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SHARING EXPERTISE

AESCULAP® S4® Element

Thoracolumbar Posterior Pedicle Screw System

Surgical Manual

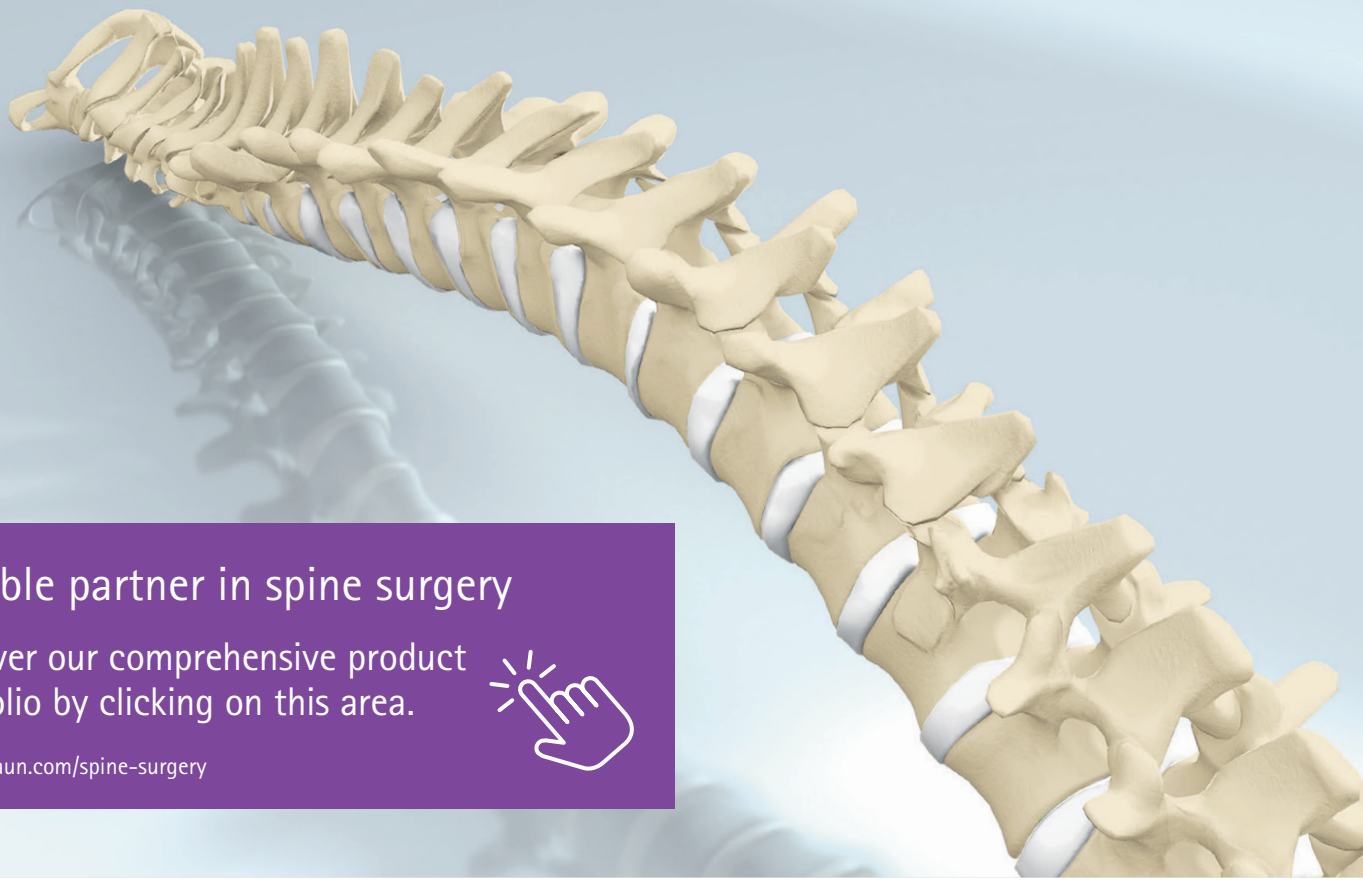
AESCULAP® S4® Element

Thoracolumbar Posterior Pedicle Screw System

Protecting and preserving spinal stability

Modern lifestyle has resulted in increasing physical inactivity among people all over the world. Of the many medical problems associated with this, spinal disorders are among the most critical. This is even more significant as the spinal column is one of the most important structures in the human body. It supports and stabilizes the upper body and is the center of our musculoskeletal system, which gives the body movement.

Our work in the field of degenerative spinal disorders is dedicated to protecting the spinal column and preserving its stability. We support spine surgeons with durable, reliable products and partner services for safe procedures and good clinical outcomes.[1-7] Our philosophy of sharing expertise with healthcare professionals and patients allows us to develop innovative implant and instrument systems that help to preserve stability and stabilize the cervical and thoracolumbar spine.



Reliable partner in spine surgery

Discover our comprehensive product portfolio by clicking on this area.

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Chapters

AESCULAP® S4® Element

A | System Overview

Product Advantages

The S4® Element implants are engineered to stabilize the construct while providing intuitively designed instrumentation for ease of implantation.

Small Implant Volume

Maximize screw head range of motion. Reduce the risk of facet and soft tissue impingement.

Patented Interlocking Thread Design

Minimize splaying of screw body.

Pressure Vessel Technology

Transfer energy throughout the polyaxial screw construct transforming it into a solid monoaxial construct, improving construct stability.

Undercut Thread Design

Help eliminate cross threading by directing the force inward, improving force transmission and efficiency throughout the rod-screw construct.

AESCULAP® S4® Element

A | System Overview

System Features

The S4® Element Spine System is a low profile and innovative thoracolumbar pedicle fixation system designed to address complex posterior pathologies. The S4® Element system features a sophisticated pressure vessel locking design capable of delivering biomechanical stability while maintaining an low profile.

The S4® Element Spine System is a top-loading low profile pedicle screw system that offers a broad selection of implants and instruments that are designed to meet the surgeons demand for a quicker yet simpler surgical procedure compared with S4®. The trays are configured to include polyaxial screws, monoaxial screws, ilium screws, pre-cut straight and pre-bent rods, rigid & adjustable cross connectors, and a variety of rod-to-rod connectors used to extend an existing construct in the event of a revision surgery or for new multilevel construct.

AESCULAP® S4® Element

B | Open Technique

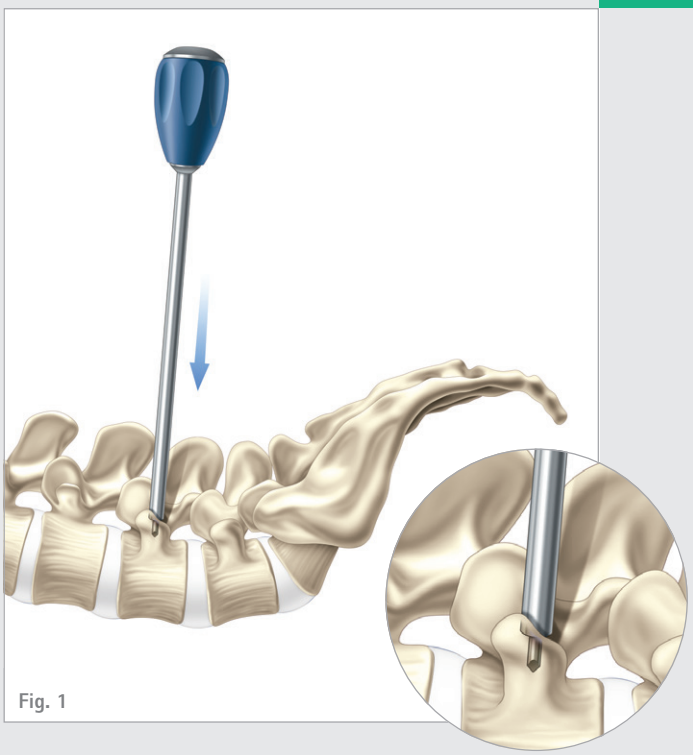

Fig. 1

B.1. Pedicle Preparation

- Determine pedicle entry point and perforate the cortex using the Bone Awl (FW190R alternative SZ241R). (Fig. 1)

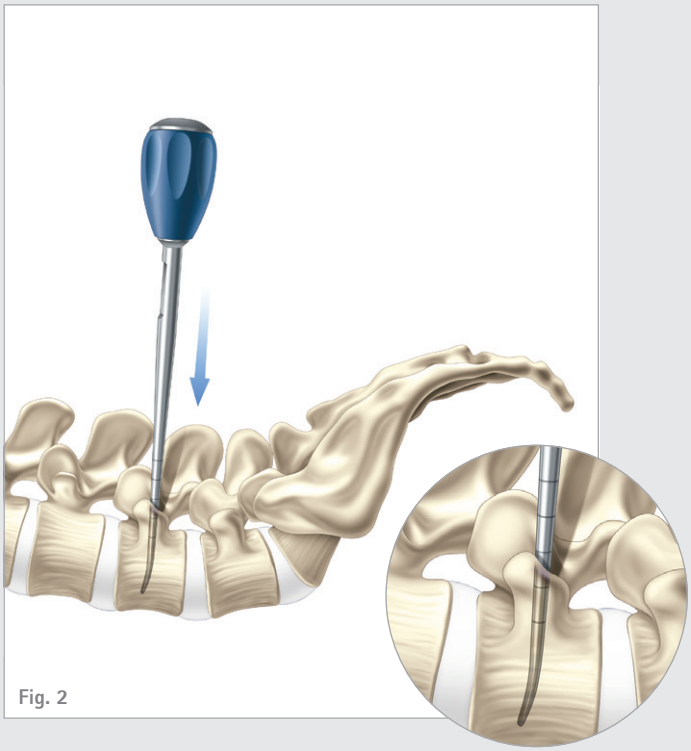

Fig. 2

- Use the Pedicle Probe to open the pedicle canal. (Fig. 2)
  - The Pedicle Probes are available straight or curved blunt-tip (FW188R or FW189R alternative SZ242R or SZ243R) and straight or curved Lenke (FW248R or FW249R).
  - The Probes have ruled markings to determine the depth measurement in the pedicle canal.
- If necessary, single or dual band Pedicle Markers (FW188R or FW189R alternative SZ242R or SZ243R) can be used to identify proper anatomic location on intra-operative imaging.

