

CBX 2015 Strike Force



Wayne Cheng, MD

Bones and Spine

Alphatec Feb7, 2015

OUTLINE

- What is cortical screw?
- What's the big deal? Why use it?
 - Indication
 - Surgical technique
 - Case study
 - Complication

Current Market

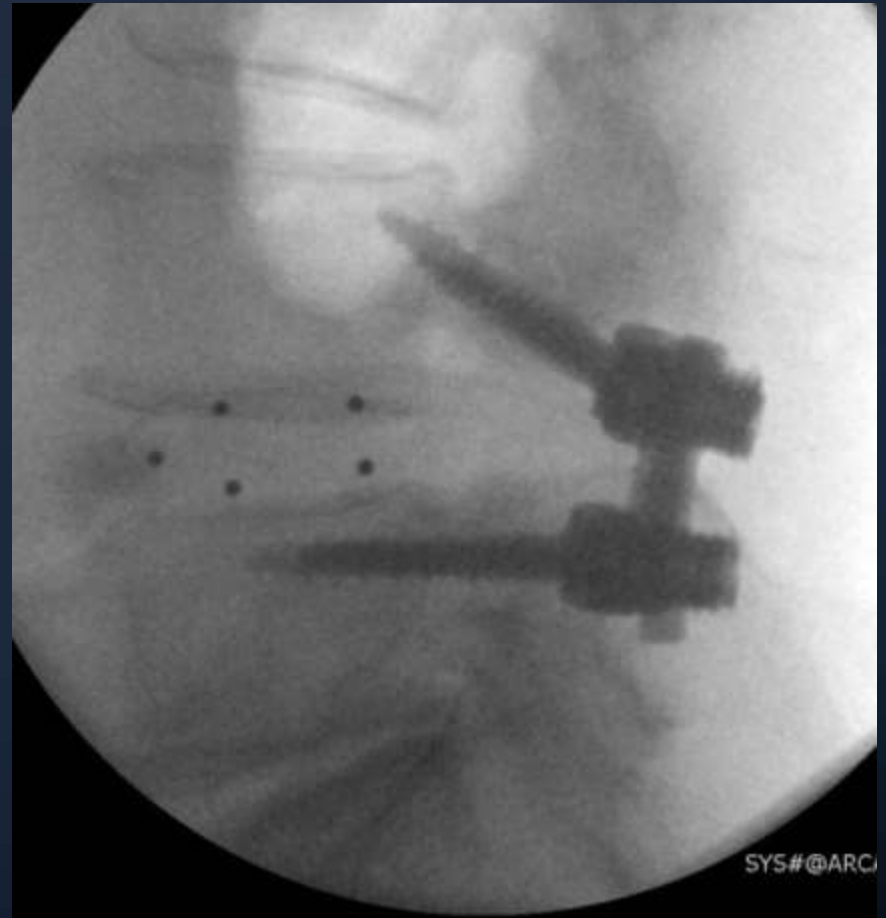
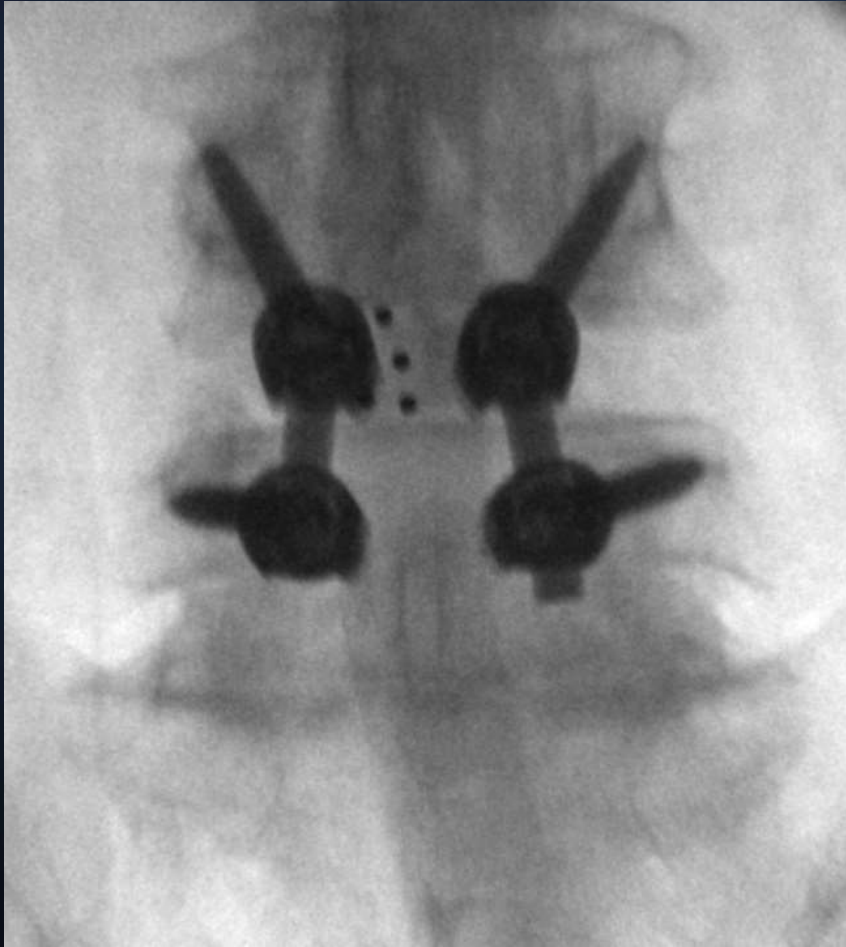
MAST® MIDLF™

MAS® PLIF

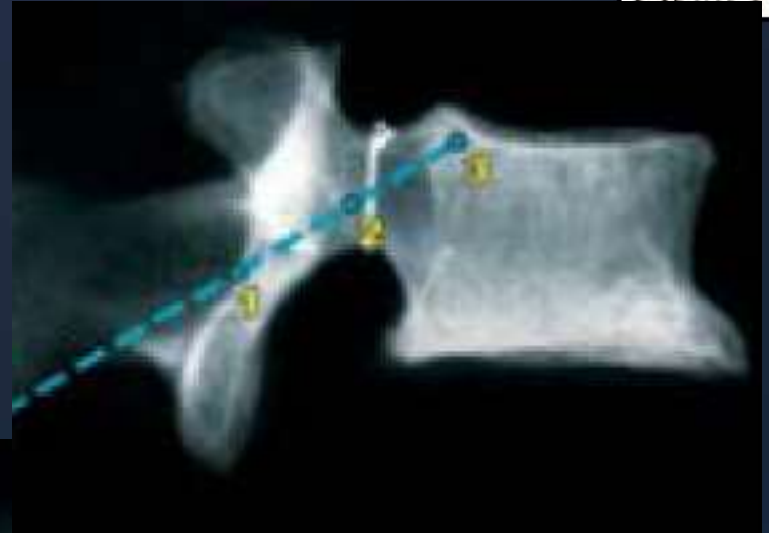


mP•CT
medialized Posterior Approach Cortical Trajectory

What is it?

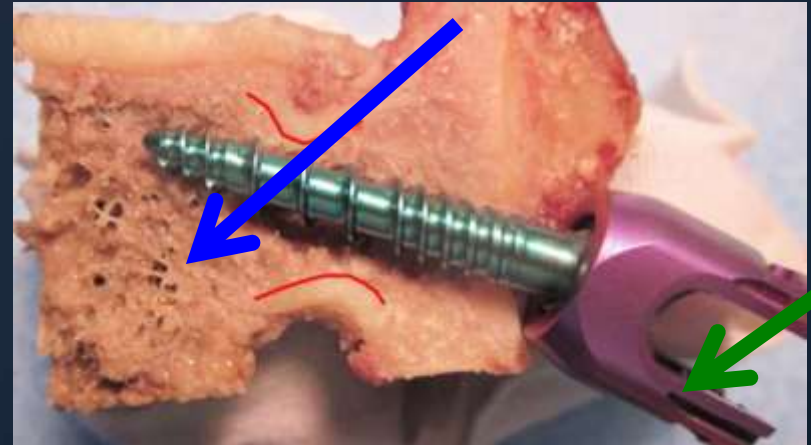
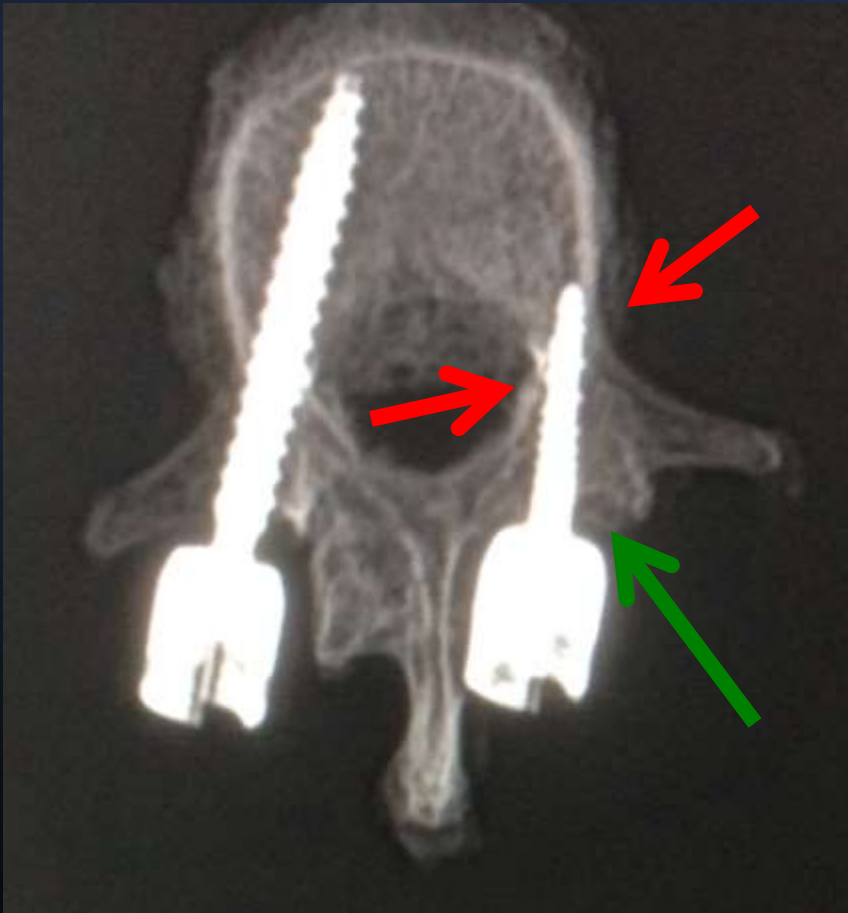


