Ackermann© medical

p|spine

Polyaxial Pedicle Screw System

Ackermann medical

p|spine

Table of Content

Company Profile

We, the Ackermann Medical GmbH & Co. KG, have our head office in Schaffhausen in Switzerland.Since almost one decade we are specialized in the development and production of medical products for spinal surgery. Therefore it is our matter of course to garant our company conforms to the highest medical standards according to FDA, 93/43/EEC (CE), ISO 13485:2003.
Since the beginning of 2013 we are building up a direct sales of implants and instruments for spinal surgery in Germany.

Concentration on the Essentials

We have made it our mission to produce only products offering maximum benefit to patients, the attending physicians, and customers.
Therefore we have committed ourselves offering our goods in the best possible quality at consistently low prices.

This is not only due to our own production and development, but also to our consistent concentration on the essentials

- no compromises in quality
- optimization of the sales management
- responsible marketing

Specifications, designs and accessories are subject to change without any notice or obligation on behalf of the manufacturer.

p|spine

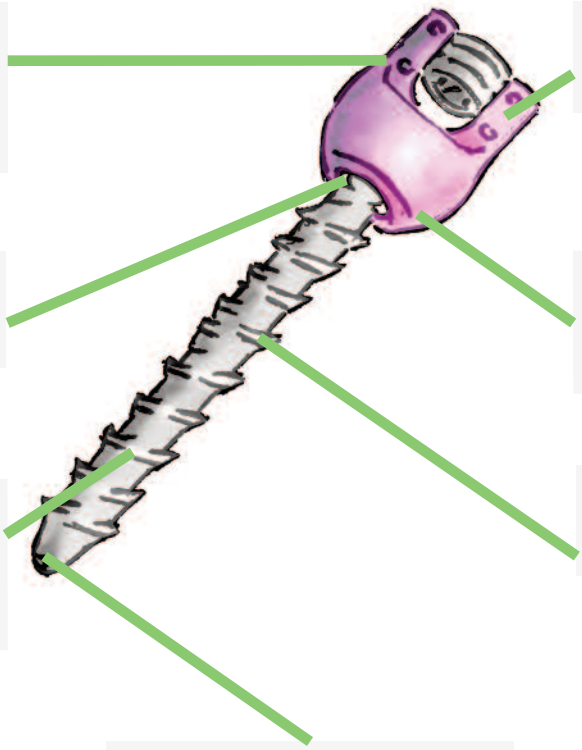
The p|spine Screw System

Being polyaxial, p|spine pedicle screws allow for an easy positioning and facilitate the fitting. Due to the self-tapping threads pre-drilling becomes obsolete, which later on increases the stability within the vertebra. The specific tulip-shaped design of the self-locking thread prevents the set screw from loosening and provides the possibility of a very low profile. All screws are cannulated and a colour coding ensures that the right size is quickly identified.
The p|spine screws are entirely manufactured from a high grade titanium alloy (TiAl6V4). Rods made of titanium or nitinol support a rigid, as well as a dynamic stabilization of the spinal column.
The p|spine pedicle screws are supplemented by a complete set of instruments, fully cannulated and made in Germany of high quality stainless steel.

Tulip shaped design
for a small screw-head which not allows any loosening

Polyaxiality
for easy positioning

Strong and dynamic fusion
by use of Titanium or Nitinol rods



Highest grade materials
Titanium alloy (TiAl6V4)

Colour-coded
for safe and simple distinctness

Self-tapping threads
no pre-drilling necessary

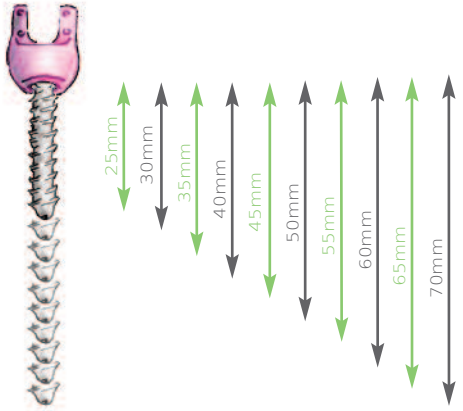
Fully Cannulated

p|spine

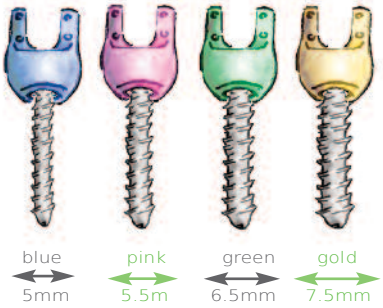
Indications | Contraindications

Ackermann provides a full range of sizes with diameters from 5 mm to 7.5 mm and lengths from 25 mm up to 70 mm. Additionaly, the p|spine screws are completed by the cement screws, which are available with the diameter 6.5 mm and lengths from 35 mm up to 50 mm.

Lengths



Colour-Code and Diameter



Indications

The use of p|spine polyaxial pedicle screws is intended for:

- degenerative disk disease
- prolapsed intervertebral disc
- pseudarthrosis
- degenerative scoliosis
- revision surgery

Contraindications

The use of p|spine polyaxial pedicle screws is NOT intended for:

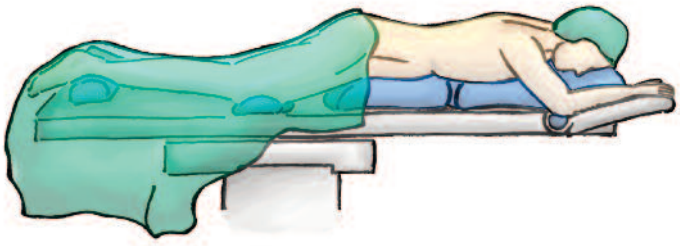
- leukocytosis
- osteoporosis
- pseudarthrosis
- patients with fractures or tumors in the spine area
- patients with spine associated infections
- psychiatric disorder
- pregnancy
- patients with proven materiel allergy or tendency to react to foreign bodies