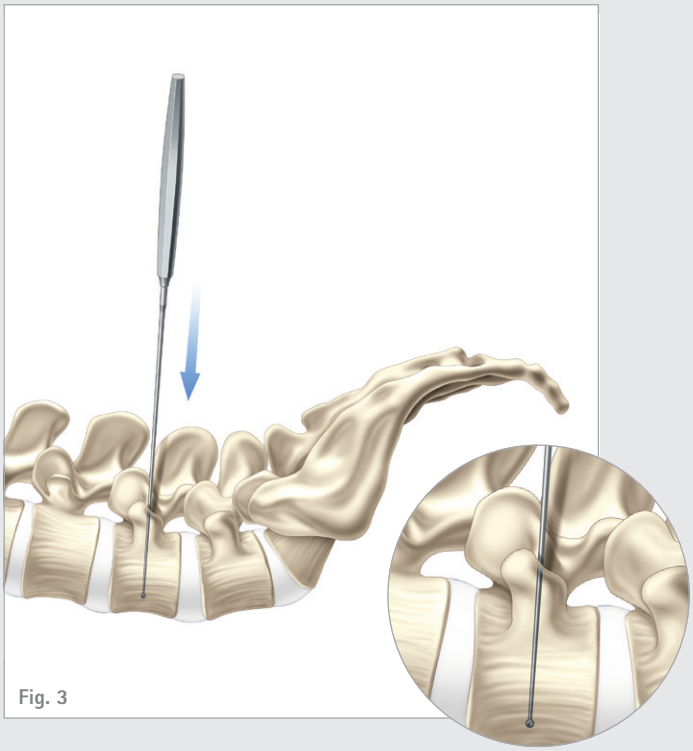

Fig. 3

- Utilize the straight or curved Pedicle Sounder (FW146R or FW147R) to confirm the patency of the pedicle and vertebral body cortex. (Fig. 3)

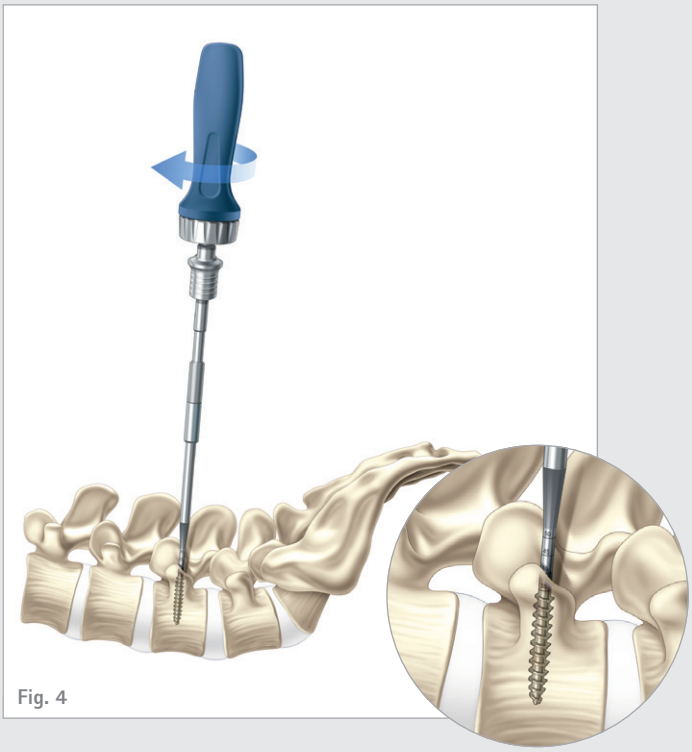

Fig. 4

B.2. Tapping

Although the S4® Element Spine System screws are self-tapping, Screw Taps are available in all diameters if desired.

- To tap, attach the straight Ratchet Handle or the T-Handle (FW165R or FW167R) to the appropriate tap based on the screw diameter. (Fig. 4)

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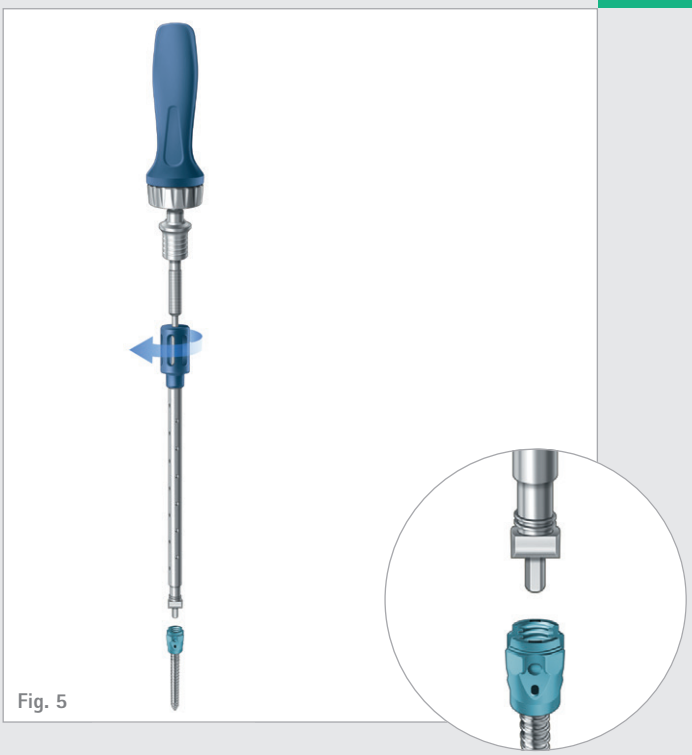

Fig. 5

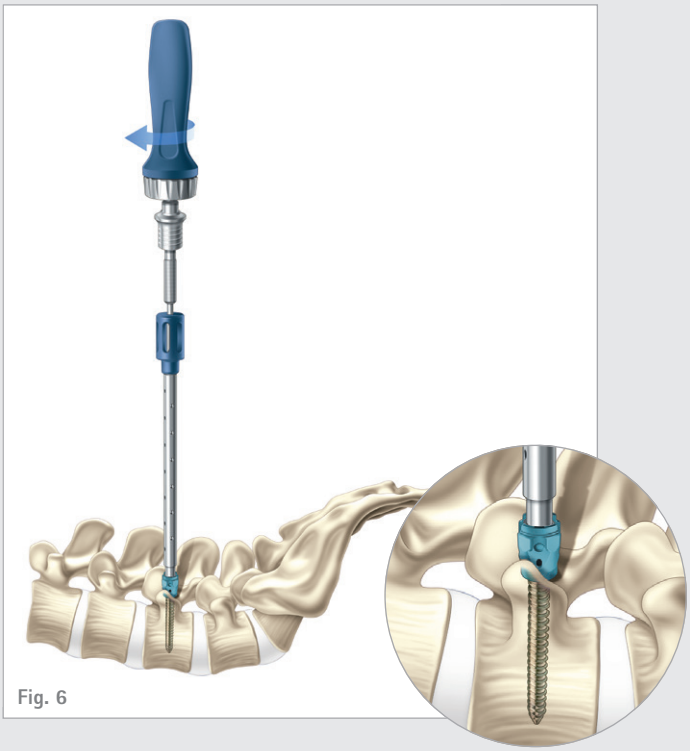

Fig. 6

B.3. Screw Application

Color-coded polyaxial screws and monoaxial screws are available in various lengths and diameters.

Polyaxial and Monoaxial Screw Application

- Attach and fully engage the hexagonal tip of the Rigid Fixation Screw Driver (FW277R & FW276R) into the head of the screw. With the Rigid Fixation Screw Driver engaging the screw head, rotate the blue twist knob in a clockwise fashion while holding the bone screw to lock the threaded end of the Screw Driver into the screw head.

Caution:

- Ensure that the Screw Driver is fully engaged and threaded onto the screw.

- Thread the screw into the prepared pedicle and release the Screw Driver from the screw head by turning the blue twist knob counter clockwise. (Fig. 6)

Caution:

- Do not thread the screw all the way into the vertebral body. Ensure that the screw maintains polyaxiality.

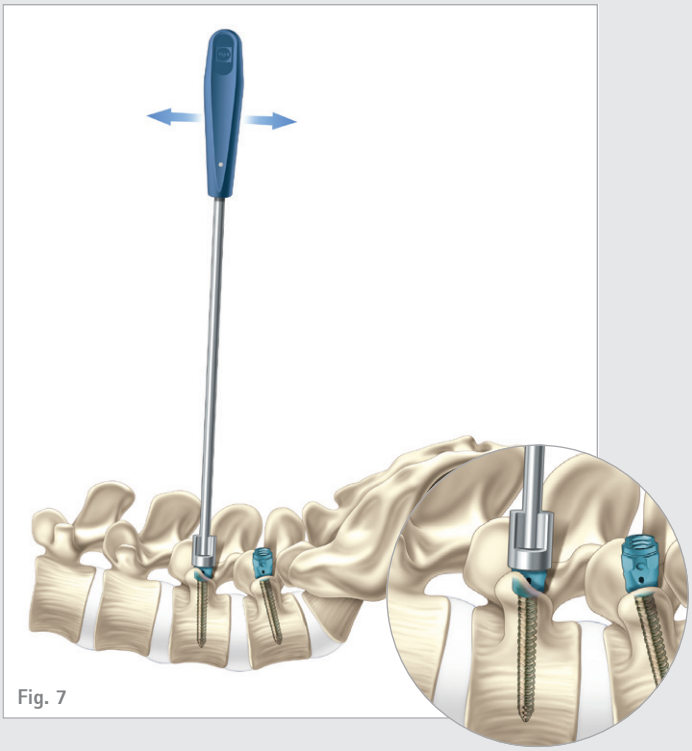

Fig. 7

- All polyaxial screw heads have 42° range of motion. If desired, align the polyaxial screw bodies using the Screw Body Manipulator (FW278R). (Fig. 7)

Note:

- In case of soft tissue impingement, the Marnay Lever (FW154R) can be used to retract soft tissue. If revision is necessary, use the Screw Manipulator to release the axial lock of the screw body and then use the Shank Tip Screw Driver (FW174R) for the safe removal of polyaxial screws.

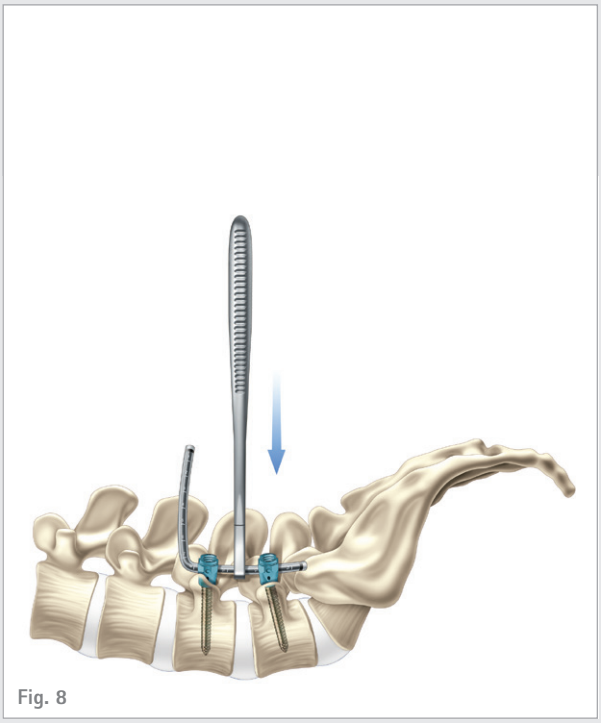

Fig. 8

B.4. Rod Placement

- Optional use of flexible Rod Trials (SZ072SU, SZ073SU or SZ074SU) as a guide for rod bending and measuring correct rod length. (Fig. 8)

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B | Open Technique

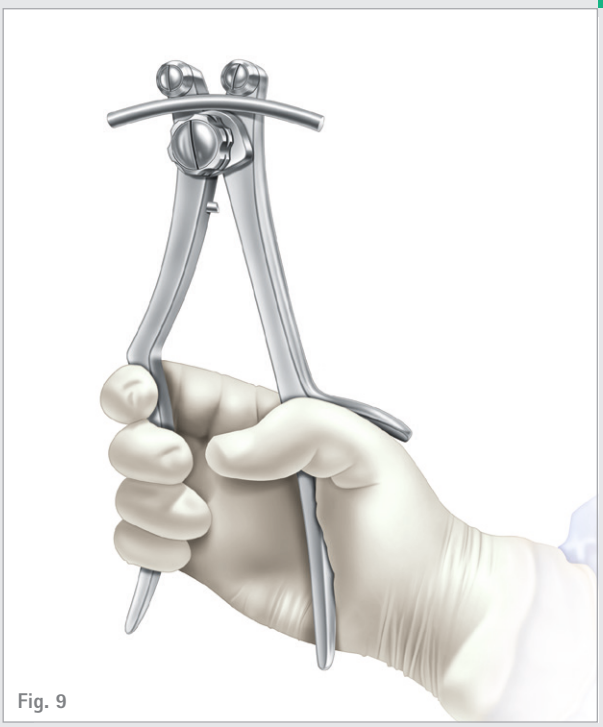

Fig. 9

Both pre-bent and straight rods are available.

