SURGICAL TECHNIQUE

Easyspine®

PEDICLE SCREW SYSTEM
Designed by leading spine surgeons, Easyspine features a simplified surgical technique and adaptable implants to accommodate various pathologies.
Unique, pre-assembled screws
- Pre-assembled locking components - no risk of dropping parts or cross threading
- Integrated multiaxial connections

A new standard: the LDR flattened rod
- Variable rigidities with a constant diameter
- Protection safety stops
- All rods compatible with all screws

Mechanical optimization
- Reliable locking (flat-on-flat connection)
- Final locking torque 30-50% below other systems’ requirements

Implant options for all pathologies
- Standard screw
- Alpha screw
- LP screw
- Pedicle hook
- Under laminar hook
- Lateral connector
- Transverse connector
- Spacer

Sterility and traceability
- Sterile packaging
The images used in this document show constructs for the purpose of LDR instrument and implant training and are not intended to provide anatomical instruction or show actual assemblies.
Pedicle pilot hole and path creation

Step 1

**Pilot hole for pedicle screw**

Use the Adjustable Square Awl (ES923R) to perforate the cortex.*

The instrument has a countersink chamfer that when engaged with the cortical bone will slightly widen the pedicle screw entry point which can make screw introduction easier.

*Note: The awl can also be used to prepare the screw path in the pedicle. The awl incorporates a depth adjustment system which can be adjusted between 15 and 50mm.

Step 2

**Screw position verification**

With the Pedicle Probe (ES927R) create a path in the pedicle for the screw. The Pedicle Probe is graduated allowing depth control.

The Pedicle Probe can also be used radiologically for additional visualization of the pedicles.

Use the Thin Pedicle Probe (ES929R) to verify the integrity of the pedicles involved and the location and orientation of the pilot holes.

Place a Pedicle Marker (ES909R) in the pilot hole to allow visualization during radiological control. This marker may be left in place while placing additional screws to help visualize the pedicle plane.
Standard or Alpha screw selection and assembly

**Standard or Alpha screw selection**

The Easyspine Standard and Alpha screws can be used interchangeably with selection based on surgeon preference and patient needs. The Standard screw provides 20° of angulation in a medial-lateral direction and the Alpha, 20° of angulation in all directions for 40° total. Both have the Easyspine’s signature pre-assembled locking components and integrated multiaxial joints.

Some surgeons prefer the Standard screw for cases where added rigidity is desired, i.e. at the end of a long construct or for scoliosis or trauma cases.

Screw diameter and length selection is dependent on patient anatomy, deformity correction needs, and anticipated loads. The 5mm screw is recommended for use in the upper thoracic region.

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**Assembly**

Once the pedicle screw size is selected, the pedicle screw can be placed in the Closed or Open Screw Holder (ES930R or ES932R). The screw is captured and self-retained* in the holder**.

The opening of the screw head must be placed toward the etched mark on the Closed or Open Screw Holder. Once assembled, this mark will allow visualization of the pedicle screw opening in order to orientate the screw for rod insertion.

*Note: The screw is held automatically in the Holder by a ball catch which operates with a friction fit on the thread of the screw.

**Note: The locking component of the pedicle screw is set by the manufacturer to a height which allows it to be self-retained within the holder. If the locking screw has been manipulated, it must be replaced to the correct position to allow the pedicle screw to be self-retained.
**LP screw selection and assembly**

**Spondylolisthesis**
Use the LP screw to reduce any grade spondylolisthesis. The reduction can be adjusted based on severity and can be stopped whenever the surgeon has achieved the desired reduction amount.

The LP screw uses the rod as a stable starting point to pull the vertebral body posterior as the screw drives into the bone.

Only two additional instruments are needed to complete a reduction, the Forcep (ES964R) and Wrench (ES956R).

**Offset**
The LP has 10mm of built-in offset facilitating:

- Lateral screw placement; could be used for anatomically lateral L5.
- Staggered pedicle screw locations due to varied anatomy.