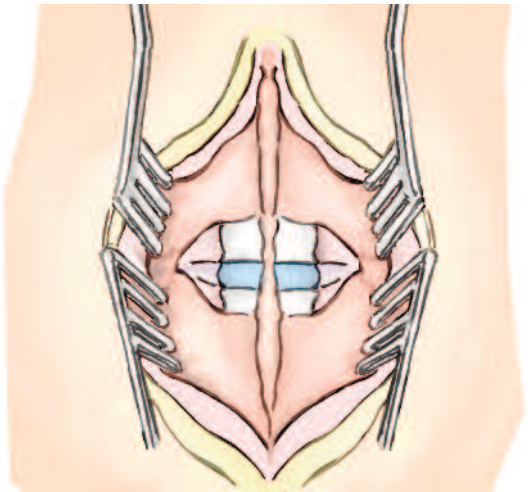
ONE | Patient Positioning and Access

Position the patient in a prone position on an operating table. Use a lumbar support to avoid intraoperative bleeding caused by abdominal compression.
Locate the correct level under x-ray radiation (an x-ray c-arm is recommended) and perform a median incision over the concerned segment. The incision should be done carefully to avoid any case of subcutaneous damage.

Note

| After dissection, the musculus erector spinae may be separated laterally to obtain the required exposure of the vertebras and their facet joints.



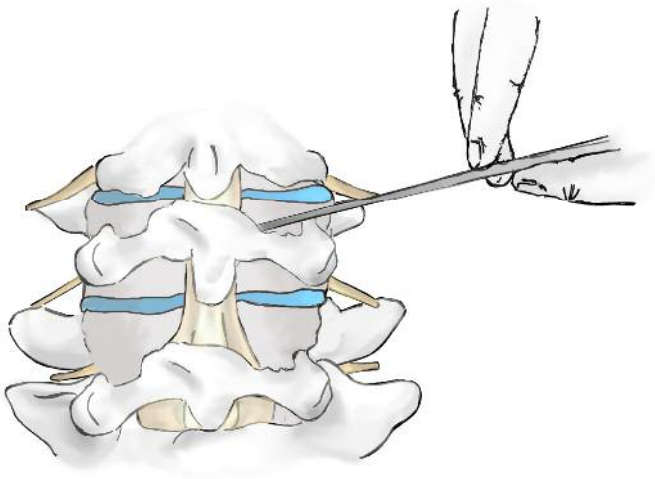


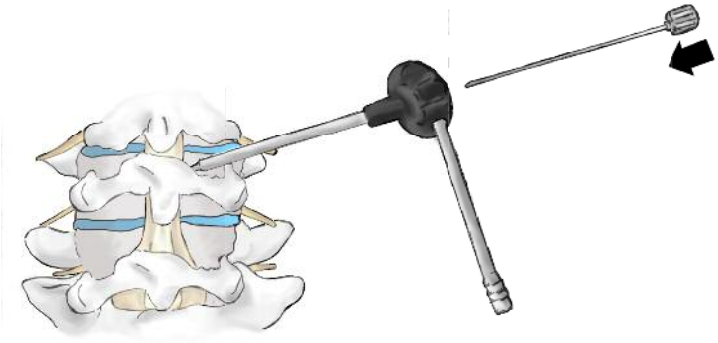
TWO | Positioning of the Retractor and Annular Window

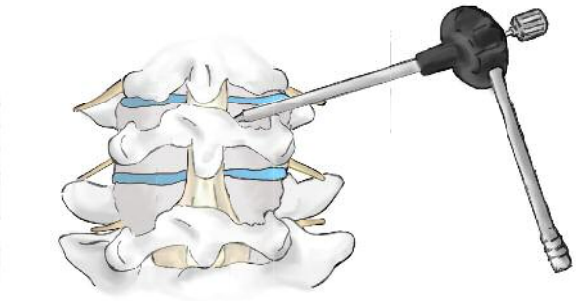
After incising and retracting the surrounding tissue, insert the retractor.
For optimal access to the concerned intervertebral disc, perform a laminectomy or laminotomy, and if needed a facetectomy.
Use a nerve root retractor to carefully retract the dura mater and upper nerve roots to the side.

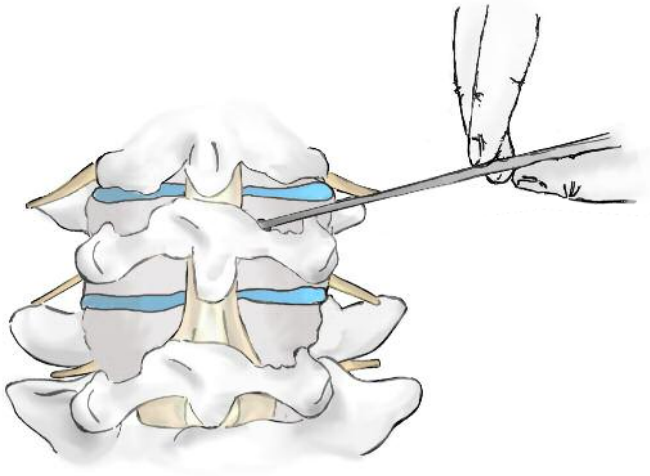
THREE | Pedicle Opening

First of all the the pedicle walls need to be punctured with a puncture needle or guide wire *[70-7781]*.
Hereby determine the positioning of the screw, which should be inserted in the followin step
The cannulated awl *[70-7796+70-7796B]* is to be passed over the fitting puncture needle *[70-7796A]* , by what the cortex is opened..
The deep rash of the awl prevents the surgeon from penetrating the vertebral body too deep







