

INTERFUSE “modular” cage for less invasive Posterior Interbody Fusion

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 Ospedale
San Carlo Borromeo

Sistema Socio Sanitario



Regione
Lombardia

ASST Santi Paolo e Carlo



INDICATIONS to INTERBODY FUSION in DEGENERATIVE LUMBAR SPINE DISEASE

- PRIMARY INSTABILITY
 - Spondylolysis (lytic, non-lytic)
 - Disc insufficiency (discogenic lumbar pain)
- POST-LAMINECTOMY
 - Spinal stenosis
 - Recurrent disc herniation

TECHNIQUES for LUMBAR INTERBODY FUSION

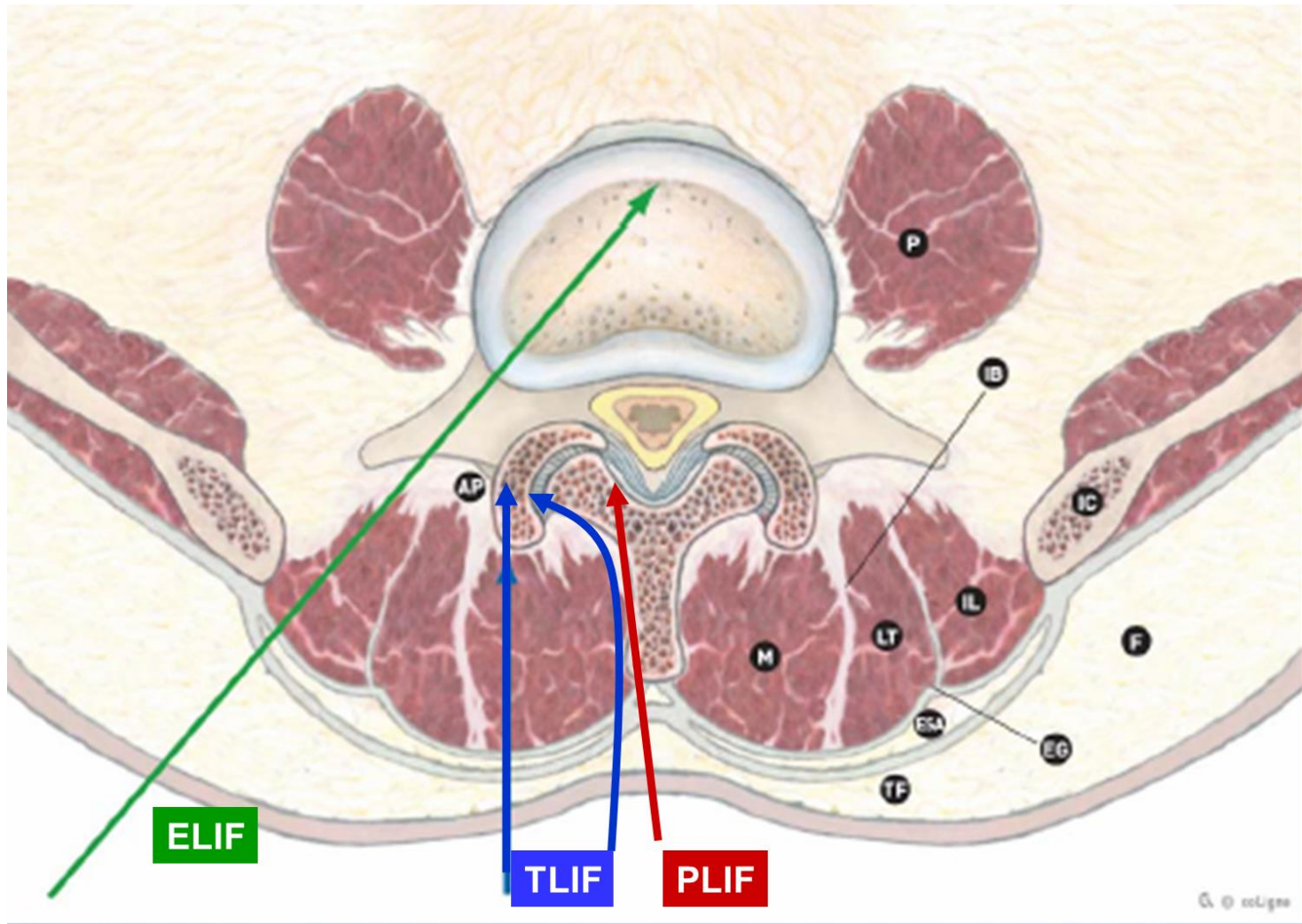
- **anterior**
 - ALIF
- **lateral**
 - XLIF
- **posterior**
 - PLIF (posterior...)
 - TLIF (transforaminal...)
 - MLIF (middle...)
 - ELIF (extraforaminal...)

TECHNIQUES for LUMBAR INTERBODY FUSION

- **anterior**
 - ALIF
- **lateral**
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- **posterior**
 - PLIF (posterior...)
 - TLIF (transforaminal...)
 - ELIF (extraforaminal...)

