Luxor® Surgical Technique

- Minimally invasive procedures
- Luminated expandable oval retractor
- Complete visualization and working space
# Luxor Surgical Technique

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Acknowledgments

Stryker Spine wishes to thank the global Luxor Surgeon Panel for their dedication to the development of the Luxor System.

Introduction

The objective of Stryker Spine Less Invasive Technologies (LiTe) is to replicate the clinical results of the corresponding open procedure. What sets the minimally invasive procedures apart from open procedures is that while delivering similar clinical results, these procedures may offer reduced intraoperative blood loss*, reduced postoperative mobilization times*, and minimized postoperative consumption of orally administered narcotics*.

The Luxor Retractor, part of the LiTe platform, was designed to provide access to the thoracic and lumbar spine from a posterior approach via a small incision. The oval design of Luxor® reduces the medial/lateral muscle retraction seen in some circular retractors, while providing more working space at the level of the incision.

Important

This Surgical Technique sets forth detailed, recommended procedures for using the Luxor System. It offers guidance that you should heed but, as with any such technical guide, each surgeon must consider the particular needs of each patient and make appropriate adjustments when necessary and as required.

Always refer to the package insert, product label and/or instructions before using any Stryker implant or instrument.

Note: No acid or alkaline solvents should be used in the cleaning of anodized components.

Note: Upon the completion of each surgical procedure, use adequate suction and irrigation to ensure the removal of any existing non-implantable materials.

Note: This is intended as a guide only. There are multiple techniques, and as with any surgical procedure, a surgeon should be thoroughly trained before proceeding.

*Data on file at Stryker Spine
Key Design Features

**Radiolucent**
- Complete visualization of anatomical landmarks

**Silicon sleeve & Anatomical blades**
- To prevent tissue from entering surgical site

**Cobb-style initial dilator**
- Facilitates tissue dissection while incorporating insertion safety

**Large distal span**
- Maximizes access at surgical site

**Oval design**
- Maximizes working & visualizations channels while minimizing tissue damage

**Thin, shadowless lighting component**
- Continuous panoramic lighting that conforms to surgical site

Reliance LITe Decompression Instruments

- Bayoneted
- Non-reflective coating
- Thinner shaft profiles
- Increased working shaft length

Fixation Instruments

- Accommodates Cannulated and Non-cannulated screws
- Rod insertion
- Blocker insertion
- Construct adjustment and final tightening
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Patient Positioning

Luxor can be used under local, epidural, spinal or general anesthesia. General anesthesia is commonly used since it is the most comfortable for the patient and allows immediate postoperative neurological assessment.

- The patient is prepped and draped in the usual sterile manner for posterolateral fusion with pedicle screw fixation.

Arm Assembly Positioning

The Mediflex Flex Arm Post (48250240) mounts to the hospital bed rail. Check compatibility of the Mediflex Flex Arm Post to the hospital bed prior to surgery.

- Mount the Arm Post to the bed rail on the opposite side of the surgeon near the patient’s hip.
- Turn the Arm Post locking mechanism clockwise to secure it to the bed.

- Once the Arm Post is secure, attach the Snake Arm (48250230) to the Arm Post and lock into place.
- The Snake Arm should be positioned to lie across the patient and wrap in front of the surgeon.

Note: The Snake Arm should be properly reset and lubricated between uses.

Note: For additional information, see the Mediflex Flex Arms Surgical User’s Manual.

Note: When using a Jackson Table, an OSI Adapter is needed to mount the Arm Post to the table.

Options are:
- OSI Retractor Adapter PN 5888
- OSI Slide Rail Adapter PN 5855-830
Lighting Preparation

- Determine the type of light source available in the OR.
- Choose the corresponding Luxor Lightsource Adapter:
  - Stryker / ACMI / Zimmer Lightsource Adapter (233-050-071)
  - Storz Lightsource Adapter (233-050-073)
  - Olympus Lightsource Adapter (233-050-072)
  - Wolf / Dyonics Lightsource Adapter (233-050-074)
- Attach the Universal Light Cable (48250215) to the appropriate Adapter and insert into the light source.
- Attach the other end of the Universal Light Cable to the Lighting Component (48250210).
- Turn on the light source power to verify light output.

Note: the Universal Light Cable is made of clear fiber optics. This is designed to easily identify broken fibers. If light output is low this instrument may need to be replaced.

Note: The Lighting Component is a single use instrument.
Establishing Access

A/P images are used to confirm placement of the Luxor System.