**Assembly**
Finger tighten the LP nut; head should still be able to swivel.

Clamp the Forcep prongs to the back side of the LP screw, where the LP screw head wraps around the screw stem.
Screw placement

Step 4

**Standard or Alpha screw**

Pedicle screw selection* and placement continues according to the surgical requirements.

The etched mark on the Closed or Open Screw Holder is used for visualization of the pedicle screw opening.

The pedicle screw opening can be placed either medially or laterally. Typical placement of the opening is medial.

*Note: A list of available implant sizes is included in the part list flyer at the back of this document.

**LP screw**

Placement continues according to the surgical requirements.

Holding the LP screw with the forceps, use the Screwdriver T25 Long (ES914R) to drive the LP screw shaft into the pedicle.

LP head orientation can be adjusted after implantation. Use caution not to drive the screw head below the rod.
Optional – spacers

When the patient anatomy requires the pedicle screw to not be fully seated, a spacer may be threaded onto the pedicle screw prior to implantation to provide compression between the bone and screw head. Because part of the threaded screw will not penetrate the bone, it is important to select a screw somewhat longer than would otherwise be employed (approximately equal to the height of the spacer).

Rod measurement

Step 5

Measurement of the flattened rod

After positioning all the pedicle screws, the required rod length can be determined by using the Rod Gauges. A 60mm (ES907R), a 100mm (ES908R), a 150mm (ES920R), and a 200mm gauge (ES921R) are available.
**Rod preparation**

**Step 6 Flattened rod rigidity choices**

Three available rod rigidities (Rigid, Medium and Slender) are available in the Easyspine® system.

The selected rod thickness/rigidity is based on surgeon philosophy, patient physiology and pathology.

All rods are compatible with all pedicle screws in the Easyspine system. This allows the surgeon to choose the rigidity without requiring any modification to the pedicle screws that have already been implanted.

**Step 7 Rod bending**

If rod bending is necessary, the French Bender (ES918R) is used to obtain the desired curvature.

The rod bender should be adjusted according to the rod thickness selected (R, M or S). The French Bender bending wheel can be positioned to accept the three rod thicknesses.

To introduce the rod into the French Bender, the flattened segment should be positioned toward the handles.

When both coronal and sagittal contouring is required, the coronal plane should be bent first, then in the sagittal plane using the flat portion of the rod as a rotational index.
**Step 8**

### Alpha and Standard screws

The rod is held by the Rod Holding Forceps (ES925R) or the Vise-Plier (ES940R or ES947R) and is introduced laterally in the heads of the pedicle screws.*

Use a Screw Holder to adjust pedicle screw orientation when introducing the rods.

*Note: When on the patient’s left side, begin to provisionally tighten the cephalad screws first. On the patient’s right side, begin to provisionally tighten the screws at the caudal end first. Securing the screws in this order will prevent the rod from moving medial and out of the screw opening on adjacent screws.

### LP screw

Typically the LP will be used in combination with the Alpha/Standard screw(s). Implant the Alpha/Standard screw(s) first; then insert and secure the rod with the Screwdriver T25 Long.

Before implanting, dial down the LP nut; screw head should still be able to swivel. Implant the LP screw.*

Using the Forceps, swivel the LP head to accept the rod.**

*Note: If the nut comes into contact with tissue during screw advancement, use the LP wrench periodically to dial down the nut or the LP screw can disassemble.

**Note: As needed, use the Screwdriver T25 Long to adjust the height of the LP screw to better accommodate the rod.
Sequential assembly

**Optional - Sequential assembly**

In long constructs or complicated cases, the Easyspine posterior-lateral loading allows sequential rod introduction.

1. Introduce the rod into one of the distal pedicle screws.
2. Pre-lock the locking screw so as to maintain the rod in the screw head using the Screwdriver T25 Long or Short (ES938R).
3. Load the rod into the next screw head using the Rod Inserter (ES922R).
4. Pre-lock the second pedicle screw. The slot in the Inserter is designed to facilitate the use of the Screwdriver T25 Long with the Rod Inserter in place.