Trajectory



Cortical bone > cancellous bone

4-points of fixation





The Spine Journal 9 (2009) 366–373

THE
SPINE
JOURNAL

Cortical bone trajectory for lumbar pedicle screws

B.G. Santoni, PhD^a, R.A. Hynes, MD^b, K.C. McGilvray, MS^a, G. Rodriguez-Canessa, BS^a,
A.S. Lyons, MS^a, M.A.W. Henson, MS^c, W.J. Womack, BS^a, C.M. Puttlitz, PhD^{a,*}

B.G. Santoni et al. / The Spine Journal 9 (2009) 366–373

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Table 1

Descriptive statistics of geometries of traditional and new cortical trajectory pedicle screws instrumented for pullout and toggle testing (mean \pm standard error of the mean [SEM])

Trajectory	Pullout		Toggle		Overall	
	Screw length (mm)	Screw diameter (mm)	Screw length (mm)	Screw diameter (mm)	Screw length (mm)	Screw diameter (mm)
Traditional	51.00 \pm 3.38	6.50 \pm 0.00	49.50 \pm 3.69	6.50 \pm 0.00	50.40 \pm 3.51	6.50 \pm 0.00
New Cortical	29.00 \pm 2.8*	4.50 \pm 0.00*	29.00 \pm 3.16*	4.90 \pm 0.21*	29.00 \pm 2.89*	4.66 \pm 0.24*

* $p < 0.001$; threads/inch: new cortical, 16; traditional, 9.

CONCLUSIONS: The current study demonstrated that the new cortical trajectory and screw design have equivalent pullout and toggle characteristics compared with the traditional trajectory pedicle screw, thus confirming preliminary clinical evidence. The 30% increase in failure load of the cortical trajectory screw in uniaxial pullout and its juxtaposition to higher quality bone justify its use in patients with poor trabecular bone quality. © 2009 Elsevier Inc. All rights reserved.

Pedicle screw insertion angle and pullout strength: comparison of 2 proposed strategies

Laboratory investigation

SERKAN İNCEOĞLU, PH.D., WILLIAM H. MONTGOMERY JR., M.D., M.P.H.,
SELVON ST. CLAIR, M.D., AND ROBERT F. MCLAIN, M.D.

