

Pars Fracture with Cortical bone Trajectory- A Pilot Study

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Bones and Spine

ISASS15

Co-Authors

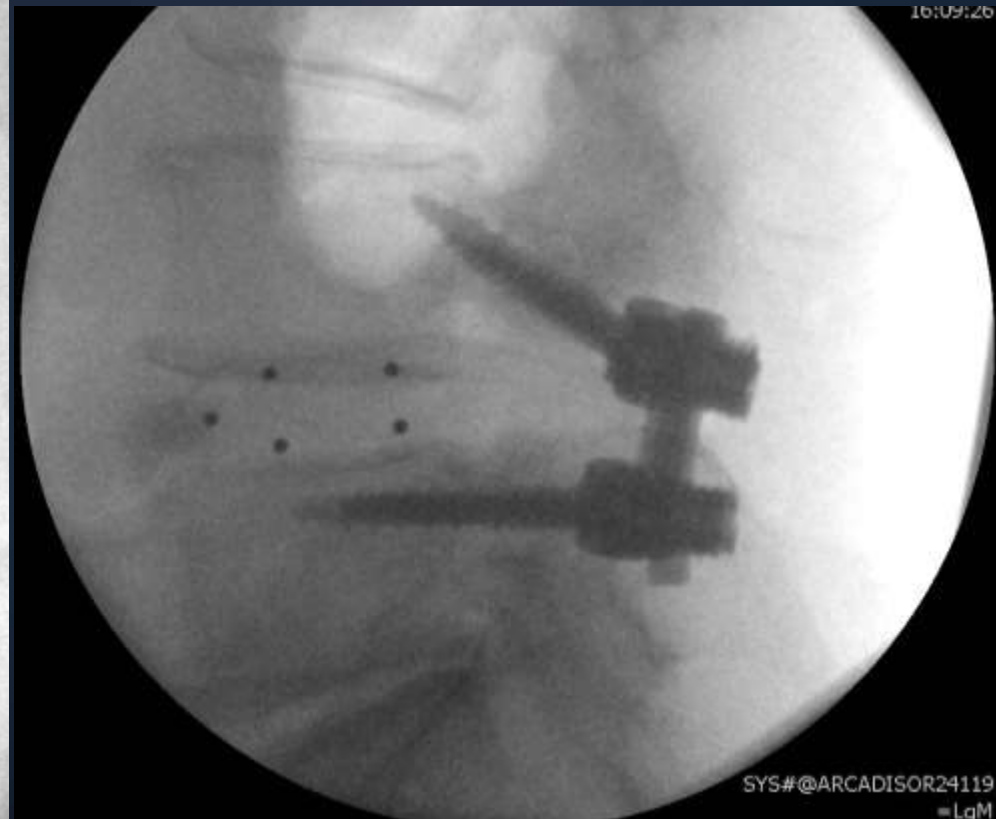