bilateral
or
unilateral

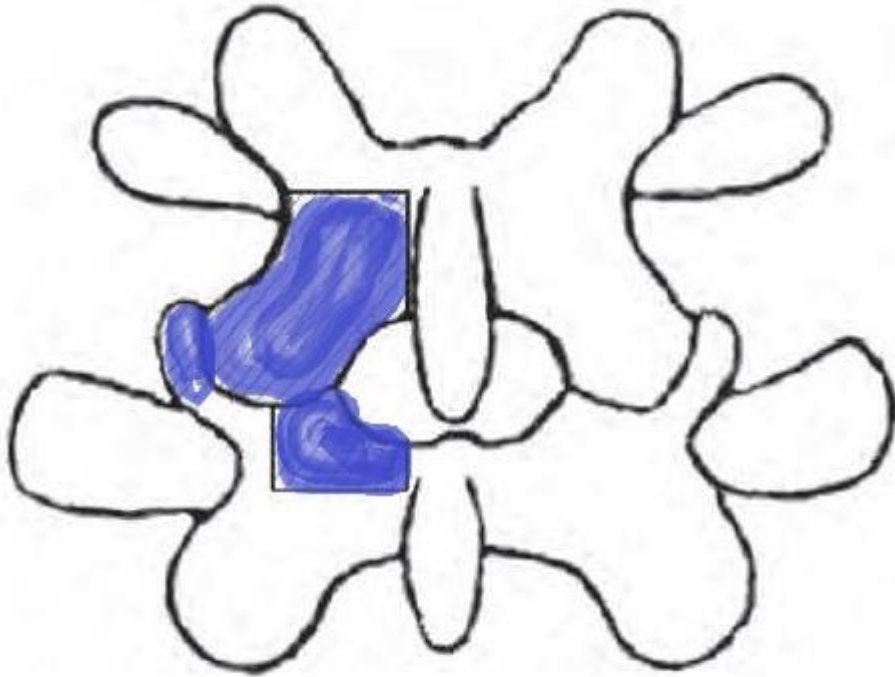
POSTERIOR UNILATERAL APPROACHES



recessual – foraminal APPROACHES

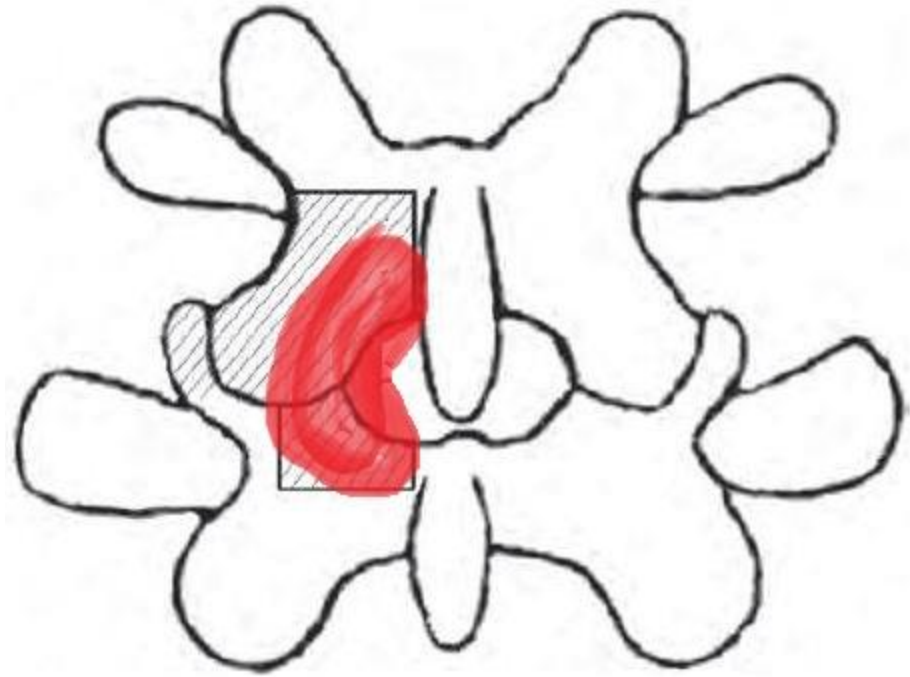
U-TLIF

complete facetectomy



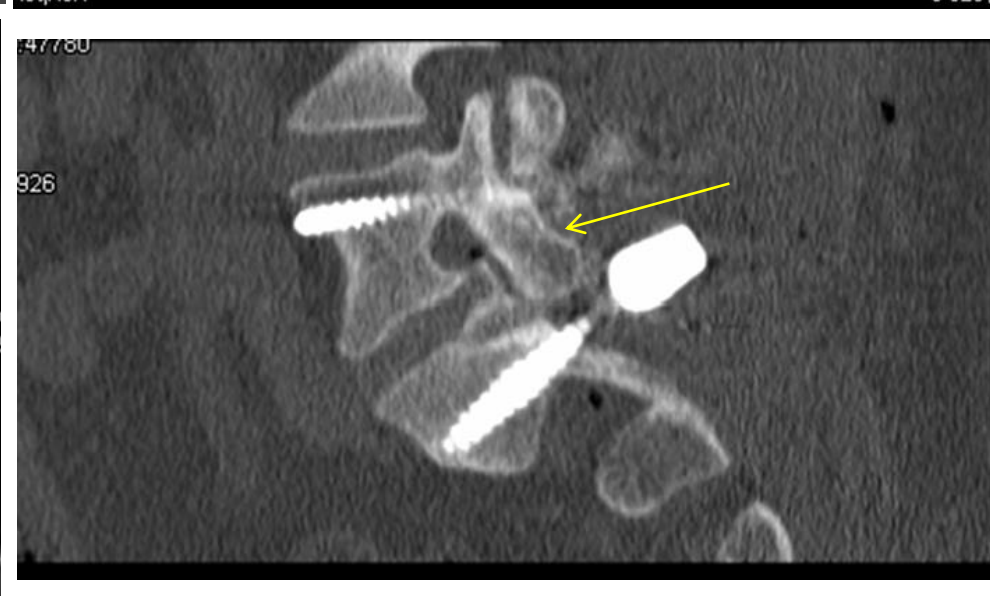
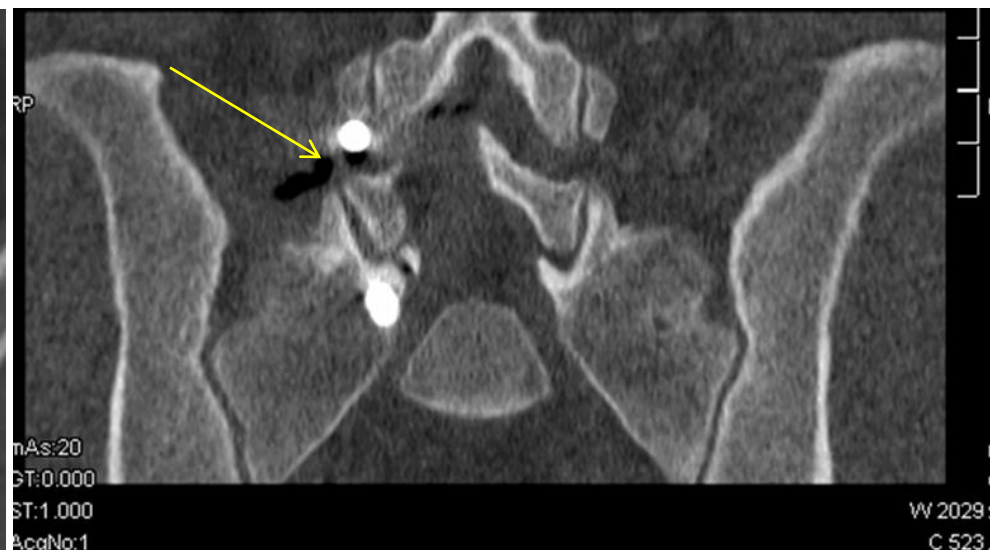
U-PLIF

partial facetectomy
(extended interlaminectomy)



U-TLIF

U-PLIF



UNILATERAL POSTERIOR LUMBAR INTERBODY FUSION

- **ADVANTAGES**
 - Time sparing
 - Blood loss sparing
 - Anatomy sparing
 - Cost sparing

UNILATERAL POSTERIOR LUMBAR INTERBODY FUSION

- INDICATIONS

- Non-lytic low-grade listhesis
- Unilateral recalibrage + sublaminar contralateral decompression
- Unilateral radicular pain in recurrent disc herniation
- Contralateral approach for failed back pain (without radicular pain) avoiding scar

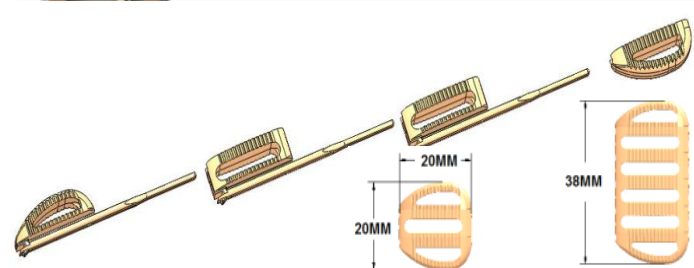
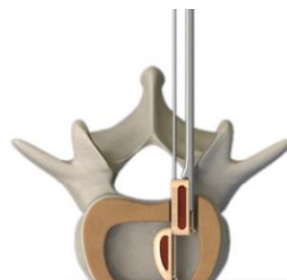
UNILATERAL POSTERIOR LUMBAR INTERBODY FUSION with single non-modular cages

- CRITICAL ISSUES
 - Amount of endplate coverage
 - size of the cages
 - Traction on neural structures
 - Number of cages
 - Control of distal cages
 - Asymmetrical positioning of the cage
 - Shape & direction of the inserction
 - Oblique / transforaminal route

INTERFUSE “MODULAR” CAGE

specific features

- Small size of single modules
 - Sparing articular complex
 - Reducing neural traction
- Unlimited multiple modules
 - Potential 100% endplate coverage
- Integral single final construct
 - Improves load sharing & reduces risk of subsidence
 - Reduces risk of migration & pseudoarthrosis

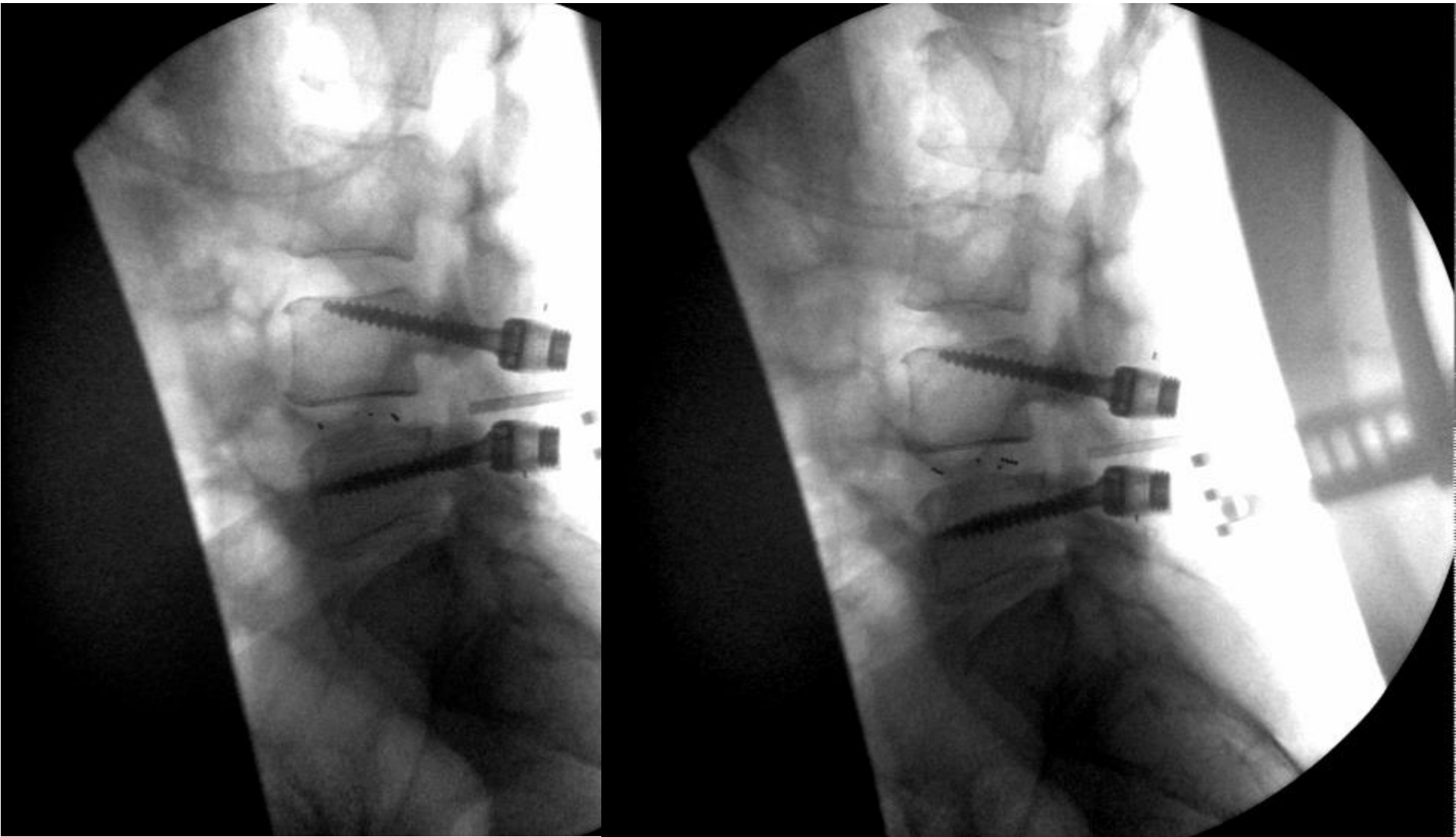


INTERFUSE “MODULAR” CAGE

advantages vs multiple independent cages in unilateral approaches

- Easier sliding (single construct)
- Continuous control & recover of first / distal cages (single construct)
- Less risk of subsidence in osteoporotic pts mainly with irregular endplate (wide and single construct)
- Less risk of migration intraop & postop (single construct)
- Less risk of pseudoarthrosis (single construct)