The Retractor Base is delivered via a dilation system at approximately the same angle as the pedicle screws are to be inserted.

Upon insertion, the Luxor retractor exposes portions of the lamina, facet joints, and transverse process.

The following steps are taken to assure the correct positioning of the Luxor System.

Markings

- Using A/P imaging, place the Guide Pin (48250010) transversely across the mid-line of the cephalad pedicles.
- Draw a line extending several inches lateral to the pedicles.

Figure 5
Repeat for the caudal pedicles.
Carefully determine the appropriate entry point and trajectory for the Luxor.

- For decompression, the entry point is approximately 2 cm off mid-line with a more medial trajectory.
- For pedicle screws, the entry point is approximately 4 cm off mid-line with a more lateral trajectory.

**Note:** The entry point is typically at or cephalad to the accessory process (AP) on the transverse process.

- A 3.5 cm incision parallel to the spine is made at the puncture site.
- Incise the fascia to make tissue dilation easier.

**Note:** For procedures not requiring distal expansion of the retractor, a 3.0 cm incision can be used for insertion.

**Note:** If tissue dilation is difficult increase the fascial incision.

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**Initial Dilator Insertion**

- Place the cobb style **Initial Dilator (48250016)** through the incision.
- Advance the Dilator through the tissue while directing it toward the inferior aspect of the superior lamina under lateral imaging.
- The **Dilator** is advanced through the lumbodorsal fascia.
- Location of the cobb style **Initial Dilator** is confirmed using imaging.
- Note the depth marking of the **Dilator** in relation to the skin.

The Dilators have depth markings (40, 50, 60, 70, 80, 90, 105, 120 mm) laser etched which correlate to retractor blade lengths.

- Choose a **Retractor Blade** length (48250(040)-(120)) based on where the top of the skin meets the Dilator.

**Note:** If the skin is between two markings on the Dilator choose the next longest Blade.
Use the cobb style **Initial Dilator** to palpate the lamina in both the sagittal and transverse planes. This confirms an appropriate approach laterally.

The tip of the **Dilator** is used to sweep the paraspinal musculature off the laminar edge.

**Note:** The Dilator (22mm width) is designed not to enter the intralaminar space when oriented cephalo-caudal.

**Note:** By keeping the Dilator tip in the subperiosteal space, the dissection is essentially bloodless.

**Note:** Feel, fluoroscopy, anatomical knowledge, review of preoperative images, and partial visualization may all contribute towards desired instrument placement accuracy.

**Note:** Great care must be taken to avoid penetration of the ligamentum flavum and inadvertent dural puncture with possible nerve injury or spinal fluid leak.

**Note:** If using the Guide Pin do not direct it lateral to the lamina or facet, which risks injury to the nerve root or deeper structures.

**Note:** To ensure that the Guide Pin was not bent during a prior surgical procedure, pass the Guide Pin through the cannulation in the cobb style Initial Dilator. This activity confirms that the Guide Pin is not bent, and reduces the risk of the Guide Pin being advanced forward into the canal space when used through the cobb style Initial Dilator during the dilation process.
Subsequent Dilator Insertion

**Option 1: Sequential Dilators**

- Slide the 2nd (48250012), 3rd (48250013), 4th (48250014) and 5th (48250015) Dilators to sequentially penetrate and gently dissect soft tissue down to the lamina.

- Remove the previous Dilator after inserting the larger one.

**Note:** Larger diameter Dilators may be used to probe and identify the anatomy.

**Note:** Use fluoroscopic images to confirm the placement of the final Dilator on the superior facet.

**Option 2: Cannulated Blunt Dissector**

- Slide the Cannulated Blunt Dissector (48250019) over the Initial Dilator. The single bar should be on the proximal end.

- Remove the Cannulated Blunt Dissector and re-insert with the double bar on the proximal end.

- Use the Cannulated Blunt Dissector to penetrate and gently spread and dissect soft tissue down to the lamina.

- Use imaging to confirm the placement of the Blunt Dissector on the superior facet.

**Note:** Proximal and distal ends of the cannulated blunt dissector are identified as follows:

1 bar denotes the proximal end.

2 bars denote the distal end.
**Retractor Assembly**

Assemble each Retractor “Blade” into the Retractor “Base” (48250030)

1. Orient the Base so that the variable driving screw and post are pointing up.
2. Align the hole in the proximal end of the Blade with the pin in the Base.
3. Lightly squeeze the Blade on the proximal edges and insert the Blade into the Base.
4. Release the **Blade** so that it engages the **Base**.

