKET VERTEBRIS LUMBAR**
Sieve for sterilization, consisting of: sieve basket base, sieve basket lid,
2x locking mechanism, instrument carrier top, incl. set of silicone
holders, instrument carrier bottom,
incl. set of silicone holders L x W x H: 530 mm x 250 mm x 150 mm ..... 85841217

## Working instruments

for application with endoscopes with working channel ID 4.1 mm (color coding ● ● ●)
and endoscopes with working channel ID 3.1 mm (color coding ● ●)

### Rongeurs, grasping forceps and punches with color coding for simple identification of the instrument diameter

**RONGEUR**, WL 360 mm, reusable
● Ø 2.6 mm, TL 460 mm, with irrigation connection ..... 8792.632
● Ø 3 mm, TL 457 mm, with irrigation connection ..... 89240.1003

**RONGEUR**, WL 360 mm, reusable
● Ø 2.6 mm, TL 457 mm, with irrigation connection ..... 89240.1125

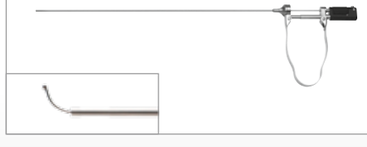
**NUCLEUS GRASPING FORCEPS**, WL 360 mm, reusable
● Ø 2.6 mm, TL 457 mm, with irrigation connection ..... 89230.1125
● Ø 3 mm, TL 457 mm, with irrigation connection ..... 89230.1003

**PUNCH**, WL 360 mm, reusable
● Ø 2.6 mm, TL 460 mm, with irrigation connection ..... 8792.671
● Ø 3 mm, TL 457 mm, with irrigation connection ..... 89240.1023

**SHEATH TUBE PUNCH**, dismantling tube sheath, reusable
● Ø 3 mm, WL 360 mm, TL 450 mm, with irrigation connection ..... 89240.1903

**SCISSORS**, WL 360 mm, reusable
● Ø 3 mm, TL 457 mm, with irrigation connection ..... 89240.1703

**DISSECTOR**
Ø 2.5 mm, WL 350 mm, atraumatic, reusable ..... 8792.591



**PROBE WITH FLEXIBLE TIP BNDL**, consisting of:
15570643 sheath tube Ø 2.5 mm, SL 350 mm,
892501625 probe insert Ø 2 mm,
892500600 spring handle ..... 892501925

## Instrument Set optional

### Instrument Set optional – for application through the endoscope

#### Auxuliary instruments sharply abrading

**ANNULOTOME**
Ø 2.5 mm, WL 350 mm, one ended, reusable ..... 8792.581

**FACE MILLER**
Ø 3 mm, WL 350 mm, sharp, reusable ..... 89260.1113

**FACE MILLER**
Ø 4 mm, WL 350 mm, sharp, reusable ..... 89260.1114

#### Dissecting claws

**RONGEUR**, double-action jaw insert, WL 360 mm, reusable
- Ø 2.6 mm, GL 460 mm, with irrigation connections ..... 8792.636
- Ø 3 mm, GL 457 mm, with irrigation connections ..... 89240.1013
- Ø 4 mm, GL 470 mm, with irrigation connections ..... 89240.1014

**SPREAD DISSECTOR**, WL 360 mm, reusable
- Ø 3 mm, GL 457 mm, with irrigation connections ..... 89230.1803



## Instrument Set optional

### Instrument Set optional – for application through the working sleeve

#### Trephines

**TREPHINE**
Ø 3 mm, WL 200 mm, sharp,
reusable ..... 8792.503

**TREPHINE**
Ø 5.3 mm, WL 200 mm, sharp,
reusable ..... 8792.504

**TREPHINE**
Ø 6.9 mm, WL 210 mm, sharp,
reusable ..... 89260.1108

#### Forceps and punches, articulated

**INTRADISC FORCEPS**
Ø 5.2 mm, WL 244 mm, color code white, TL 393 mm,
with irrigation connection, reusable ..... 8792.623

**INTRADISC FORCEPS**
Ø 5.2 mm, WL 240 mm, color code white, articulated, TL 389 mm,
with irrigation connection, reusable ..... 89240.1052