Intraop X-ray control

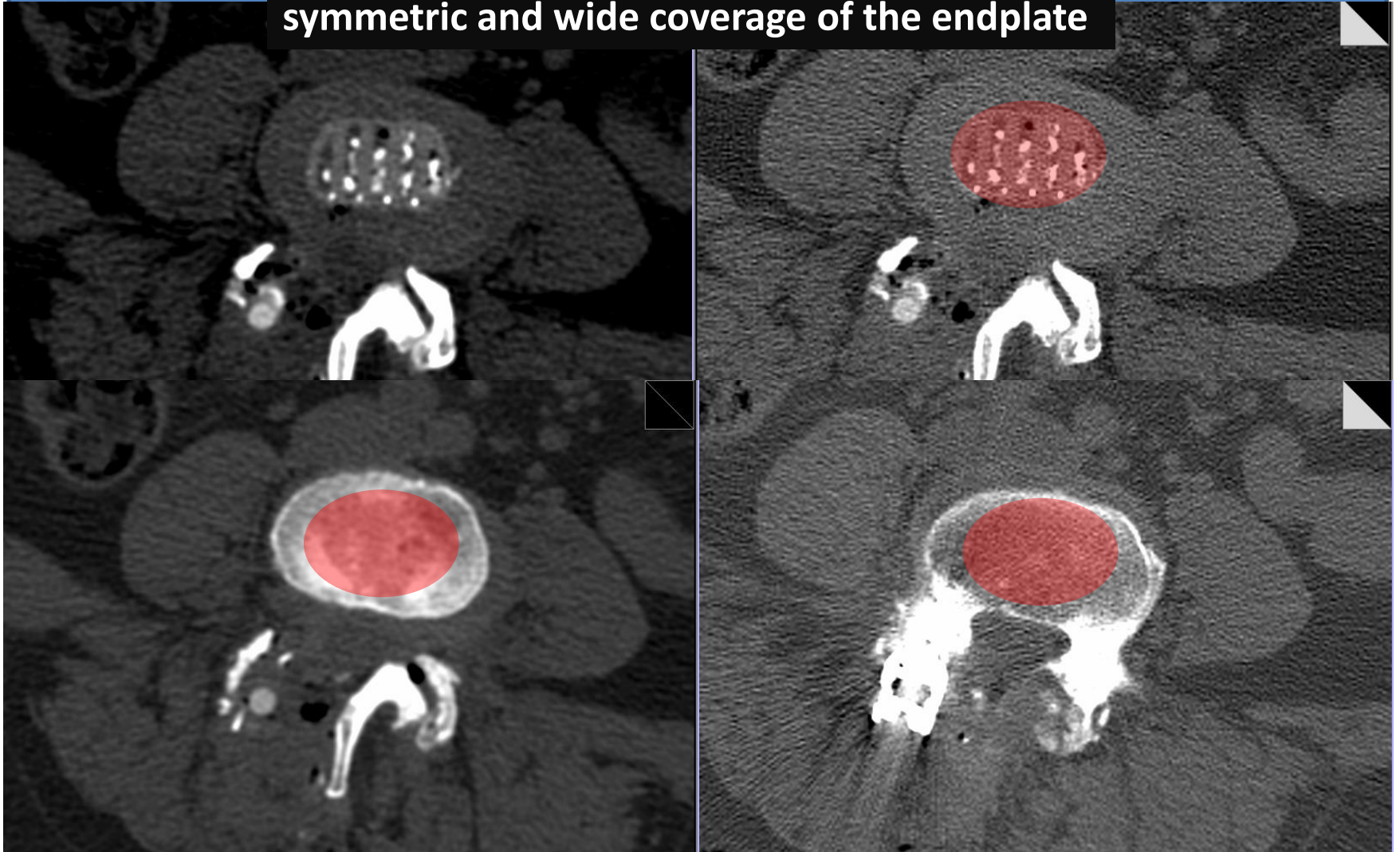


Intraop X-ray control



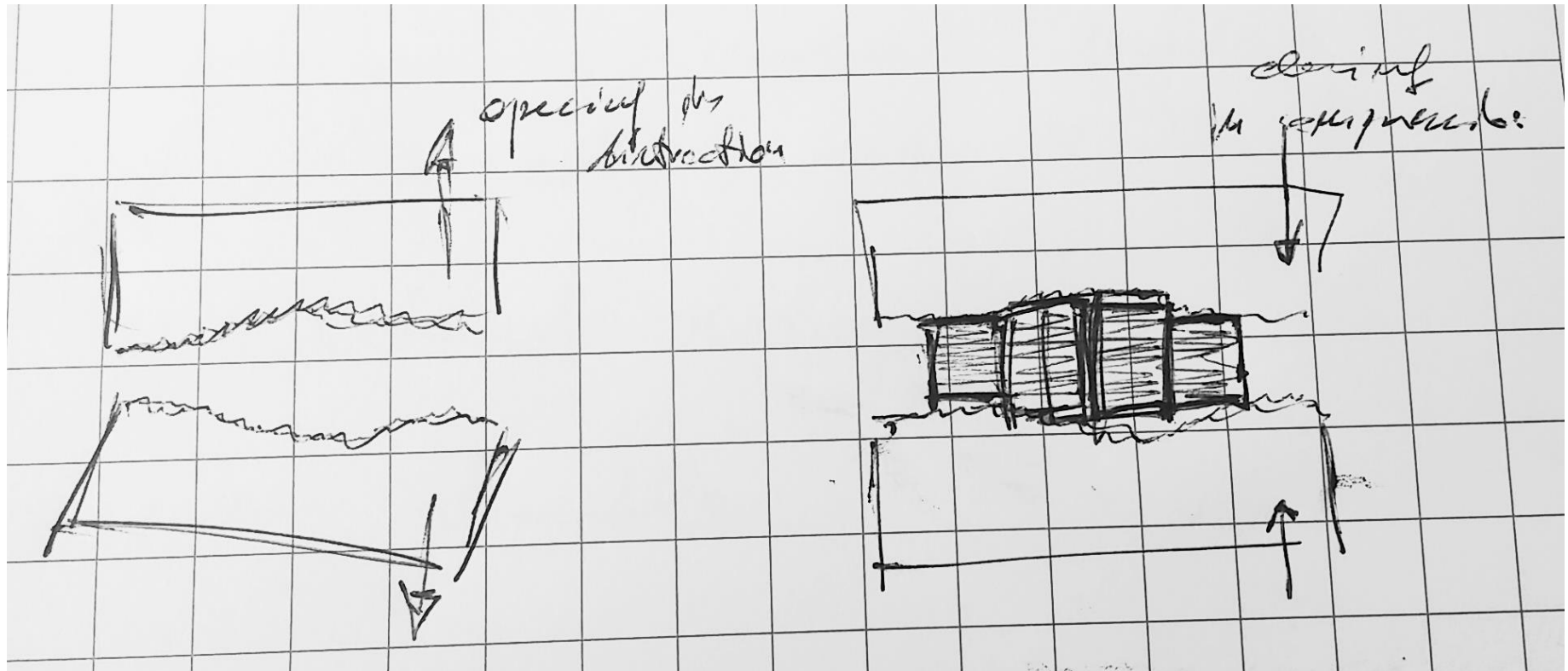
UTLIF, partial emilaminectomy

symmetric and wide coverage of the endplate



TIPS & TRICKS

“modelling” irregular plates filled with modules of different sizes



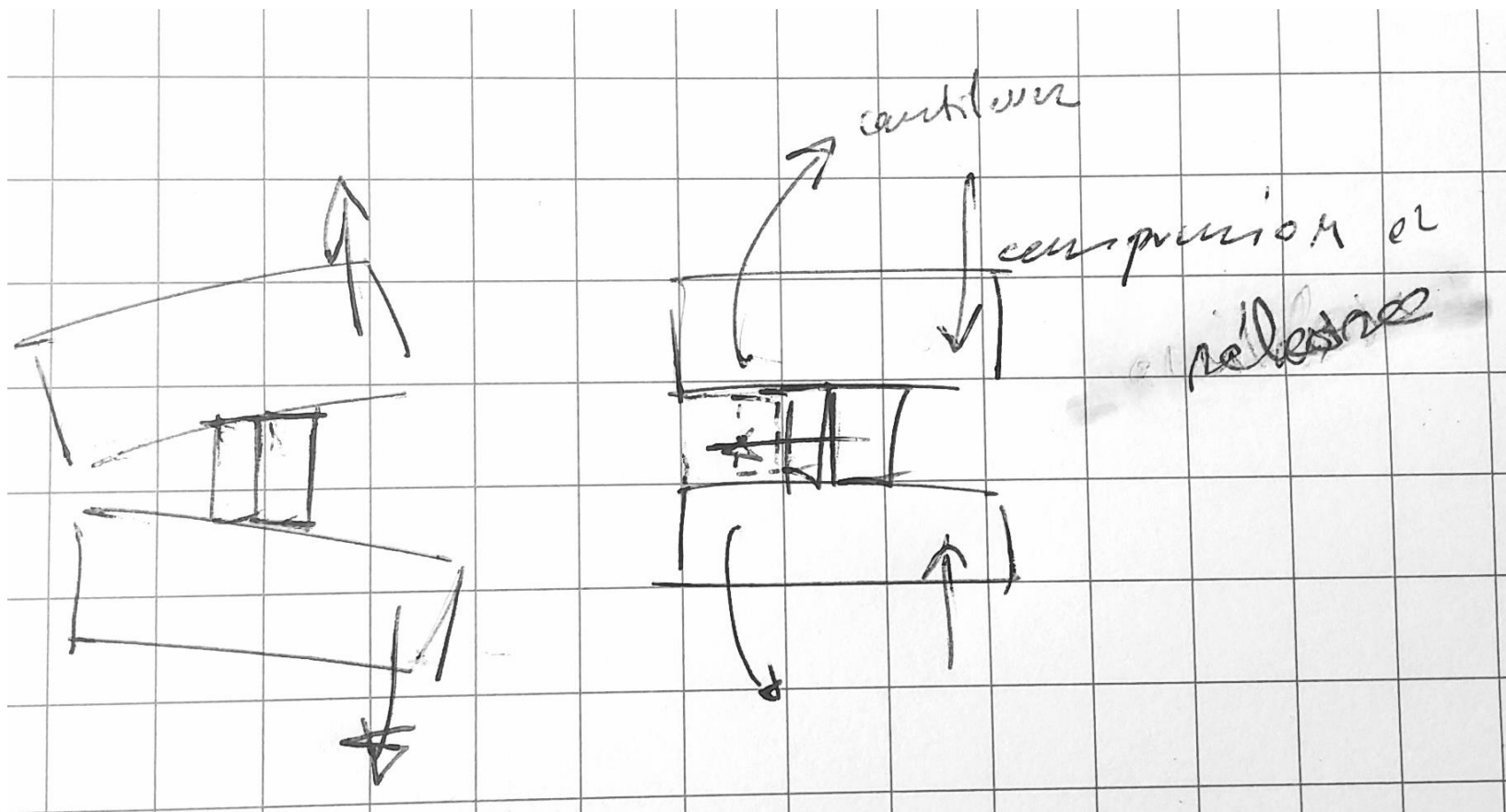
TIPS & TRICKS

“modelling” irregular plates
filled with modules of different sizes



TIPS & TRICKS

improvement of sliding

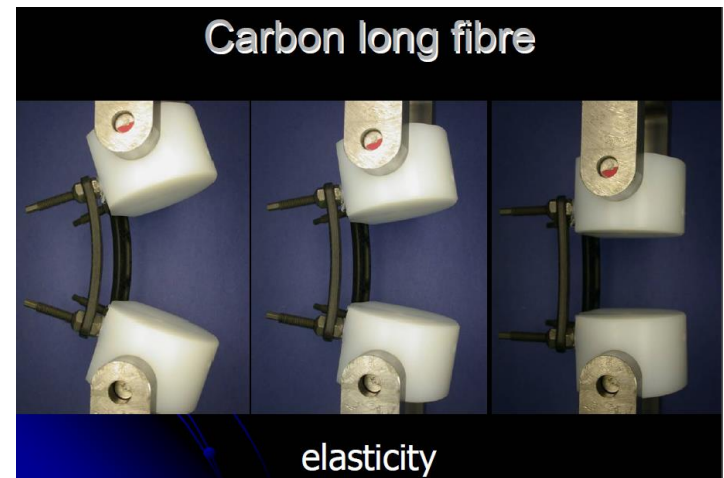


TIPS & TRICKS improve fusion

- Courettage of the endplate AFTER the trial and BEFORE cage implant, to re-open the pores of the bone