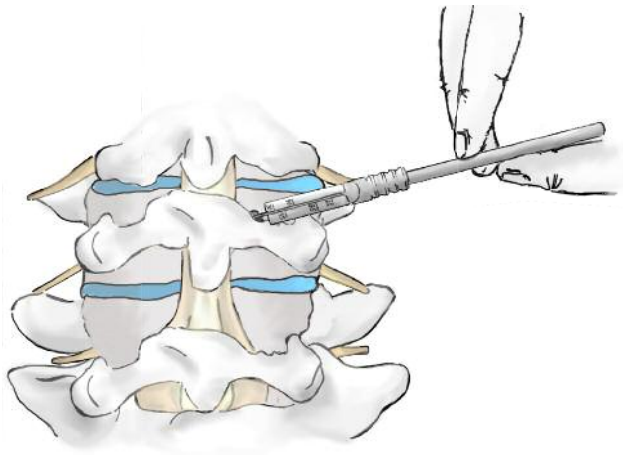


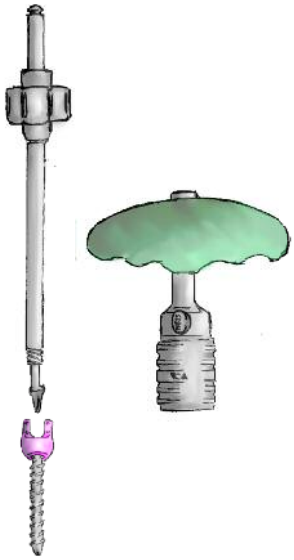
FOUR | Checking of the Pedicle Opening

Ensure an optimal screw bearing with the pedicle guide wire *[70-7781]*. Afterwards exclude a perforation.

FIVE | Determining the Screw Length

Due to the scale on the depth measuring gauge *[70-7794]* in combination with 70-7781, the optimal screw length can be determined directly and adequately in mm.





SIX | Preparing the Pedicle Screw Driver

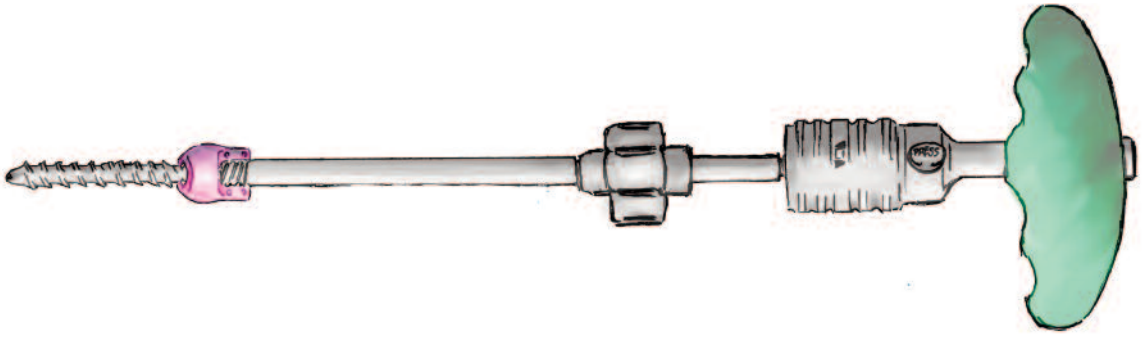
The pedicle screw driver set is consisting of the following parts (see on the left):

| trocar for pedicle screw driver *[e.g. 70-7780]*

| T-handle *[70-7799]*

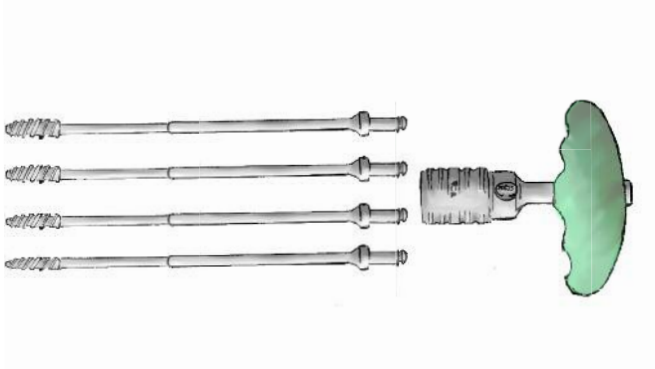
| and pedicle screw *[e.g. 70-7731]*

The final assembly looks like the below scheme:



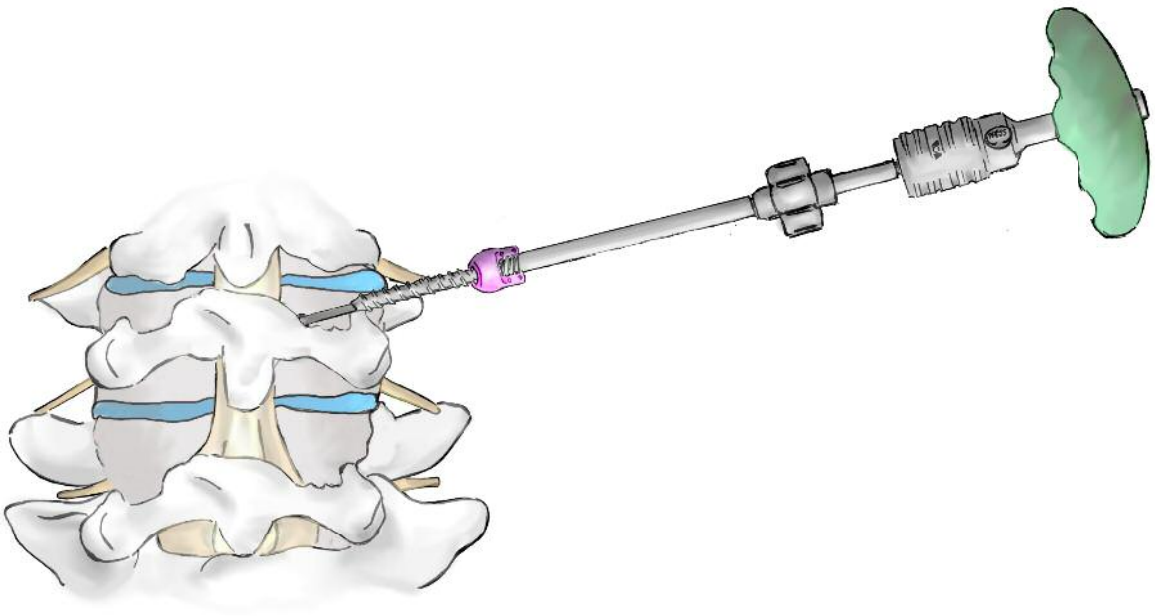
SEVEN | Valve and Radiator

Although the Ackermann Medical pedicle screws are self-tapping, thread cutters from 5.0 mm to 7.5 mm *[70-7757, 70-7758, 70-7783 and 70-7787]* are available in the standard product range and also in the operation set. In the case of an extremely hardened bone wall of the cortex, it might be necessary to preturn a thread, to guarantee a firm fitiing of the pedicle screws.