5. The cutouts at the top of the **Blade** should snap into the rectangular features in the **Base**.

6. Repeat the process for the second **Blade**.

**Note:** If a side of the **Blade** does not engage the **Base**, push on the 1mm edge of the **Blade** that is not engaged toward the cephalo-caudal orientation of the **Base**.

**Note:** The **Blades and Base** are color coded. Match the appropriate **Blade** color with the corresponding **Base** color during assembly.

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- Based on the Blade length, obtain the corresponding **Silicon Sleeve (48251(040)-(120)**.

- With the **Retractor** in the closed state, dip the **Blades** in a saline bath.

- Slowly slide the corresponding **Silicon Sleeve** onto the **Blades** until it contacts the **Base**.

**Note:** The **Silicon Sleeve** is a single use instrument.

**Note:** The **Silicon Sleeve** should be slightly longer than the longest **Blade** being used.

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**Note:** In cases where the **Retractor** cannot be actuated due to docking on bone, using **Blades** of different length is recommended.

**Note:** The **Silicon Sleeve** may need to be cut or altered to accommodate the varying blade lengths chosen.

**Note:** The sterile **Sleeve** should be cut with a sterile cutting instrument prior to assembly onto the **Retractor**.

**Note:** No jagged edges or visible silicon fragments should be present on the Sleeve when introducing the **Retractor** assembly into the incision.
Insert the **Lighting Component** into the **Retractor Base**. The **Lighting Component** should be inserted between the **Retractor Blade** and **Silicon Sleeve**.

The **Lighting Component** is inserted until the black bar on the Component is even with the Retractor Base.

The **Lighting Component** should be oriented so that the “Stryker LITE” logo is facing up.

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**Retractor Insertion**

- Slide the closed **Retractor** assembly over the **Blunt Dissector** with the variable drive screw and post positioned laterally.

- Dock the **Retractor** on the lamina.
Attach the **Snake Arm** to the **Retractor Base**.

Lock the **Snake Arm** to the **Retractor Base** post by turning the collet.

Secure the **Arm Assembly** by tightening the knobs.

Remove the final **Dialator**. This establishes an oval operative corridor to the lamina and interlaminal space.

Use imaging to confirm appropriate positioning.

**Note:** If repositioning of the Retractor is necessary to expose the laminar edge, use the **Driver (48250200)** to collapse the Retractor. The Retractor can then be moved or angled over the pathology using the cobb style Initial Dilator. Once in the proper location, the Arm Assembly is tightened.

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**Retractor Variable Opening/Closing Mechanism**

Insert the **Driver (48250200)** into the post of the **Retractor Base** and screw down (clockwise) the variable drive screw to expand the distal end of the Retractor Blades.

If necessary, gently rock the **Retractor Base** in the cephalo-caudal direction during expansion.
Confirm expansion and position of the Luxor System with imaging.

**Note:** Distal opening of the Retractor is dependant on the Blade length. There is a mechanical stop in the Retractor base with a maximum opening of 22.5 degrees. This correlates to:

<table>
<thead>
<tr>
<th>Blade Length (mm)</th>
<th>Retractor Distal Span with Silicon (mm)</th>
<th>Maximum Rod Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>68</td>
<td>65</td>
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<td>50</td>
<td>76</td>
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<td>90</td>
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<tr>
<td>120</td>
<td>85</td>
<td>80</td>
</tr>
</tbody>
</table>
Disc Preparation and Removal

Luxor System offers a comprehensive set of Reliance LITe decompression instruments. This Reliance LITe set consists of:

- Penfield Elevators: Inspection of the surgical site between dura and bone.
- Nerve Retractors: Retract compressed nerve root away from disc space.
- Nerve Probes: Inspection of the surgical site. The ball tip helps to prevent damage of the nerve.
- Woodson Probes: Exploration of the disc space.
- Suction Tips: Provide suction capabilities to evacuate fluid and debris from surgical site.
- Kerrison Rongeurs: Remove disc material, cartilage and hard connective tissue.
- Sypert Rongeur: Remove hard connective tissue. Instrument designed exclusively for use through the Luxor™ Retractor.
- Bovie: Dissect soft tissue.
- Bi-Polar: Dissect soft tissue.
These instruments are designed with:

- Bayoneted working shafts provide greater visibility while working through the Retractor.