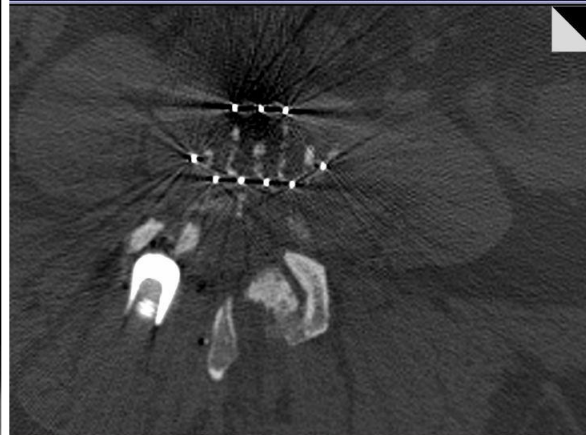


- Autologous bone better than bone substitutes to fill in the cages
- Non-rigid rods / plates



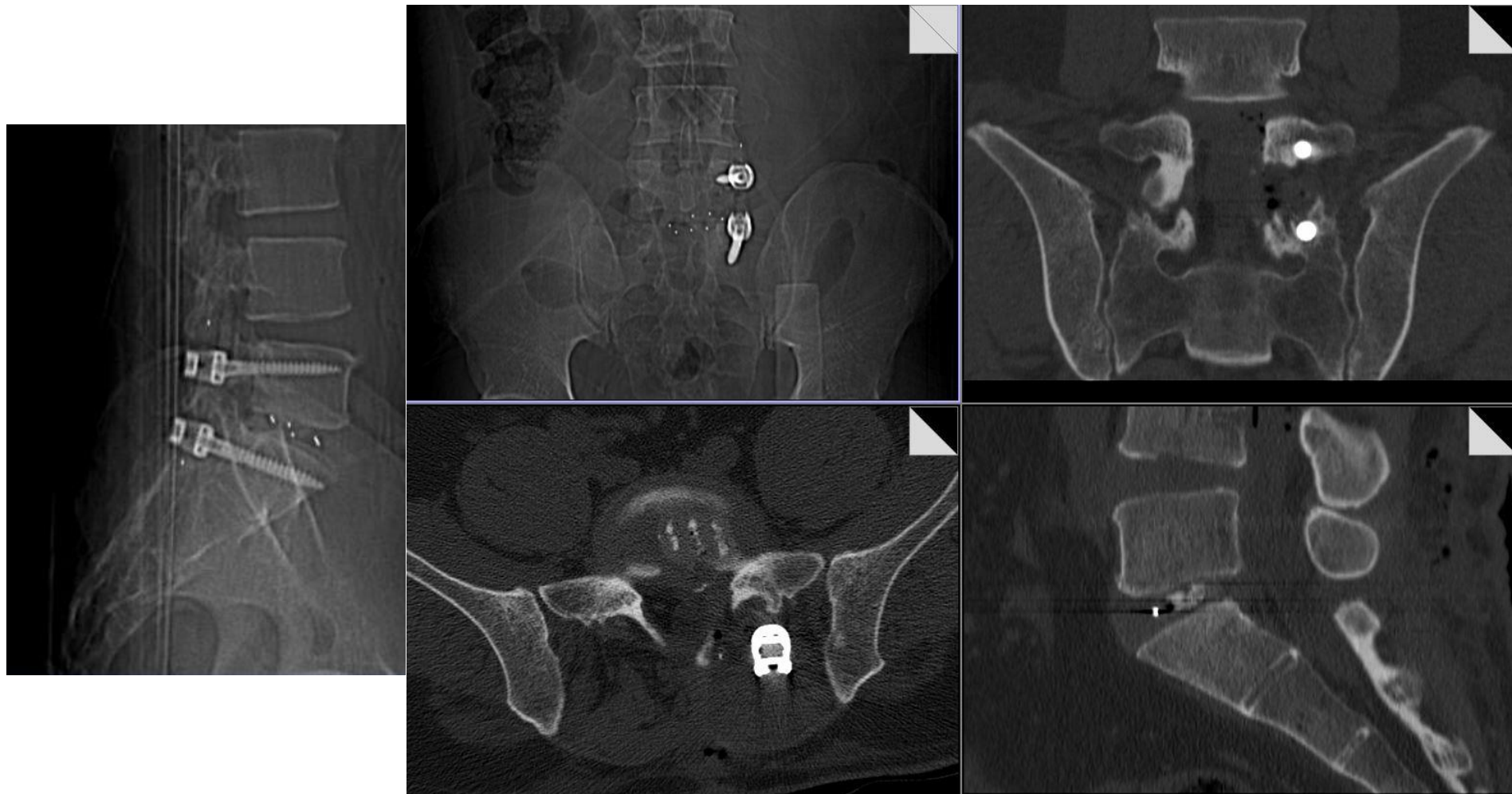
UTLIF for unstable stenosis

partial emilaminectomy and sublaminar contralateral decompression

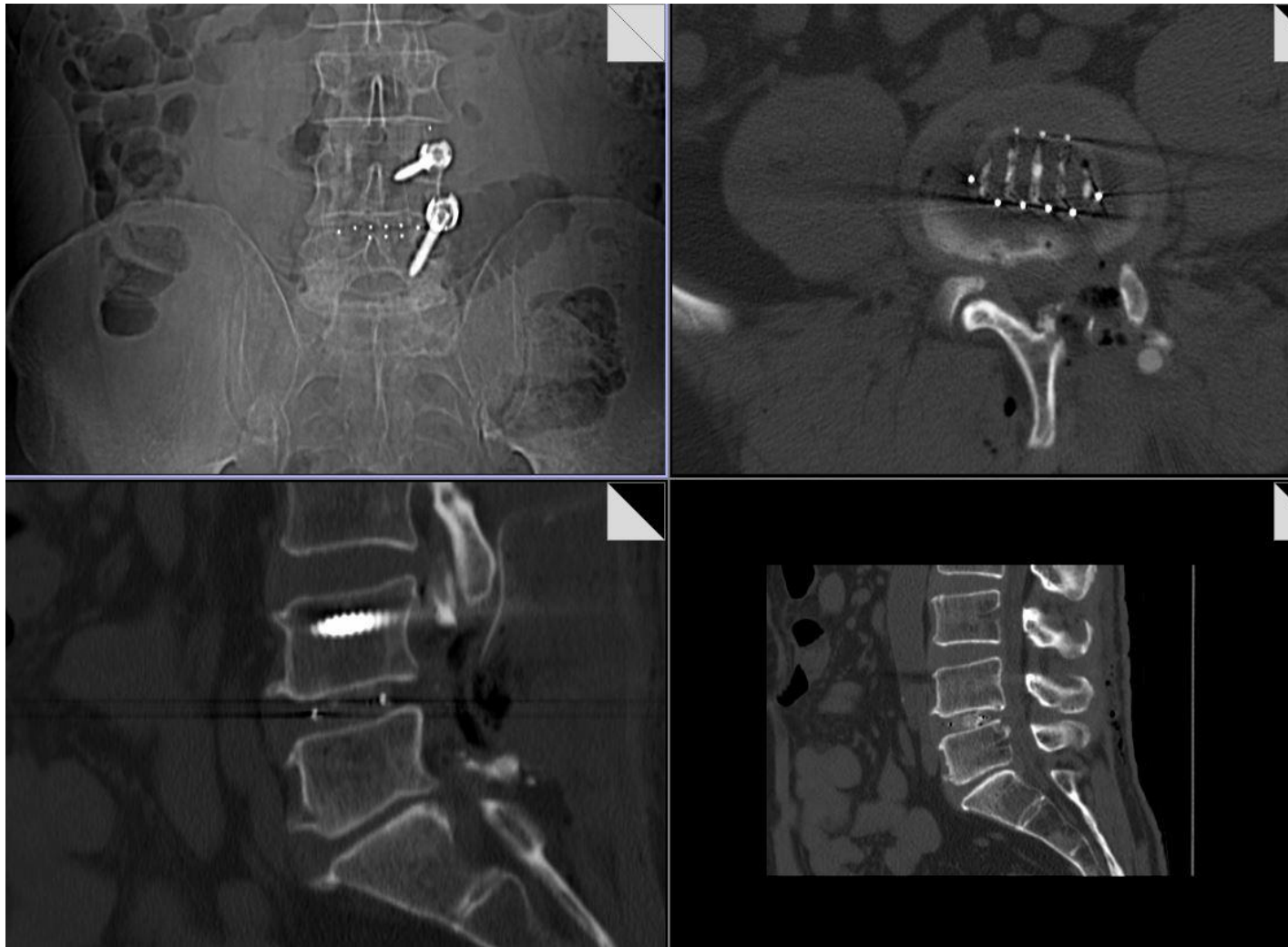


- listhesis reduction and lordosis maintenance (lordotic cage)
- wide plate coverage (5 cages)

T-cages for TLIF recurrent disc herniation



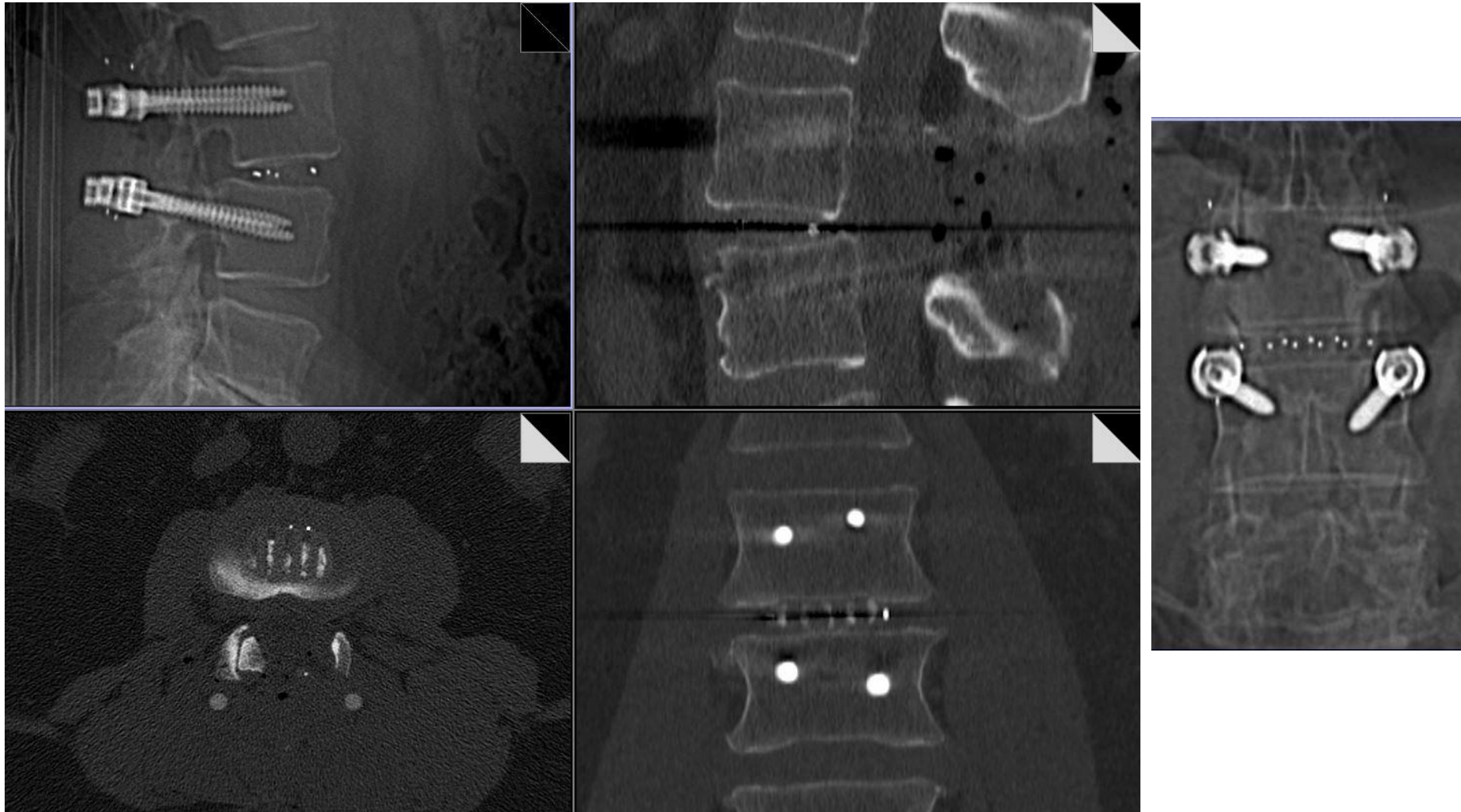
Recurrent disc herniation, 5 modules symmetric & wide coverage