Repeat steps 3 and 4 for each screw in the construct.
Spondylolisthesis reduction

**Implant LP screw and insert rod**

Insert LP screw using Screwdriver T25 Long, until the LP head level meets the rod held by the Standard screw(s).* The LP screw will be proud of the vertebral body.** (Dial down LP nut before implanting.)

Rotate the LP screw head to accept the rod. Pre-tighten LP set screw securing the rod using the Screwdriver T25 Long. The provisional tightening of the rod inside the LP head should not allow any movement.

*Note: If the nut comes into contact with tissue during screw advancement, use the LP wrench periodically to dial down the nut or the LP screw can disassemble.**Note: The LP screw must have approximately two-thirds of its length in bony anchorage to avoid the risk of screw pull out during reduction.

**Implant Standard screws and rods**

Implant Standard screw(s) into the level(s) adjacent to the recessed vertebral body using the standard Easyspine technique.*

In the vertebrae below the spondylolisthesis, direct the trajectory of the Standard screw toward the endplate; the inferior screw should not be parallel with the endplate. This trajectory provides the angle on the rod that is necessary for proper reduction.

Insert rod into screws and pre-tighten set screws with Screwdriver T25 Long, such that Standard screws can still translate on the rod.

*Note: The Standard screw is recommended for spondylolisthesis cases, as it provides a solid anchor with no swivel movement during reduction.

**Note: The LP screw must have approximately two-thirds of its length in bony anchorage to avoid the risk of screw pull out during reduction.
**Surgical Technique**

**Easyspine®**

### Spondylolisthesis reduction

**Reduce**

Bilaterally drive the LP screw down using the Screwdriver T25 Long until satisfied with the restoration of the lordotic curve. As the screw advances, the vertebral body will move toward the rod.*

*Note: Reduction amount is determined by:
- the rod's lordotic curve
- how proud the LP screw starts from the vertebral body
- the trajectory of the inferior screw (in this case the sacrum screw)
**Rod adjustment**

**Step 5 Rod adjustment**

Before final locking, the rod can be translated inferiorly until the superior rod protection stop contacts the superior screw.* In this position, the rod will not protrude from the superior screw head, protecting the superior facet joint from impingement.

The lordotic orientation can be adjusted using the Vise-Plier. The flattened segment of the rod can be used to aid in visualization of the lordotic plane.

* Note: Rod should not translate when using an LP screw for a spondylolisthesis reduction.

**Step 10 Compression or distraction**

Necessary compression or distraction of the assembly can be performed.

Lock one of the assembly screws, then use the Compression Forceps (ES905R) or the Distraction Forceps (ES906R) by positioning the forceps on the heads of the involved pedicle screws.

Pre-tightening set screws allows the rod to translate without risk of expulsion from the screw heads.

The instrument provides maintenance of the compression or distraction during final locking of the construct.
**Final locking**

**Step 11 Standard or Alpha screw**

Complete the final lock of the set screws with the Screwdriver T25 Short.* The Screwdriver T25 Long can be used through the Closed Screw Holder for rotational control and counter torque.

It is necessary to ensure that the rod is free from any contact with bone. The final locking of the pedicle screw can be compromised if the rod is not free to engage the bottom, or saddle, of the pedicle screw.

Testing of the Easyspine system has been completed utilizing an assembly torque of 8.5 N-M (75 in-lbs).

A double "click" or "squeak" may be heard when the locking of the screw is completed. To visually verify final lock, the height of the set screw should be approximately 1mm below the screw head for the S Rod, flush with the screw head for the M Rod and .5mm above the screw head for the R Rod.

*Note: For longer constructs, provisionally tighten all screws before performing the final lock. This will ensure the rod has the freedom to rotate and the flat on flat connection is parallel.

**LP screw**

Lock the LP nut using the Wrench. The LP nut must come into contact with the ball-joint.*

Perform the final lock on the LP set screw using the Screwdriver T25 Long.