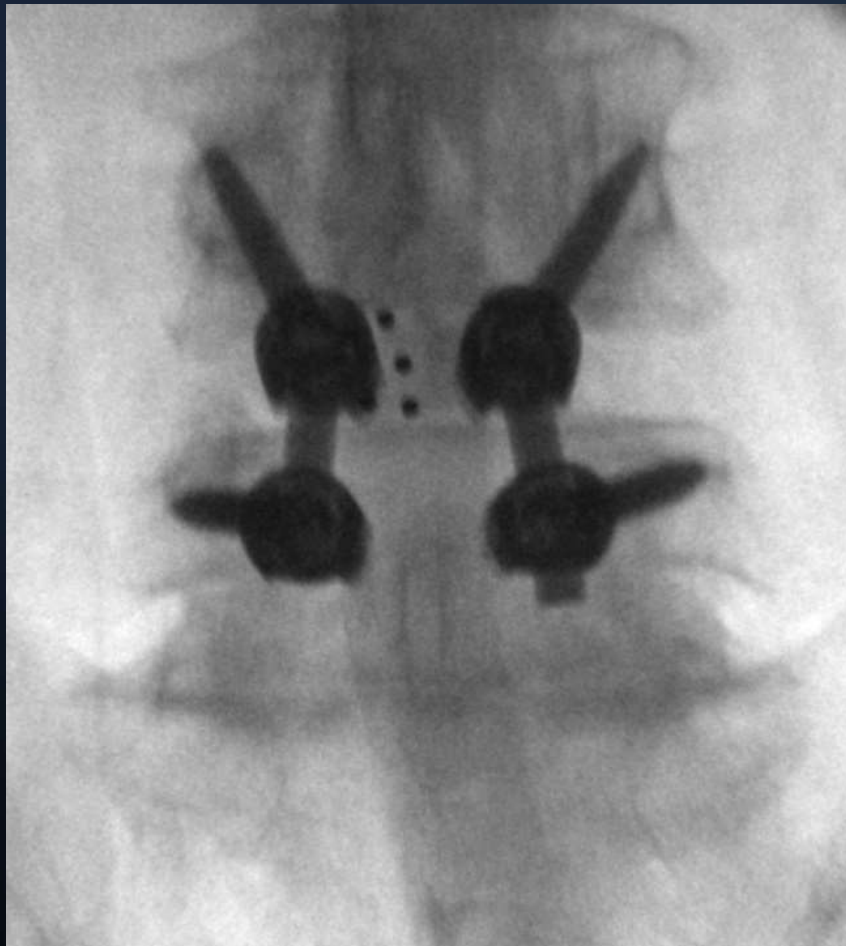
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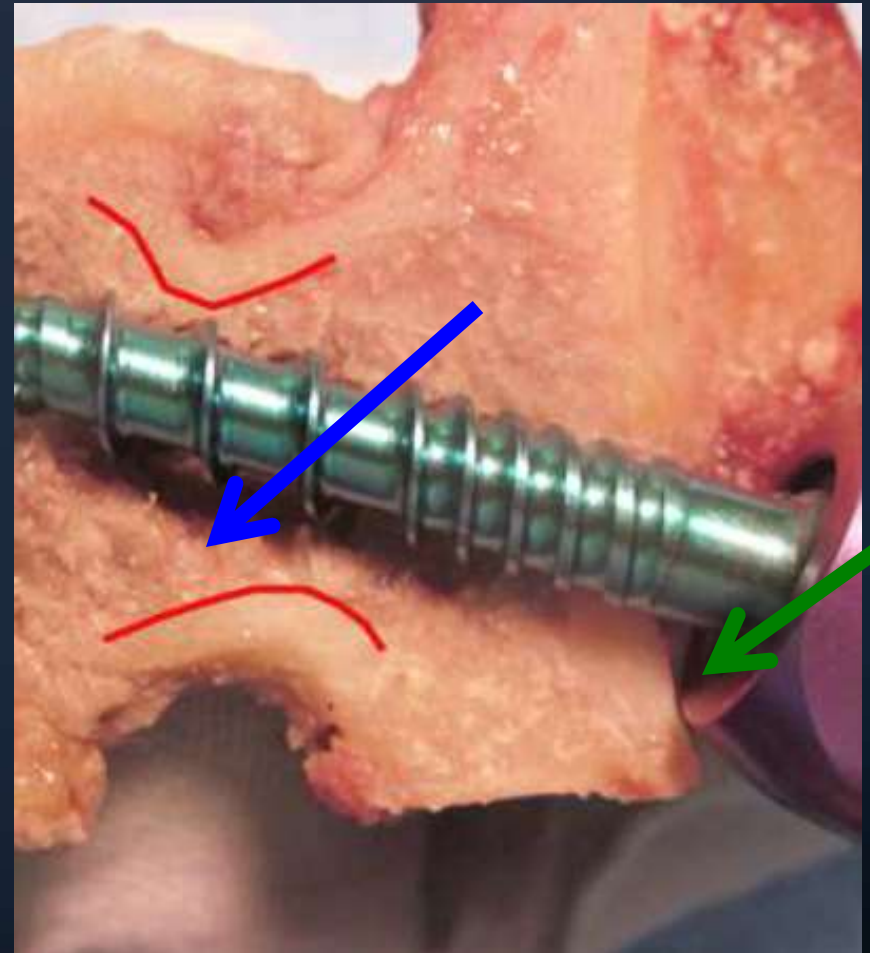
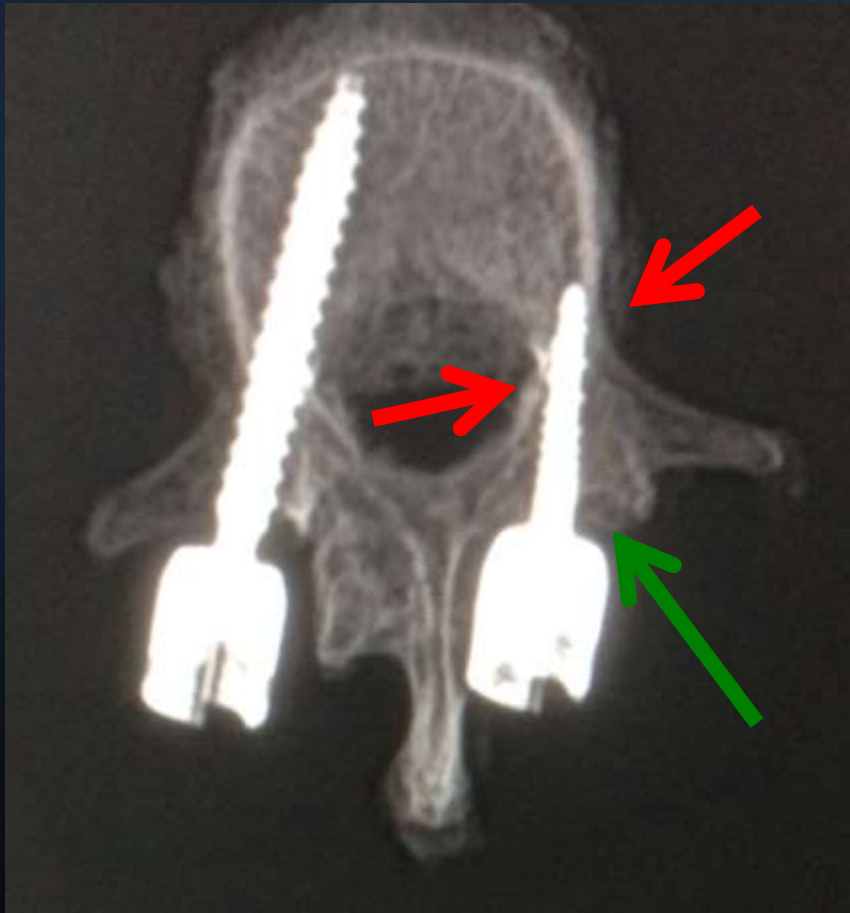
Olumida Danisa, MD

