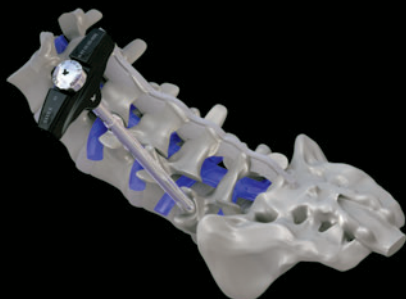


# SURGICAL TECHNIQUE

by spineart



1

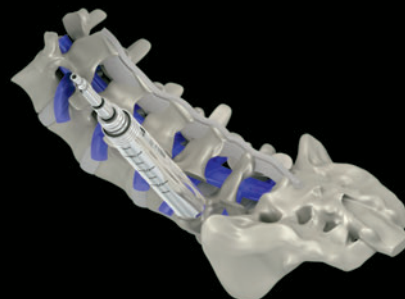
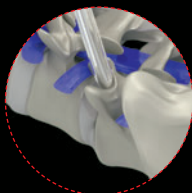
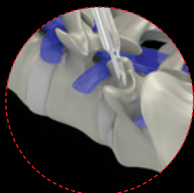
## PEDICLE TARGETING

Assemble the 4 elements of the trocar 3 in 1 instrument. Dock the trocar 3 in 1 instrument to the pedicle's bony entry point and advance it into the pedicle under fluoroscopy. Hold onto the trocar 3 in 1 / stick during fluoroscopy in order to keep hands out of the x-ray field.

Note: The distal tip of the trocar 3 in 1 / square awl / dilator tube #1 can be advanced 20mm before reaching a safety stop.

Carry out AP and lateral imaging to ensure that the trocar 3 in 1 / square awl / dilator tube #1 trajectory matches with the pedicular anatomy.

- trocar 3 in 1 / square awl / dilator tube #1 MIS-IN 03 10-N
- trocar 3 in 1 / needle MIS-IN 03 15-N
- trocar 3 in 1 / T-handle MIS-IN 03 14-N
- trocar 3 in 1 / stick MIS-IN 03 13-N



2

## SEQUENTIAL DILATION

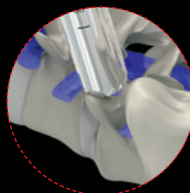
Carefully detach the needle and T-handle from trocar 3 in 1 instrument.

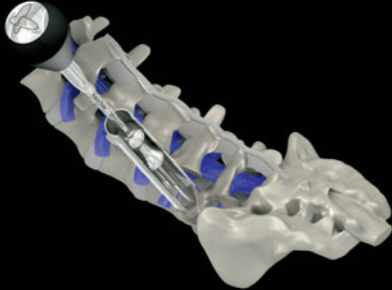
Start sequential dilation by putting dilator tube #3 over dilator tube #2 followed by serrated dilator tube #4 over dilator tube #3. Advance all dilator tubes until black ring markings are clearly visible.

Firmly attach serrated dilator tube #4 to the bony structure. Hold on to serrated dilator tube #4 and remove dilator tubes #1 to #3. Leave serrated dilator tube #4 in place in order to implant the pedicle screw.

Note: Switch to non-serrated dilator tube #4 if performing K wire based technique.

- dilator tube #2 MIS-IN 04 00-N or dilator tube #2 (PEEK) MIS-IN 04 01-N
- dilator tube #3 MIS-IN 05 00-N or dilator tube #3 (PEEK) MIS-IN 05 01-N
- dilator tube #4 serrated MIS-IN 06 02-N or dilator tube #4 MIS-IN 06 00-N or dilator tube #4 (PEEK) MIS-IN 06 03-N





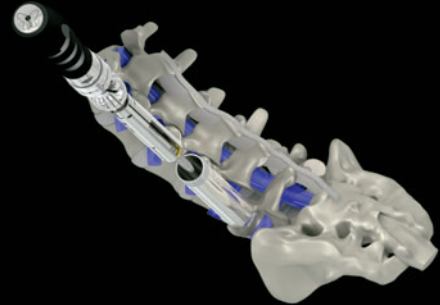
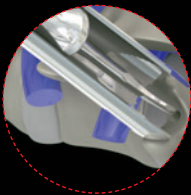
3

### PEDICLE PREPARATION

Introduce the K wireless pedicle probe through the serrated dilator tube #4. Start preparing the pedicle canal by placing the instruments distal tip curvature in a medial position. Carry out AP and lateral control under fluoroscopy during pedicle preparation maneuver.