#### Rongeurs, punches and scissors

**RONGEUR**
4.3 X 5 mm, WL 247 mm, jaw section 6 mm long, TL 320 mm,
reusable ..... 8791.691

**RONGEUR**
4.3 X 4.5 mm, WL 247 mm, jaw section 12 mm long, TL 320 mm,
reusable ..... 8791.601

# VERTEBRIS lumbar

## Instrument Set optional

### Endoscopes

**PANOVIEW PLUS DISCOSCOPE**
25° Ø 5.9 mm, SL 165 mm rigid, with lateral ocular lens,
working channel Ø 3.1 mm, irrigation channel Ø 1.2 mm, TL 279 mm,
rod lens system ..... 89210.3253

### Access instruments

#### Working sleeves for application with discoscope 89210.3253

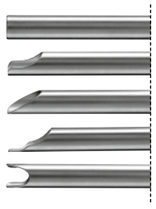
**WORKING SLEEVE**
ID 6 mm, OD 7 mm, TL 120 mm,
distal end beveled, graduated, reusable ..... 89220.3007

**WORKING SLEEVE**
ID 6 mm, OD 7 mm, TL 146 mm,
distal end beveled, graduated, reusable ..... 89220.1057

#### Working sleeves for application with discoscope 89210.1253

**WORKING SLEEVE**
ID 6 mm, OD 7 mm, TL 166 mm,
fenestrated distal end for foraminoplasty, graduated, reusable ..... 89220.1007

**WORKING SLEEVE**
ID 6 mm, OD 7 mm, TL 186 mm,
distal end with elevator tip, graduated, reusable ..... 89220.1157



**WORKING SLEEVES BNDL**, ID 6 mm, OD 7 mm, TL 166 mm,
graduated, reusable consisting of:
15208255 discoscope working sleeve, with distal viewing window,
15208257 working sleeve, distal end beveled,
15208258 working sleeve, distal end with elevator tip,
15208260 working sleeve, double fenestrated distal end,
15208261 working sleeve, distal end straight ..... 89220.1907

#### Attachments for working sleeves OD 7.0 mm

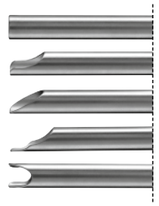
**HANDLE ATTACHMENT**
for working sleeve, Ø 7 mm, reusable ..... 89200.1007



Instrument Set optional

#### Working sleeves for application with discoscope 89210.1254

**WORKING SLEEVE**, ID 7 mm, OD 8 mm, reusable
TL 186 mm, distal end beveled, graduated ..... 89220.1078
TL 186 mm, distal end with 45° window, graduated ..... 89220.1038
TL 166 mm, distal end with long elevation lip, graduated ..... 89220.1068
TL 186 mm, distal end with elevation lip, graduated ..... 89220.1088



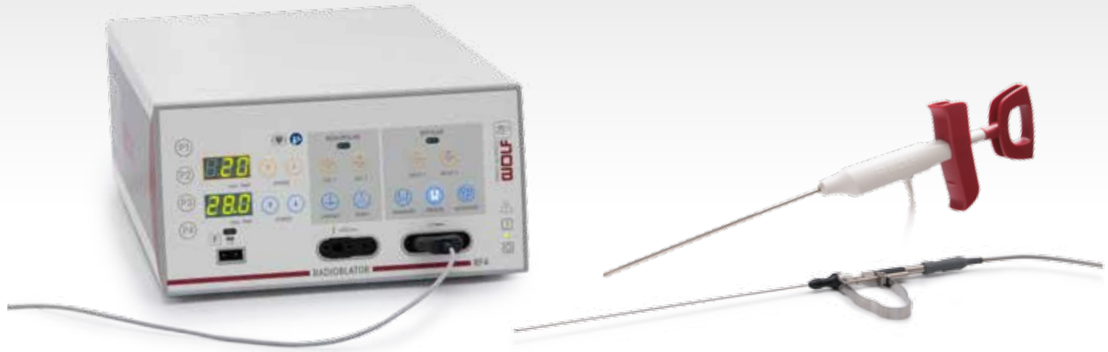
**WORKING SLEEVE BNDL**, ID 7 mm, OD 8 mm, TL 166 mm, graduated,
consisting of:
15208262 discoscope working sleeve, distal end beveled,
15208263 discoscope working sleeve, with distal viewing window,
15208264 discoscope working sleeve, distal end straight,
15208265 discoscope working sleeve, distal end with elevator tip,
15208266 discoscope working sleeve, fenestrated distal end
for foraminoplasty ..... 89220.1908