*Note: For a counter torque device when locking the LP nut, assemble the Screwdriver T25 Long through the cannulated shaft of the LP Wrench. Tighten the nut by rotating the LP Wrench clockwise while using the Screwdriver T25 Long as a counter torque device.
Cross connection

The Cross connection is made up of three components: the connecting rod and two cross connection hooks.

Two cross connection hook configurations are available (open and closed). The closed configuration must be assembled onto the rod prior to rod loading. The following assembly sequence describes the steps for using the open cross connection hook.

First cross connection hook assembly

Assemble the cross connection hook onto the Hook Holder (ES928R) by threading the Hook Holder to the set screw threads.* The Screwdriver T25 Long can be used by inserting it through the Hook Holder and into the set screw to avoid unintentional rotation of the hook locking component.

*Note: Do not over tighten the Hook Holder.
Cross connection

**Cross connection rod assembly**

The cross connection rod has a stop on one end which ensures that it does not pass through the opening in the hook. This stop should not be cut off when cutting the connecting rod for length and should be assembled with the first hook in the necessary orientation to facilitate completion of the assembly.

The connecting rod can be cut to the necessary length with the Transverse Connector Cutter (ES919R). The Rod Gauges can be used to measure the reference distance between the two flattened rods.

The hook is attached and the connection rod is assembled to the flattened rod by a rotational movement combined with slight downward pressure on the hook. The connection rod should be on the top (posterior) side of the two flattened rods.*

The hook can now be pre-tightened onto the rod using the Screwdriver T25 Long. This is done by first unscrewing the Hook Holder so that the locking screw is free to move. Pre-tightening the hook helps to avoid inadvertent disassembly of the hook from the flattened rod.

*Note: The hooks can be oriented either medially or laterally.
Second cross connection hook assembly
Assemble the second hook on the Hook Holder. Introduce the hook onto the connection rod then assemble it onto the flattened rod through slight downward pressure and rotation of the hook.

Cross connection locking
Once the two hooks are in place on the flattened rod, the cross connection assembly can be completed with final tightening using the Screwdriver T25 Long or Short.
Trauma reduction

Concept

The trauma set allows reduction of fractures and restoration of normal physiological contour. Successive manipulation of the distractors and reduction levers allows a gradual re-opening of the posterior and anterior spaces of the vertebral bodies.

Note: Standard screws provide more control and are recommended for trauma cases.

Note: For better visualization, only one side is presented. However the procedure should be completed bilaterally and simultaneously such that the reduction steps can be made respecting the overall symmetry of the spine.

Pedicle screw fixation

The Easyspine pedicle screws are fixed in the superior and inferior pedicles of the involved vertebral bodies. Proper multiple level instrumentation should be used to support the expected physiological loads. These pedicles should be undamaged and secure since the screws are used for anterior and posterior distraction and reduction.
Step 2 Positioning of the Distractor Assembly
The Distractor Assembly (ES933R or ES965R, ES934R and ES935R) is positioned under the pedicle screw heads, on each side of the spinal column (bilaterally).
Trauma reduction

**Step 3**

**Posterior space distraction of the vertebral body**

The distractor wheel is turned to distract the column and permit the opening of posterior space of the damaged vertebral body.

In case of severe trauma, partial distraction will be made through several steps after anterior space re-opening.

**Note:** Always distract symmetrically from both sides of the vertebrae.

**Step 4**

**Attachment of Reduction Levers**

Insert the Open Reduction Levers (ES937R) on the screw heads (with the distractor assembly in place).

The opening on the Open Reduction Levers should be placed toward the opening on the screw head to allow the introduction of the flattened rods.
**Step 5**

**Distraction of the anterior space**

By moving the tips of the levers together, the anterior space of the vertebral bodies will be opened to reduce the fracture.

The Reduction Levers can be fixed in this position with the Quick Lock Plate (ES936R) that is placed over the tips of the Reduction Levers. Once the anterior space is locked, verify reduction with fluoroscopy.