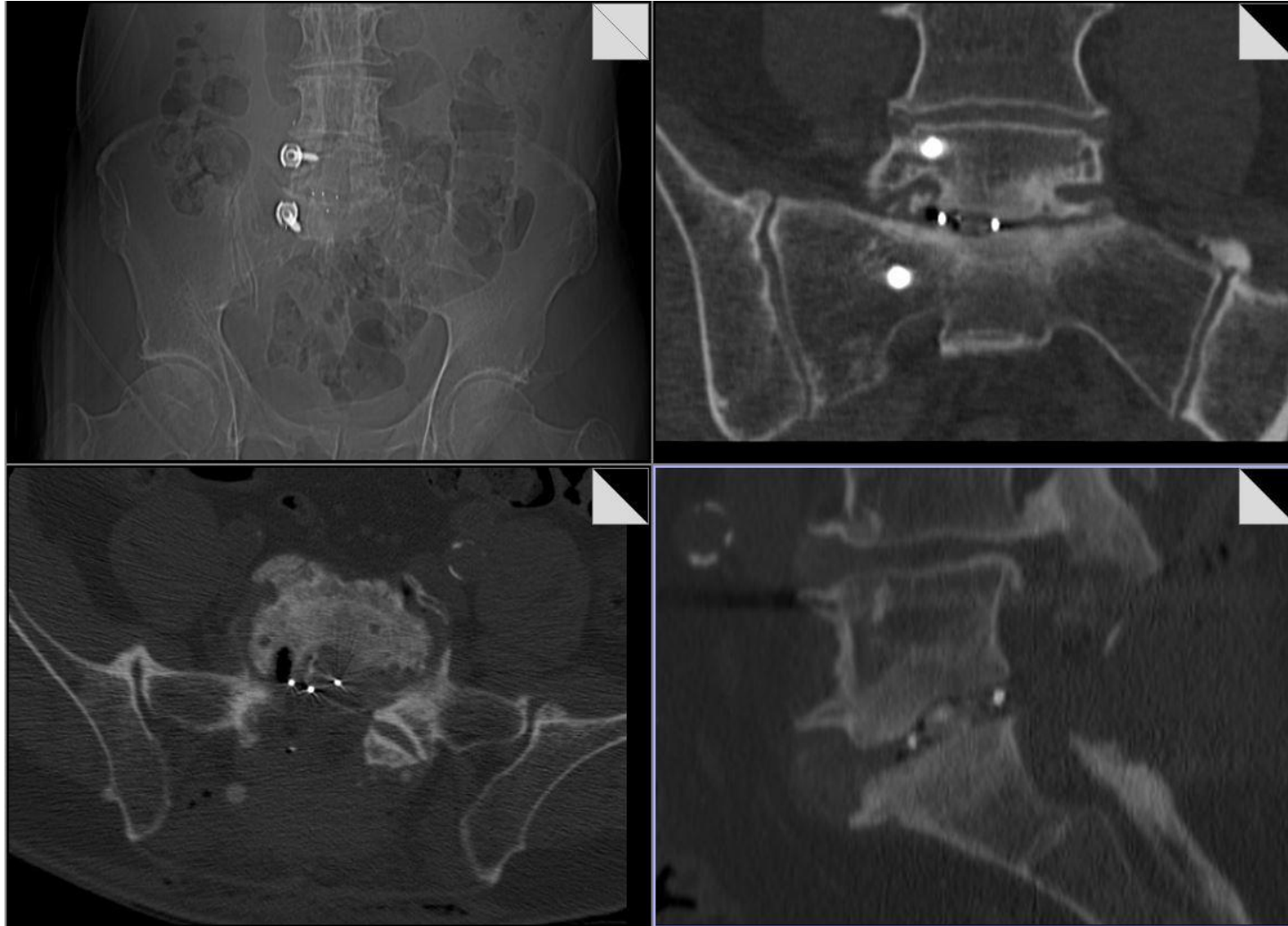
Recurrent disc herniation, 5 modules mild symmetric but wide coverage



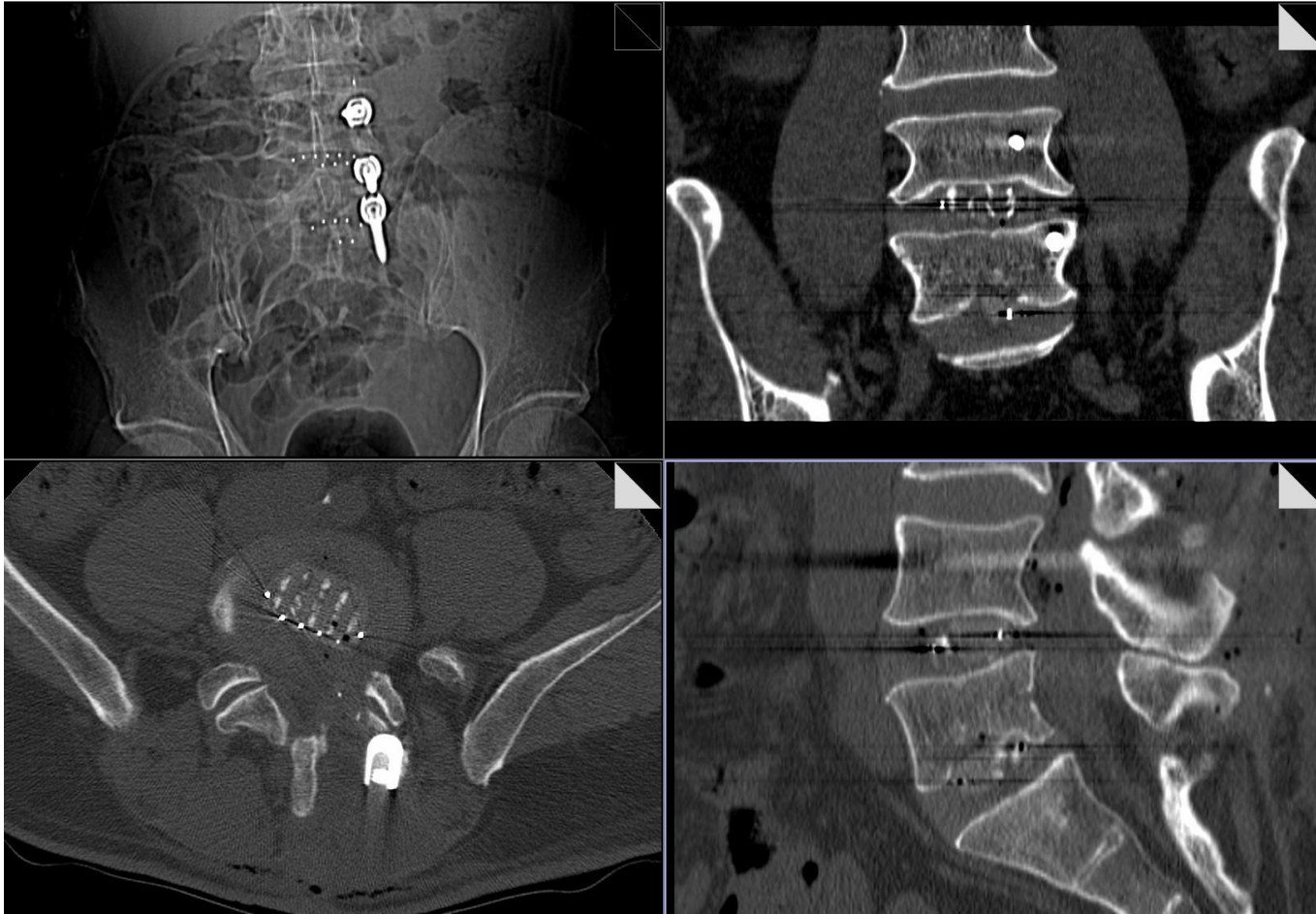
Unstable stenosis, 5 lordotic modules symmetric & wide coverage, lordotic correction

