Aesculap Spine S⁴ SRI

Spondylolisthesis Reduction Intrument



Surgical Technique



Main Advantages of the S⁴ Spondylolisthesis Reduction Instrument:



- The unique design of the S⁴ SRI facilitates simultaneous correction of translation and slip angle
- Allows reduction with single-level fusion, sparing adjacent healthy vertebra
- Reduces the listhetic vertebral body along the same curved displacement route, minimizing interference with anatomical structures and eliminating neurologic deficits that typically result from initial over-distraction of an already stretched nerve root
- Enables simultaneous reduction and distraction making it easier to use while reducing overall procedure time
- Reduction maneuver is precise and controlled, reducing risk of inadvertent (unwanted and potentially damaging) movements





Fig. 1 A safe reduction utilizing Aesculap's spondylolisthesis reduction instrument and the S⁴ Spinal System with TLIF.

Fig. 2



Perform a standard Gill Procedure (Fig. 2). During the decompression, perform a complete resection of the pars interarticularis defects to fully decompress the exiting nerve roots. Also, perform a complete resection of the residual superior articular processes in preparation for the TLIF or PLIF.

Planning and Preparation

Screw Placement and Selection

- Within the limits of the patient's anatomy, the screws in the cephalad vertebral body are best placed parallel to its superior endplate and as parallel to each other as possible (Fig. 3 & 4). Place the caudal vertebra screws so that they are parallel to the cephalad vertebra screws in both planes (as compared to the standard convergent manner) (Fig. 3 & 4). Placement of screws in this way allows for optimal operation of the reduction instrument and provides for easier rod placement.
- Polyaxial screws should be used in the cephalad vertebra to be repositioned and monoaxial screws should be used in the caudal vertebral body. In the case of an L5/S1 reduction, the chosen length at S1 should achieve bi-cortical purchase.





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Application and Use

S⁴ SRI – Application and Use

The instrument (Fig. 5) has two components: a right and a left. Each has two pedicle screw attachments: one attaches to the cephalad vertebral screw that will be repositioned, and the other to the caudal vertebral screw.



Prior to Attaching the Instrument

- On the caudal components, make sure the distraction nuts are at a point of minimal distraction (toward the most caudal position of the S⁴ SRI).
- Also, on the caudal components, make sure the reduction bolts are backed out to the point of minimal reduction.

Tips & Tricks:

When attaching the S⁴ SRI, it is not necessary to over-tighten the connection of the instrument to the pedicle screw.

Application and Use

Attaching the Instrument to the Pedicle Screws

- Attach the cephalad component first (Fig. 5). Insert the mounting post into the tulip of the screw and finger tighten (Fig. 6).
- The caudal components are labeled "R" for right and "L" for left. Following this labeling leads to lateral placement of the reduction instruments (Fig. 8). Alternatively, the devices can be placed medially to the pedicle screws by putting the right on the left and the left on the right (Fig. 8a).
- Ensure that the articulated head (Fig. 5) is positioned inferiorly and insert the distraction spindle (caudal component) into the articulated head of the cephalad component. At the same time, insert the mounting post into the tulip of the pedicle screw of the caudal vertebra and finger tighten.







Once the instrument is attached and positioned properly tighten the caudal and cephalad components using the T-handles (Fig. 7). Hold the smaller inner T-handle (FW232R) and use it to apply counter torque while tightening with the larger outer T-handle (FW231R).

The mounting post on polyaxial screws should be tightened enough to lock the polyaxial head. The mounting post on monoaxial screws need to be tightened enough to cover the break-off tabs and part of the screw head.





Tips & Tricks:

Medial placement of the reduction instrument is the preferred method because it usually allows for easier reduction and less soft tissue impingement from the device itself. Lateral placement sometimes allows an easier interbody placement, but can make the reduction maneuver more difficult. In order to avoid breaking of the tab during reduction, make sure to fully tighten the SRI device to the pedicle screw prior to performing the reduction.

Application and Use

The Reduction Process

- Using the large outer T-handle (FW231R) on the reduction bolt, turn clockwise to carefully reduce the spondylolisthesis under C-arm control (Fig. 9).
- Best results are usually achieved by one or two turns of the reduction bolt on alternating sides.
- Monitor the nerve root tension during reduction typically, a decrease in the nerve root tension will be observed.

Distraction

Using the S⁴ distraction forceps (FW181R - located in the S⁴ Spinal System set) slowly spread the S⁴ SRI device to achieve the desired distraction and then lock the distraction in place with the distraction nut on the threaded distraction spindle (Fig. 10).

Tips & Tricks: Overreduction by 2-3 mm allows for the minimal loss of reduction that occurs with graft placement.







Interbody Implant and Rod Placement

- Using the T-handles and applying counter torque as described in the tightening procedure on page 6, remove the S⁴ SRI from one side (if required to provide room to work) and perform a routine TLIF or PLIF (Fig. 11) with the Aesculap ProSpace or T-Space interbody fusion implant systems.
- If the S⁴ SRI was not removed from one side during the previous step, remove one side.
- Place the S⁴ rod, and then lock in place with the set screws (Fig. 12) as described in the S⁴ Spinal System Surgical Technique.
- Repeat on the contralateral side.













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