Cortical Bone Trajectory



Cortical bone > cancellous bone

3-points of fixation



Biomechanical study



The Spine Journal 9 (2009) 366–373



Spine

SPINE Volume 38, Number 8, pp 635–641
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B.G. BIOMECHANICS

Biomechanics of Lumbar Cortical Screw–Rod Fixation *Versus* Pedicle Screw–Rod Fixation With and Without Interbody Support

Luis Perez
Neil R. C

Spine

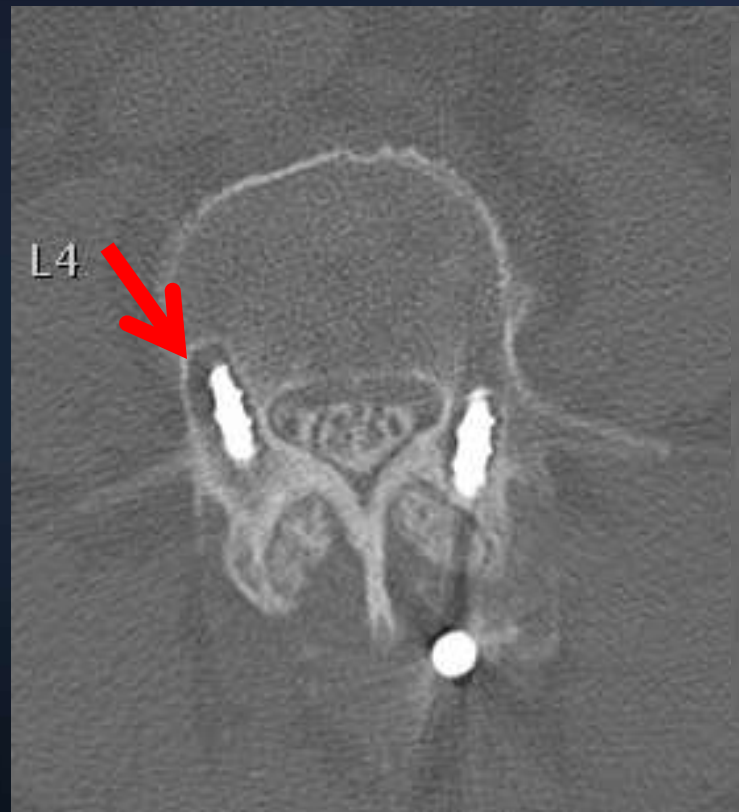
SPINE Volume 39, Number 22, pp E1297–E1302
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BIOMECHANICS