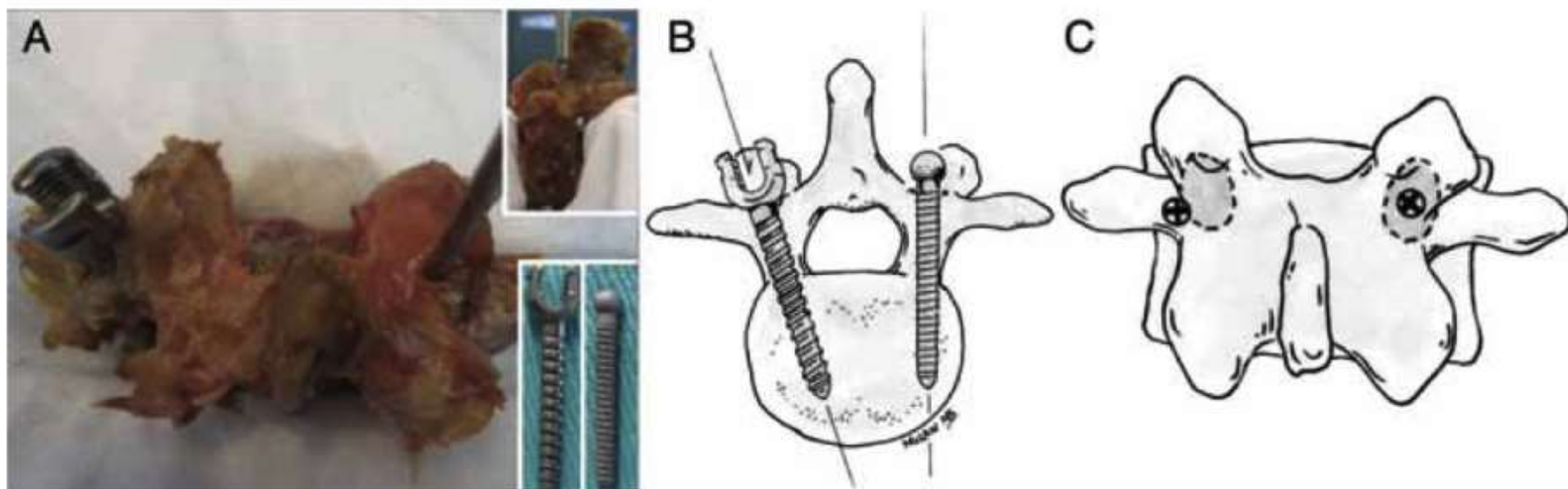
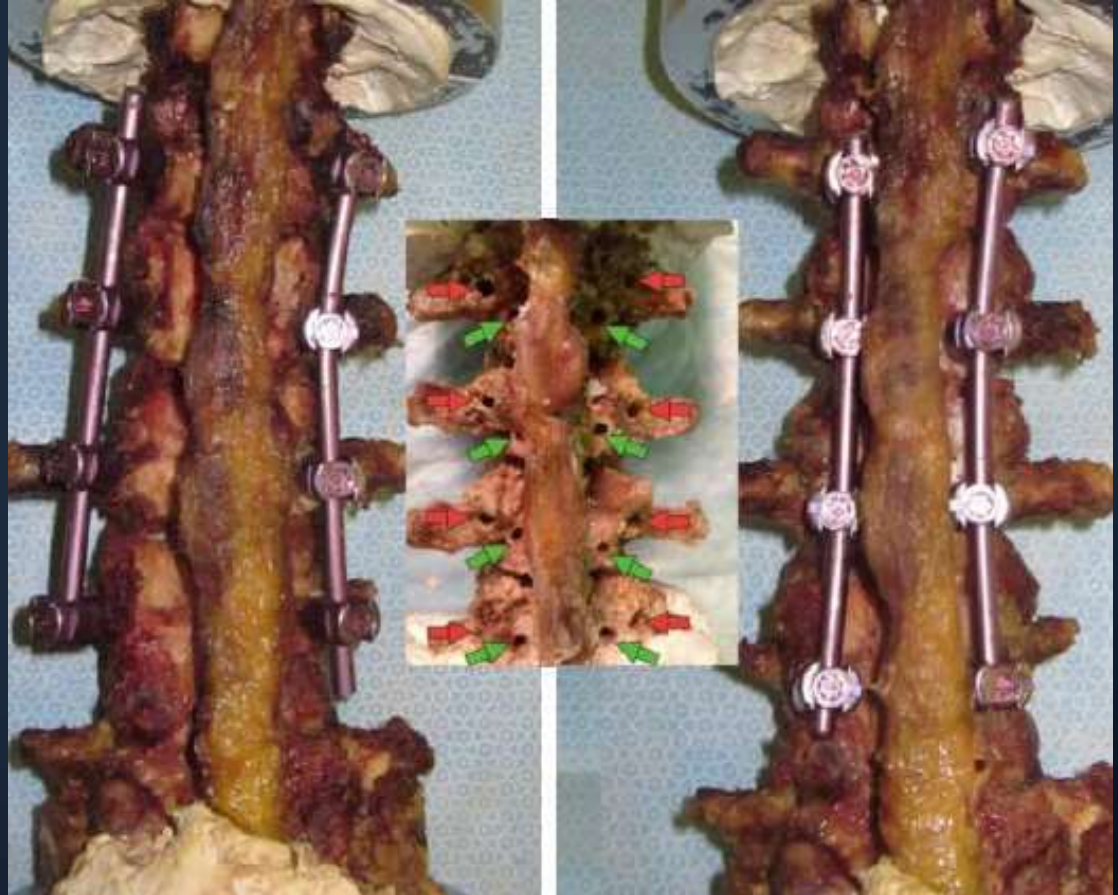
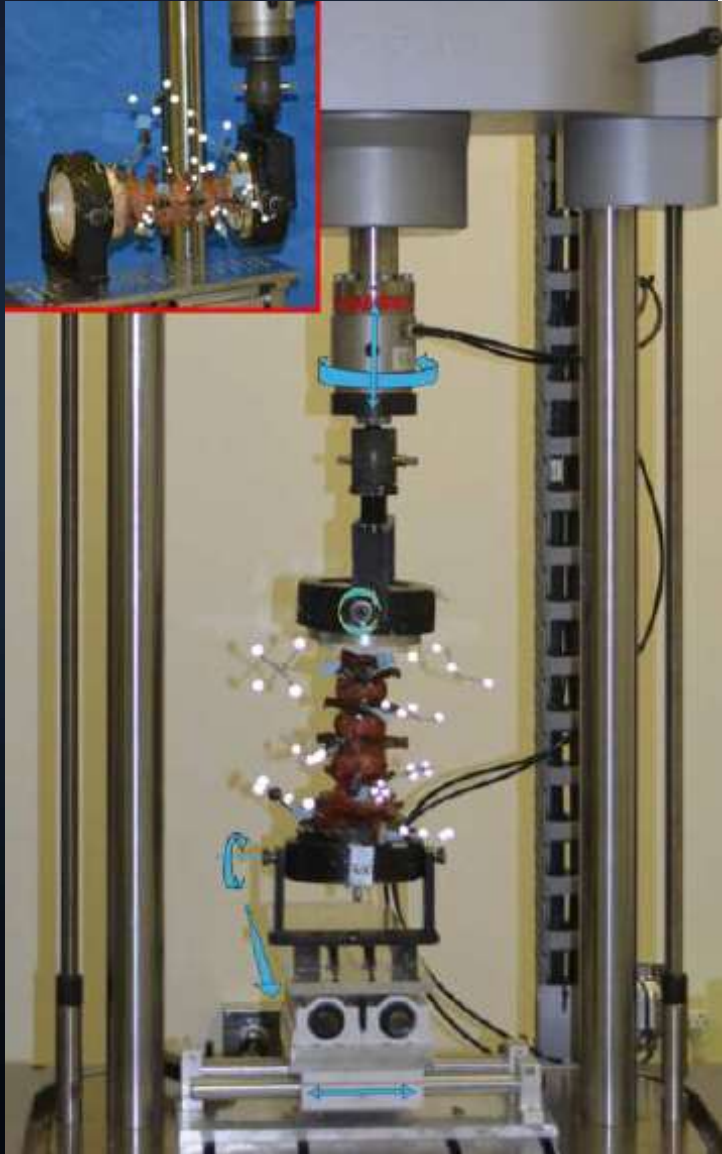
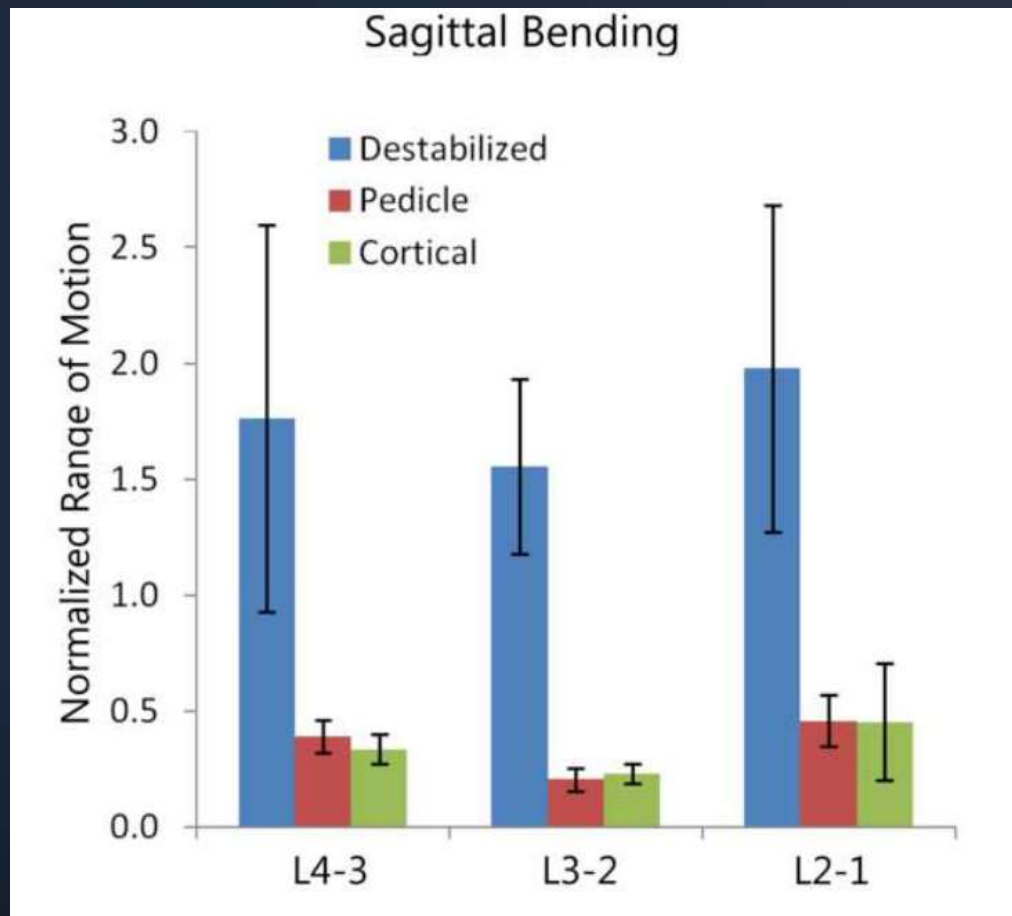


FIG. 1. **A:** Lateral photograph demonstrating the ideal starting point of the Group B screw (**upper inset**). The Group B (Technix) screw (**lower right inset**) has a smaller ratio of inner to outer diameter and a narrower thread pitch compared with a Group A (Xia) screw (**lower left inset**). **B and C:** Illustrations of the screw entry points and trajectories. Standard pedicle screw with coaxial trajectory (Group A) inserted in the right pedicle (that is, the pedicle that appears on the left side of the drawings) is illustrated. On the left pedicle (that is, the pedicle that appears on the right side of the drawings), the screw hole with the medial starting point and vertical trajectory (Group B) is being prepared at the junction of the inferior aspect of the superior articular process and pars in this L-5 vertebra.