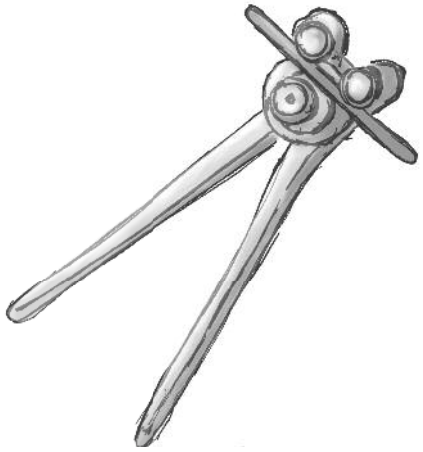
EIGHT | Screwing in the plspine Screws

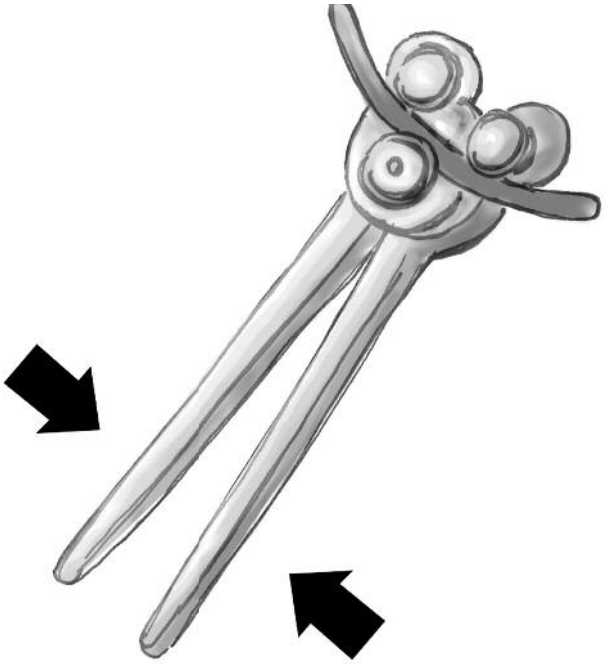
All Ackermann Medical pedicle screws are cannulated, so that the screw can be placed over the guide wire into the exact position and can be tightened with sufficient force. The guide wire and the borehole redundantize the axis correction

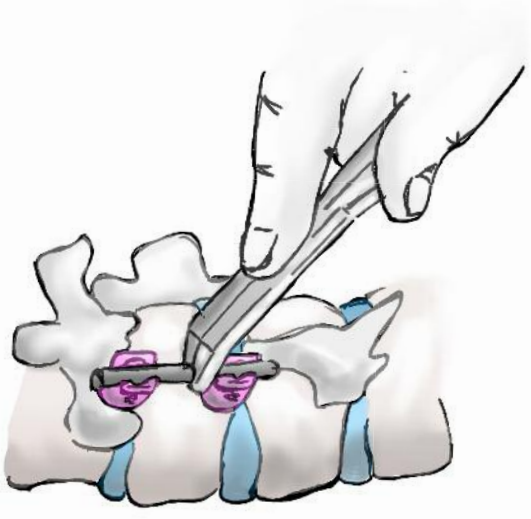


NINE | Rod Bending

If you are not using Ackermann Medical pre-bent connecting rods they can be bent individually with the rod bending forceps *[70-7785]*







TEN | Rod Insertion

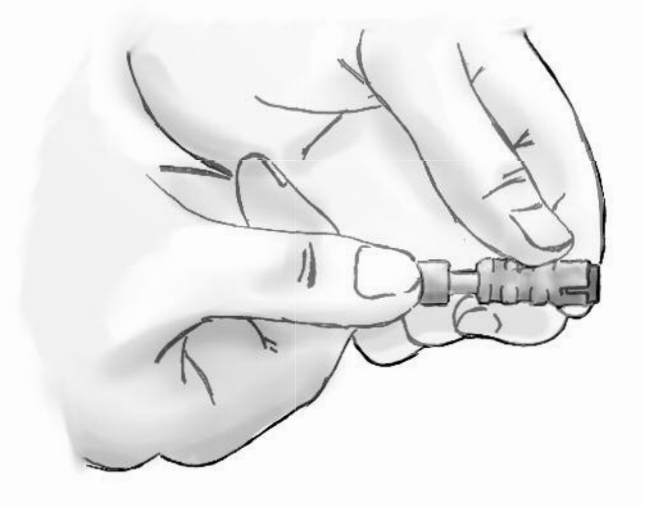
Insert the (curved) connecting rod *[e.g. 70-7771]* with the rod holding instrument *[70-7795]* to restore the lordosis.

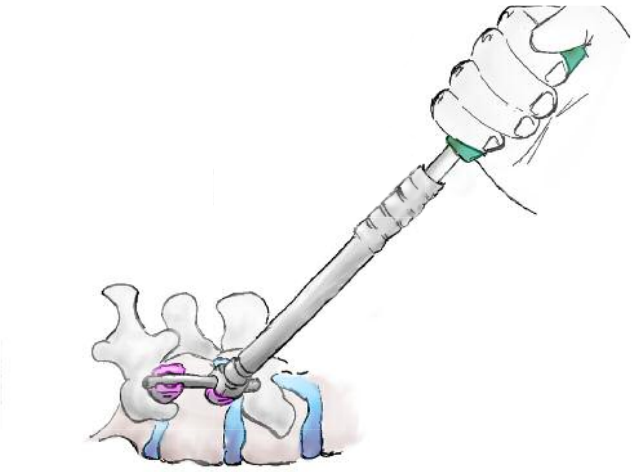
ELEVEN | Placing the Nut Screw with the Nut Screw Driver

Prepare the positioning instrument *[70-7788+ 70-7809]* for the placement of the nut screw as followst.
Telescope the quick release. Afterwards insert the nut screw. Advance the quick release until it stops. Finally, insert the screw through the guide tube and position it over the rod

Note

| Do not tighten the screw!