The scaled graduation indicates the progression of the distal tip of the instrument into the pedicle canal.

- pedicle probe (K wireless) MIS-IN 34 00-N
- dilator tube #4 serrated MIS-IN 06 02-N



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### PEDICLE SCREW INSERTION

Connect the clipping tube or open clipping tube to the screw head and assemble the construct with the screwdriver. Insert the assembly into dilator tube #4 and start inserting the implant into the prepared pedicle canal.

Continue to advance screw until the black line on the clipping tube reaches the proximal end of the serrated dilator tube #4 to ensure that the screw has passed the serrated dilator tube #4.

Use fluoroscopic control to verify the screw trajectory and screw seat. Turn the large opening of the clipping tube in a midline position and ensure the polyaxiality of the screw and clipping tube assembly.

Remove the screwdriver, leaving the polyaxial screw and clipping tube assembly in place. Repeat steps 1-4 for each screw.

Note: In case of a K wire based technique, it is crucial to take caution in order to prevent inadvertent removal or advancement of the K wire.

- clipping tube MIS-IN 17 01-N
- clipping tube open MIS-IN 19 03-N
- straight handle ratchet HAN-SI RA ST-N or T-handle ratchet HAN-SI RA TE-N
- screwdriver shaft PS cannulated MIS-IN 33 01-N
- screwdriver tube ELL-IN 21 03-N





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## FASCIA DILATION

Once all desired screws and clipping tubes in place, create a working plane and a path for the rod by dilating the muscles and the fascia between the screws with the fascia dilator.

- fascia dilator MIS-IN 43 00-N



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## ROD MEASURING

Measure the appropriate rod length by inserting the caliper into the craniocaudal clipping tubes. Push down the caliper until fully seated in the screw heads.

Read the exact rod length on the laser etched scale.

- caliper MIS-IN 37 00-N



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## ROD INSERTION

Hold the rod with the rod inserter and insert it through the outer clipping tube windows.

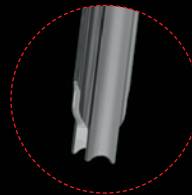
Grab the rod with the rod pusher and slide the rod into the screw heads. Verify the rod placement under fluoroscopy.

Once the rod is in the desired position, place the universal tubes into the clipping tubes in order to seat the rod into the screw heads.

Note: Insert the universal tube by following the PUSH marking.

Release the rod inserter and hold the rod with the rod pusher.

- rod inserter MIS-IN 35 01-N
- rod pusher MIS-IN 36 00-N
- universal tube MIS-IN 28 01-N





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## PRELIMINARY TIGHTENING

Load the setscrew to the self-retaining distal tip of the setscrew holder. Release the rod pusher and advance the setscrews through the universal tubes.

Note: In case of high rod seating, the persuader can be used to reduce the rod. The stabilizer can be additionally used in order to realign the clipping tubes.

- setscrew holder ELL-IN 01 10-N
- universal tube MIS-IN 28 01-N
- persuader MIS-IN 21 00-N
- locker MIS-IN 11 00-N
- stabilizer MIS-IN 29 00-N



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## COMPRESSION AND DISTRACTION

At this surgical step, compression or distraction may be performed by using the compression or distraction forceps in combination with the stabilizer and the dynamometric tightener.

Attach the stabilizer onto the clipping tubes in order to realign them. Verify, that the universal tubes are in place.

Insert the dynamometric tightener into one of the craniocaudal universal tubes and attach the hexagonal tip of the instrument to the setscrew in order to generate a more rigid construct. A parallel compression or distraction maneuver can now be carried out.

Note: It is recommended to use the ROME02<sup>®</sup><sub>MIS</sub> system in conjunction with the Spineart<sup>®</sup> JULIET<sup>®</sup> cages in order to obtain circumferential stabilization of the treated segment. Refer to the JULIET<sup>®</sup> surgical techniques for the fusion procedure.