- Working lengths of the 16cm or more for surgical procedures in the lower posterior thoracic and lumbar spine.

- Non-reflective coating to further increase visibility by reducing glare, while working through the Retractor.

- Handle profiles and shaft diameters minimized to provide greater visibility.

- Tips rounded for safety.
Disc Preparation and Removal Continued

- Identify the offending disc material.
- Enter the disc space at the vertebral margins.
- Resect the posterior lip of the vertebral body. This will simultaneously help free the cartilagenous endplate and provide direct entry to the disc space.

- Remove the offending disc material with a Sypert Rongeur (48247001).
- Intradiscal and extradiscal work can be executed, as one would normally perform during a microdiscectomy.

- The nerve root and spinal canal are explored to ensure the decompression is complete.
- Once the nerve root is decompressed, irrigate the disc space thoroughly.
Interbody Fusion

A shaver (TPS Saber; Stryker Endoscopy) is ideal to free the cartilagenous endplates while preserving the bony endplate.

If an Interbody Fusion is to be performed, complete the discectomy, leaving the anterior and lateral aspects of the annulus intact.

Prepare the endplate for the interbody fusion.
Once the disc space is meticulously prepared, insert cancellous bone into the disc space using angled and straight forceps.

Subsequently, use available bone tamps to impact the cancellous bone. The anterior longitudinal ligament and remaining annulus will contain the graft.

Insert the allograft. Carefully use an angled osteotome or bone tamp to slide the allograft. The chamfered edge facilitates this maneuver.

Pack additional cancellous bone medial to the first graft, then insert the second graft.

To achieve a posterolateral fusion, decorticate the facet, pars, transverse processes and sacral ala using a burr, chisels, curettes, kerrisons, and/or rongeurs in the normal manner.

Place the bone graft over the decorticated bone in the usual manner.
Screw Insertion: Cannulated

The Luxor System is used in conjunction with Stryker Spine systems (i.e., Xia Precision System, Techtonix). See the appropriate Surgical Technique for additional information and device package insert for indications, contraindications, warnings & precautions.

- Insert the Jam Shidi 48237 (105), (110), (115), (135) through the Luxor Retractor to the intersection of the facet and transverse process.

- Confirm that the appropriate pedicle starting place has been determined using both A/P and lateral images.
Use the Jam Shidi needle to gain access to the pedicle.

- After placing the Jam Shidi at the intersection of the facet and the transverse process, the needle may be advanced partially through the pedicle using the Slap Hammer (48237120).

As the pedicle is navigated with the Jam Shidi, it should approach the medial wall of the pedicle on the A/P view and should approach the base of the pedicle on the lateral view.

When the needle reaches the medial wall on the A/P view, verification needs to be performed in the lateral view to ensure the needle is past the base of the pedicle.
Remove the inner trocar of the Jam Shidi.

The removal of the Jam Shidi inner trocar allows the K-Wire (Sharp - 48230230, Blunt - 48230231) to be inserted into the pedicle.

Caution should be practiced with regards to the position of the K-Wire in order to avoid the advancement of the K-Wire.

Note: The K-Wire is 1.2mm in diameter.

Note: The K-Wire is a single use instrument.
Use the **K-Wire Guide Tube** (**48230235**) to prevent the K-Wire from bending or moving during insertion.

- Place the **K-Wire Guide Tube** over the K-Wire and dock on the Jam Shidi.
- Use the **Slap Hammer** to impact the K-Wire.

Once the K-Wire is inserted, remove the outer shaft of Jam Shidi.

- Hold the K-Wire in position when removing the Jam Shidi.

Prepare the pedicle by placing the **Xia® Precision Square Awl** (**48237001**) over the K-Wire and twisting into the pedicle.

- Hold the K-Wire in position when removing the Awl.
- Use the cannulation of the **Slap Hammer** to impact the Awl.

**Note:** The Awl has a stop at 12.0mm.
If the bone is too hard, the appropriate Tap may be used to prepare the pedicle screw canal.

The Xia Precision Taps (5.5mm – 48230165, 6.5mm – 48230166, 7.5mm – 48230167) are calibrated and laser etched with 10.0mm intervals to help indicate the depth at which the Tap has been inserted as well as to help determine proper screw length.

Note: The length of the Taps’ thread is 25mm.
The Tap Sleeve (48231315) can be used to prevent soft tissue from contacting the Taps’ thread.