- All rods may be contoured using the French Rod Bender (FW024R).
- To contour the rod, place rod on the bender and squeeze the handle until the desired curvature is achieved. (Fig. 9)

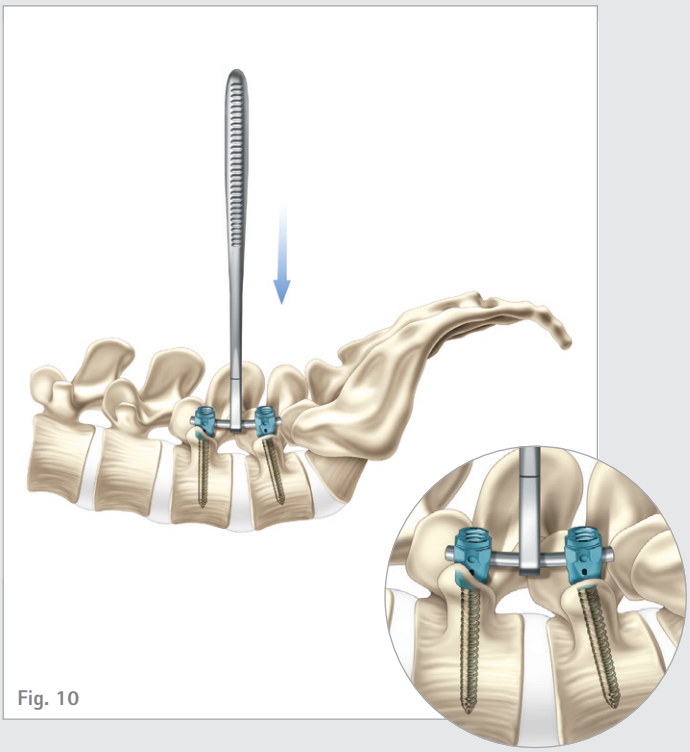

Fig. 10

- Use the Rod Holding Forceps (FW012R) to assist with rod placement or rod manipulation. (Fig. 10)

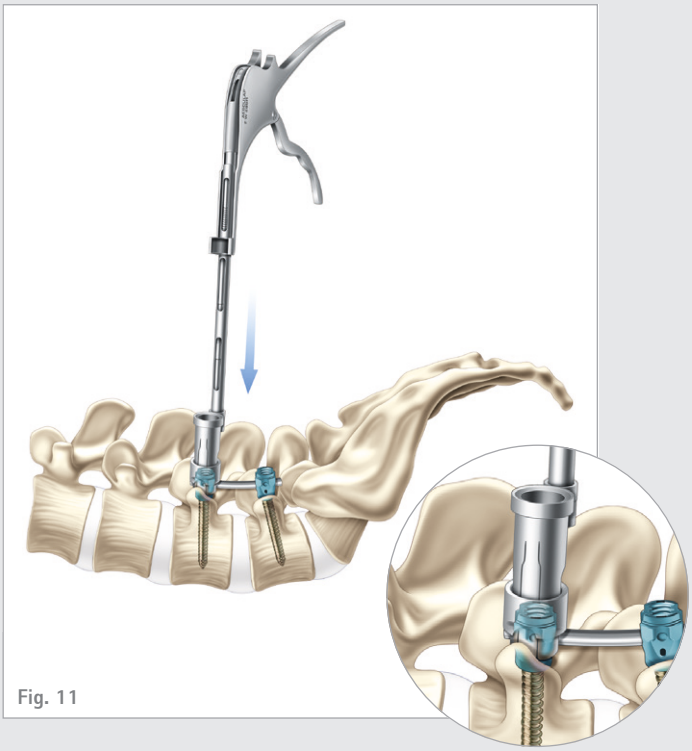

Fig. 11

B.5. Rod Reduction

a) Reduction by Rod Persuader

- Place the Rod Persuader (FW285R) over the implant head and ensure the tip of the persuader is fully engaged to the head of the implant. (Fig. 11)
- Squeeze the handle of the persuader to seat the rod into the head of the pedicle screw.

Optional:

- FW485R S4® Element Detachable Rod Persuader can be used instead of FW285R.

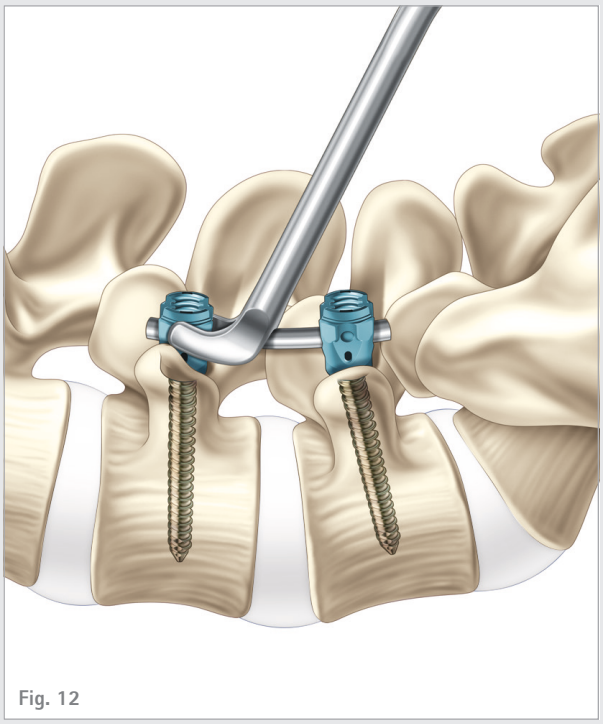

Fig. 12

b) Reduction by a Fork Rocker

For minor vertical adjustments to seat the rod into the pedicle screw body, the straight or curved Fork Rockers (FW288R or FW289R) may be used.

- Align the pins in the Fork Rocker with the line on the pedicle screw body, and fit into the under cut grooves on the medial and lateral edges. (Fig. 12)

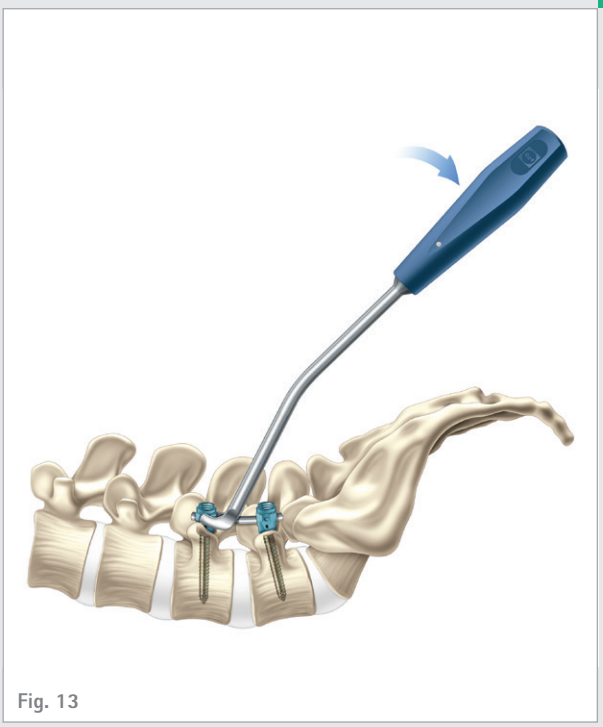

Fig. 13

b) Reduction by a Fork Rocker (continued)

- Push down on the handle of the Fork Rocker to lever the rod into the screw head. (Fig. 13)
- If necessary, the Rod Pusher (FW513R) can be used to push the rod into position.

Fig. 14

B.6. Set Screw Application

Insert the dual ended or handled Set Screw Starter (FW279R or FW251R) firmly into the set screw and remove the set screw from the caddy. (Fig. 14)

Note:

- The set screw must be fully engaged to the Set Screw Starter.

Fig. 15

Finger tighten the set screw into the screw body until it contacts the rod. (Fig. 15)

Caution:

- The Set Screw Starter is not designed for final tightening of the construct. It is designed to only tighten to a depth that still allows compression and distraction maneuvers to be performed.

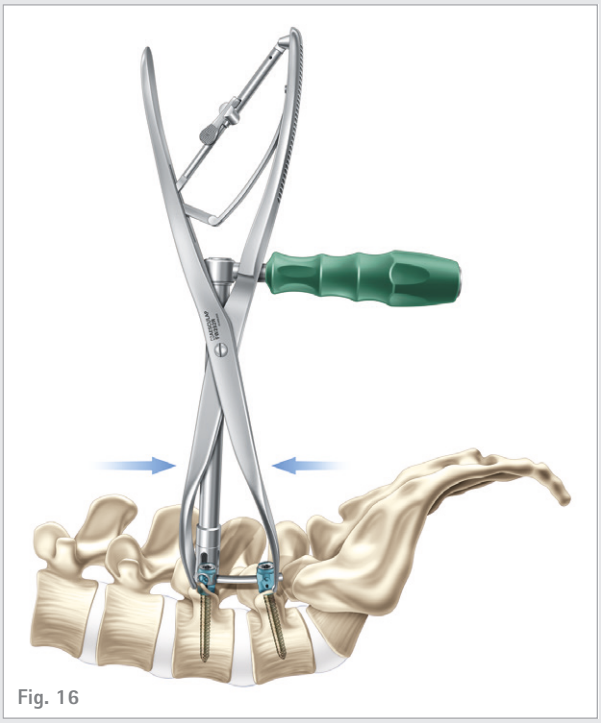

Fig. 16

B.7. Compression Maneuver

Use the Compression Forceps (FW282R) to compress the construct. (Fig. 16)

- Fully tighten one set screw to create a fixed point for compression.
- Fully seat the Counter Torque L-Handle (FW283R) or the Derotation Sleeves (FW287R) on the unlocked screw body and perform the compression maneuver.
- Once the desired compression is achieved, fully tighten the remaining set screw.