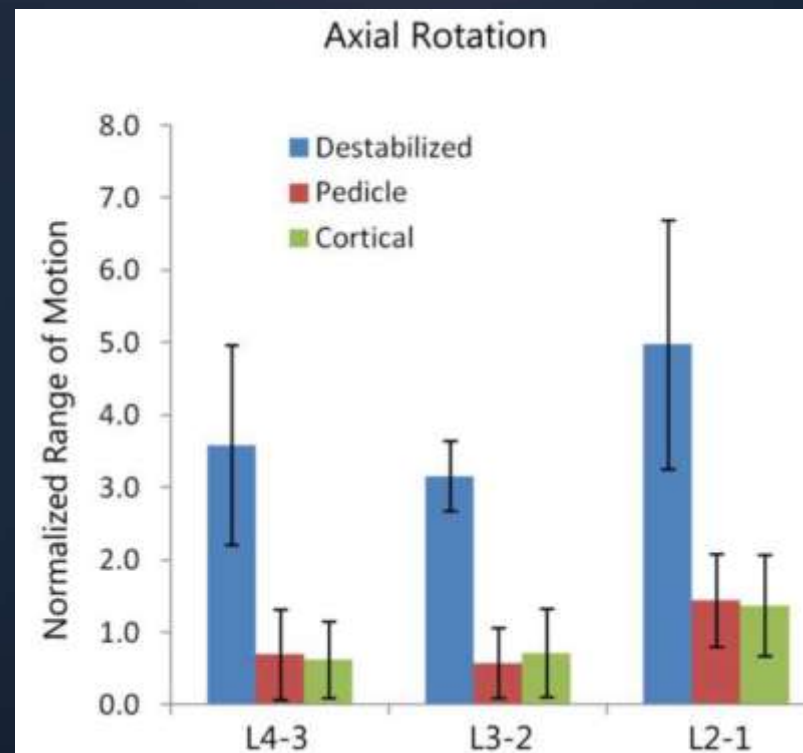
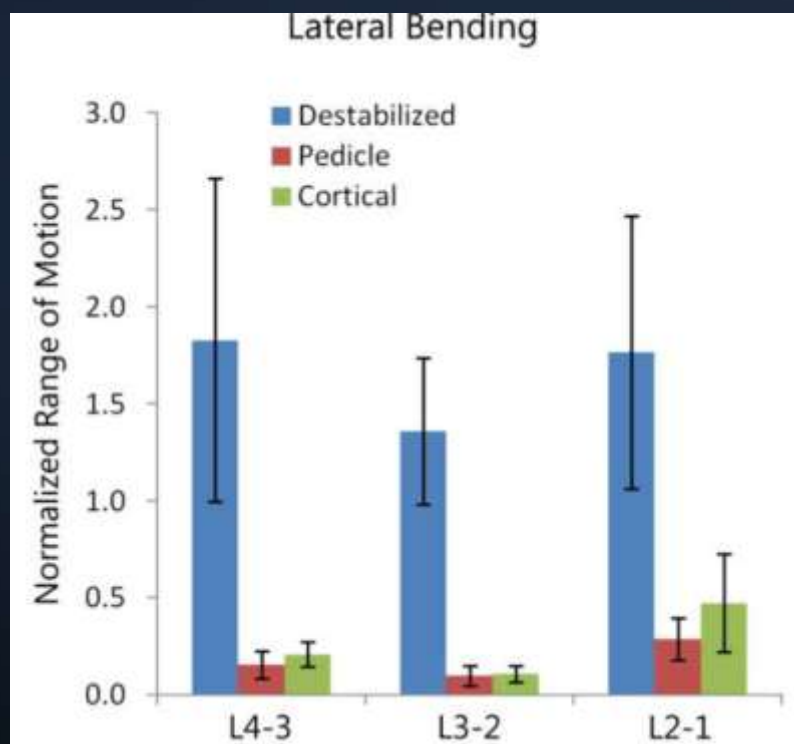
Multi-level spondylolisthesis



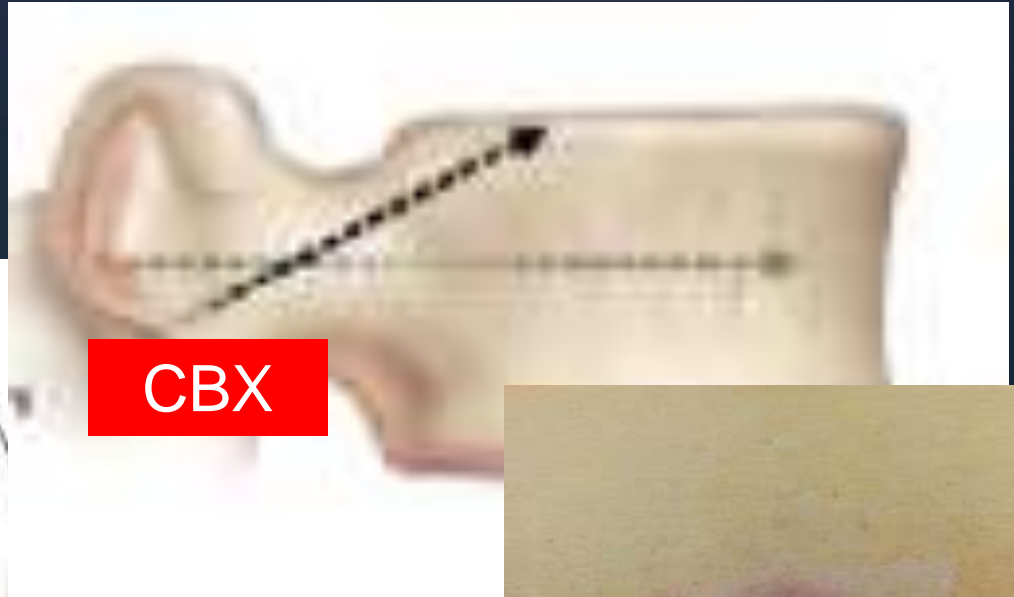
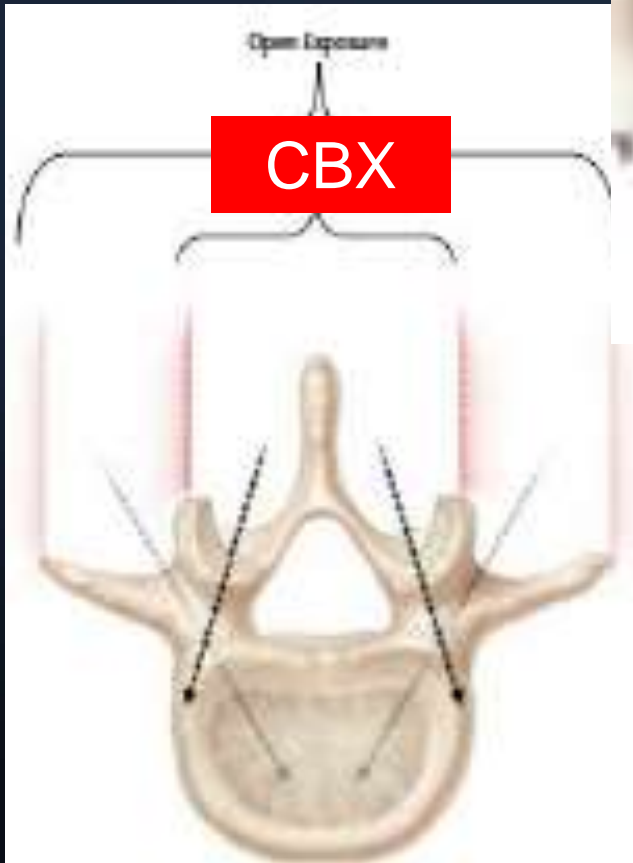
Biomechanical Study