- compression forceps MIS-IN 41 00-N
- distraction forceps MIS-IN 42 00-N
- dynamometric tightener ELL-IN 03 06-N
- stabilizer MIS-IN 29 00-N
- universal tube MIS-IN 28 01-N





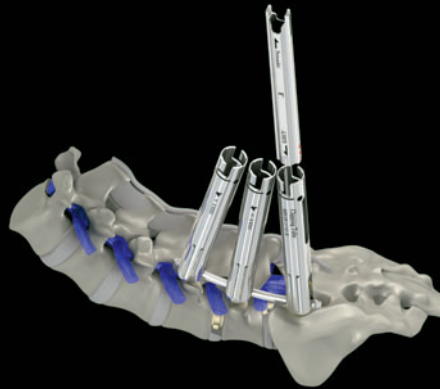
10

### FINAL TIGHTENING

After having carried out sufficient compression or distraction, finally tighten the setscrews with the dynamometric tightener in combination with the stabilizer.

Release the compression or distraction forceps.

- dynamometric tightener ELL-IN 03 06-N
- stabilizer MIS-IN 29 00-N



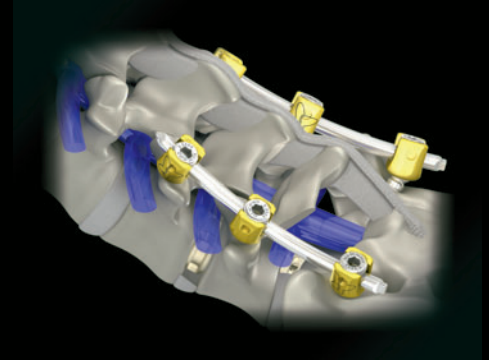
11

### CLIPPING TUBE RELEASE

Confirm that final construct is completed before removing clipping tubes. Reverse the universal tube and push it down the clipping tubes until the flanks of the clipping tubes open. Gently pull off the clipping tubes.

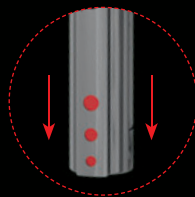
Repeat this step for every clipping tube.

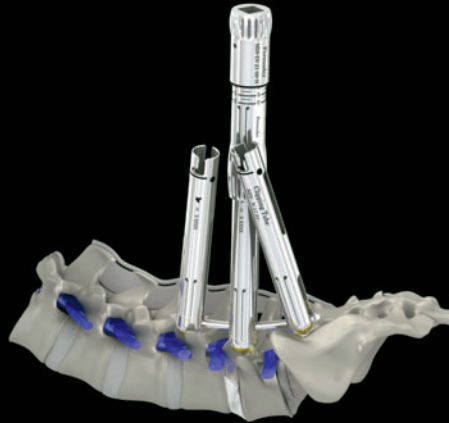
- universal tube MIS-IN 28 01-N



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### FINAL CONSTRUCT





1

## OPTIONAL

### SPONDYLOLISTHESIS REDUCTION

In case of a spondylolisthesis, the slipped vertebral body can be realigned by using the persuader. Place the universal tubes into the clipping tubes and attach the persuader in open position (read marking «20») onto the contralateral and ipsilateral clipping tube of the slipped vertebral body.

Lock the persuaders on the clipping tubes by turning them clockwise, until the opening matches with the laser etched points.

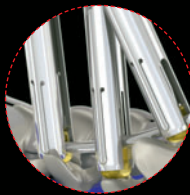
Start parallel reduction by turning the threaded knurls of the persuaders clockwise. Use the lockers (mini T-handles) to support the reduction process. The reduction maneuver can be performed bilateral and simultaneously.

- universal tube MIS-IN 28 01-N
- clipping tube MIS-IN 17 01-N
- clipping tube open MIS-IN 19 03-N
- persuader MIS-IN 21 00-N
- locker MIS-IN 11 00-N

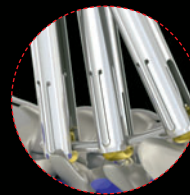
Verify the reduction under fluoroscopic control. Once the desired reduction has been achieved, load the setscrew to the self-retaining distal tip of the setscrew holder and advance it through the persuader and universal tubes. Release the setscrew holder and continue the setscrew fixation with the dynamometric tightener.

Take off the persuaders from the clipping tubes and carry out the compression/distraction and the final tightening maneuver as described in steps 9 and 10. Release the clipping tubes as described in step 11.