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B | Open Technique

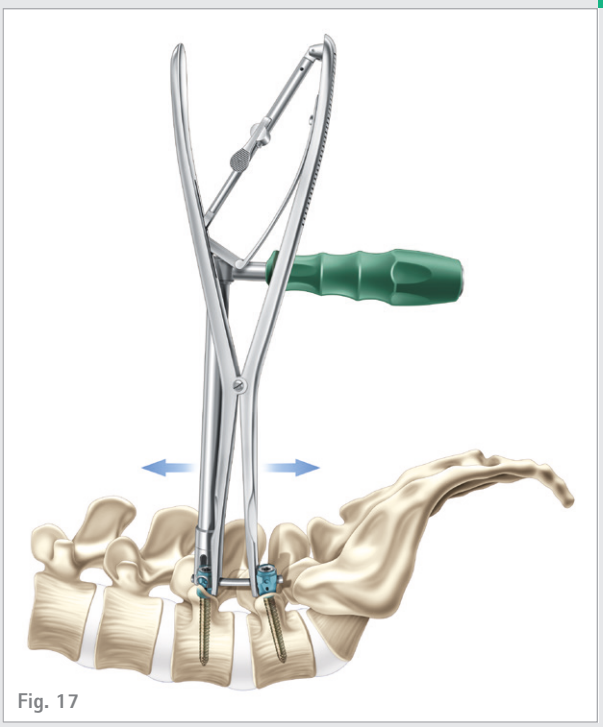

Fig. 17

B.8. Distraction Maneuver

Use the Distraction Forceps (FW281R) to distract the construct. (Fig. 17)

- Fully tighten one set screw to create a fixed point for distraction.
- Fully seat the Counter Torque L-Handle (FW283R) or the Derotation Sleeves (FW287R) on the unlocked screw body and perform the distraction maneuver.
- Once the desired distraction is achieved, fully tighten the remaining set screw.

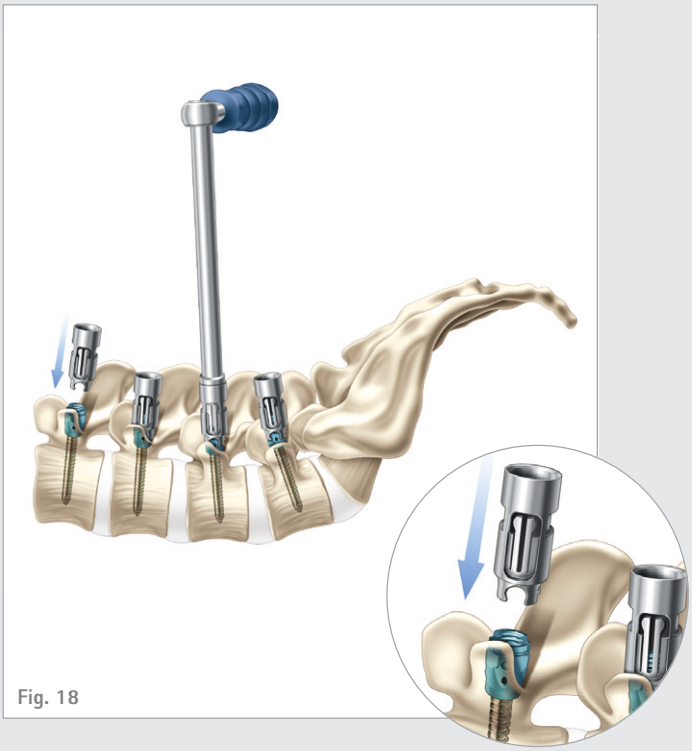

Fig. 18

B.9. Derotation Maneuver

Use the Derotation Sleeves (FW287R) and the Counter Torque L-Handle (FW283R) to rotate the rod. (Fig. 18)

- Place the Derotation Sleeves over the pedicle screws that contain the rod to be rotated.
- Connect the Counter Torque L-Handle to one of the derotation sleeves to perform the rotation maneuver.
- Once the desired rotation is achieved, fully tighten the set screws.

Caution:

- The Derotation Sleeves should be used during rotation maneuvers to prevent splaying of the screw head.

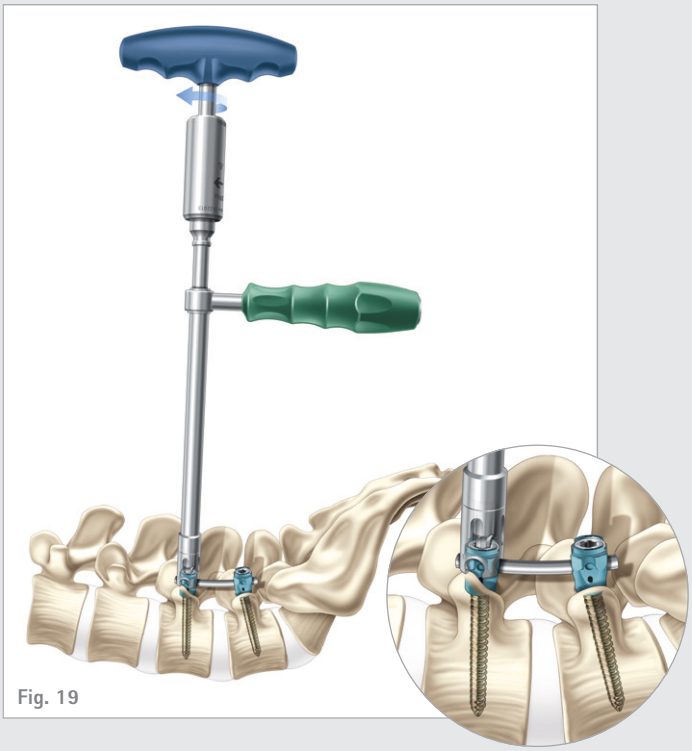

Fig. 19

B.10. Final Tightening

Final tightening of each set screw is completed using the Torque Wrench (FW170R) along with the Counter Torque L-Handle (FW283R). (Fig. 19)

- Insert the Torque Wrench through the tube of the counter torque so the tip is exposed.
- Fully seat the tip of the Torque Wrench into the socket of the set screw.
- Engage the counter torque tip with the rod.
- Turn the Torque Wrench (FW170R) in a clockwise direction while firmly holding the counter torque.
- If using the Line-To-Line Torque Wrench (FW170R), turn the wrench in the clockwise direction until the arrows on the Torque Wrench line up with each other.

Caution:

- Over tightening the set screw more than the specified setting of 10 Nm (90 in/lbs) could lead to implant failure. Damaged set screws must be replaced.

- Use the Set Screw Revision Screw Driver with the 4 mm hex tip (FW193R) to remove a previously tightened set screw if necessary.

Warning:

- Do not use the Torque Wrench without the Counter Torque L-Handle. This could lead to thread jumping of the set screw within the screw body and, as a consequence to rod loosening.

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C | Addendum: Cross Connector Application

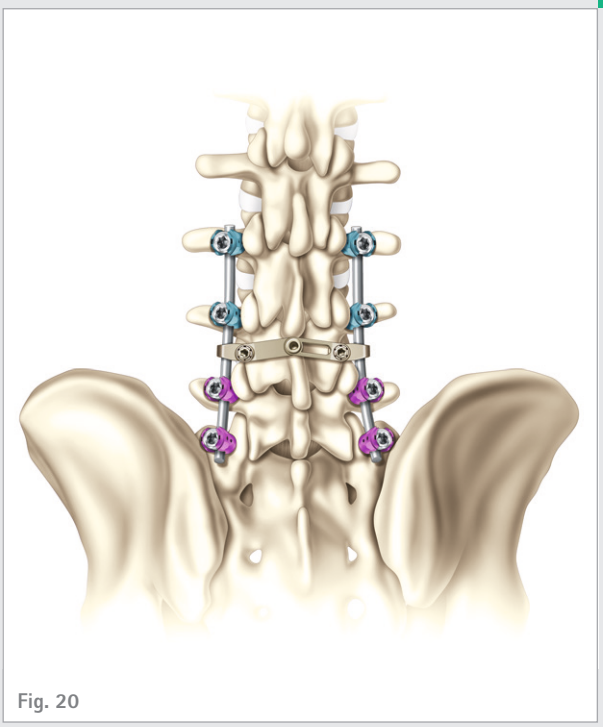

Fig. 20

C.1. Cross Connector Application

In the event that additional rotational stability of the construct is required, a cross connector may be used.

- Determine the appropriate size using the Cross Connector Sizing Template (FW202R).
- Verify there are no obstructions, then insert the cross connector. (Fig. 20)

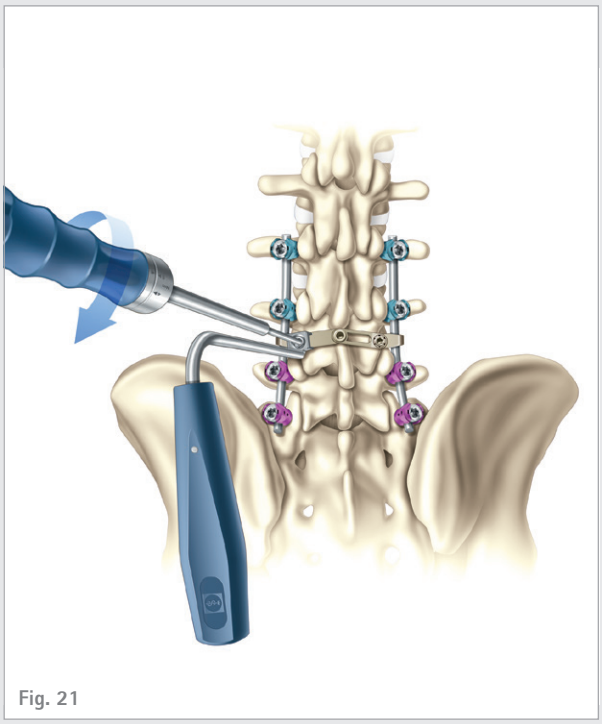

Fig. 21

- If the cross connector fits properly and is fully seated onto both rods, final tightening can be accomplished by applying 4 Nm (36 in/lbs) of torque to the locking screw using the Cross Connector Torque Wrench (FW207R) and the Cross Connector Counter Torque (FW204R). (Fig. 21)

If necessary, the optional "bar" style adjustable cross can be used.

- The bar style adjustable cross connectors can be contoured using the Cross Connector Bender (FW203R).
- Place the cross connector face-up in the bender and apply the necessary force required to achieve appropriate angle. The maximum angle allowed by the cross connector is 20°.

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D | Addendum: Rod-to-rod Connector Application

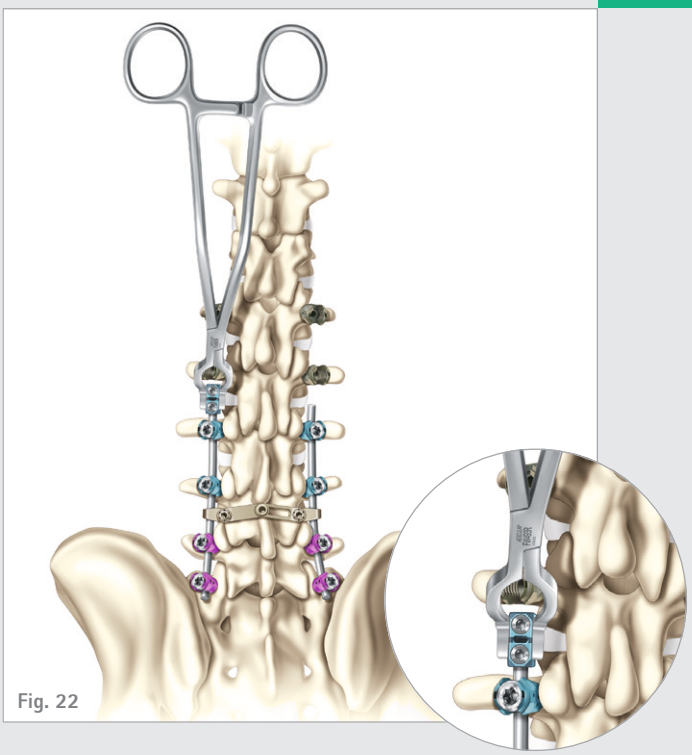

Fig. 22

A rod-to-rod connector may be used to extend an existing construct in the event of a revision surgery or for a new multi-level construct or to connect to an offset screw.