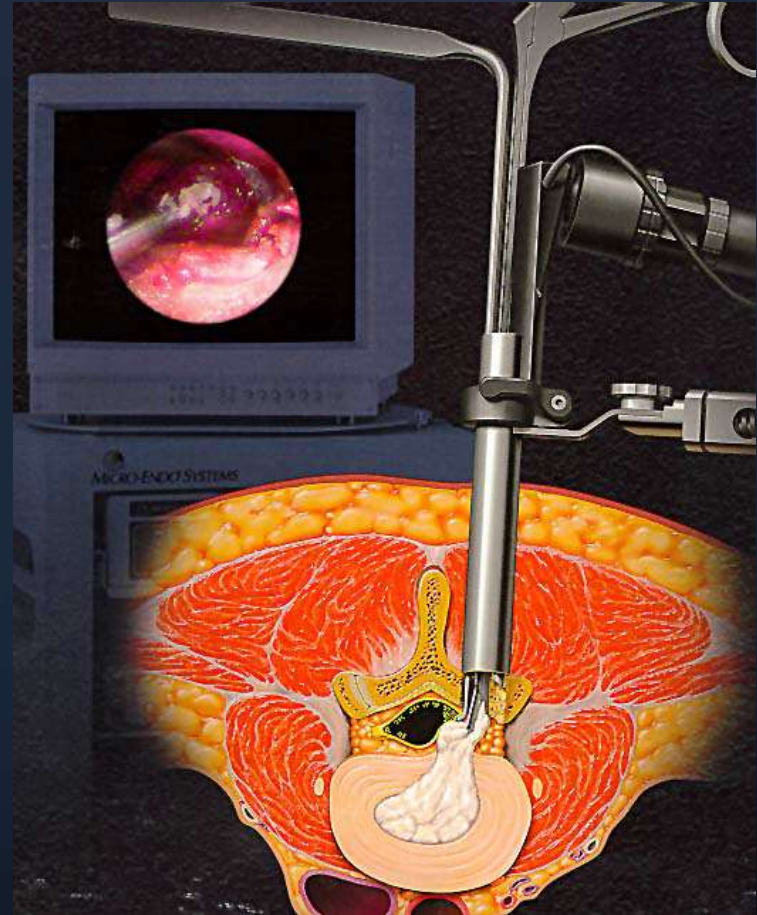
Biomechanical Study



Less Invasive



Familiar approach



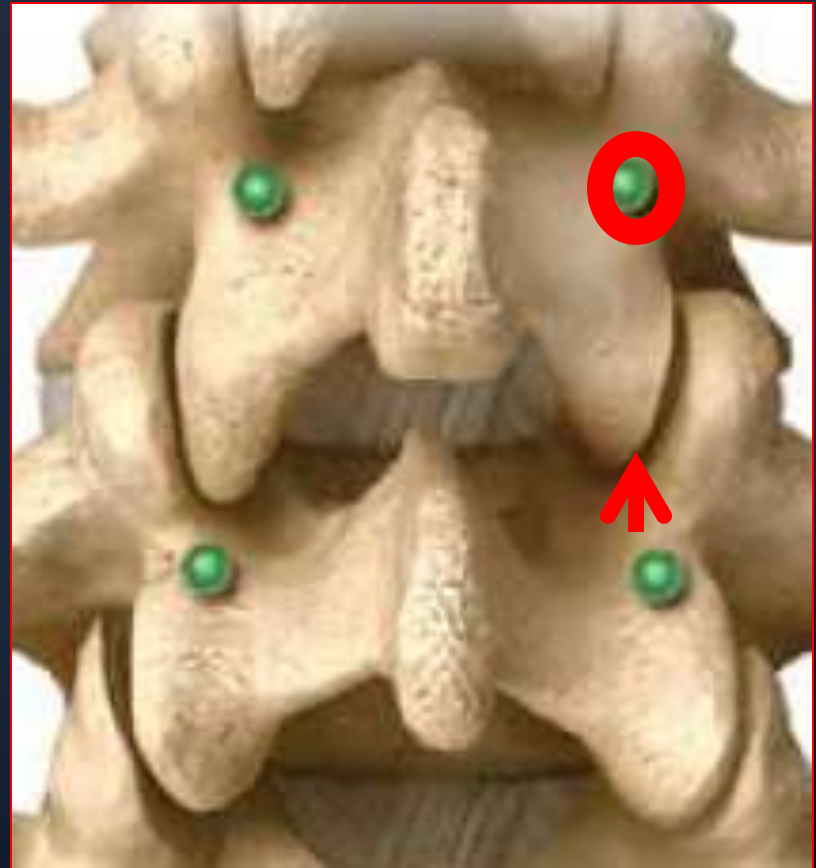
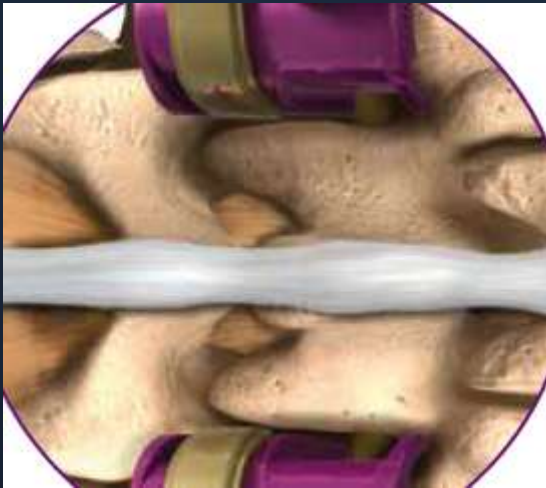
INDICATION

- OSTEOPOROSIS
- LARGE BODY HABITUS
- EXTENSION OF FUSION
- BACKING UP ALIF

SURGICAL TECHNIQUES



RETRACTORS/ STARTING POINT



ATOMY OF PARS

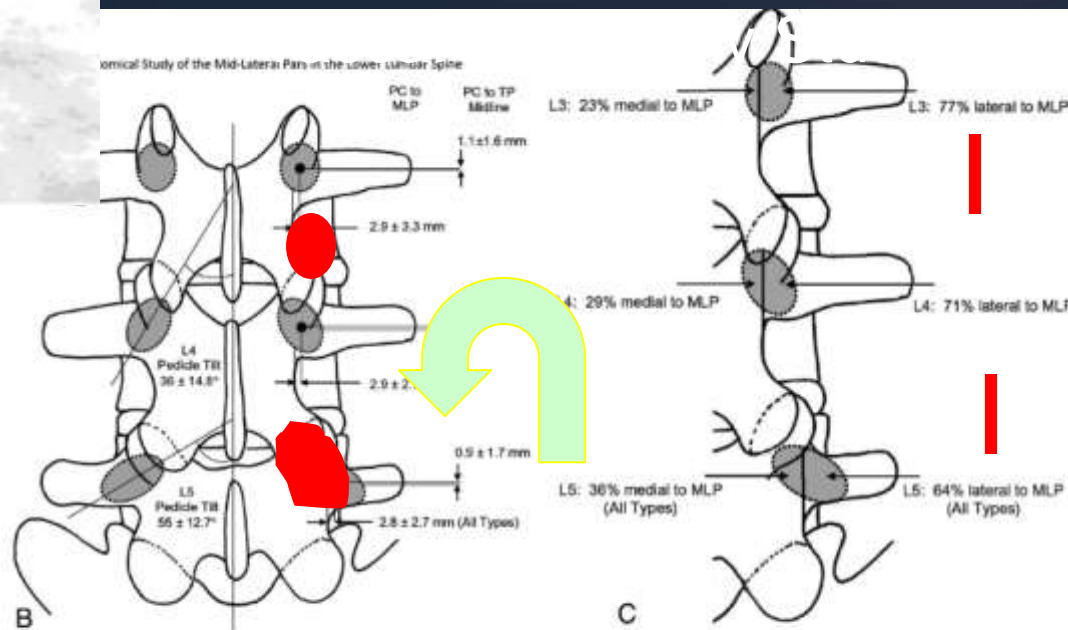
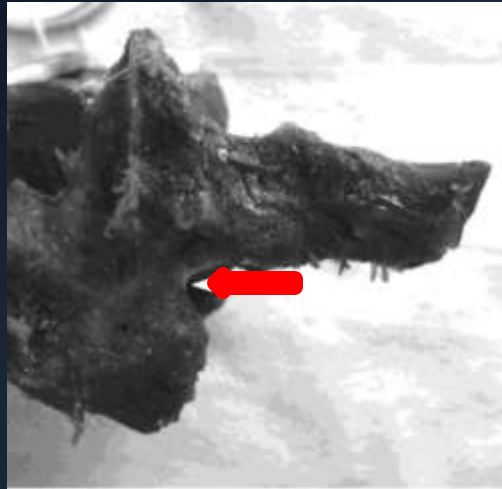


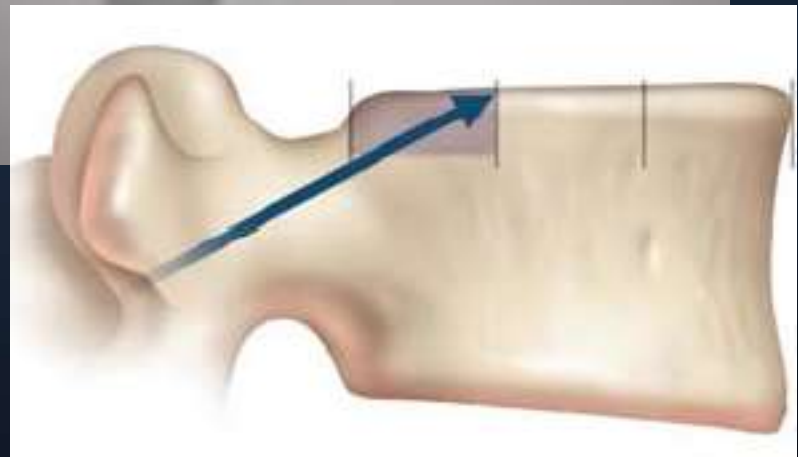
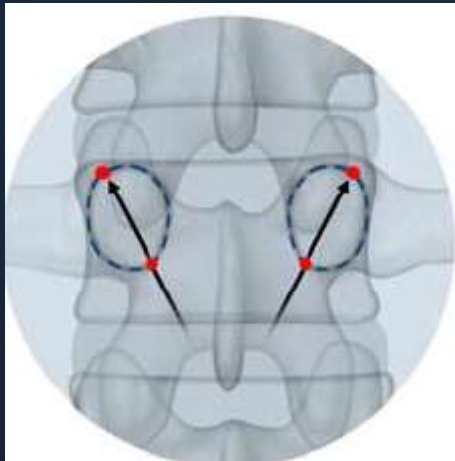
Figure 2. **A**, Typical lower lumbar vertebra with soft tissue attachments removed. Arrow points to the dense area of bone at the MLP from which measurements were based. **B**, L4 and L5 pedicle tilt angles, PC to MLP = Distance of the pedicle center to the MLP, PC to TP midline = Distance of the pedicle center to the midline of the base of the transverse process. **C**, The % of pedicle medial and lateral to the MLP from L4 to S1.