#### Attachments for working sleeves OD 8 mm

**HANDLE ATTACHMENT**
for working sleeve, Ø 8 mm, reusable ..... 892001008

# VERTEBRIS lumbar

## Radioblator RF 4 MHz – Multidisciplinary Radiofrequency Surgical System



| Radiofrequency Surgical System | |
|---|---|
| **TipControl RF Instrument, bipolar, sterile for Radioblator** | |
|  | **TIPCONTROL RF INSTRUMENT BIPO**<br>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 4 MHz, sterile, for single use ..... 4993691 |
| | **TIPCONTROL RF INSTRUMENT BIPO**<br>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 4 MHz, sterile, for single use ..... 4993692 |
| **TipControl RF Instrument, bipolar, sterile for US 2-PIN** | |
|  | **TIPCONTROL RF INSTRUMENT BIPO**<br>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 |
| | **TIPCONTROL RF INSTRUMENT BIPO**<br>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 |



Radioblator RF 4 MHz – Multidisciplinary Radiofrequency Surgical System

| Radiofrequency Surgical System | |
|---|---|
| **TipControl RF Instrument, bipolar** | |
|  | **TIPCONTROL RF INSTRUMENT BNDL SHORT**, consisting of:<br>899351100 RF Electrode handle bipo,<br>899351010 sheath tube Ø 2.5 mm, SL 290 mm ..... 899351000 |
|  | **TIPCONTROL RF ELEKTRODE BIPO**<br>Ø 2.5 mm, WL 290 mm, for endoscopic spine surgery, flexible, Pack = 5 PCS, sterile, for single use..... 499351000 |
|  | **TIPCONTROL RF INSTRUMENT KPL LONG**, consisting of:<br>899351100 RF Electrode handle bipo,<br>899352010 sheath tube long Ø 2.6 mm ..... 899352000 |
|  | **TIPCONTROL RF ELEKTRODE BIPO**<br>Ø 2.5 mm, WL 400 mm for endoscopic spine surgery, flexible, Pack = 5 PCS, sterile, for single use..... 499352000 |
|  | **TIPCONTROL CONNECTION CABLE BIPO**<br>WL 3 m, 2 PIN international plug, connection to EU flat plug, reusable..... 899351210 |
| **Accessories** | |
|  | **SHEATH TUBE**<br>Ø 2.5 mm, SL 290 mm compatible with TipControl handle bipolar, reusable..... 899351010 |
|  | **SHEATH TUBE**<br>Ø 2.6 mm, SL 400 mm compatible with TipControl handle bipolar, reusable..... 899352010 |
|  | **TIPCONTROL ANSCHLUSSKABEL BIPO**<br>WL 3 m, US 2 pin plug, connection to EU flat plug, reusable..... 899351220 |
| **Radioblator RF 4 MHz**<br>**4 MHz working frequency – precisely focused and tissue presserving, monopolar and bipolar cutting and coagulation mode, program memory for 4 user presets** | |
|  | **RADIOBLATOR RF 4 BNDL**, consisting of:<br>2330001 Radioblator RF 4,<br>2330901 footswitch 2 pedals,<br>2330045 connection cable mono WL 3 m,<br>2440.03 power cable ..... 23300011 |

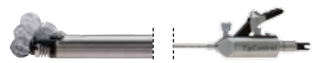
# VERTEBRIS lumbar

## Universal Motor System


| Accessories for Universal Motor System – Power Drive ART1 & Power Speed AS1 | |
|---|---|
| **Burrs** | |
|  | **BURR OVAL**,<br>with lateral protection, color code violet, PACK = 1 PC, WL 350 mm, reusable<br>Ø 2.5 mm ..... 899751502<br>Ø 3.0 mm ..... 899751503<br>Ø 4.0 mm ..... 899751504 |
|  | **BURR OVAL**,<br>with front guard, color code violet, PACK = 1 PC, WL 350 mm, reusable<br>Ø 2.5 mm ..... 899751512<br>Ø 3.0 mm ..... 899751513<br>Ø 4.0 mm ..... 899751514 |
|  | **BURR ROUND**,<br>without protection, color code royal blue, PACK = 1 PC, WL 350 mm, reusable<br>Ø 2.5 mm ..... 899751302<br>Ø 3.0 mm ..... 899751303<br>Ø 4.0 mm ..... 899751304 |
|  | **DIAMOND BURR ROUND**,<br>without protection, color code light turquoise, PACK = 1 PC, WL 350 mm, reusable<br>Ø 2.5 mm ..... 899751402<br>Ø 3.0 mm ..... 899751403<br>Ø 4.0 mm ..... 899751404 |
| **Nucleus resectors** | |
|  | **NUCLEUS RESECTOR SMOOTH**,<br>color code canary yellow, PACK = 1 PC, WL 350 mm, reusable,<br>Ø 3.0 mm ..... 899751003<br>Ø 4.0 mm ..... 899751004 |
| **Nucleus resectors, sterile, for single use** | |
|  | **NUCLEUS RESECTOR**,<br>color code red, Ø 4.5 mm, PACK = 5 PCS, WL 240 mm ..... 499751045 |
|  | **NUCLEUS RESECTOR CURVED**,<br>color code red, Ø 4.5 mm, PACK = 5 PCS, WL 240 mm ..... 499751245 |