Alternatively | Placing the Nut Screw with the Vertebrae Lever Rocker

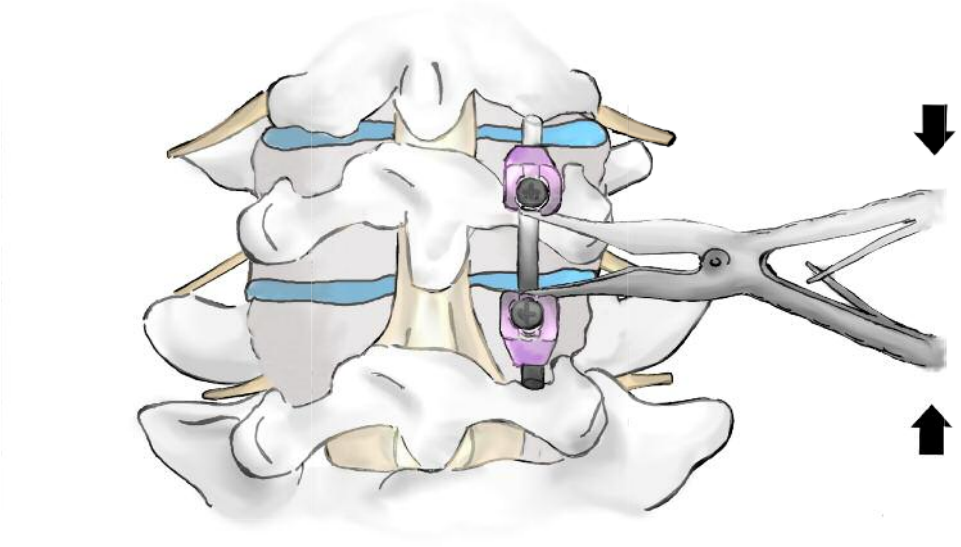
Attach the vertebrae lever rocker *[70-7708]* to the pedicle screw. Then depress the rod with the buttress nut sleeve *[see ELEVEN | Placing the Nut Screw with the Nut Screw Driver]*.
Screw in the nut screw

Note

| Do not tighten the screw!

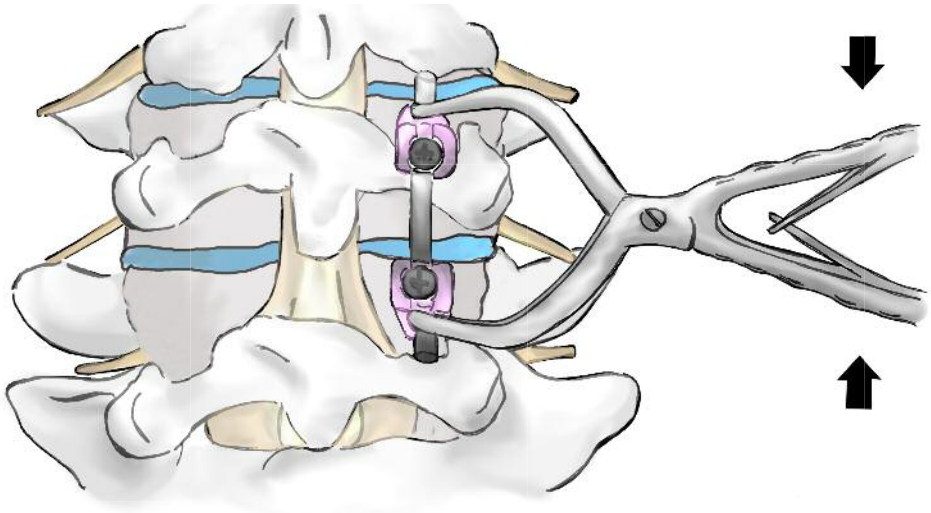
TWELVE | Repositioning with the Disctraction Forceps

Use the distraction forceps *[70-7797]* to distract the distance between the two pedicle screws.



THIRTEEN | Repositioning with the Compression Forceps

Use the compression forceps *[70-7798]* to compress the distance between the two pedicle screws.

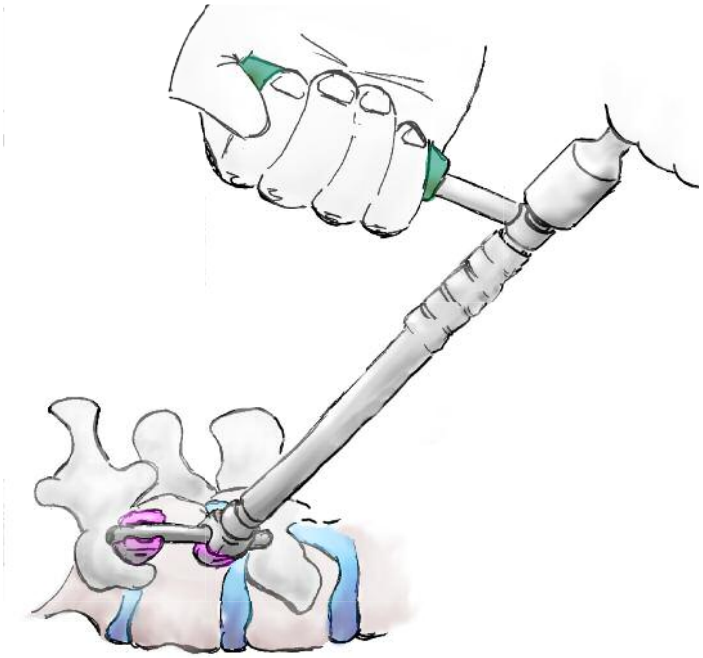


FOURTEEN | Assembly of the Torque Wrench with T-Handle and Anit-Rotation Holder

Insert the torque wrench [70-7790] into the anti-rotation holder [70-7791]. Afterwards insert and set the pressure pad on connecting rod. Tightening the nut screw with max. 8 Nm

Note

| A higher torque can damage the screw! Ackermann Medical screws have a self-locking thread, which automatically connects by 8 Nm with the tulip head.