D.1. Axial Rod-to-rod Connector Application

- To place the axial rod-to-rod connector, first determine required length (short or long).
- Use the Rod-To-Rod Connector Inserter (FW493R) to grab the connector and fully seat the rods inside the connector and confirm adequate rod placement using the provided window on the connector. (Fig. 22)

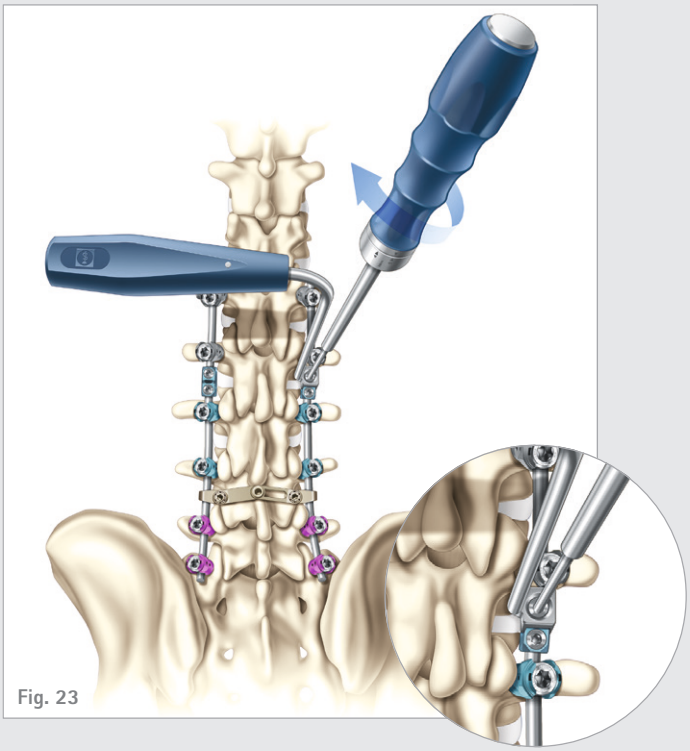

Fig. 23

- Final tighten by applying 4 Nm (36 in/lbs) of torque using the Cross Connector Torque Wrench (FW207R) and the Rod-To-Rod Connector Counter Torque Device (FW495R). (Fig. 23)

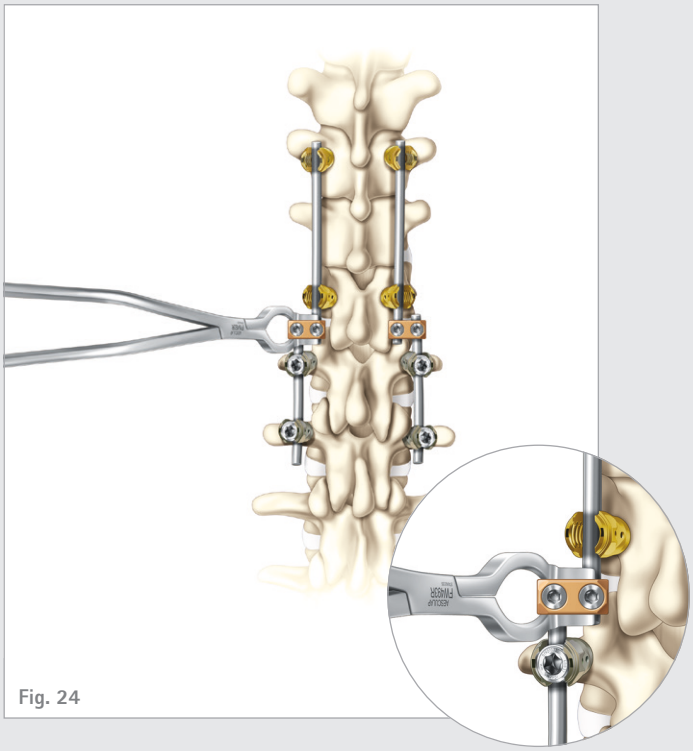

Fig. 24

D.2. Domino Rod-to-rod Connector Application

- To place the domino rod-to-rod connector, first determine required length (7 mm or 11 mm) and desired connector type (open / closed or closed).
- For open / closed style, use the Rod-To-Rod Connector Inserter (FW493R) to grab the connector and slide a rod into the closed hole and then connect to the other rod using the open hole. (Fig. 24)
- For closed style, use the inserter to grab the connector and slide both rods into the closed holes prior to placing the rods into the pedicle screw tulip heads.

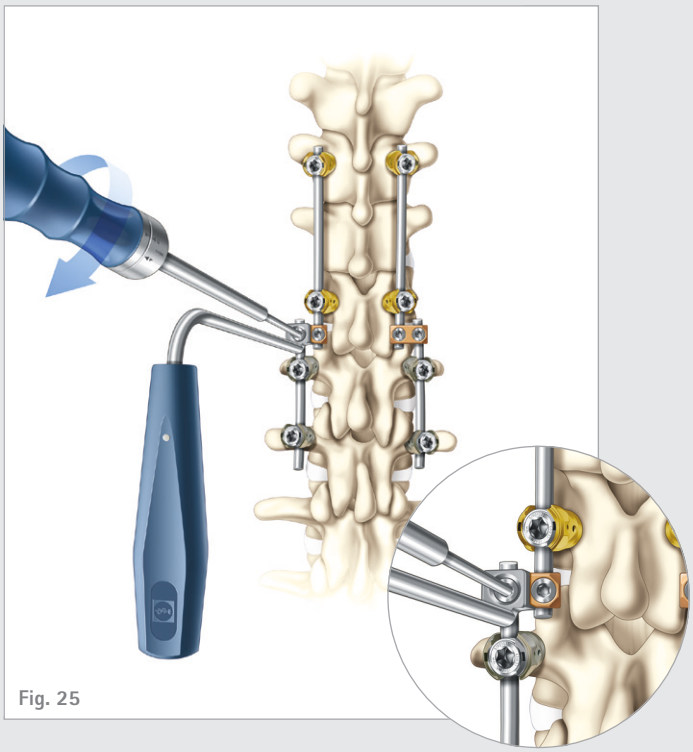

Fig. 25

- Final tighten by applying 4 Nm (36 in / lbs) of torque using the Cross Connector Torque Wrench (FW207R) and Rod-To-Rod Connector Counter Torque Device (FW495R). (Fig. 25)

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D | Addendum: Rod-to-rod Connector Application

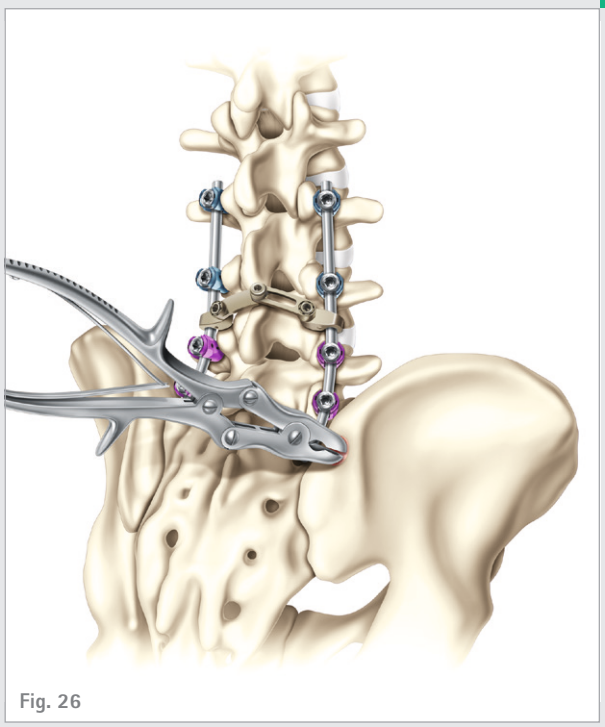

Fig. 26

D.3. Pelvic Screw & Lateral Offset Connector Application

The posterior part of the Iliac crest needs to be exposed for pelvic screw placement. Approximately 1.0 to 2.0 cm up from the tip of the spine is an ideal starting point.

- Use a rongeur to make a notch in the crest of sufficient length and depth for the head of the iliac screw. (Fig. 26)

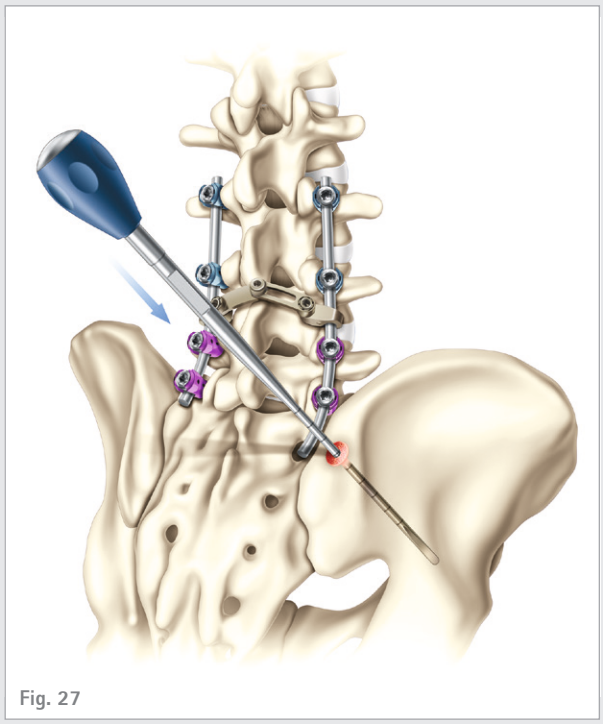

Fig. 27

- Perforate the ilium using a straight or curved Extended Length Bone Probe (FW476R or FW477R) or straight or curved Extended Length Thoracic Probe (FW474R or FW475R). (Fig. 27)

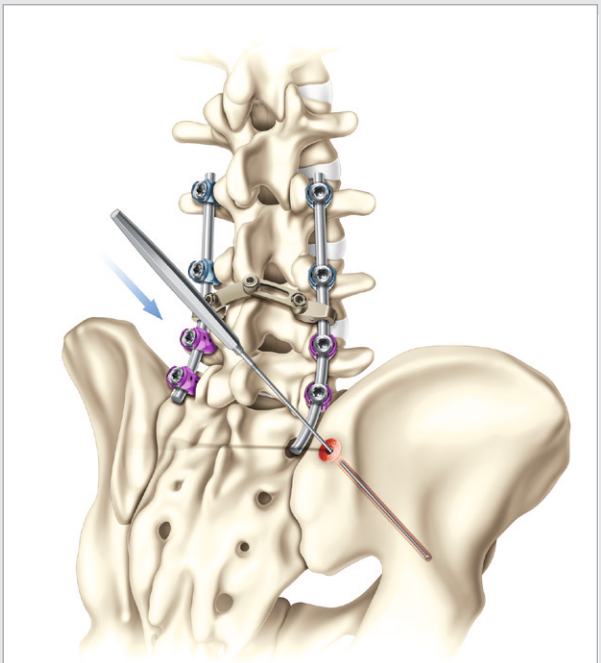

Fig. 28

- Utilize the straight or curved (FW146R or FW147R) Pedicle Sounder to confirm the patency of the ilium canal. Stop every few centimeters during perforation to check integrity of the canal. (Fig. 28)