ADJACENT CAPSULE

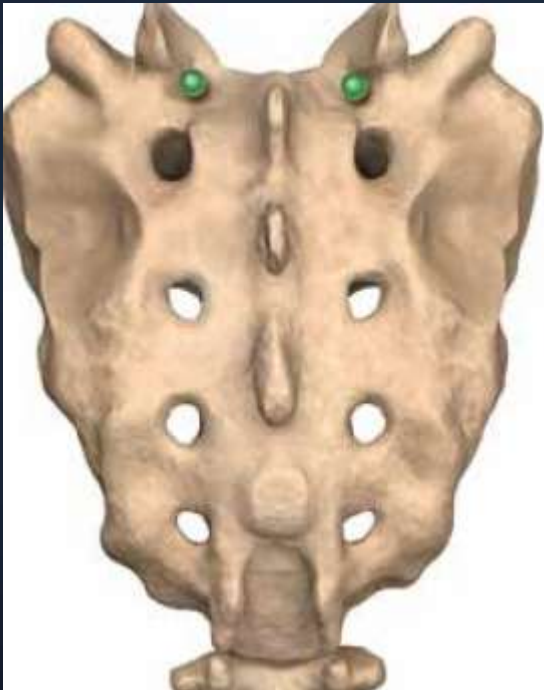




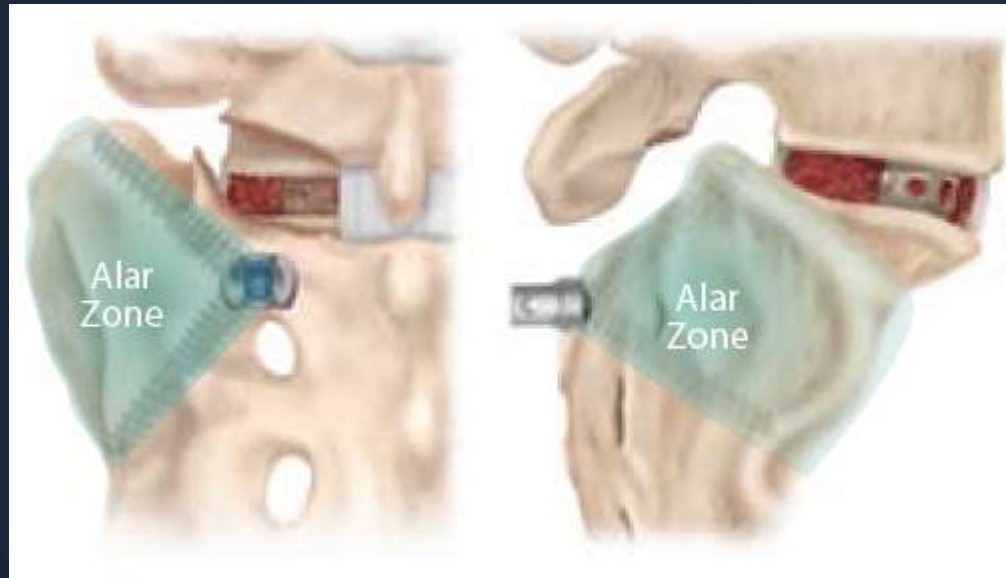
TARGET



SACRUM FIXATION



S₁ ALAR FIXATION



Case 1

77yo M. Ceflex, spondy.



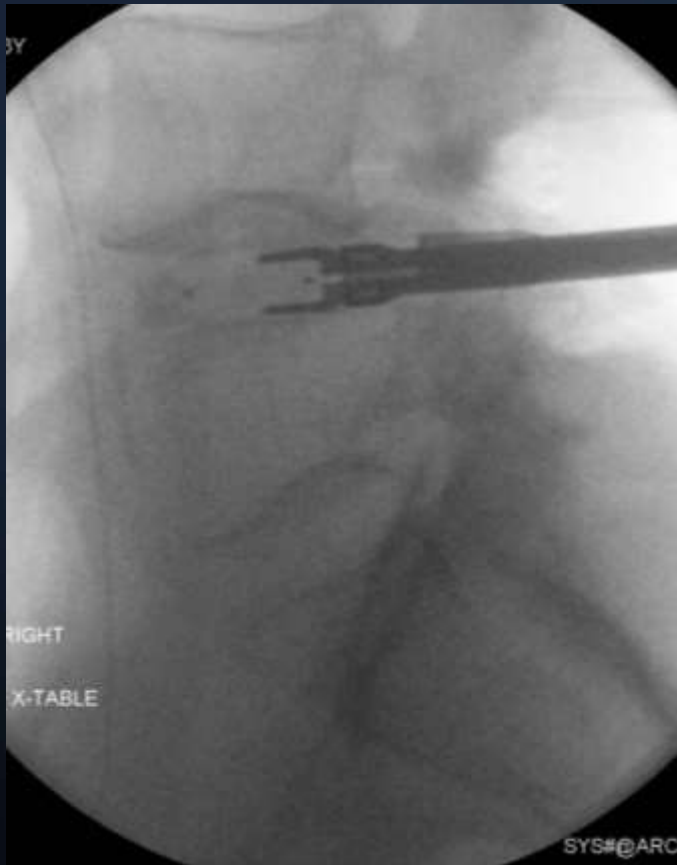
Case 1

pre op MRI



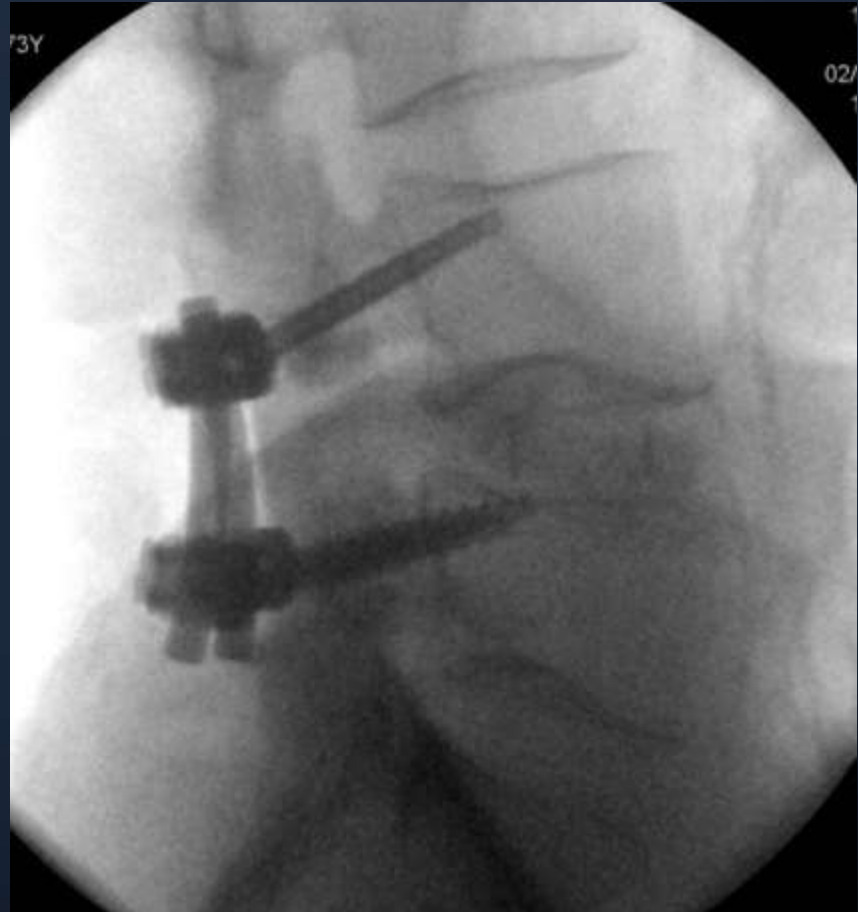
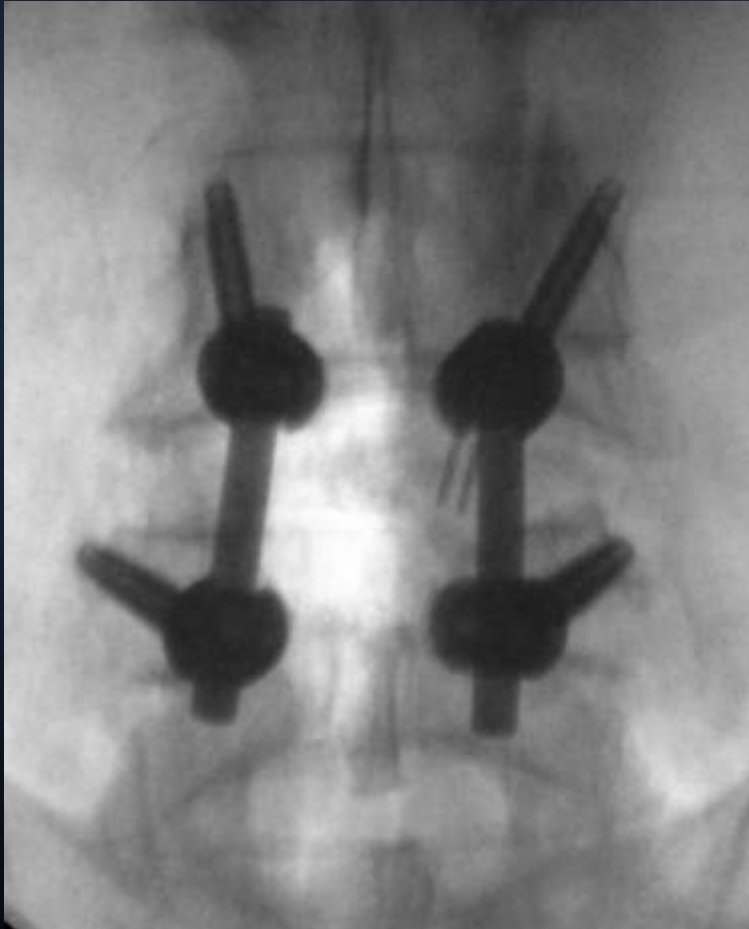
Case 1