Universal Motor System

| Accessories for Universal Motor System Power Drive ART1 & Power Speed AS1 | |
|---|---|
| **Articulated burr for Power Stick M5** | |
|  | **TIPControl – ARTICULATING BONE SHORT BURR BNDL**, consisting of:<br>899753754 articulating burr Ø 4 mm,<br>499751704 burr insert round Ø 3.5 mm,<br>15261106 irrigation adapter M5,<br>15372005 wrench,<br>15336058 drive shaft M5 ..... 899753794 |
| | **TIPControl – ARTICULATING BONE BURR LONG BNDL**, consisting of:<br>899751754 articulating burr Ø 4 mm,<br>499751704 burr insert round Ø 3.5 mm,<br>15261106 irrigation adapter M5,<br>15372005 wrench,<br>15336056 drive shaft M5 ..... 899751794 |
|  | **TIPCONTROL – BURR INSERT**<br>round, Ø 3.5 mm, Pack = 5 PCS, sterile, for application with TipControl<br>articulated burr, for extraction of bony structures, sterile, for single use ..... 499751704 |
| | **TIPCONTROL – BURR INSERT DIAMOND**<br>round, Ø 3.5 mm, Pack = 5 PCS, sterile, for application with TipControl<br>articulated burr, for extraction of bony structures, sterile, for single use ..... 499751714 |
| **Tip Control Nucleus Resector** | |
|  | **TIPCONTROL NUCLEUS RESECTOR ARTICULATING**<br>articulated, Ø 5.5 mm, Pack = 3 PCS, WL 350 mm, for application with the motor<br>handles M5/0 and M5/3, for resection of soft tissue, sterile, for single use ..... 499751005 |
| **Motor Handles – Power Stick M5** | |
|  | **POWER STICK M5/0**<br>Motor handle max. 16000 U/min, with fixed connection cable,<br>for use with rotation tools, control by footswitch ..... 8995500001 |
|  | **POWER STICK M5/3**<br>Motor handle max. 16000 U/min, with fixed connection cable, for use with<br>rotation tools, with three function buttons, control optional by footswitch ..... 8995500031 |
| **Accessories for High-Speed Motor System – for use with angled handpiece for endoscopic high-speed tools** | |
| **Burr with distal protection** | |
|  | **BURR ROUND, CARBIDE**<br>Ø 3.0 mm, Pack = 3 PCS, WL 353.5 mm, reusable ..... 82960.3730 |
| | **SHEATH TUBE WITH DISTAL GUARD**<br>Ø 4.0 mm, for endoscopic high-speed tools, WL 350 mm, reusable ..... 82970.1330 |
|  | **DIAMOND BURR ROUND, DIAMOND**<br>Ø 3.0 mm, Pack = 3 PCS, WL 353.5 mm, reusable ..... 82960.3930 |
| | **SHEATH TUBE WITH DISTAL GUARD**<br>Ø 4.0 mm, for endoscopic high-speed tools, WL 350 mm, reusable. ..... 82970.1330 |
| **Burr without distal protection** | |
|  | **DIAMOND BURR ROUND**<br>Ø 3.7 mm, Pack = 3 PCS, WL 355 mm, reusable ..... 82960.3940 |
| | **SHEATH TUBE**<br>Ø 4.0 mm, for endoscopic high-speed tools, WL 350 mm, reusable. ..... 82970.1340 |

# VERTEBRIS lumbar

## Universal Motor System

### Accessories for High-Speed Motor System – for use with angled handpiece for endoscopic high-speed tools

#### High-Speed Handle

**ANGLED HANDPIECE MAX. 20,000 RPM**
with INTRA-interface, for endoscopic tools with length 350 mm
and sheath Ø 2.35 mm, reusable. ..... 82950.1301