Effect of Physiological Loads on Cortical and Traditional Pedicle Screw Fixation

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-Gross Loosening (3/22)



19msec

T:

31:18

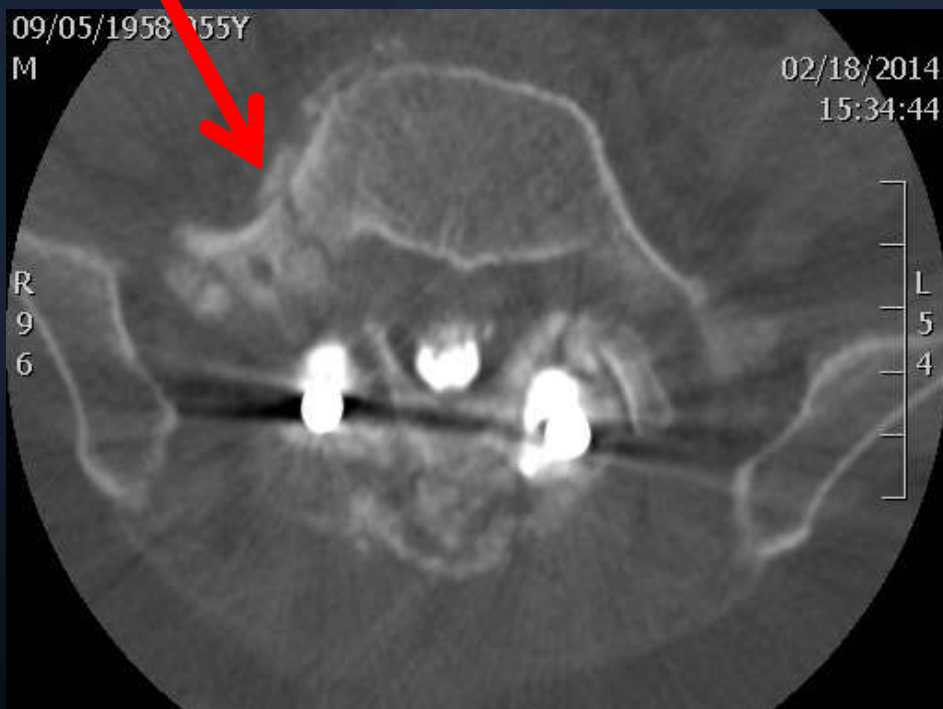
D:

29:43

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Pars/pedicle Fx (2/22)



Pilot Study

- GOAL:

Using Cadaveric study to understand the potential mechanism that would explain the loosening and fractures