**Step 6**

**For long reductions**

In the case of multiple level trauma it may be impossible to reduce the fracture in one stage. In such cases repeat steps 3 - 5 until the required reduction is obtained.
Trauma reduction

**Rod insertion and locking**

Once the reduction is obtained, the standard steps for rod selection, insertion, bending*, introduction and locking are followed.**

*Note: Rod bending is recommended in trauma cases to ensure maintenance of the reduction.

**Note: Only the Open Reduction Levers (ES937R) allow rod insertion after the Reduction Lever is in place.
Step 8  Removal of the Levers and Distractor

Remove the Quick Lock Plate.
Remove the Open Reduction Levers.
Loosen the Distractor by operating the wheels and remove the Distractor Assembly.

Fracture before reduction. Fracture after reduction.
Pedicle hook

**Step 1** Remove inferior aspect of the facet*
Depth of pedicle anatomy dictates amount of facet preparation.

*Note: Pedicle hooks should never be used below T10. The pedicle hook should always be placed in the joint capsule and should not split the inferior articular process.

**Step 2** Use Pedicle Rasp (ES951R) to prepare pedicle and verify hook position
**Step 3**  
**Hook assembly to instrument**  
Assemble pedicle hook to Pusher (ES9036R) using the Screwdriver T25 Long.

**Step 4**  
**Place hook in final position***  
Slide handle of Hook Pusher laterally to ensure hook is sitting properly around the pedicle.  
Disassemble hook from Pusher using Screwdriver T25 Long.  
Confirm that set screw is backed out enough, such that swivel will not hit the rod during insertion.

*Note: Take caution when placing hook to avoid slipping hook in between the cortical walls of the lamina.*
**Pedicle hook**

**Step 5** **Pedicle screws**

Implant screws at other levels using the standard Easyspine pedicle screw technique.*

**Step 6** **Rod**

Insert rod into the screw and hook heads.

Pre-tighten the set screws in the pedicle screws until rod will not translate. Pre-tighten the set screw in the hook, but maintain rod movement. This will allow proper rod translation in the hook head during distraction.

*Note: Hooks must be implanted before pedicle screws. If not implanted in this order the Hook Pusher will interfere with the screw heads.

**Step 7** **Distract as needed**

Distraction is required to securely push hook around pedicle. The Distractor can also be used to adjust the spacing between the pedicle hook and screws.

Use the Screwdriver T25 Long to secure the hook to the rod after distraction.

**Step 8** **Perform final lock on all set screws**

Place bone graft between the vertebrae to be fused or around the Easyspine rod in the natural channel created between the spinous and transverse process.
### Under laminar hook

**Concept**

The Easyspine under laminar hook was designed to be used in the lumbar region as an angled offset hook.

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**Step 1**  
Place pedicle screws using the standard Easyspine technique

**Step 2**  
Insert rod into the screw heads

**Step 3**  
Perform final tightening on pedicle screws
Step 4  Use Laminar Rasp (ES952R) to prepare lamina and verify hook position

Step 5  Assemble hook to hook holder
Similar to the LP assembly, clamp the Forcep (ES964R) prongs to the back sides of the hook, where the hook head wraps around the hook swivel.
**Final hook position**

Using the Screwdriver T25 Long to stabilize the assembly, place the hook in final position. Use the notch in the stem of the hook as an indicator of the hook’s position. The notch lines up with the hook’s orientation.

**Rod insertion**

Rotate hook head to accept the rod using the Forceps.

**Provisionally tighten the hook set screw**
Step 9

**Lock hook nut**

Perform the final lock on hook nut: Insert the Screwdriver T25 Long through the cannulated shaft of the Wrench (ES956R), then use the Screwdriver T25 Long to keep the inside of the nut from moving while turning the outer nut to lock.

During final lock, apply pressure using the Screwdriver T25 Long to curve the hook blade under the lamina.

Step 10

**Compress or distract as needed**

Step 11

**Perform the final lock on the hook set screw**

Place bone graft between the vertebrae to be fused or around the Easyspine rod in the natural channel created between the spinous and transverse process.
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