- As an instrument advances into the pedicle, the proximal end of the instrument will move relative to the markings. If this does not occur during insertion the procedure should be stopped and fluoroscopy should be used to verify the position of the K-Wire in relation to the Precision Square Awl or Precision Tap.

Note: 1.0cm interval markings on the K-Wire provide the cannulated instruments depth in the pedicle.

- Check pedicle depth with either fluoroscopy or read the depth from the Tap Sleeve as it moves along the proximal shaft of the Taps. There are markings at 30, 40 and 50mm.

Note: The Tap Sleeve is made of radiolucent Ultem Poly Ether Imide.

Note: Slide the Tap Sleeve proximal to the Tap shaft to engage the friction fit.

- Hold the K-Wire in position when removing the Precision Tap.
Screw Insertion

With the pedicle pathways prepared and proper screw length and diameter determined, the bone screw is prepared for insertion.

The **Xia Precision Polyaxial Screwdriver** (48231310) provides a very rigid connection between the polyaxial bone screws and the screwdriver. The screwdriver can be attached to any of the cannulated modular handles using the quick release mechanism.

1. Preload the **Screwdriver Protection Sleeve** (48237009) onto the **Xia Precision Screwdriver**.

2. Place a **Xia Precision Bone Screw** on the distal end of the screwdriver and lock into place.

**Note:** The **Xia Polyaxial Screwdriver** (48041310) may be too short to use with some of the longer Luxor Retractor Blades.
Note: With the **Xia Precision Bone Screw** engaged with the **Precision Screwdriver**, the **Screwdriver Protection Sleeve** is slid over the proximal end of the screwhead to prevent the screwhead from contacting instruments during implantation.

- Place the **Xia Precision Bone Screw** over the **K-Wire** and insert into the pedicle.

- After driving the screw assembly into the pedicle, remove the **K-Wire** to prevent it from advancing.

- Be certain that the screw assembly is not inserted too far. If the multi-axial head of the **Xia Precision Bone Screw** is driven too forcefully against bone, it will lose its multi-axial capabilities making it difficult to connect the assemblies during subsequent steps.
Repeat the process for additional bone screws.

After inserting additional bone screws, the head of the bone screws should be the same height.

**Note:** The polyaxial bone screws may lock upon insertion. Use the **Xia Inserter (48047009)** to unlock the heads before introducing the rod.

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**Screw Insertion: Non-Cannulated**

- Use the **Bayoneted Awl (48250350)** to create a starting hole for the pedicle screw through the Luxor Retractor while not obscuring the surgeon’s view.
Use the **Bayoneted Gear Shift (48250300)** to open up the pathway of the pedicle through the **Luxor Retractor** while not obscuring the surgeon's view.

- The **Gear Shift** should contact the bone at all times.
- The correct rotational insertion of the instrument will allow the **Gear Shift** to follow a path of least resistance without violating the pedicle walls.

Use the **Tapered Ball Probe (48250360)** to feel the wall of pedicle.

**Note:** The Tapered Ball Probe has markings at 30, 40, 50 and 60mm. Use imaging to determine the appropriate screw length.

**Note:** To ensure maximum exposure and maneuverability of the Luxor System, decortication can be facilitated when it is performed after pedicle probing and tapping and prior to screw placement.

See the Xia Spinal System Operative Technique for pedicle screw insertion and package insert for indications, contraindications, warnings & precautions.
Rod Insertion

- Adjust the bone screw height using the Xia Poly Adjustment Driver (48047033).

- Align the tulip heads of the bone screws using the Screw Head Adjuster (48250310) to facilitate rod insertion.
Use the Rod Calipers (48250320) to determine the appropriate rod length.

1. Adjust the length of the Rod Caliper stems based on the corresponding Blade Length.

2. Collapse the Rod Caliper stems and insert into the Retractor.

Note: When using the Rod Caliper start with arms adjusted to longest blade length being used. When using the 120 mm blades the Rod Caliper arms should be fully extended.

3. Dock the Rod Caliper stems onto the most superior and inferior bone screw heads.

4. Twist the nut on the Rod Caliper until slight pressure is felt once the nut contacts the Caliper stems.

5. Remove the Rod Caliper from the Retractor. The stems will spring back to the position inside the Retractor.

6. Compare the distal span of the Rod Caliper stems with the rod sizes.

Note: Another way to determine rod lengths is by placing a rod of the estimated length in the Rod Holder and holding it over the surgical site. Use imaging to help determine the appropriate rod length.
Perform rod bending with the **Xia French Bender** (03807010) to fit the desired spinal contours.