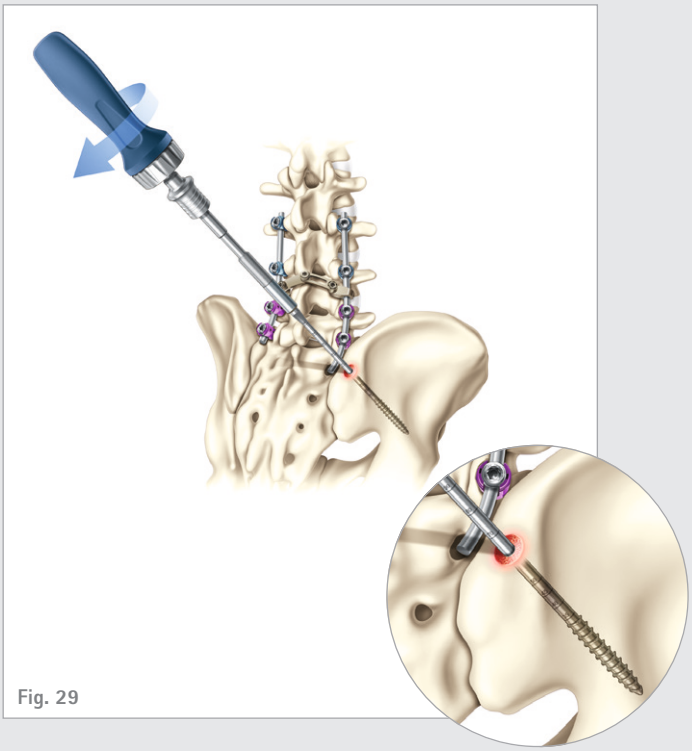

Fig. 29

- Tap canal and identify depth with the desired 7.0 mm extended Screw Tap (FW497R) or 8.0 mm extended Screw Tap (FW498R), and choose screw length. (Fig. 29)

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D | Addendum: Rod-to-rod Connector Application

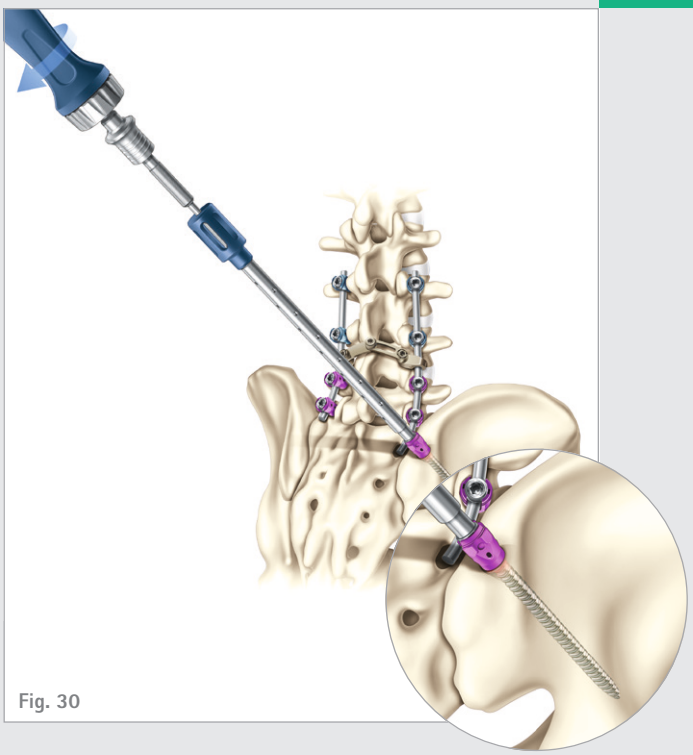

Fig. 30

- Attach desired handle to polyaxial Screw Driver (FW277R) and thread the screw into the ilium. (Fig. 30)

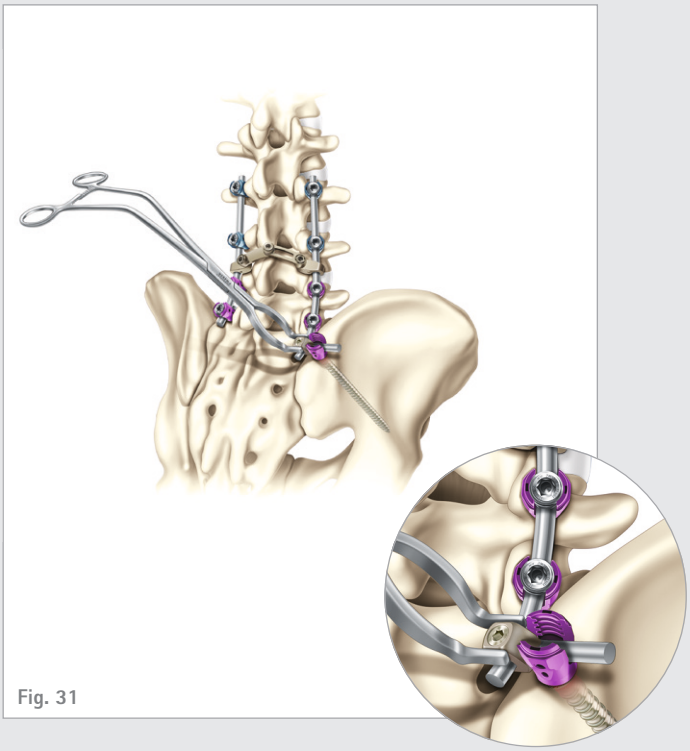

Fig. 31

- Determine offset distance between the pelvic screw and the rod from the main construct and choose desired lateral offset connector type (open / closed or closed).
- Use the Rod-To-Rod Connector Inserter (FW493R) to grab the lateral offset connector and attach it to the rod from the main construct. (Fig. 31)

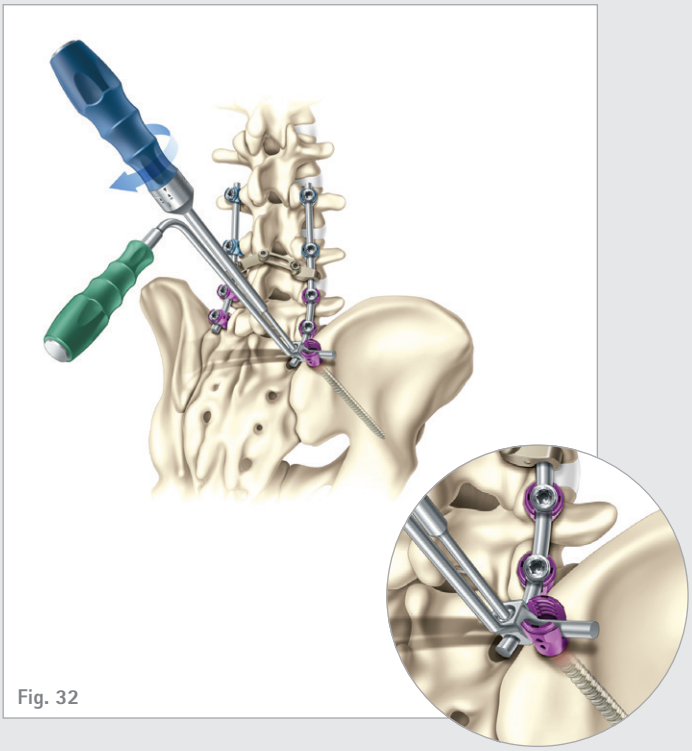

Fig. 32

- Final tighten by applying 4 Nm (36 in/lbs) of torque using the Cross Connector Torque Wrench (FW207R) and Rod-To-Rod Connector Counter Torque Device (FW495R). (Fig. 32)
- After connecting the lateral offset connector to the rod from the main construct, a rocker or Rod Persuader may be used to fully seat the connector rod into the pelvic screw's tulip head.

Note:

- For sacropelvic fixation, it is recommended to place a screw in the sacrum, which is attached to the spinal rod, above or below the attachment of the lateral offset rod connector to the rod.

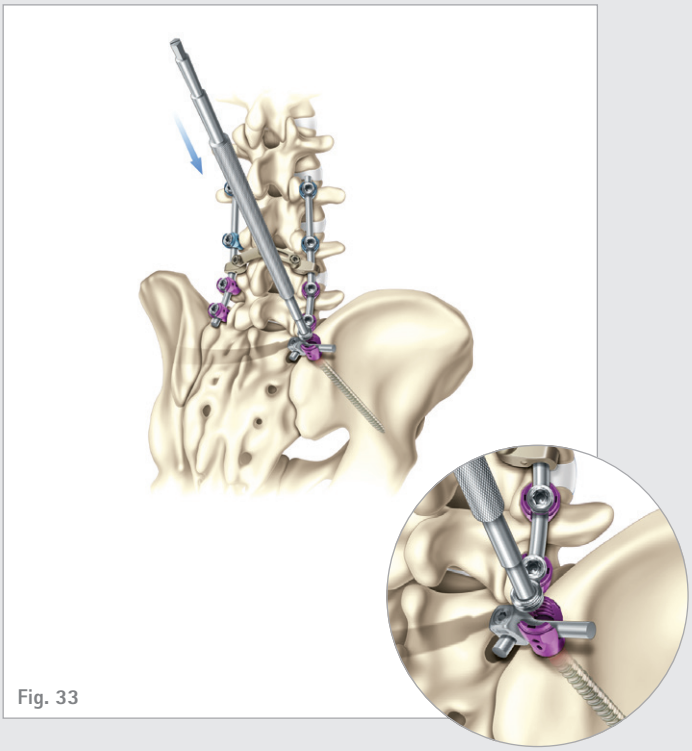

Fig. 33

- Start the set screw on the pelvic screw and finger tighten the set screw. (Fig. 33)

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D | Addendum: Rod-to-rod Connector Application

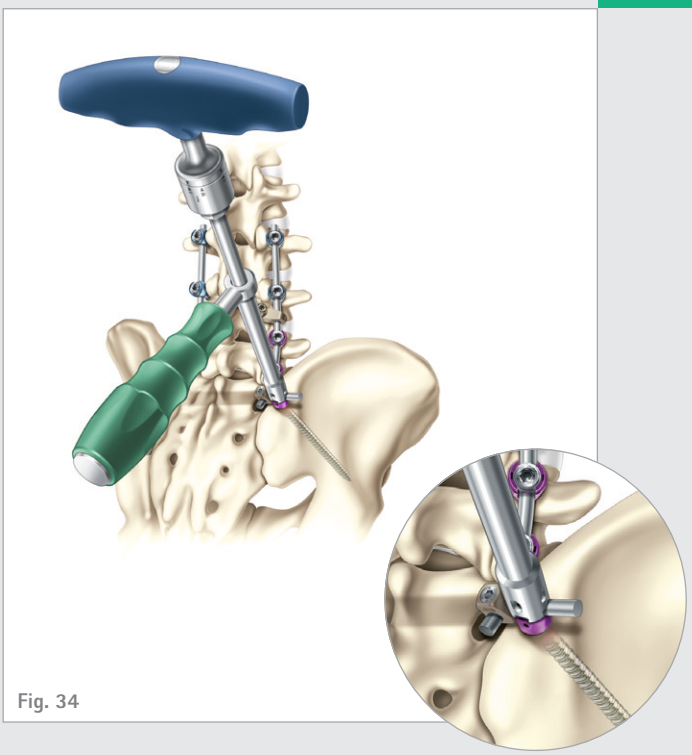

Fig. 34

- Final tightening of the set screw by using the clicking torque handle or the Line-To-Line Torque Wrench along with the Counter Torque L-Handle (as described in chapter B.10.). (Fig. 34)

Note:

- For removal of rod connector, use Connector Revision Screw Driver (FW491R). To remove pedicle screw, first use Set Screw Revision Screw Driver (FW193R) to disengage set screw and use Screw Driver with Shank Tip (FW174R) to remove the polyaxial screw.