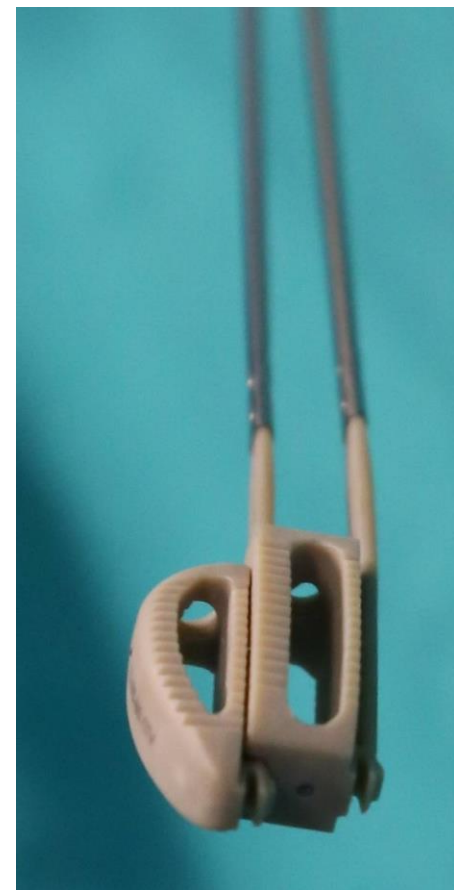
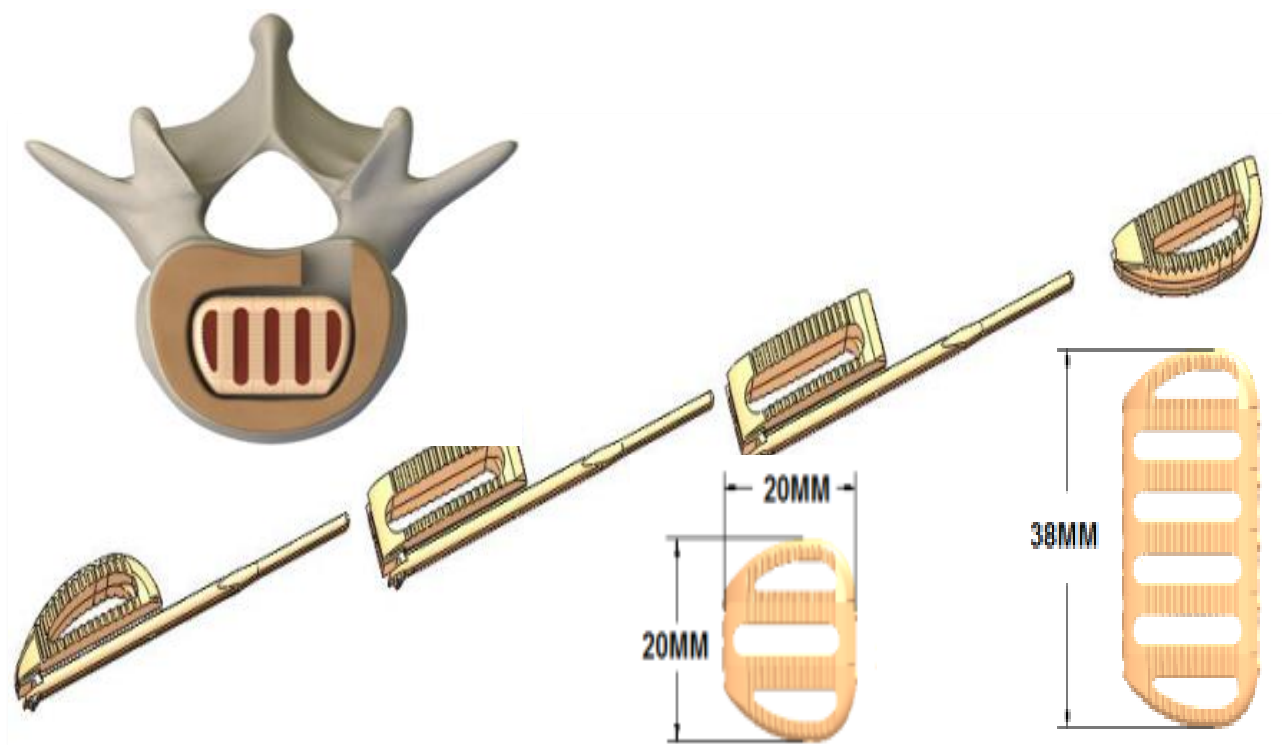


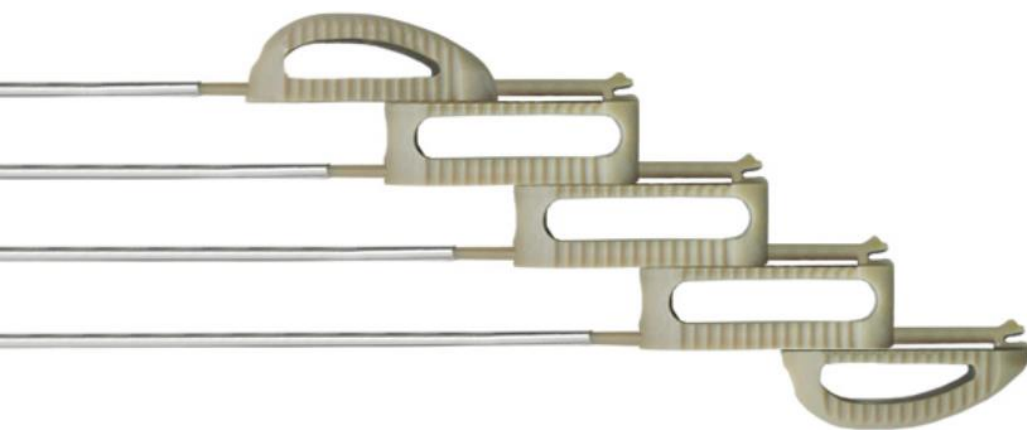
Unstable stenosis, narrowed space, 2 modules asymmetric & little coverage



Reccurent disc herniation & junctional disease, unilateral approach, 2 level treated, 5 module at the irregular plate, lordotic correction



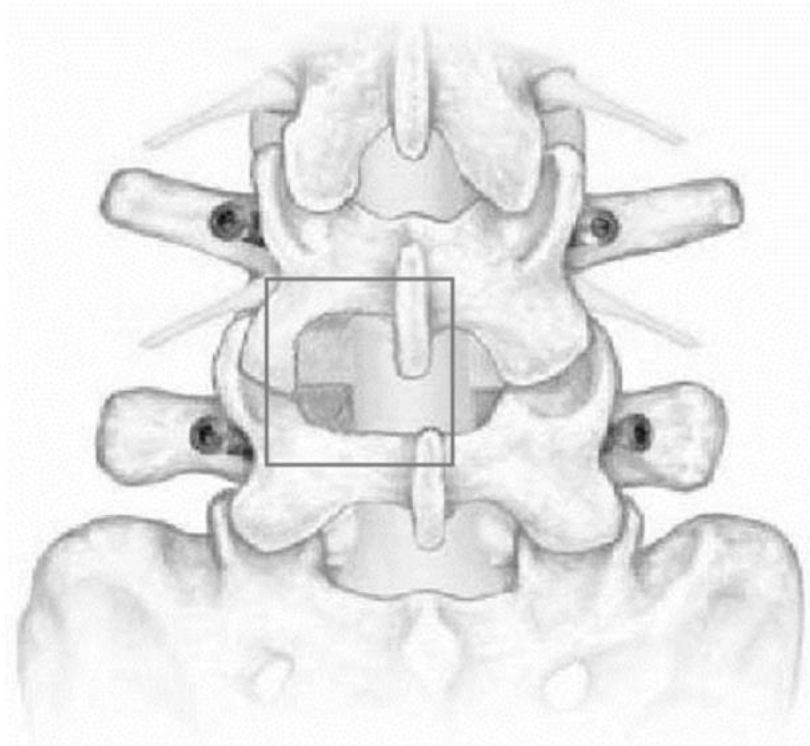




INTERFUSE S™

FORWARD THINKING FOR THE BACK.

VTI offers a proven, state-of-the-art solution to implanting a large footprint device through a minimally invasive posterior approach. The result is a less invasive implantation that achieves big time clinical fusion results.



ACCESS CHANNEL

- Create an access channel to the annulus by performing a laminectomy and medial facetectomy (Fig. 4)
- Extending the laminectomy to the medial border of the inferior facet ensures sufficient access to the disc space for nucleus removal and device implantation

UTLIF CASES

Unilateral pedicle screw fixation with the use of wide-surface modular interbody cages in degenerative lumbar spine disease.

Introduction

In lumbosacral fixation surgery unilateral pedicle screws have proved effective as bilateral fixation, both biomechanically and clinically. Unilateral fixation allows faster surgery with less blood loss, is less invasive, is cheaper. Furthermore a wide endplate coverage by the intersomatic cage improves load sharing in biomechanical models thereby increasing fusion rate and lowering the risk of subsidence.

Materials and methods

39 patients (25 men and 14 women, median age 53 years) underwent unilateral TLIF with the use of a modular PEEK cage intraoperatively assembled with a variable number of element within the disc space which can be implanted unilaterally even through a small access channel (Interfuse S TM, VTI) . Indications for surgery included spinal stenosis with primary or post-laminectomy instability, recurrent disc herniation, first-grade non-lytic listhesis. All patients underwent immediate post-operative CT scan and follow-up evaluation including a clinical and radiographic assessment 2 months post-operatively and clinical/CT evaluations at 6 and 12 months.