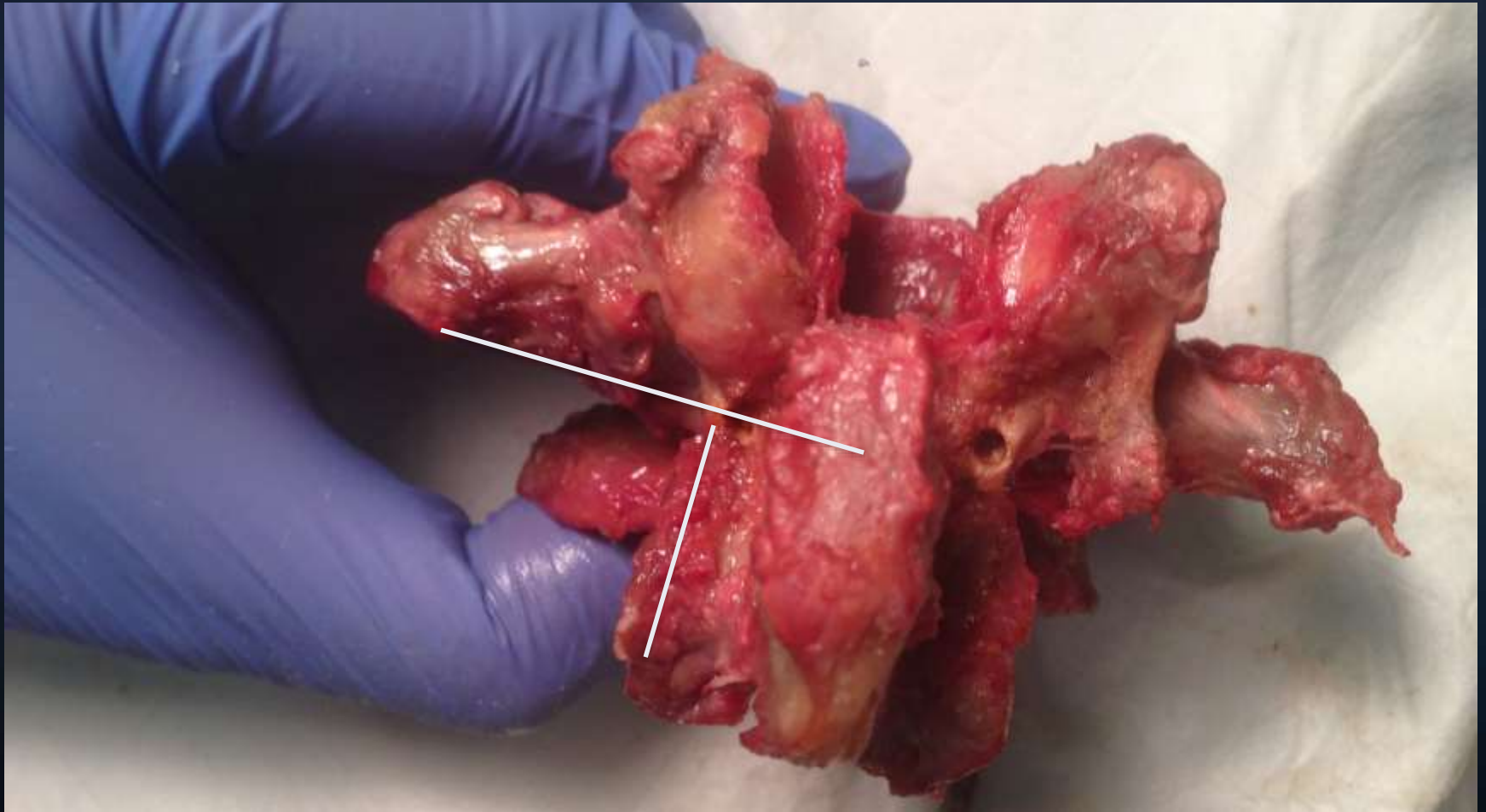
Materials & Methods



- 9 vertebrae (w dexta)
- 17 screws (L₁ to L₅)
 - 4.5 x 25mm
- Cortical trajectory
- Video process
- Radiographs (3 views)

Material & Method

Starting point



Matsukawa, K., et al. (2013). "Morphometric measurement of cortical bone trajectory for lumbar pedicle screw insertion using computed tomography." J Spinal Disord Tech **26**(6): E248-253.