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E | Open Augmentation Technique

Fig. 35

E.1. Screw Placement

The placement of the screws is described in the previous chapter B.3. screw application.

Select the appropriate screw length. The contact with the anterior cortical wall should be avoided in order not to risk cement leakage.

It is recommended to place the augmentation screw over the K-wire to avoid unwanted penetration of bone into the augmentation area. The K-wire remains in place until the full placement of the screw. (Fig. 35)

Note:

- When the augmentation screws are being placed without K-wire, there is a risk of penetration of bone particles, which could interfere with the proper injection of the cement. Therefore it is necessary to check the path by introducing carefully a K-wire under image intensifier control.
- Align the monoaxial screws before introducing the cement. Afterwards, realignment is not possible.

Danger:

- It has to be avoided that the K-wire is pushed too far forward because there is danger of perforation of the aorta.

Fig. 36

E.2. Cannula Attachment

The augmentation cannula is placed over the K-wire, connected with the augmentation screw and hand tightened. The K-wire is removed afterwards. (Fig. 36)

Note:

- When introducing the augmentation cannula it is important to align the polyaxial screw vertically in order to avoid cross threading.
- For each augmentation screw one injection cannula (single use) is required.
- In order to avoid unwanted cement leakage make sure that there is a tight connection between cannula and applier.

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E | Open Augmentation Technique

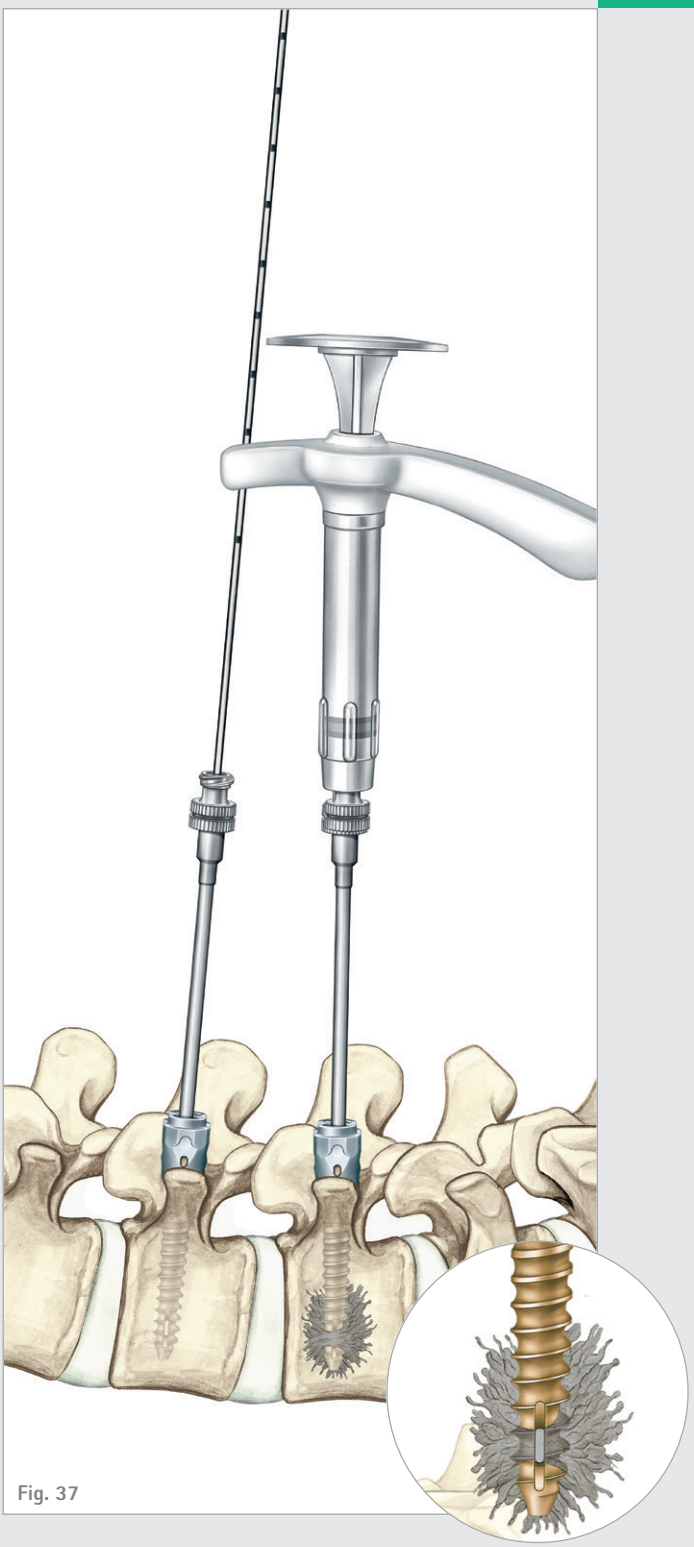

Fig. 37

E.3. Cement Application

Attach the cement applier to the cannula. For cement application make sure that the consistency of the cement is according to the specifications of the manufacturers. (Fig. 37)

Note:

- It is important that there is no cement at the connection between applier and cannula.
- When applying cement ensure that the cannula doesn't loose connection.
- Recommended cement quantity: 2 ml
- Cannula volume: 0.5 ml

Fig. 38

Cement injection should be effected under real time image intensifier control:

- Inject cement until it extrudes from the slots. Check that no cement leakage occurs.
- Continue the injection until the adequate quantity of cement is introduced and shows in a cloud pattern. (Fig. 38)

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E | Open Augmentation Technique

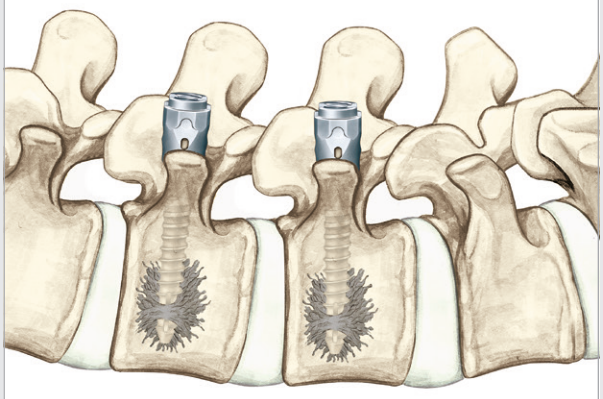

Fig. 39

The cannula remains in the pedicle screw until the cement has hardened.

Otherwise there is a risk of contamination of the screw head. (Fig. 39)

Note:

- The manufacturers specifications for the cement hardening times have to be observed.

The next steps (rod positioning, insertion of the locking screw, ...) are described as previous chapters B.4. - B.10. of the open technique.

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F | Implants and Instruments Overview

Polyaxial Screws	Article No.	Description	
	ST240T	S4® Element Polyaxial Screw, Ø 4.5 mm	4.5 x 25 mm
	ST241T		4.5 x 30 mm
	ST242T		4.5 x 35 mm
	ST243T		4.5 x 40 mm
	ST244T		4.5 x 45 mm
	ST245T		4.5 x 50 mm
	ST250T	S4® Element Polyaxial Screw, Ø 5.0 mm	5.0 x 25 mm
	ST251T		5.0 x 30 mm
	ST252T		5.0 x 35 mm
	ST253T		5.0 x 40 mm
	ST254T		5.0 x 45 mm
	ST255T		5.0 x 50 mm
	ST260T	S4® Element Polyaxial Screw, Ø 6.0 mm	6.0 x 25 mm
	ST261T		6.0 x 30 mm
	ST262T		6.0 x 35 mm
	ST263T		6.0 x 40 mm
	ST264T		6.0 x 45 mm
	ST265T		6.0 x 50 mm
	ST266T		6.0 x 55 mm
	ST267T		6.0 x 60 mm

Polyaxial Screws	Article No.	Description	
	ST270T	S4® Element Polyaxial Screw, Ø 7.0 mm	7.0 x 25 mm
	ST271T		7.0 x 30 mm
	ST272T		7.0 x 35 mm
	ST273T		7.0 x 40 mm
	ST274T		7.0 x 45 mm
	ST275T		7.0 x 50 mm
	ST276T		7.0 x 55 mm
	ST277T		7.0 x 60 mm
	ST230T		7.0 x 70 mm
	ST231T		7.0 x 80 mm
	ST232T		7.0 x 90 mm
	ST233T		7.0 x 100 mm
	ST234T		7.0 x 110 mm
	ST281T	S4® Element Polyaxial Screw, Ø 8.0 mm	8.0 x 30 mm
	ST282T		8.0 x 35 mm
	ST283T		8.0 x 40 mm
	ST284T		8.0 x 45 mm
	ST285T		8.0 x 50 mm
	ST286T		8.0 x 55 mm
	ST287T		8.0 x 60 mm
	ST235T		8.0 x 70 mm
	ST236T		8.0 x 80 mm
	ST237T		8.0 x 90 mm
	ST238T		8.0 x 100 mm
	ST239T		8.0 x 110 mm

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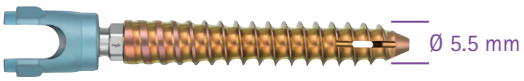
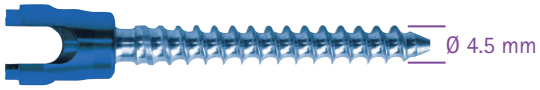
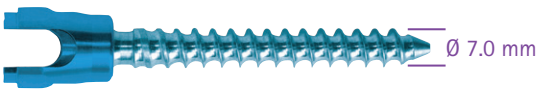
Polyaxial Screws	Article No.	Description	
	ST422T	Polyaxial Screws for cement augmentation (sterile packed)	5.5 x 35 mm
	ST423T		5.5 x 40 mm
	ST424T		5.5 x 45 mm
	ST425T		5.5 x 50 mm
	ST432T	Polyaxial Screws for cement augmentation (sterile packed)	6.5 x 35 mm
	ST433T		6.5 x 40 mm
	ST434T		6.5 x 45 mm
	ST435T		6.5 x 50 mm
	ST436T		6.5 x 55 mm
	ST437T		6.5 x 60 mm
	ST438T		6.5 x 70 mm
	ST439T		6.5 x 80 mm
	ST442T	Polyaxial Screws for cement augmentation (sterile packed)	7.5 x 35 mm
	ST443T		7.5 x 40 mm
	ST444T		7.5 x 45 mm
	ST445T		7.5 x 50 mm
	ST446T		7.5 x 55 mm
	ST447T		7.5 x 60 mm
	ST448T		7.5 x 70 mm
	ST449T		7.5 x 80 mm
	ST452T	Polyaxial Screws for cement augmentation (sterile packed)	8.5 x 35 mm
	ST453T		8.5 x 40 mm
	ST454T		8.5 x 45 mm
	ST455T		8.5 x 50 mm
	ST456T		8.5 x 55 mm
	ST457T		8.5 x 60 mm
	ST458T		8.5 x 70 mm
	ST459T		8.5 x 80 mm