Intra-op



Case 1

Intra-op



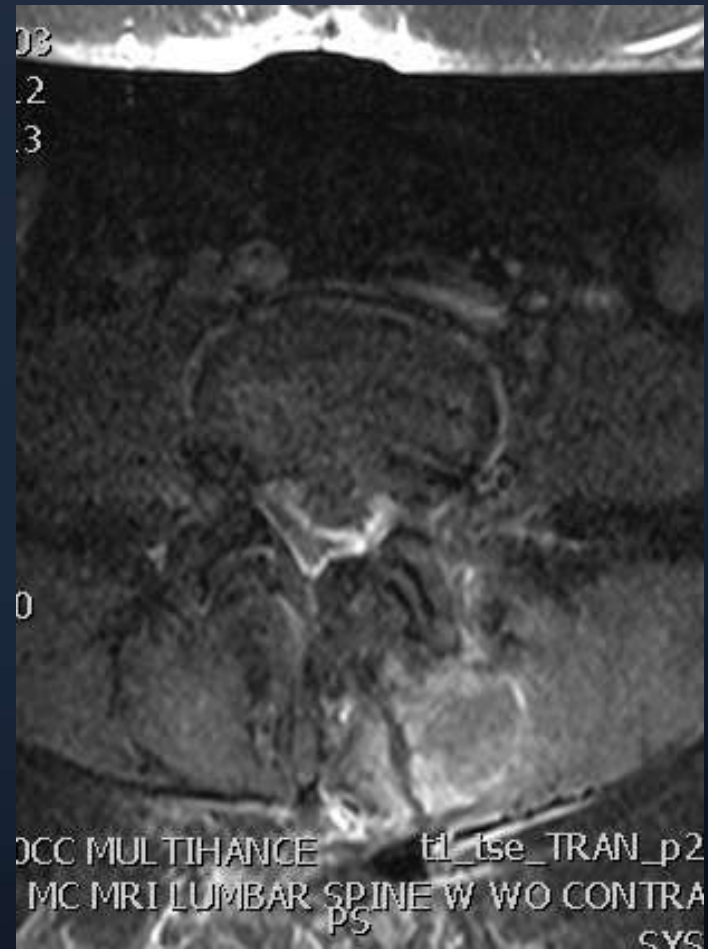
CASE 2

56 yo , 300 lbs, recurrent HNP



Case 2

Recurrent HNP



Case 2



Case 2



Case 3

61 yo M, Backing up ALIF



Case 4

81 yo F, Adjacent Level



Complications

-Pseudoarthrosis



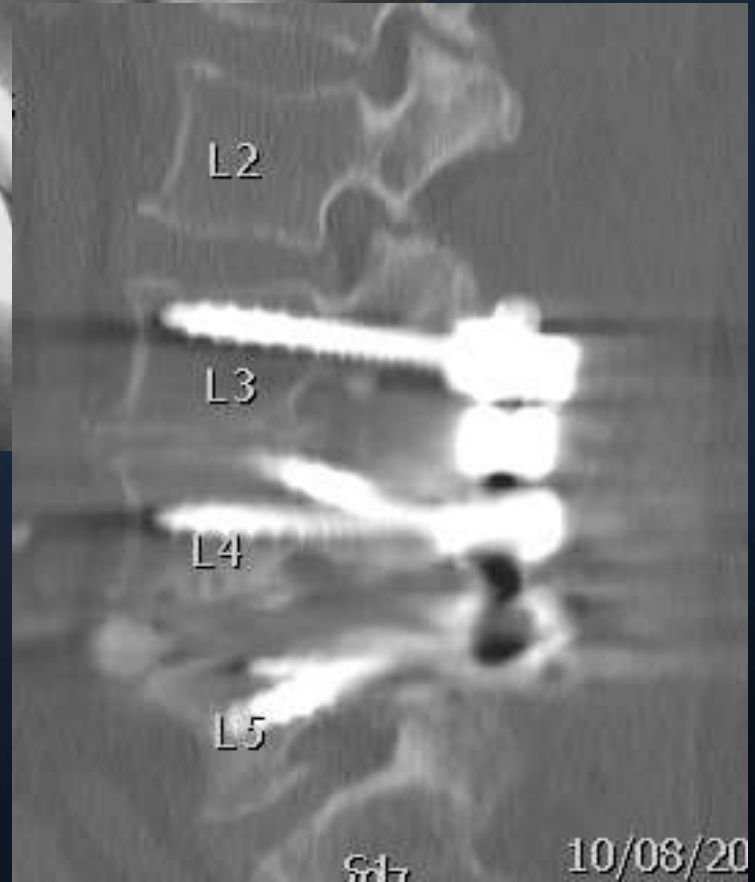
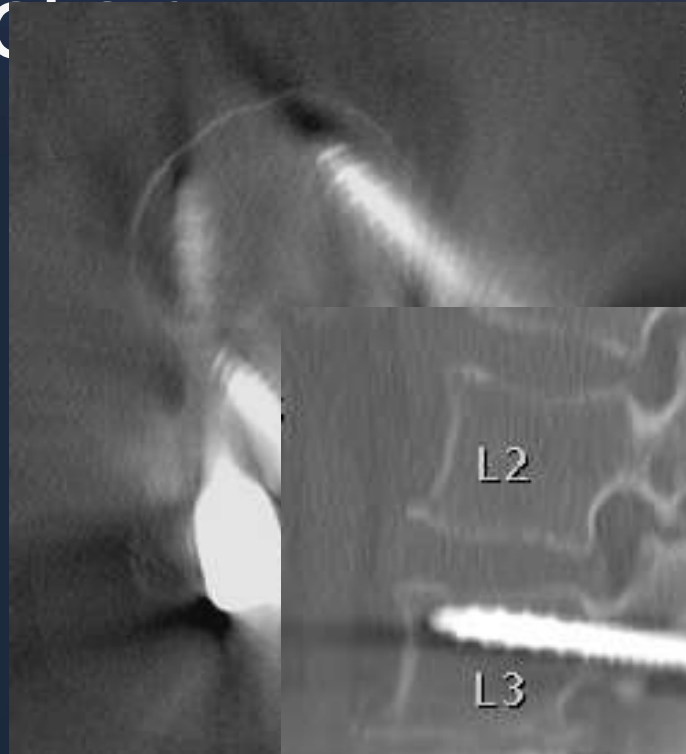
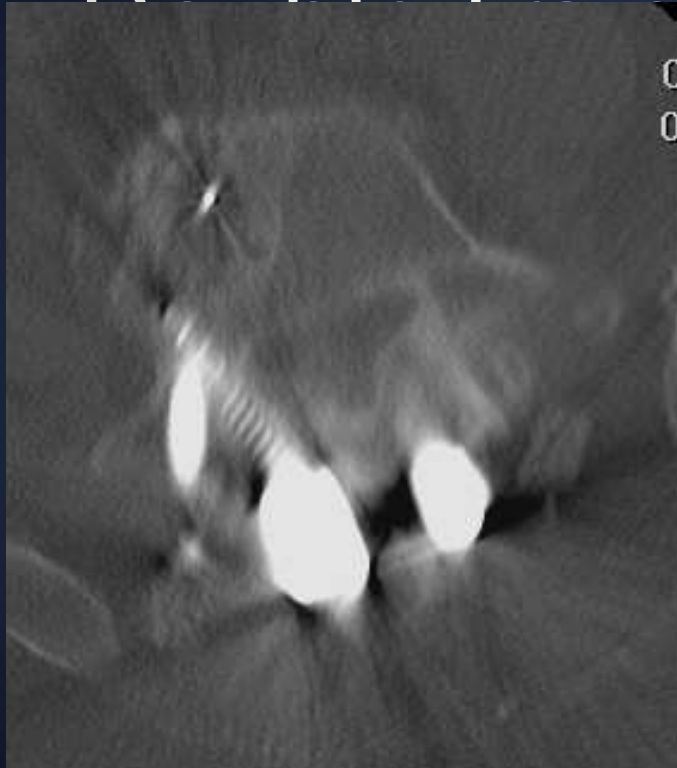
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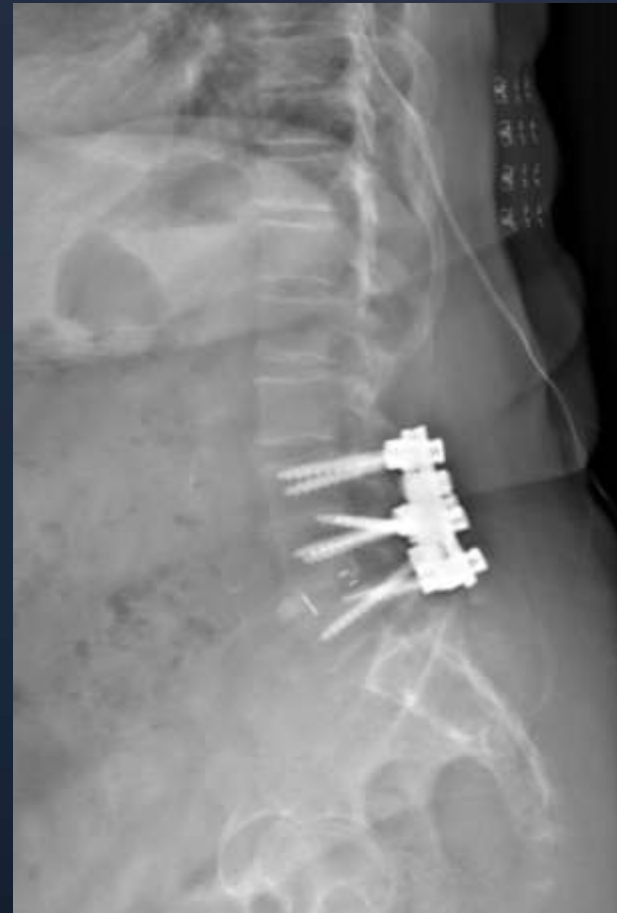
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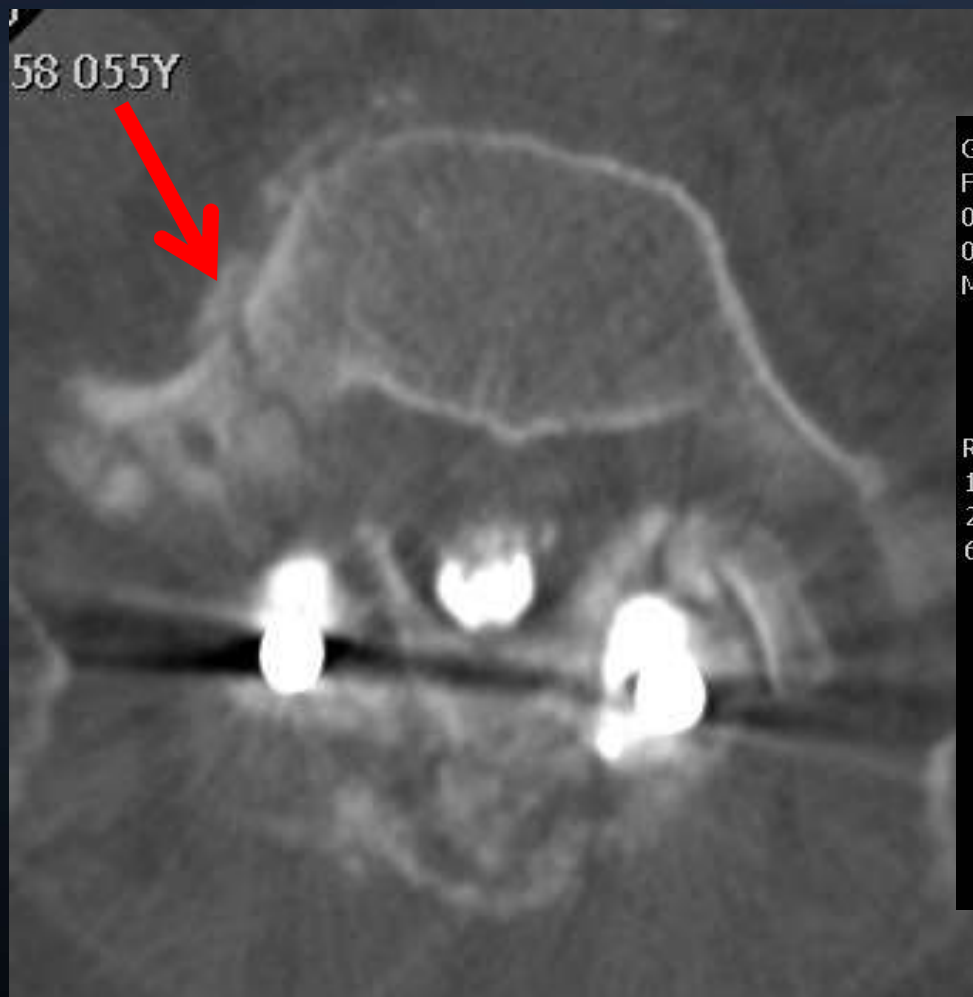
Pseudoarthrosis-