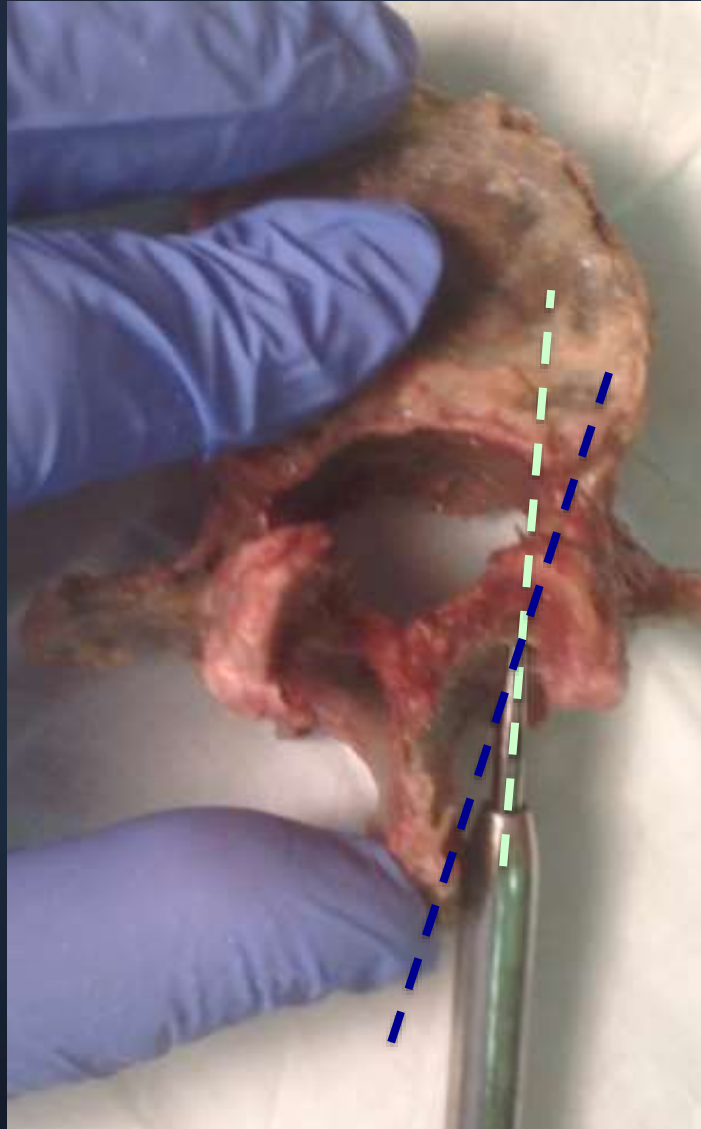


Results

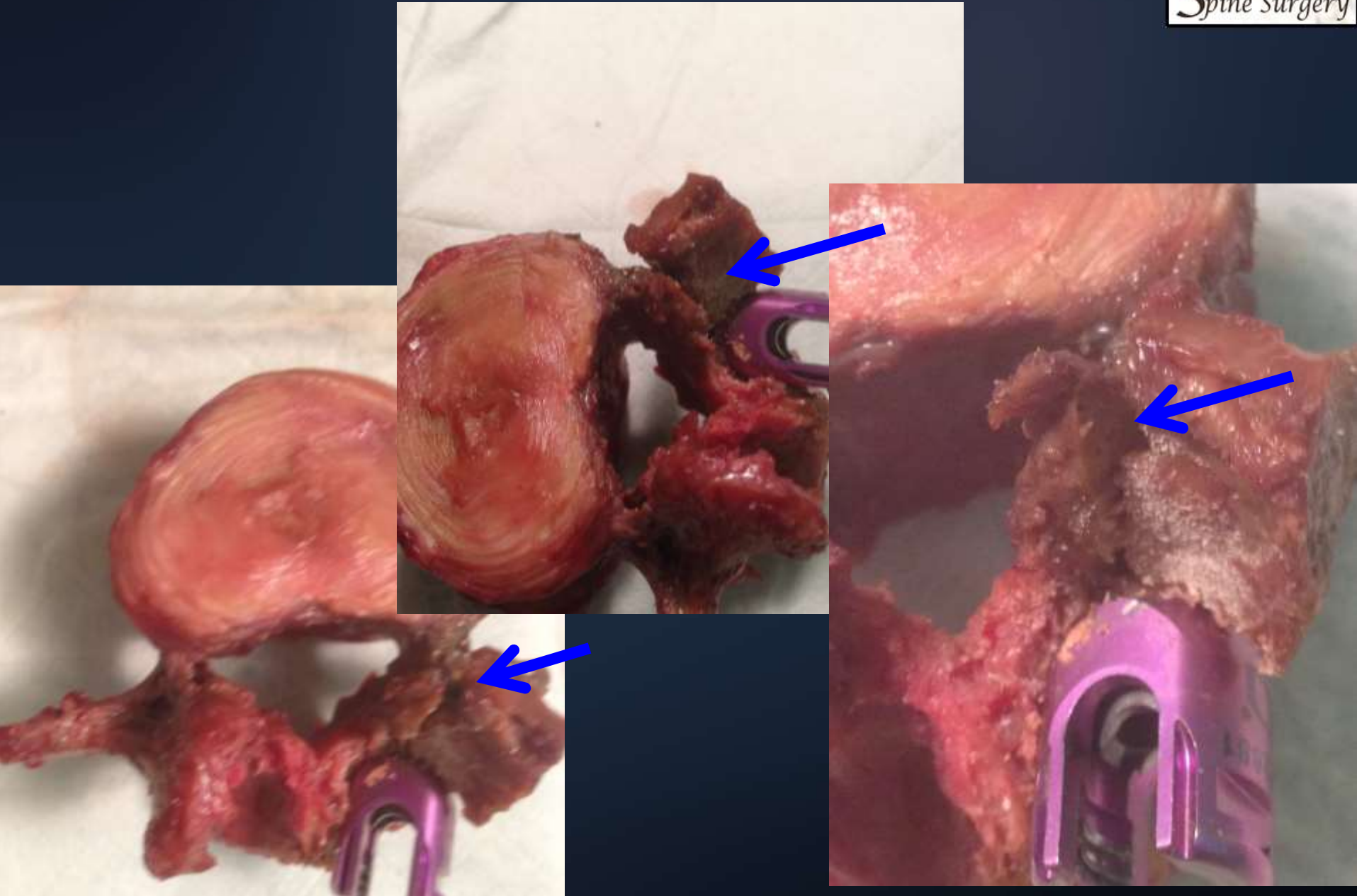
Donor	BMD (g/cm ²)	L1	L2	L3	L4	L5	Total
1	0.875	2**	-	-	-	-	2
2	0.961	-	1 ^f	-	-	-	1
3	1.037	-	2	-	2*	-	4
4	0.875	-	-	-	2	2	4
5	0.864	2	-	-	-	-	2
6	1.075	2*	2**	-	-	-	4
*: 1 side Loosening; **: 2 sides Loosening; f: fractured.							17