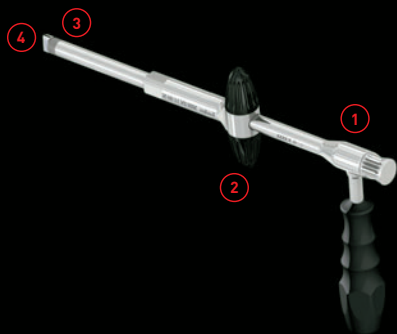
- dynamometric tightener ELL-IN 03 06-N
- setscrew holder ELL-IN 01 10-N



OPEN POSITION



CLOSED POSITION



2

## SCREW BASED M.I.S. RETRACTOR PLACEMENT

Prior to the screw based retractor placement, assemble the small counter torque with the locker, the appropriate retractor t-shaft and retractor threaded tube (small or large).

- 1 counter torque small MIS-IN 12 00-N
- 2 locker MIS-IN 11 00-N
- 3 retractor threaded tube / large MIS-IN 32 10-N  
or retractor threaded tube / small MIS-IN 32 14-N
- 4 retractor t-shaft large MIS-IN 32 11-N  
or retractor t-shaft small MIS-IN 32 13-N

In order to position the screw based M.I.S. retractor, follow the surgical steps 1-4 to position the pedicle screws at the desired level.

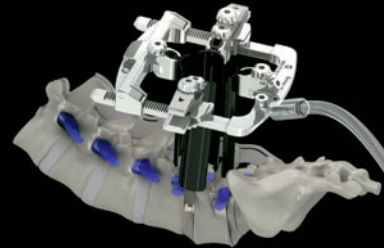
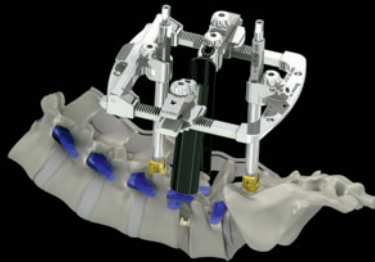
Once the pedicle screw and clipping tube assemblies are positioned, insert the retractor t-shafts into the clipping tubes and assure that the distal tip of the instrument is well seated in the polyaxial screw head.

Note: It is crucial to position the pedicle screws parallel to the endplates.

Chose the desired angle and start locking the retractor t-shaft and threaded tube to the polyaxial screw head. Hold the small counter torque while turning the locker clockwise. Maintain polyaxiality of the screw, retractor t-shaft and retractor threaded tube assembly in order to position the retractor frame.

Release the clipping tubes with the universal tubes as described in step 11.

- counter torque small MIS-IN 12 00-N
- locker MIS-IN 11 00-N
- retractor t-shaft large MIS-IN 32 11-N  
and retractor t-shaft small MIS-IN 32 13-N
- universal tube MIS-IN 28 01-N
- retractor threaded tube / large MIS-IN 32 10-N  
or retractor threaded tube / small MIS-IN 32 14-N



### 3

Place the assembled retractor frame over the retractor t-shafts and lock the polyaxiality in the desired position. Measure the desired blade length with the dilator tube #2. The attachment can be performed manually or with the retractor blade holder. Lock the blades manually or with the retractor blade locker.

Distract carefully between the the retractor t-shafts and the blades to generate sufficient space for the intersomatic approach. After having inserted the desired cage, release the distraction on the self-retaining mechanism and detach the retractor frame from the retractor t-shafts.

Reattach the clipping tubes to the screw heads with the help of the universal tubes and the dilator tube #5. Reinsert the small counter torque and locker assembly to release the retractor t-shafts.

- dilator tube #2 MIS-IN 04 00-N  
or dilator tube #2 (PEEK) MIS-IN 04 01-N
- retractor system MIS-IN 32 00-N
- retractor blades (width 16mm) MIS-BT XX 16-N  
or retractor blades (width 21mm) MIS-BT XX 21-N
- retractor blade holder IS-IN 32 12-N
- retractor blade locker MIS-IN 32 02-N
- universal tube MIS-IN 28 01-N
- clipping tube MIS-IN 17 01-N
- clipping tube open MIS-IN 19 03-N
- counter torque small MIS-IN 12 00-N
- locker MIS-IN 11 00-N
- retractor t-shaft large MIS-IN 32 11-N  
and retractor t-shaft small MIS-IN 32 13-N
- distraction forceps MIS-IN 42 00-N

### BLADE BASED M.I.S. RETRACTOR PLACEMENT

The M.I.S. retractor can additionally be used by only attaching the blades. Within this technique, the retractor t-shafts are replaced by retractor blades.