4.5 System

Surgical Technique

This publication is not intended for distribution in the USA.
## Contents

EXPEDIUM® 4.5 Spine System  
Features and Benefits

**Surgical Technique**
- Extended Tandem Connector  
- Placement  
- Rod Rotation  
- Intra-Operative Compression and Distraction  
- Bridging Proximal and Distal Rods

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPEDIUM® 4.5 Spine System</td>
<td>2</td>
</tr>
<tr>
<td>Features and Benefits</td>
<td>3</td>
</tr>
<tr>
<td><strong>Surgical Technique</strong></td>
<td></td>
</tr>
<tr>
<td>Extended Tandem Connector</td>
<td>4</td>
</tr>
<tr>
<td>Placement</td>
<td>5</td>
</tr>
<tr>
<td>Rod Rotation</td>
<td>7</td>
</tr>
<tr>
<td>Intra-Operative Compression and Distraction</td>
<td>8</td>
</tr>
<tr>
<td>Bridging Proximal and Distal Rods</td>
<td>9</td>
</tr>
</tbody>
</table>
“Larger deformities in smaller anatomies are still one of the most challenging issues in spinal surgery.”

Statements like this highlight a common sentiment among spine surgeons engaged in the treatment of small stature patients. Concerns over implant profile and implant selection, along with the ability to choose instrumentation based on patient size and pathology are fairly common when treating this patient group.

Seeking to eliminate these concerns, DePuy Spine has developed a rod-hook-screw system specifically designed for these smaller anatomies: the EXPEDiUM 4.5 Spine System.

The new EXPEDiUM system exhibits the lowest profile in our Thoracolumbar Portfolio, making it a useful option for cases in which the surgeon is challenged with implant protrusion and cosmetic problems.
### FEATUrES AnD bEnEFITs

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low implant profile</td>
<td>• Decreases soft tissue disruption and may improve cosmesis</td>
</tr>
<tr>
<td>In-Line Technology</td>
<td>• Appropriate implant option for specific patient anatomy, indication, and surgeon’s preferred technique</td>
</tr>
<tr>
<td>Offset Technology</td>
<td>• Appropriate implant option for specific patient anatomy, indication, and surgeon’s preferred technique</td>
</tr>
<tr>
<td>Complete line of Hooks</td>
<td>• Appropriate implant option for specific patient anatomy, indication, and surgeon’s preferred technique</td>
</tr>
<tr>
<td>System includes Ti and SS and CoCr Rods</td>
<td>• Appropriate implant option for specific patient anatomy, indication, and surgeon’s preferred technique</td>
</tr>
<tr>
<td>Completely re-designed instruments (NOT just downsized!)</td>
<td>• Provide the precision and tactile feel critical for procedures in smaller anatomies</td>
</tr>
<tr>
<td>Square Thread Set Screw, TOP NOTCH™, Reduction Tools</td>
<td>• Secure closure mechanism, implant/instrument interface</td>
</tr>
<tr>
<td>Interconnectivity with other EXPEDIUM products</td>
<td>• Offers the ability to create hybrid constructs and simplifies revision cases</td>
</tr>
</tbody>
</table>
| New design for the Extended Tandem Connector | • Easier implantation and correction maneuvers  
                                          • More tissue friendly  
                                          • Stronger construct |
The device presented in this surgical technique is indicated for skeletally mature spines and can be used in a number of deformity correction techniques such as rod rotation, segmental correction, osteotomies or revisions, among others. The selection of the correction technique and anchors for the Extended Tandem Connector construct is dependent on diagnosis and curve type.

The most typical construct in which this device is used consists of two Extended Tandem Connectors, two dual diameter rods per connector (4.5-5.5 mm) and anchors above and below each connector.

This surgical technique manual should be used in conjunction with the EXPEDIUM Spine System Surgical Technique.
4.5 System

PLACEMENT

Sizing and Locating the Extended Tandem Connector in the Spine

- Locate the flattest portion of the spine in the sagittal plane (generally around the Thoracolumbar Junction) and choose the size of the Extended Tandem Connector that will best fit the anatomy. The length of the connector should not exceed the length of the flat portion of the spine (Figure 1).

*Note: It is better to place the Extended Tandem Connector above L3, as the curvature of the spine significantly increases in the portion between the lumbar spine and the sacrum.*

- In the Coronal Plane, the Extended Tandem Connector is located over the pedicles, between the spinous process and the transverse processes (Figure 2).

*Note: Dual Diameter rods (4.5 mm to 5.5 mm) must be used to build constructs with the Extended Tandem Connector. The 5.5 mm portion of the rod will connect with the Extended Tandem Connector while the 4.5 mm portion of the rod will connect with the anchors.*

Anchor Insertion

- Prepare the sites for insertion of at least four anchors in the proximal spine and four anchors in the distal spine. These anchors are inserted in the levels other than the ones chosen for the connector (Figure 3).

*Note: 4.0 mm diameter screws cannot be used in an Extended Tandem Connector/Dual Diameter rod construct.*
**Surgical Technique**

**Rod Template & Rod Contouring**

- Place the Extended Tandem Connector at the chosen site.

- To determine the length of the rods to be used above and below the connector place the rod template inside the proximal and distal anchors and mark on the template where the ends of the Tandem Connector lie and where the ends of the 4.5 mm portion of rods will be cut. Make an additional mark on the template where the centreline of the connector is.

- Remove the template from the anchors making note which end is the proximal end.

- Place the 5.5 mm portion near the transition zone of the proximal dual diameter rod up against the mark that was made on the rod template that signifies the proximal end of the connector.