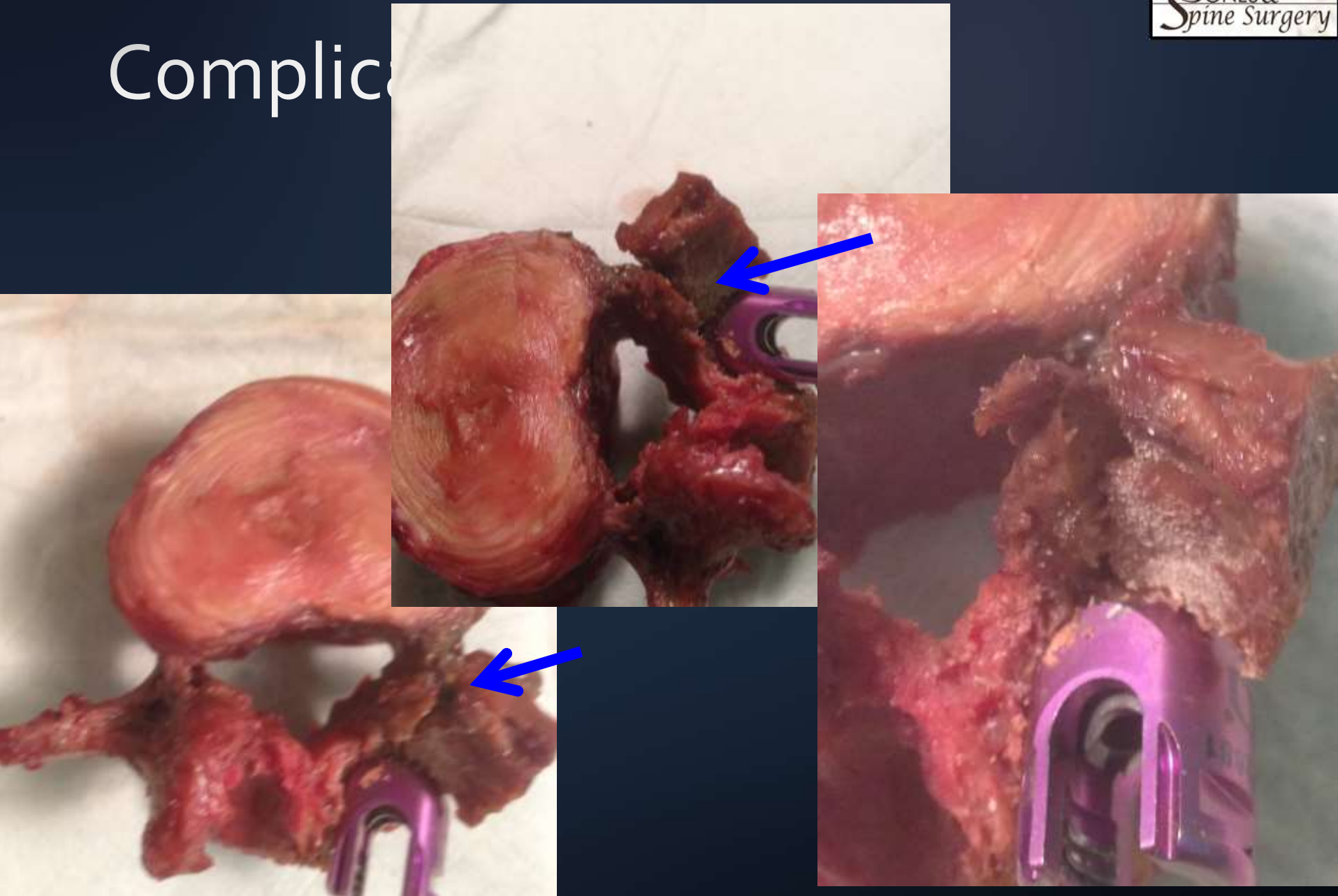
Pseudoarthrosis Double Trajectory



Complication- Fracture



Complica





Conclusion

- Cortical bone trajectory is a great alternative to standard pedicle screw trajectory because:
 - Strong
 - Smaller incision
 - Familiar anatomy
- Know potential complication so you can avoid them!