The **Rod Introducer (48250330)** is used through the Retractor to:

1. Transition the rod from a vertical to a horizontal orientation
2. Seat the rod into the screw head
3. Hold the rod in between screw heads
4. Adjust the rod between screw heads
5. Remove the rod during the surgical procedure

- Grasp the appropriate length rod in the middle using the Rod Introducer.
- Rotate the rod to a off-vertical orientation.
Insert the rod through the Retractor Base.

Place the distal section of the rod into the head of either the inferior or superior screw.

Push down on the center of the rod to seat it into the remaining screw heads.

Adjust the positioning of the rod such that it extends through the screws as seen on the lateral x-ray.

Note: It is recommended not to release the rod from the Rod Inserter until the Blockers are inserted into the screwheads.
**Figure 59**

**Blocker Insertion**

The **Inserter (48047009)** can help align the **Universal Tightener 5mm (03807008)** and the **Blocker (03756230)** through the Retractor.

The two engraved lines on the Universal Tightener denote the following:

1. When the lower line is aligned with the top of the Inserter, the Blocker is at the top of the implant.

2. When the upper line is aligned with the top of the Inserter, the Blocker is fully introduced into the implant.
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Figure 60

Insert the Universal Tightener into the Blocker.

Figure 61

Place the Inserter through the Retractor and dock it onto the screw head.

Note: Maintain the position of the rod in the screwheads using the Rod Inserter.

Figure 62

Slide the Universal Tightener and Blocker through the Inserter and secure it in the tulip head of the screw.

Rotate the Blocker clockwise to properly seat and temporarily tighten the Blocker.

Note: Do not perform final tightening of the Blocker with the Inserter in place, or it may not be possible to remove the Inserter.

Repeat for other bone screws.

Release the Rod Inserter from the rod once the Blockers are introduced.

Note: The Retractor may need to be repositioned for easier Blocker insertion by adjusting the Snake Arm or distal expansion.

Note: Use imaging and monitoring, as preferred, for added information during bone screw insertion.

Note: For easier blocker insertion, the Retractor may need to be repositioned by adjusting the Snake Arm or increasing the Retractor’s distal blade expansion.
Compression

- Lock the 1\textsuperscript{st} Blocker.
- Insert the \textbf{Compressor (48250370)} through the Retractor. The \textbf{Compressor} handle should point medially.
- Insert the \textbf{Xia Universal Tightener} through the Retractor and engage the 2\textsuperscript{nd} Blocker.
- Engage the \textbf{Compressor} on the screwheads and apply force.
- Lock the 2\textsuperscript{nd} Blocker using the \textbf{Universal Tightener}.
- Remove the \textbf{Universal Tightener}.
- Release the force from the \textbf{Compressor} and remove from the Retractor.

\textbf{Note: Compressor} should be stored in the open position while in the container.
**Construct Tightening**

Once the correction procedures have been carried out and the spine is fixed in a satisfactory position, the final tightening of the Blocker is done by utilizing the **Anti-Torque Key (48027000)** and the **Torque Wrench (03807028)**.

1. Insert the **Torque Wrench** through the **Anti-Torque Key**.
2. Mate the top of **Anti-Torque Key** with the bottom of the handle of the **Torque Wrench**.
3. Insert the final tightening assembly through the **Retractor**.
4. Visualize the distal end of the **Torque Wrench** entering the **Blocker**.
5. Dock the **Anti-Torque Key** on the **Screw**.
6. Line up the two arrows on the **Torque Wrench** to achieve the optimum torque of 12Nm for final tightening of the implants.

**Note:** The Anti-Torque Key must be used for final tightening. The Anti-Torque performs two important functions:

1. It allows the Torque Wrench to align with the axis of the tightening axis.
2. It allows one to maximize the torque needed to lock the implant assembly.

**Note:** If the Anti-Torque Key cannot be easily removed from the implant head, the rod may not be fully seated.

- Apply bone graft to the fusion site and close in the usual manner.

**Note:** For additional information, please refer to the Xia Surgical Technique.
Contralateral Side

Move to the opposite side of the patient and repeat the steps of the technique on the contralateral side.