FIFTEEN | Insertion of the Lumbar Cages

Now you can start the discectomy as preparation for the insertion of the lumbar cages. For all further steps please see *Surgical Techniqie t|spine or t|spinecurve*.

p|spine

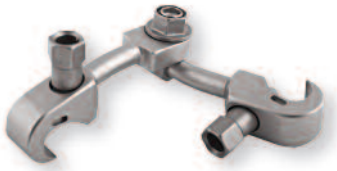
Screws

Diameter 5.0 mm		
Screws	Length [mm]	Colour-Code
70-7720	25	blue
70-7721	30	blue
70-7722	35	blue
70-7723	40	blue
70-7724	45	blue
70-7725	50	blue
Diameter 5.5 mm		
Screws	Length [mm]	Colour-Code
70-7730	25	pink
70-7731	30	pink
70-7732	35	pink
70-7733	40	pink
70-7734	45	pink
70-7735	50	pink
70-7737	55	pink
70-7736	60	pink
Diameter 6.5 mm		
Schrauben	Length [mm]	Colour-Code
70-7740	30	green
70-7741	35	green

Diameter 6.5 mm		
Screws	Length [mm]	Colour-Code
70-7742	40	green
70-7743	45	green
70-7744	50	green
70-7747	55	green
70-7745	60	green
Diameter 7.5 mm		
Screws	Length [mm]	Colour-Code
70-7751	40	gold
70-7752	45	gold
70-7753	50	gold
70-7750	55	gold
70-7754	60	gold
70-7755	65	gold
70-7756	70	gold
Diameter 6.5 mm		
Cement Screws	Length [mm]	Colour-Code
70-7741CM	35	green
70-7742CM	40	green
70-7743CM	45	green
70-7744CM	50	green

Ackermann offers diverse instruments for save and successfull use of the p|spine screws, which are available separately or in full instrumentation sets.

Cement Adapter	
70-7749CM	Cement adapter for cement screws
Crosslinks	
70-7762	Short, 36 mm - 44 mm
70-7763	Medium, 43 mm - 52 mm
70-7764	Long, 51 mm - 67 mm
Diameter 5.5 mm	
Rods Titanium	**Length [mm]**
70-7770	50
70-7771	60
70-7772	70
70-7773	80
70-7774	90
70-7775	100
70-7775-150	150
70-7775-300	300
Durchmesser 5.5 mm	
Rods Nitinol	**Length [mm]**
70-7776	60
70-7777	70
70-7778	80



Punction Needle	
70-7653	with handle
Pedicle Finder, 3 mm ball tip, 190 mm WL	
70-7687	not malleable
70-7688	malleable
Awl	
70-7695	straight
70-7695SP	tapered
70-7694	Forceps for 70-7695/SP
Nut	
70-7719	for crosslinks
70-7718	Nut driver for 70-7719, inner HEX 6 mm for crosslinks
Stapler	
70-7719STAP	Stapler for pedicle screw system
Persuader for Percutaneous Reduction and Rod Replacement	
70-7748HE	Standard version
70-7748 ► SET PART	ECO version
Tapping Device	
70-7787 ► SET PART	for 5 mm screws
70-7757 ► SET PART	for 5.5 mm screws
70-7758 ► SET PART	for 6.5 mm screws
70-7783	for 7.5 mm screws












Screw Driver for Pedicle Screws		
70-7759 ▶ SET PART	Trocar, D 5 mm, for 70-7780	
70-7780 ▶ SET PART	Pedicle screw driver, 6 x HEX 3.5 mm	
70-7781 ▶ SET PART	Guide wire, D 1.3 mm, length 400 mm, for 70-7780	
Rod Pushing Device		
70-7782 ▶ SET PART	with T-handle	
Rod Bending Plier		
70-7785 ▶ SET PART	for Titanium and Nitinol rods	
Screw Driver for Screw Setting		
70-7788 ▶ SET PART		
70-7809 ▶ SET PART	Guide sleeve for 70-7788	
Nut Driver		
70-7788-100	TX 20	
70-7788-200	TX 25	
Torque Wrench		
70-7790 ▶ SET PART	with T-handle	
Antirotation Device		
70-7791 ▶ SET PART		
Depth Measuring Gauge		
70-7794 ▶ SET PART		
Rod Holding Device		
70-7795 ▶ SET PART	curved	
70-7795STR	straight	
70-7795PCS	for percutaneous system	

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Pedicle Finder

70-7796 ► SET PART	Trocar, cannulated for 70-7796A/B
70-7796A ► SET PART	Guide wire for 70-7796
70-7796B ► SET PART	Holding device for 70-7796

Distraction Forceps

70-7797 ► SET PART

Compression Forceps

70-7798 ► SET PART

T-Handle

70-7799 ► SET PART — with ratchet and quick action coupling, cannulated, for 70-7753/57/58/87/88

Vertebrae Lever Rocker

70-7808 ► SET PART

p|spine
Instrumentation

Instrumentation Sets	
▸70-7473SET	p|spine set with container, insert for instruments and instruments
Assembly	1 x container
	2 x insert for instruments
	3 x tapping device
	1 x rod pushing device
	2 x trocar for pedicle screw driver
	1 x pedicle screw driver
	2 x guide wire
	1 x rod bending forceps
	2 x screw driver for screw setting
	1 x torque wrench
	1 x antirotation device
	1 x depth measuring gauge
	1 x rod holding device
	1 x trocar for guide wire and holding device
	1 x guidance
	1 x holding device
	1 x distraction forceps
	1 x compression forceps
	1 x T-handle
	1 x vertebrae lever rocker

All components of the kit is autoclavable and reusable. If neccessary every component is separately available, too.

Place of Use (immediately after use)

IMMEDIATELY after each use (within no more than 10 min. or before drying of contaminants) the instruments need to be cleaned and impurities removed under running water, using a soft brush or cloth used solely for this purpose. NEVER use a metal brush, steel wool or other cleaning devices containing metal in order to avoid the imminent risk of corrosion. Rinse under cold, running water until all visible impurities and contaminants have been successfully removed.

Storage and Transport

Place instruments in a container. Keep the inside of the container moist/wet (no contaminants shall dry).Reprocess all instruments soonest possible.