Monoaxial Screws	Article No.	Description	
	ST340T	S4® Element Monoaxial Screw, Ø 4.5 mm	4.5 x 25 mm
	ST341T		4.5 x 30 mm
	ST342T		4.5 x 35 mm
	ST343T		4.5 x 40 mm
	ST344T		4.5 x 45 mm
	ST345T		4.5 x 50 mm
	ST350T	S4® Element Monoaxial Screw, Ø 5.0 mm	5.0 x 25 mm
	ST351T		5.0 x 30 mm
	ST352T		5.0 x 35 mm
	ST353T		5.0 x 40 mm
	ST354T		5.0 x 45 mm
	ST355T		5.0 x 50 mm
	ST360T	S4® Element Monoaxial Screw, Ø 6.0 mm	6.0 x 25 mm
	ST361T		6.0 x 30 mm
	ST362T		6.0 x 35 mm
	ST363T		6.0 x 40 mm
	ST364T		6.0 x 45 mm
	ST365T		6.0 x 50 mm
	ST366T		6.0 x 55 mm
	ST367T		6.0 x 60 mm
	ST370T	S4® Element Monoaxial Screw, Ø 7.0 mm	7.0 x 25 mm
	ST371T		7.0 x 30 mm
	ST372T		7.0 x 35 mm
	ST373T		7.0 x 40 mm
	ST374T		7.0 x 45 mm
	ST375T		7.0 x 50 mm
	ST376T		7.0 x 55 mm
	ST377T		7.0 x 60 mm

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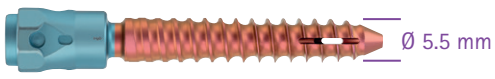
Monoaxial Screws	Article No.	Description	
	ST381T	S4® Element Monoaxial Screw, Ø 8.0 mm	8.0 x 30 mm
	ST382T		8.0 x 35 mm
	ST383T		8.0 x 40 mm
	ST384T		8.0 x 45 mm
	ST385T		8.0 x 50 mm
	ST386T		8.0 x 55 mm
	ST387T		8.0 x 60 mm

Monoaxial Screws



Article No.	Description	
ST462T	Monoaxial Screws for cement augmentation (sterile packed)	5.5 x 35 mm
ST463T		5.5 x 40 mm
ST464T		5.5 x 45 mm
ST465T		5.5 x 50 mm
ST472T	Monoaxial Screws for cement augmentation (sterile packed)	6.5 x 35 mm
ST473T		6.5 x 40 mm
ST474T		6.5 x 45 mm
ST475T		6.5 x 50 mm
ST476T		6.5 x 55 mm
ST477T		6.5 x 60 mm
ST478T		6.5 x 70 mm
ST479T		6.5 x 80 mm
ST482T	Monoaxial Screws for cement augmentation (sterile packed)	7.5 x 35 mm
ST483T		7.5 x 40 mm
ST484T		7.5 x 45 mm
ST485T		7.5 x 50 mm
ST486T		7.5 x 55 mm
ST487T		7.5 x 60 mm
ST488T		7.5 x 70 mm
ST489T		7.5 x 80 mm
ST492T	Monoaxial Screws for cement augmentation (sterile packed)	8.5 x 35 mm
ST493T		8.5 x 40 mm
ST494T		8.5 x 45 mm
ST495T		8.5 x 50 mm
ST496T		8.5 x 55 mm
ST497T		8.5 x 60 mm
ST498T		8.5 x 70 mm
ST499T		8.5 x 80 mm

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RodS	Article No.	Description	
	SW653T	S4® Pre-Bent Rods, Ø 5.5 mm	5.5 x 30 mm
	SW654T		5.5 x 35 mm
	SW655T		5.5 x 40 mm
	SW656T		5.5 x 45 mm
	SW657T		5.5 x 50 mm
	SW658T		5.5 x 55 mm
	SW659T		5.5 x 60 mm
	SW661T		5.5 x 70 mm
	SW662T		5.5 x 80 mm
	SW663T		5.5 x 90 mm
	SW684T		5.5 x 100 mm
	SW674T	S4® Straight Rods, Ø 5.5 mm	5.5 x 35 mm
	SW675T		5.5 x 40 mm
	SW676T		5.5 x 45 mm
	SW677T		5.5 x 50 mm
	SW678T		5.5 x 55 mm
	SW679T		5.5 x 60 mm
	SW681T		5.5 x 70 mm
	SW682T		5.5 x 80 mm
	SW664T		5.5 x 100 mm
	SW666T		5.5 x 120 mm
	SW667T		5.5 x 150 mm
	SW668T		5.5 x 180 mm
	SW669T		5.5 x 200 mm
	SW670T		5.5 x 300 mm
	SW671T		5.5 x 400 mm
	SW672T		5.5 x 500 mm

Cross connectors and Set Screw	Article No.	Description	
	SW488T	S4® Cross Connectors, adjustable	35 - 36 mm
	SW489T		36 - 38 mm
	SW494T		38 - 42 mm
	SW495T		42 - 50 mm
	SW496T		50 - 60 mm
	SW497T		60 - 77 mm
	SW498T		77 - 107 mm
	SW697T		43 - 49 mm
	SW698T		49 - 60 mm
	SW699T		60 - 75 mm
	SW490T	S4® Rigid Cross Connectors, straight	28 mm
	SW491T		30 mm
	SW492T		32 mm
	SW493T		34 mm
	SW690T		21 mm
	SW691T		25 mm
	SW695T		38 mm
	SW696T		41 mm
	SW790T	S4® Set Screw for monoaxial-/ polyaxial screws	

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F | Implants and Instruments Overview

Rod-to-rod Connectors	Article No.	Description	
	All rod-to-rod connectors available as both non-sterile and sterile packed implants. Sterile packed article nr. SW838TS - SW871TS		
	**SW842T**	Closed Domino Connector	7 mm
	SW844T		11 mm
	**SW841T**	Closed / Open Domino Connector	7 mm
	SW843T		11 mm
	**SW838T**	Axial Connector	Short
	**SW839T**		Long
	SW847T		20 mm
	**SW849T**	Closed Lateral Offset Connector	35 mm
	SW872T		50 mm
	SW846T		20 mm
	**SW848T**	Open Lateral Offset Connector	35 mm
	SW871T		50 mm

Instruments	Article No.	Description
	**SZ241R* alternative FW190R**	Bone Awl
	**SZ242R* alternative FW188R**	Straight Pedicle Probe
	**SZ243R* alternative FW189R**	Curved Pedicle Probe
	**FW248R**	Straight Lenke Probe
	**FW249R**	Curved Lenke Probe
	**FW146R**	Straight Pedicle Sounder
	**FW147R**	Curved Pedicle Sounder
	**SZ249R* alternative FW191R**	Single Band Pedicle Marker
	**SZ248R* alternative FW192R**	Dual Band Pedicle Marker

**Please note that the articles have an older version which is shipped as long as available.*

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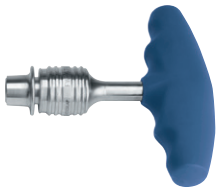
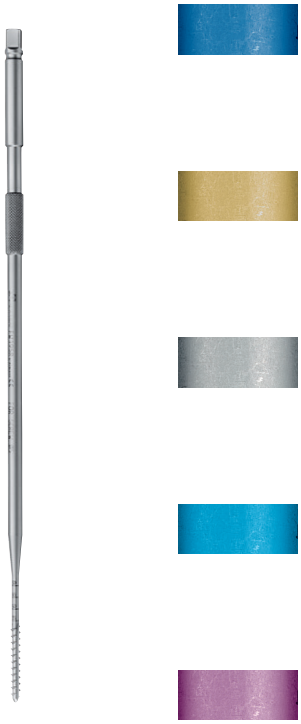
F | Implants and Instruments Overview

Instruments	Article No.	Description
	FW165R	S4® Ratchet Handle straight
	FW167R	S4® Cannulated T-Handle
	FW194R	Screw Tap, 4.5 mm
	FW195R	Screw Tap, 5.0 mm
	FW196R	Screw Tap, 6.0 mm
	FW197R	Screw Tap, 7.0 mm
	FW198R	Screw Tap, 8.0 mm

Instruments	Article No.	Description
	**FW277R**	S4® Element Polyaxial Screw Driver
	**FW276R**	S4® Element Monoaxial Screw Driver
	**FW278R**	Screw Body Manipulator
	FW174R	Removal Screw Driver with shank tip
	FW193R	Set Screw Revision Screw Driver
	**FW279R**	Dual Ended Set Screw Starter
	**FW251R**	Handled Set Screw Starter
	**FW285R**	S4® Element Rod Persuader
	**FW485R**	S4® Element Detachable Rod Persuader
	**FW288R**	S4® Element Fork Rocker straight
	**FW289R**	S4® Element Fork Rocker curved

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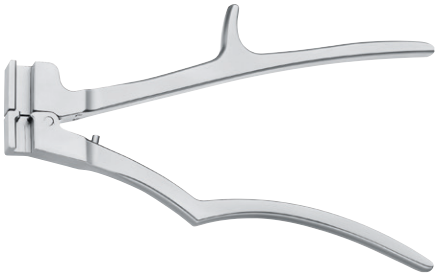
Instruments	Article No.	Description
	**FW283R**	Counter Torque L-Handle
	**FW170R**	Line-to-Line Torque Wrench
	**FW154R**	Marnay Lever
	SZ072SU	Rod Bending Template 60 mm
	SZ073SU	Rod Bending Template 150 mm
	SZ074SU	Rod Bending Template 290 mm
	**FW024R**	French Rod Bender
	**FW012R**	Rod Holding Forceps
	**FW513R**	Rod Pusher

Instruments	Article No.	Description
	**FW281R**	Distraction Forceps
	**FW282R**	Compression Forceps Distraction
	**FW287R**	Derotation Sleeve
	**FW202R**	Cross Connector Sizing Template
	**FW203R**	Cross Connector Bender
	**FW204R**	Cross Connector Counter Torque
	**FW207R**	Cross Connector Torque Wrench, 4 Nm

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F | Implants and Instruments Overview

Instruments	Article No.	Description
	**FW493R**	Rod-To-Rod Connector Inserter
	**FW495R**	Rod-To-Rod Connector Counter-Torque
	**FW497R**	Extended Length Screw Tap, 7.0 mm
	**FW498R**	Extended Length Screw Tap, 8.0 mm
	**FW474R**	Extended Length Thoracic Probe, straight
	**FW475R**	Extended Length Thoracic Probe, curved
	**FW476R**	Extended Length Bone Probe, straight
	**FW477R**	Extended Length Bone Probe, curved

Injection Cannula	Article No.	Description
	**SR146SU**	S4® Injection Cannula, short, 100 mm

AESCULAP® S4® Element

F | Literature

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6. Beisse R. Endoscopic surgery on the thoracolumbar junction of the spine. Eur Spine J. 2006;15:687-704.
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Notes

AESCULAP® – a B. Braun brand

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