It is recommended that a visible inspection of the surgical site be performed followed by irrigation and suction post procedure to insure that no existing implantable materials are left in-situ.
## Catalog # | Description
--- | ---
### Instruments
| 48250000 | Luxor Retractor Tray
| 48250000AA | Luxor Retractor Tray Insert
| 48250230 | Snake Arm
| 48250240 | Arm Post
| 48250010 | Guide Pin
| 48250012 | Dilator #2
| 48250013 | Dilator #3
| 48250014 | Dilator #4
| 48250015 | Dilator #5
| 48250016 | Cobb Style Initial Dilator
| 48250019 | Cannulated Blunt Dissector
| 48250030 | Retractor Base
| 48250040 | Set of Retractor Blades 40mm
| 48250050 | Set of Retractor Blades 50mm
| 48250060 | Set of Retractor Blades 60mm
| 48250070 | Set of Retractor Blades 70mm
| 48250080 | Set of Retractor Blades 80mm
| 48250090 | Set of Retractor Blades 90mm
| 48250105 | Set of Retractor Blades 105mm
| 48250120 | Set of Retractor Blades 120mm
| 48251040 | Set of Silicon Sleeves 40mm
| 48251050 | Set of Silicon Sleeves 50mm
| 48251060 | Set of Silicon Sleeves 60mm
| 48251070 | Set of Silicon Sleeves 70mm
| 48251080 | Set of Silicon Sleeves 80mm
| 48251090 | Set of Silicon Sleeves 90mm
| 48251105 | Set of Silicon Sleeves 105mm
| 48251120 | Set of Silicon Sleeves 120mm
<table>
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<td>Driver</td>
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<tr>
<td>48240005</td>
<td>Reliance LITe Decompression Tray</td>
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<tr>
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<td>Reliance LIte Decompression Tray Top Insert</td>
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<td>Reliance LIte Decompression Tray Middle Insert</td>
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<tr>
<td>48242240</td>
<td>Kerrison Bayonet 2mm, 40 degree</td>
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<td>Kerrison Bayonet 5mm, 90 degree</td>
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<td>48242200</td>
<td>Kerrison Bayonet Upbiting (curved up at tip), 2mm</td>
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<td>48242400</td>
<td>Kerrison Bayonet Upbiting (curved up at tip), 4mm</td>
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<td>48243045</td>
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<td>Woodson Probe Bayoneted 90 degree</td>
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<td>Ball Probe Bayoneted 110 degree, Straight, Short</td>
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<tr>
<td>48245002</td>
<td>Suction Tip with Bend, with Lip</td>
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<td>Colorado MircoNeedle 7 inch Sleeve, 2 inch 45 degree bend</td>
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<td>Sypert Rongeur</td>
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<td>Xia Rod Pusher</td>
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Removal or Revision Procedures

The spinal implants are temporary internal fixation devices designed to stabilize the operative site during the normal healing process. After healing occurs, these devices usually serve no functional purpose and can be removed. Removal may also be recommended in other cases, such as:

- Corrosion with a painful reaction
- Migration of the implant, with subsequent pain and/or neurological, articular or soft tissue lesions
- Pain or abnormal sensations due to the presence of the implants
- Infection or inflammatory reactions
- Reduction in bone density due to the different distribution of mechanical and physiological stresses and strains
- Bone growth restraint due to the presence of the implants (in pediatric use)
- Failure or mobilization of the implant

Standard ancillaries provided by Stryker Spine can be used to remove the implants. Any decision by a physician to remove the internal fixation device should take into consideration such factors as the risk to the patient of the additional surgical procedure as well as the difficulty of removal. Removal of an unloosened spinal screw may require the use of special instruments to disrupt the interface at the implant surface. This technique may require practice in the laboratory before being attempted clinically. Implant removal should be followed by adequate postoperative management to avoid fracture or re-fracture. Removal of the implant after fracture healing is recommended. Metallic implants can loosen, bend, fracture, corrode, migrate, cause pain or stress shield bone.
A surgeon must always rely on his or her own professional clinical judgment when deciding whether to use a particular product when treating a particular patient. Stryker does not dispense medical advice and recommends that surgeons be trained in the use of any particular product before using it in surgery.

The information presented is intended to demonstrate the breadth of Stryker product offerings. A surgeon must always refer to the package insert, product label and/or instructions for use before using any Stryker product. Products may not be available in all markets because product availability is subject to the regulatory and/or medical practices in individual markets. Please contact your Stryker representative if you have questions about the availability of Stryker products in your area.

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