Preparation for Cleaning

Soak instruments in cold water for at least 5 min. and clean them, using a soft brush or cloth which are being used solely for this purpose. NEVER use a metal brush, steel wool or other cleaning devices containing metal in order to avoid the imminent risk of corrosion. Afterwards, wash down the entire surface of the instrument for 10s. by use of a cleaning gun (min. continuous pressure of 4 bar); articulate moveable parts constantly during the preliminary cleaning. Instruments featuring lumina and/or LuerLock flush channels are to be rinsed for an additional 10s. after visibly clear water has flown from the ports. Place the instruments in an ultrasonic bath for 10min. (35-40kHz for min. 5min. or longer acc. to specifications). Prior to switching on the ultrasonics make sure that all lumina, sheaths, etc. are filled with cleaning fluid!
Note that the preliminary cleaning – even the use of a disinfectant – is only intended as a preparatory step and DOES NOT replace the actual disinfection!

Mechanical Cleaning

Make sure that multiple instruments do not come in contact with each other; especially different materials such as titanium, brass, aluminum, stainless steel, etc. need to be cleaned separately in order to avoid formation of a rust film. Composite instruments (particularly stainless steel combined with ceramics) shall be placed with sufficient distance away from other products to prevent damage arising from the pressure of different thermal expansions.

Instruments have been tested with the following devices:

Washer-Disinfector G 7735 CD (Miele)

1. washing cycle: alkaline program (No 105)
2. washing cycle: enzymology program (No 105)

Washer-Disinfector G 7836 CD (Miele)

1. two component alkaline/enzymatic program
2. OxiVario

Washer-Disinfector Niagara SI PCF (Medisafe) (RECOMMENDED)

1. Cleaning process with pulsed ultrasonic irrigation
2. Cleaning process without pulsed ultrasonic irrigation

The water which is to be used needs to be sterile or nearly sterile (<10 microbes/ml) and low in endotoxins (< 0.25 units/ml). The air which is being used for drying needs to be cleaned by means of micro filters which are regularly checked and maintained. A maintenance schedule has to be documented.

Manual Cleaning
Mechanical cleaning is mandatory with these products as they are classified as class „critical B" according to the RKI/BfArM-recommendations.

Disinfection
Take the instruments and place them into the disinfecting bath (Caution: products need to be fully immersed; at least 1cm below the liquid surface).
Multiple instruments shall not come in contact with each other; especially different materials such as titanium, brass, aluminum, stainless steel, etc. need to be disinfected separately in order to avoid formation of a rust film. Composite instruments (particularly stainless steel combined witto prevent damage arigising from the pressure of different thermal expansions. Rinse all the lumina of the instrument at least five times using a sterile syringe (min 50ml) and disinfectant.

After disinfection
Remove products and rinse for at least 5 min. under running water until all disinfectant is removed from the instruments (the water which is to be used needs to be sterile or nearly sterile with <10 microbes/ml and low in endotoxins with < 0.25 units/ml).
Constantly articulate moveable parts.
Rinse all the lumina of the instrument with water at least five times using a sterile syringe (min 50ml).

Disinfectants that have been successfully tested are
1. Alkaline, Neodisher FA, pH 12.2, Dr. Weigert
2. Enzymatic, deconex 23 Neutrazym, pH 9.7, Borer
3. 2-Component Alkaline/Enzymatic, deconex TWIN PH, pH 10.9, deconex TWINZYME, pH 7, Borer
4. 2-Component Alkaline, Sekumatic FR, pH 12.1; Secumatic OxiVario. PH 7.8; Neutralizer: Sekumatic FNZ, pH 2.2, Ecolab
5. Enzymatic; M20029 3E-Zyme Scope Plus, pH 6.1, Medisafe
6. Enzymatic + Ultrasound, M20029 3E-Zyme Scope Plus, pH 6.1, Medisafe

Drying
After cleaning and disinfection place the instruments into suitable containers. Make sure that there is NO residue of the disinfectant.
When drying as part of the cleaning/disinfection cycle is completed make sure that a temperature of 150°C/300°F is not exceeded.
All operations need to take place in a clean, monitored environment!

Maintenance
Apply a small amount of high-grade surgical lubricant on all joints or other moveable parts which are supposed to move smoothly. Sort out all blunt or damaged instruments.
Clearly damaged instruments (cracks on the insulation, breakage, strongly bleached polymer handles or coatings) are NOT to be reused but repaired or disposed of.

Testing and Inspection
Jointed instruments are to be tested for ease of movement (avoid too much backlash). The functionality of ratchet mechanisms needs to be checked. All instruments: visually check for damage and wear. Blades should be even and without notches. Long and narrow instruments (especially jointed instruments) should be particularly checked for damages. If instruments are part of a larger set they are to be checked together with all associated components.

Packaging

Individually: a standardized packaging material may be used. The size of each bag needs to match the individual instrument so that there is no tension applied on the sealing.
Sets: sort instruments into designated trays or place on multi-purpose sterilization trays. Blades need to be protected; the weight of each tray may not exceed 8kg (18lbs). For the trays an adequate packaging procedure is to be used.

Sterilization

All products have been precleaned to an extent which allows for processing and sterilization by use of the equipment stated here. This only applies to a processing method according to these instructions within a system that has been configured and validated in compliance with ISO 17665 and in which all cleaning/disinfecting devices comply with ISO 15883. With the result of the sterilization process greatly depending on the equipment that is being used a sterilization validation acc. to ISO 17665 MUST be performed at the place of use prior to the first application. All products MAY be used only if the result of this validation is positive.

For the sterilization of medical devices various methods can be applied. Regarding products manufactured by Ackermann, gravity steam sterilization with a fractionated process is recommended.

Temperature	134°C – 137°C (273°F – 279°F)
Pressure	3 bar
Duration	5 min

Please comply with all recommendations issued by the manufacturer of your sterilization device with regard to handling and loading. Instruments that are to be sterilized need to be thoroughly exposed to the steam, including inner surfaces. Before using the instruments they need to be cooled down to room temperature.