- Spinous process had to be removed 7/9 (78%)
- Loosening(evidenced by change of traj) 6/17(35%)
- Fracture 1/17(6%)

SP required removal



Complication-Fracture

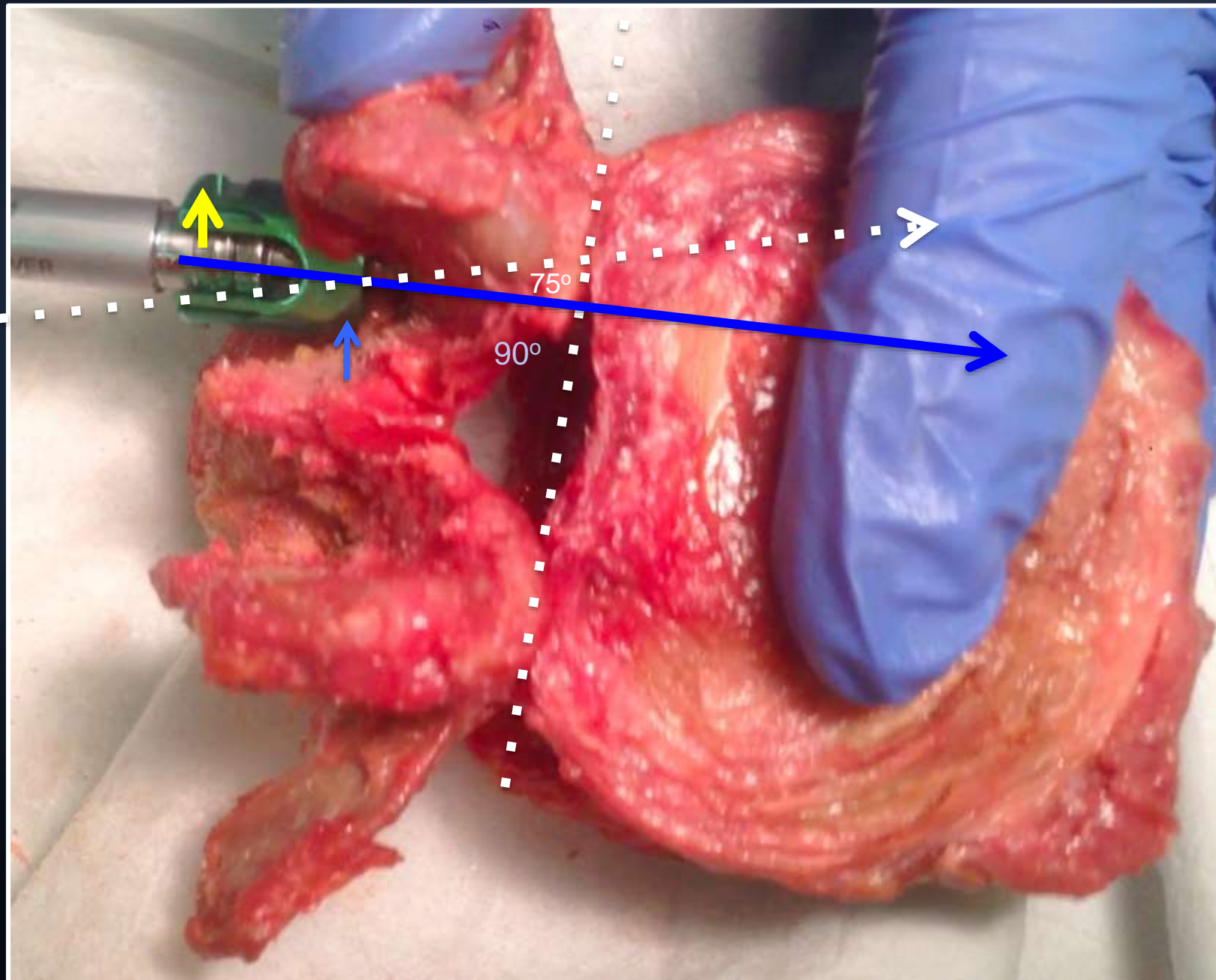


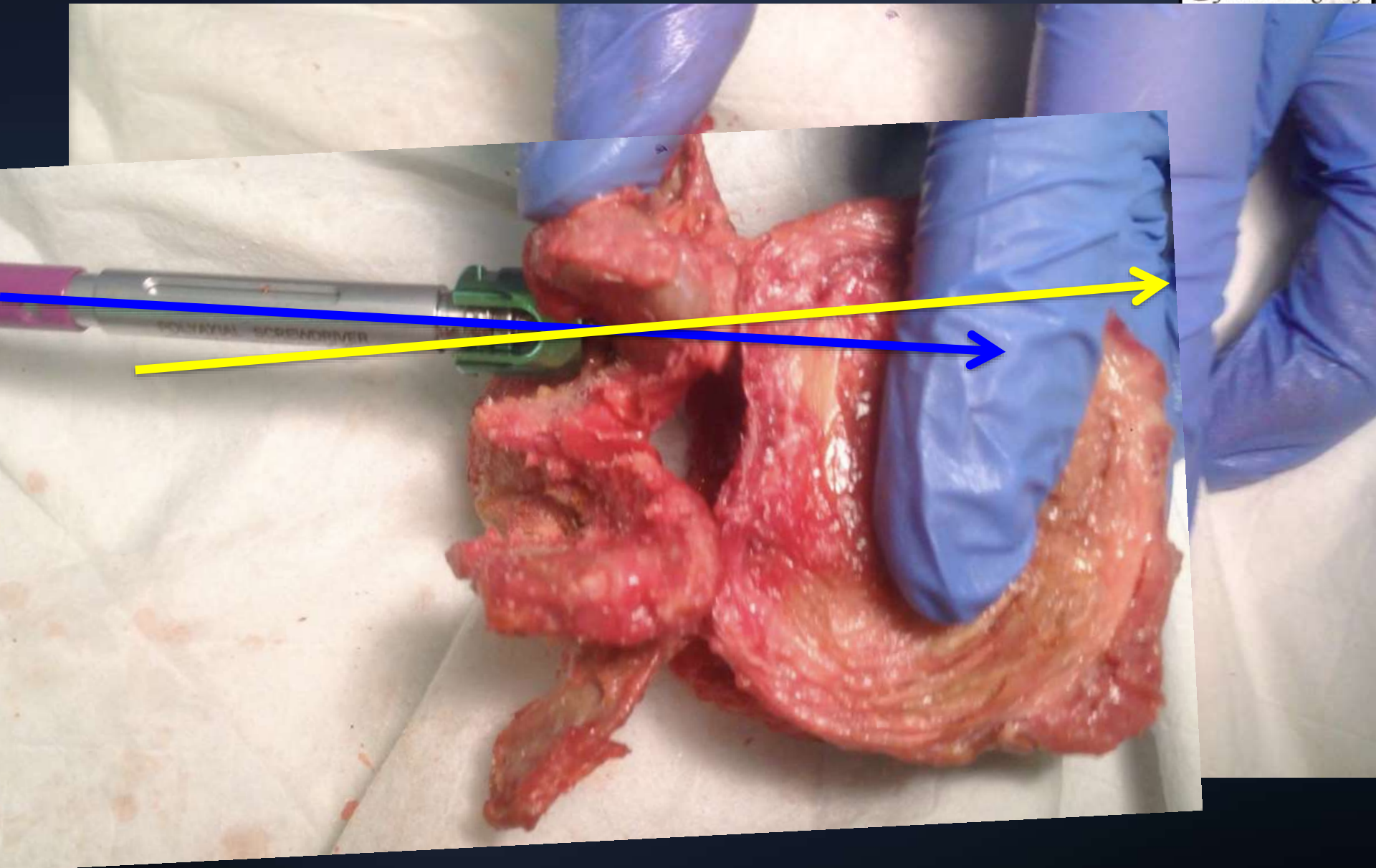
Results - FX



LOOSENING







Discussion



8 PTS

Screws placed w intra-op navigation.

16 month f/u

5/8 loosening (63%)

2 required revision surgery

Conclusion

- Spinous process may hinder screw trajectory
- Fx may happen when head of screw impinges against base of SP and lamina.
- Same mechanism may explain loosening due to change of insertion trajectory
- Future study
 - More cadavers
 - Levels
 - Modular head
 - Biomechanical quantification