#### High-Speed Motor X1

**HIGH-SPEED-MOTOR MAX. 50000 RPM**
for use with high-speed-attachments, control by footswitch, reusable. ..... 809510005

**CONNECTION CABLE WL 3M**
for connecting the X1 motor to the 2305 Motor Control Unit 2305. ..... 809510205

### Universal Motor System

#### PowerDrive ART1
Universal Motor System: autom. handle and tool recognition, storage function with user-specific parameters and memory function for tools

**POWERDRIVE ART1 MOTOR SYSTEM 2304 BNDL**, 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
2440.03 power cable, power supply unit 100 V, 50/60 Hz ..... 23040021
2440.03 power cable, power supply unit 110 V, 50/60 Hz ..... 23040041
2440.03 power cable, power supply unit 115 V, 50/60 Hz ..... 23040061
2440.03 power cable, power supply unit US 120 V, 50/60 Hz ..... 23040071
2440.03 power cable, power supply unit 127 V, 50/60 Hz ..... 23040121
2440.03 power cable, power supply unit 240 V, 50/60 Hz ..... 23040141

**FOOTSWITCH 2 PEDALS**
for Power Drive ART1 Motor Control Unit (2304) ..... 2304.901

#### PowerSpeed AS1
Universal Motor System: autom. handle and tool recognition, storage function with user-specific parameters and memory function for tools

**POWERSPEED AS1 MOTOR CONTROL UNIT 2305**
Universal Motor System for orthopedics, spine surgery and bronchoscopy,
for connection of motor handle M4. M5/0. M5/3. S1. M1 and
high-speed motor X1, connection for two handpieces and a footswitch,
6.5" touch screen color display, compatible with core nova,
power supply unit 100-240 V, 50/60 Hz ..... 2305001

**WIRELESS FOOTSWITCH**
for PowerSpeed AS1 generator (2305) ..... 2305100
with:
charger for wireless footswitch ..... FW8002M/08
backup cable for wireless footswitch ..... 2305300

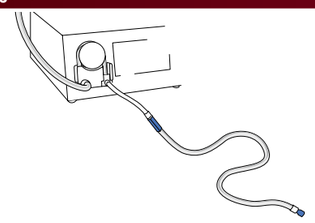
## FLUID CONTROL Arthro-Spine – Innovative Fluid Management System

### 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

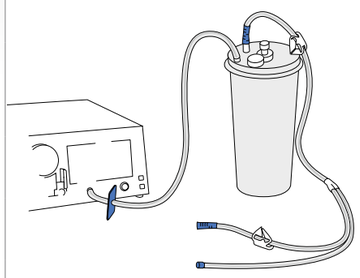
**IRRIGATION TUBE SET SPIKE**
L 3 m, with Y-piece, PVC, Pack = 10 PCS,
for Fluid Control Arthro/Spine 2204 and Fluid Control Lap 2216 ..... 4171223

**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

# VERTEBRIS lumbar

FLUID CONTROL Arthro-Spine – Innovative Fluid Management System

## Suction / Evacuation



### Accessories – reusable

**VACUUM TUBE**
silicone, for connection of vacuum (pump) with suction container .....8170.401

**SUCTION CONTAINER**
3 L, includes mounting bracket.....8170.981

### Accessories – for single use

**SUCTION CONTAINER**
3 L, Pack = 2 PCS.....2215.971

**TUBE SET**
L 5 m, with Y-shape piece, PVC, Pack = 10 PCS, sterile .....4170.901

**PROTECTIVE FILTER FOR GAS FILTRATION**
sterile .....4171.121

## Consumables and Accessories



**MEMBRANE**.....15479006

**IRRIGATION LEVER, CPL** .....15461.034

**REPLACEMENT O-RING**
15461,034, PACK = 10 PCS.....9500.113

**O-RING**.....15364285



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RIWOspine GmbH
Pforzheimer Straße 32
75438 Knittlingen
Germany

Phone: +49 7043 35-0
Fax: +49 7043 35-4300
info@riwospine.com
www.riwospine.com

Managing Directors:
Jürgen Pfab
Jürgen Steinbeck

Trade Register:
Mannheim HRB 725912
V.A.T. ID No.: DE 308 734 584
Tax No.: 48051/13111

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