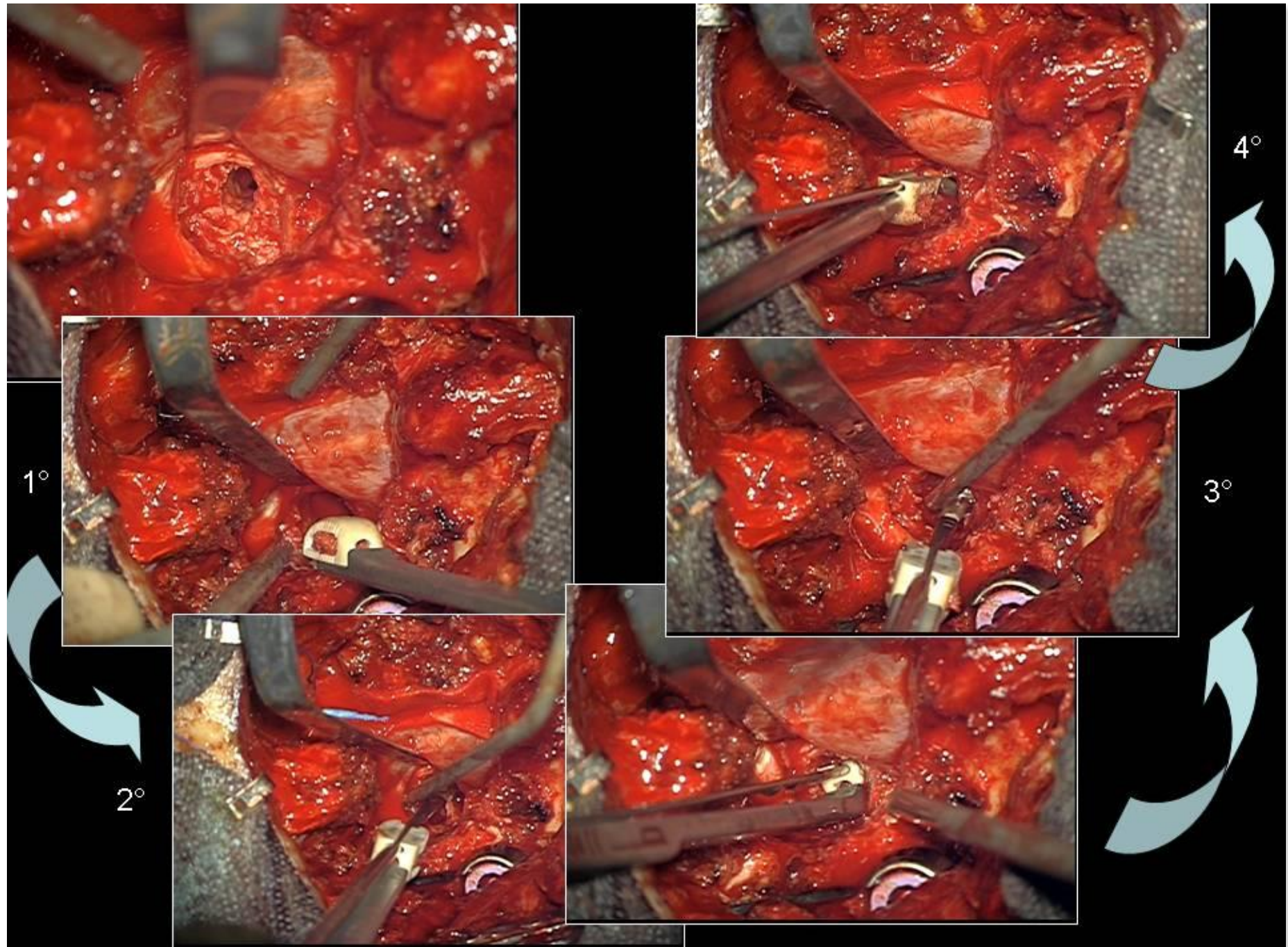
Results and conclusion

Median follow-up was 10,2 months (range 1-28). Cage positioning was straightforward and no surgical complication occurred. Postoperative CT scan always showed appropriate cage positioning and a wide endplate coverage: 55% (range 47-64%) along the transverse diameter and 68% (range 61-74%) along the antero-posterior diameter. Two months after surgery the Oswestry Disability Index was improved in all patients and X-ray did not show any dislocation of the implants except in one case associated with loosening of a screw . 6-months assessment was available for 33 patients and 12 months assessment for 26 patients: all were still clinically improved and CT did not show signs of pseudarthrosis.

According to our experience unilateral TLIF can be safely and effectively performed with the use of the InterFuse modular cage, taking advantage of the small size of single modules of the cage, and allowing a customized coverage of large or irregular endplates This is particularly useful in recurrency and osteoporosis.

CONCLUSION

According to our preliminary experience, unilateral PLIF can be safely and effectively performed with the use of InterFuse STM cage. The small size of every module allows cage insertion through a narrow access channel, thus avoiding arrectomy and undue root traction. This feature makes the system suitable in cases of reoperation, when epidural scar tissue may hinder access to the disc space. Moreover, the wide endplate coverage lowers the risk of pseudoarthrosis and improves load sharing, thus preventing cage subsidence. The radiolucent material allows for an accurate assessment of fusion on CT images and for artifact-free follow-up MRI images.



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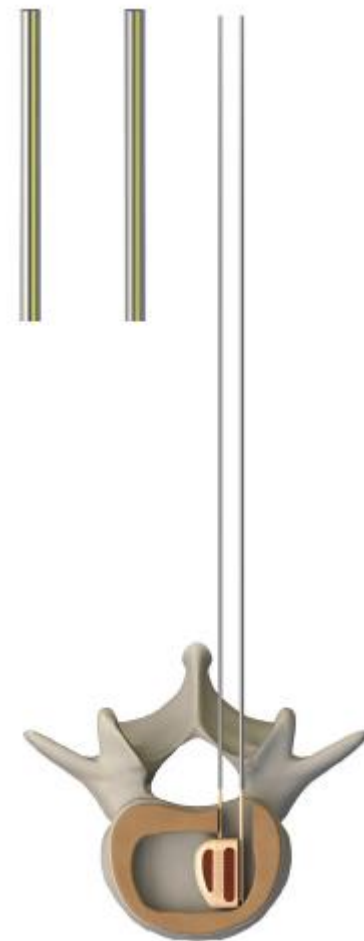
MINIMALLY INVASIVE POSTERIOR APPROACH.

InterFuse is the superior way to implant a large footprint device through a small, familiar posterior access channel.



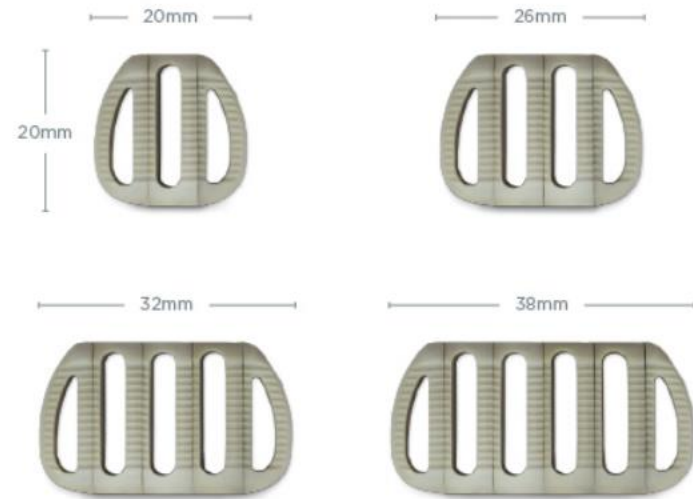


VERIFICATION OF MODULE ENGAGEMENT



ANATOMICAL CUSTOMIZATION.

The modular design of InterFuse S enables surgeons to customize the size of the device to the patient's vertebrae.

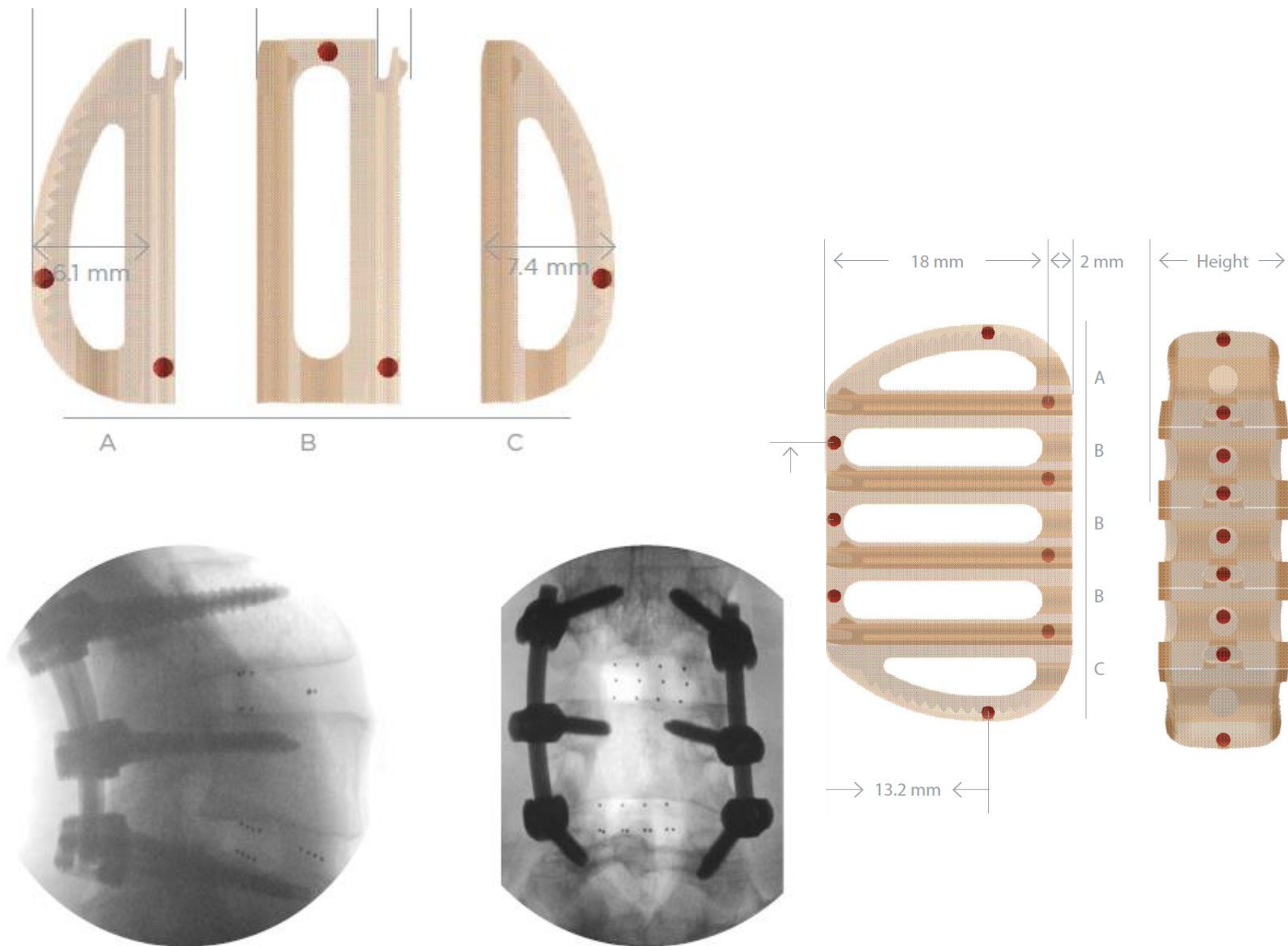




MAXIMUM FOOTPRINT.

Patented Intra-body assembly technology allows surgeons to achieve the biggest footprint possible.







Device Sizer (Trial) - Represents the A/P and thickness of an implant module. Used to determine the correct size implant prior to opening packaging.



Threaded Inserter - The Threaded Inserter attaches to the PEEK implant modules and is used to place the implant components during implantation. Distal end of tail should align with top marker ring of the inserter. The inserter is hand tightened loosely.



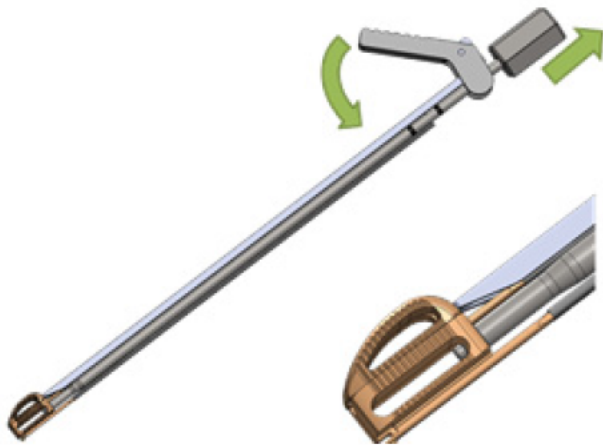
Insertion Guard - An alternative to the Threaded Inserter which provides greater torsional control during module insertion and assembly. Prevents tail breakage when using Positioning Lever.