Other durations and/or temperatures may also be applied. However, when doing so deviations of parameters should be validated (Caution: contact the manufacturer of your autoclave to confirm temperatures and/or sterilization durations). Temperature inside the autoclave should not exceed 139°C/182°F. This could cause possible damage to handles, insulation or other non-metallic components. Do not sterilize using hot air or Processing and Sterilization Instructions of Medical Devices (acc. to ISO 17664) flash autoclave methods.

In case only pre-vacuum sterilization can be performed, please adhere to the following parameters:

for Europe (except Switzerland and France)

Sterilizer type	pre-vacuum
Preconditioning pulses	3
Preconditioning pressure	30 psia
Minimum temperature	134°C
Cycle time	5 min.
Sample configuration	individually wrapped

for Switzerland and France

Sterilizer type	pre-vacuum
Preconditioning pulses	3
Preconditioning pressure	30 psia
Minimum temperature	134°C
Cycle time	18 min.
Sample configuration	individually wrapped

others	
Sterilizer type	pre-vacuum
Preconditioning pulses	3
Preconditioning pressure	30 psia
Minimum temperature	132°C / 270 °F
Cycle time	4 min.
Sample configuration	individually wrapped

Storage

Store instruments secured against mechanical damage. Use additional wrapping to protect against dust. Do not stack instruments which are packed sterile; especially do not place heavy items on top in order to avoid damage to the sterile packaging of other instruments.
Products need to be stored in a clean and dust-free environment at moderate temperatures of 19° - 25°C (66° - 77°F) and humidity of 40 - 60% (to avoid the risk of embrittlement of the sterile packaging AND of plastic components, especially handles).

Additional Information

Do not exceed maximum loading capacity of the sterilizer when processing multiple instruments in one sterilization cycle.

Warnings

ALL INSTRUMENTS MUST BE CLEANED, DESINFECTED AND STERILIZED PRIOR TO EACH USE.
All reusable Ackermann products are shipped in non-sterile condition. Before the first use transport packaging, coarse dust/pieces of paper/packaging remains need to be removed and each product processed and sterilized according to these instructions. All products have been precleaned to an extent which allows for processing and sterilization by use of the equipment stated here. This only applies to a processing method according to these instructions within a system that has been configured and validated in compliance with ISO 17665 and in which all cleaning/disinfecting devices comply with ISO 15883.
THOROUGH CLEANING AND DISINFECTION IS CRUCIAL FOR AN EFFECTIVE STERILIZATION!
Especially in Germany, the adherence to and knowledge of the RKI/BfArM-recommendations is the prerequisite for these instructions. In accordance with EU Directive 93/42 processing is NOT permitted in Germany without comprehensive awareness of these guidelines!
Processing must only be carried out by personnel explicitly designated by §4 Abs. 3 MPBetreibV after verifying their qualification! Strong cleaning agents may cause fading of markings.

Limitations on Reprocessing

Instruments have been validated for 50 cycles, based on an average treatment.
Products that have been marked as single-use (acc. to DIN EN 980 2008-11/figure 5.2) MUST NOT be reprocessed! With such products materials are being used that are NOT reprocessable under normal conditions or do not withstand more than one sterilization process and, therefore, may break during surgery if reprocessed! (this applies to practically all single-use products featuring plastic components)

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Supplementary Equipment

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Complementary to our p|spine screws Ackermann offers a wide range of discectomy and neuroscopic instruments.

Vertibroscope and rotative holding disk	
70-7040	Rotative holding disk holds the endoscope and allows 360° rotation with 30° view
70-7180	Vertibroscope for discectomy, 30° rotatable, with light-transmission, lenses made of saphire
Kerrison rongeur	
70-7060	30°, 2 mm jaw, 250 mm WL
70-7065	40°, 2 mm jaw, 250 mm WL
70-7070	90°, 2 mm jaw, 250 mm WL
70-7075	90°, 3.5 mm jaw, 330 mm WL, rotatable
70-7076	40°, 3.5 mm jaw, 330 mm WL, rotatable
Micro conchotome, 250 mm WL	
70-7080	5 mm jaw, 45° upwards arched
70-7085	3 mm jaw, 45° upwards arched
70-7090	5 mm jaw, 45° straight
70-7095	3 mm jaw, 45° straight
Micro forceps, 2 mm jaw, 200 mm WL	
70-7086	45° angled upwards
70-7091	straight
70-7092	straight, spoon with teeth
Micro scissors, 2 mm jaw, 200 mm WL	
70-7097	single action, cutting 90° towards the handle
Curette, 272 mm overall length	
70-7100	3 mm jaw, 45° angled
70-7105	5 mm jaw, 45° angled
70-7106	5 mm jaw, 90° angled

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Supplementary Equipment

Suction tube, 272 mm overall length	
70-7110	without spatula tip
70-7111	with spatula tip
Bipolar forceps, 1.2 mm jaw, bayonet, 280 mm overall length	
70-7115	straight
70-7120	angled
Bipolar cable	
70-7130	
Nerve manipulator, 90° angled - knurled handle	
70-7135	1 mm tip, 272 overall length
70-7142	3 mm tip, 30 mm spatula length, curved upwards
70-7146	1.5 mm ball tip, 5 mm angled, 200 mm WL
70-7147	1.5 mm ball tip, 9 mm angled, 200 mm WL
Spatula, 90° angled, 200 mm WL - knurled handle	
70-7139	spatula size 7 mm x 4 mm, knurled handle
Nerve retractor, knurled handle	
70-7140	wide tip, 272 mm overall length
70-7143	3 mm tip, 30 mm spatula length, 200 mm WL
Nerve manipulator, 272 mm overall length	
70-7136	1.5 mm tip, 90° angled
70-7137	1 mm tip, 90° angled
70-7141	3 mm jaw, spatula form

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Supplementary Equipment

Ball tip dissector, 272 mm overall length	
70-7145	90°, 1.5 mm tip
Bayonet knife, 272 mm overall length	
70-7150	2 mm tip
70-7155	1 mm tip
Neurosurgical retraction arm	
70-7190	to hold the rotative disk and the vertibroscope

Ackermann Medical GmbH & Co. KG
Schlossstrasse 67
8200 Schaffhausen
Switzerland

Tel +41 (0) 525 330 915
Fax +41 (0) 525 330 948
info@ackermannmedical.ch
www.ackermannmedical.com