- Cut the 4.5 mm portion of the rod at the mark on the template that signifies the end of the proximal 4.5 rod. Cut the 5.5 mm portion of rod that signifies the centreline of the connector minus 2.5 mm (allows space for the Tandem Connector distractor). Repeat this step for the distal dual diameter rod.

- Contour the 4.5 mm portion of the proximal dual diameter rod to match the proximal end of the rod template. Repeat this step for the 4.5 mm portion of the distal dual diameter rod. The 5.5 portion of the rod remains straight, as it will reside inside the Extended Tandem Connector.

**Tandem Connector/Dual Diameter Rod Assembly**

- Place rods into the anchors located above and below the Extended Tandem Connector. Assure that there is a 5 mm gap between the two rods to allow for insertion of the distractor.

- Place the connector in the spine by inserting it onto the proximal and distal rods one at a time. Position the centre of the Extended Tandem Connector about the centre of the gap between the rods.

**Tandem Connector-Revision**

- To remove the Extended Tandem Connector in a revision case, loosen the proximal and distal set screws of the connector.

- Slide the Extended Tandem Connector proximally until the proximal end of the distal rod is no longer inside the connector. Move the opening of the distal end of the connector away from the distal rod and slide the whole tandem connector off the proximal rod.
The Extended Tandem Connector construct can be used to facilitate a rod rotation maneuver by replacing a full rod with a combination of one Tandem Connector and two dual diameter rods. With this construct, the proximal and distal dual diameter rods can be rotated independently from each other (Figure 5).

**Rotation of the First Rod**

- To rotate the proximal portion of the spine, first loosen the Extended Tandem Connector's proximal set screw and then tighten the Extended Tandem Connector's distal set screws. Rotate the proximal rod to the desired position.

- Tighten Extended Tandem Connector's proximal set screw and remaining proximal anchors to hold the proximal rod in place. Set screws are not to be tightened down until rod rotation has been completed on the contralateral side.

- To rotate the distal portion of the spine, first loosen the Extended Tandem Connector's distal set screw and then tighten the Extended Tandem Connector's proximal set screws. Rotate the distal rod to the desired position.

- Tighten Extended Tandem Connector's distal set screw and anchors to hold the distal rod in place. Set screws are not to be tightened down until rod rotation has been completed on the contralateral side.

**Rotation of the Second Rod**

- On the contra-lateral side, repeat steps above for the second Extended Tandem Connector construct.
INTRA-OPERATIVE COMPRESSION AND DISTRACTION

- The Extended Tandem Connector construct can be used to facilitate intra-operative compression and/or distraction maneuvers such as the ones that occur after an osteotomy or a spondylectomy. Below are the steps to follow:

- Loosen one or both set screws on the Extended Tandem Connector. (Figure 6)

- If rod distraction is desired, insert the Tandem Connector distractor into one of the channels of the connector in order to separate the rods. (Figure 7 & 8)

- If rod compression is desired loosen one or both set screws on the Extended Tandem Connector and place one tip of the compressor inside the slot of the connector and the other tip against an adjacent anchor and compress until the desired correction is achieved.

- Tighten all set screws.

FIGURE 6: Distraction/Compression Maneuvers-Loosening Set Screw

FIGURE 7: Distracting the rod

FIGURE 8: Finalising Distraction & Tightening set screw
The Extended Tandem Connector can be used when the proximal and distal rods of the construct need to be bridged as part of the correction maneuvers (e.g., for wedge osteotomies or vertebral column resection). In those cases, the Extended Tandem Connector is used to give some flexibility when estimating the correct rod lengths, which is hard to gauge when the rods are not collinear (Figure 9).

Anchor Insertion & Tandem Connector/Dual Diameter Rod Assembly

- Place anchors and rods per surgeon’s correction technique. Leave the rods disengaged in the area adjacent to the osteotomy until after the Tandem Connector has been inserted.

**FIGURE 9:** Bridging proximal and distal rods after osteotomy procedure
Sizing of the Extended Tandem Connector in the Spine

Choose the size of the connectors that best fit the anatomy and the area around the osteotomy where the proximal and distal rods will connect. Determining the size of the Tandem Connector should be done once the correction maneuver is completed and the proximal and distal rods are parallel (collinear) to one another. It is important to keep in mind that:

- The rods inside the connector should be long enough so that the ends are visible through the windows of the connector. If that is not the case, a longer tandem connector will be needed (Figure 10).

- The rods should be short enough so that there is at least a 5 mm gap between them to allow for the insertion of the distractor (Figure 10).

- In the Coronal Plane, the Extended Tandem Connector is located over the pedicles, between the spinous process and the transverse processes (as shown in Figure 2 on page 5).

- The connector is placed in the spine by inserting it into the proximal and distal rods one at a time. Position the centre of the Extended Tandem Connector about the centre of the gap between the rods.

Note: Anchors adjacent to the Tandem Connector should be spaced apart no greater than 76 mm for the 40 mm connector, 125 mm for the 60 mm connector and 172 mm for the 80 mm connector.

Compression and Distraction Maneuvers

- Compression and/or distraction maneuvers can be done as previously explained in this document.
Indications
The EXPEDIUM Spine System is intended to provide immobilisation and stabilisation of spinal segments in skeletally mature patients as an adjunct to fusion in the treatment of acute and chronic instabilities or deformities of the thoracic, lumbar and sacral spine.

The EXPEDIUM Spine System is intended for noncervical pedicle fixation and nonpedicle fixation for fusion for the following indications: degenerative disc disease (defined as back pain of discogenic origin with degeneration of the disc confirmed by history and radiographic studies); spondylolisthesis; trauma (i.e., fracture or dislocation); spinal stenosis; curvatures (i.e., scoliosis, kyphosis, and/or lordosis); tumour; pseudarthrosis; and failed previous fusion in skeletally mature patients.

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