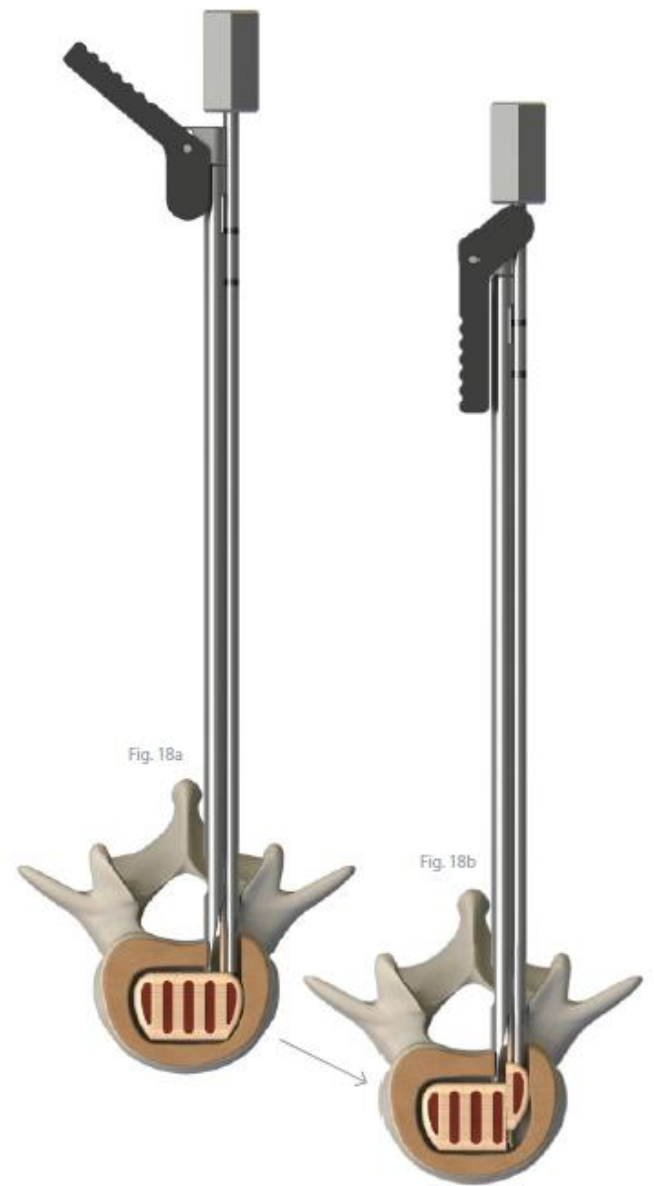
Positioning Lever - Used to move/position inserted implant assembly medially using a “walk it over” motion to safely and effectively position the implant.



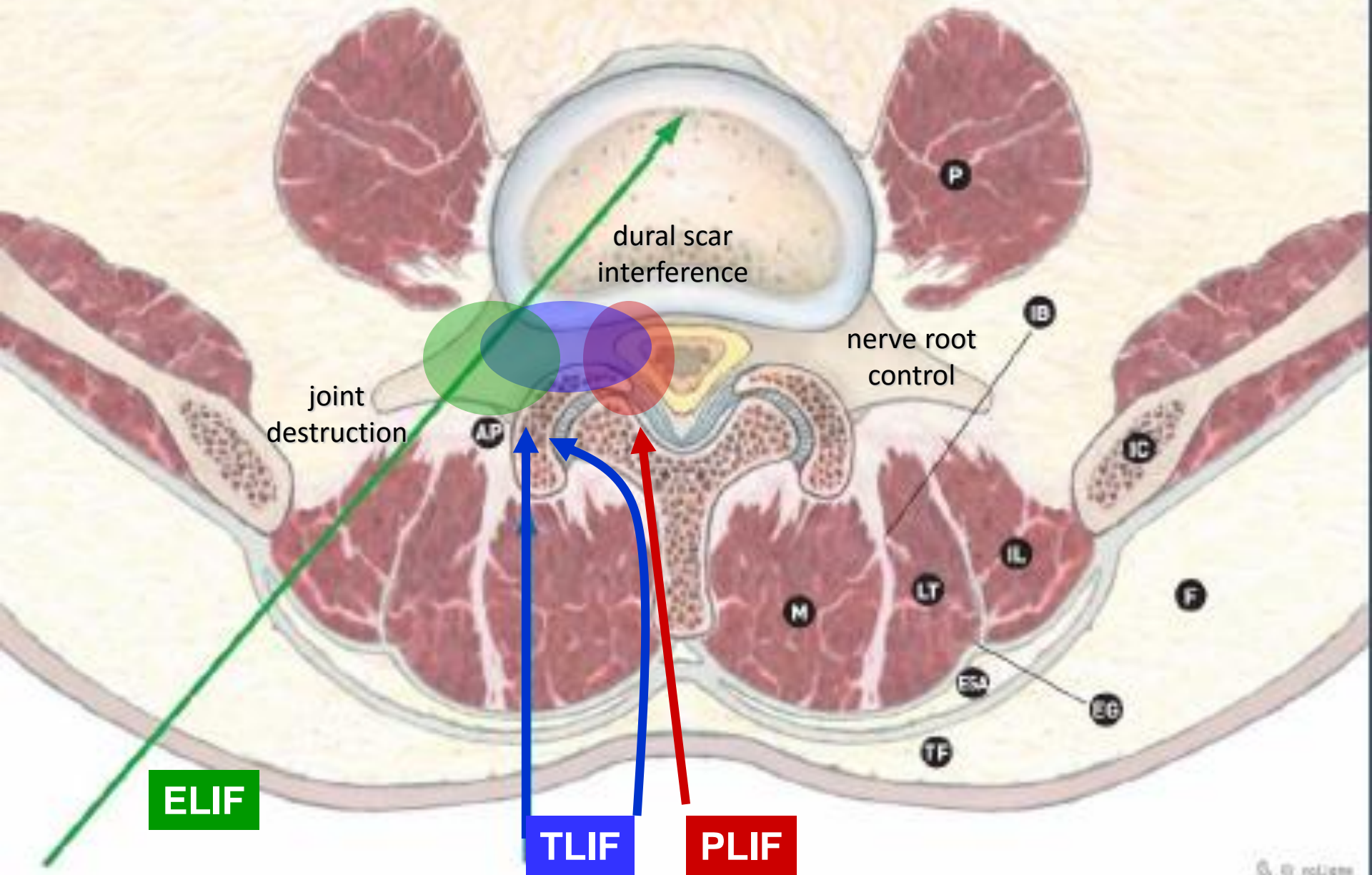
Tail Removal Tool - Once a module is assembled the Tail Removal Tool is slid over the adjacent tail until it is flush with the posterior surface of the implant and the distal end of tail is even with the top of the tool. The instrument is rotated and the tail is removed.



Module Disengagement Tool - The Module Disengagement Tool is used to separate locked implant modules. A Threaded Inserter is attached to the module to be removed and the Module Disengagement Tool is mated to the adjacent module. The lever is used to provide a disassembly force without stressing the annulus or requiring the use of a mallet.



UNILATERAL APPROACHES: key points



Unilateral lateralized approaches for Lumbar Interbody Fusion with OstaPek

U-PLIF - Unilateral Posterior

- incomplete joint removal
- recessual and preforaminal nerve root exposure (no extraforaminal)
- ☞ more dural sac medial mobilization needed

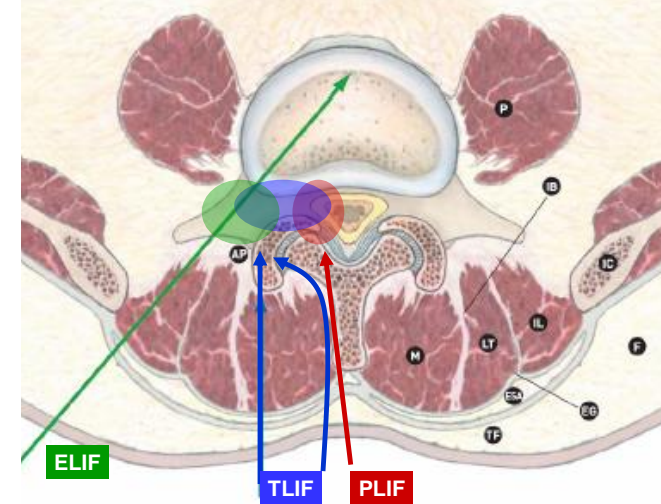
U-TLIF - Unilateral Transforaminal

- complete joint removal
- recessual, foraminal and extraforaminal nerve root exposure
- ☞ less dural sac medial mobilization needed

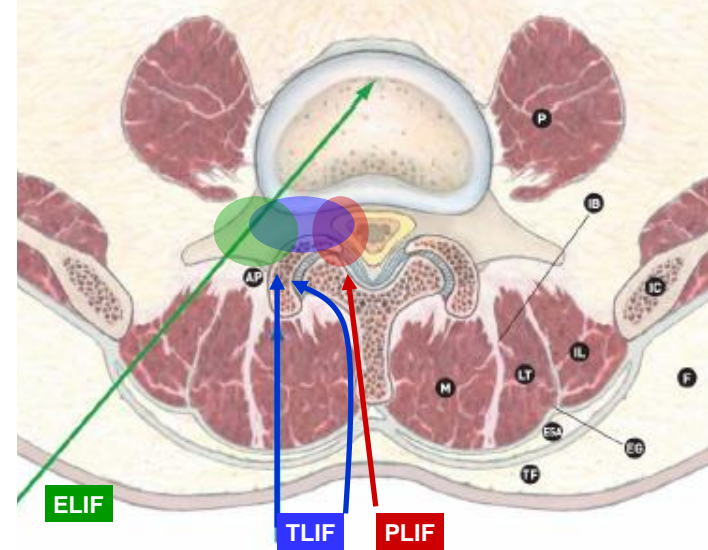
U-ELIF - Unilateral Extraforaminal

- minimal external joint removal
- extraforaminal and foraminal nerve root exposure (no recessual)
- ☞ no dural sac mobilization needed

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Department of Neurosurgery -



Unilateral lateralized approaches for Lumbar Interbody Fusion with OstaPek



U-PLIF - Unilateral Posterior

- recessal and preforaminal nerve root exposure (no extraforaminal)
- ☞ more dural sac medial mobilization needed
- **radiculopathy from recurrent operated disc herniation**

U-TLIF - Unilateral Transforaminal

- recessal, foraminal and extraforaminal nerve root exposure
- ☞ less dural sac medial mobilization needed
- **recurrent radiculopathy from peridural scar post failed-back surgery**

U-ELIF - Unilateral Extraforaminal

- extraforaminal and foraminal nerve root exposure (no recessal)
- ☞ no dural sac mobilization needed
- **lumbar pain from instability (primary o post failed-back surgery ← *contralateral approach*)**
- **radiculopathy from dynamic foraminal stenosis**
- **radiculopathy from recurrent operated extraforaminal disc herniation**