Direct Lateral Approaches to the Spine: Advantages and Limitations

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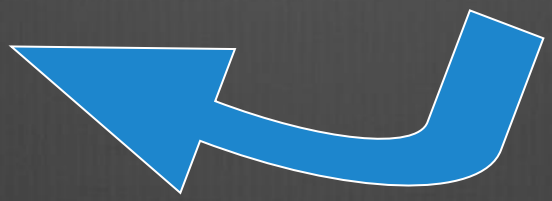
Disclosures

- Consultant
  - Innovasis
  - Titan Spine
  - K2M
- Royalties
  - Choice Spine

Rationale for the lateral approach

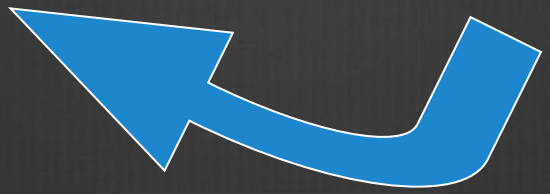
- Alternative anterior procedures
  - ALIF
  - Open lateral retroperitoneal

Lateral is less invasive?



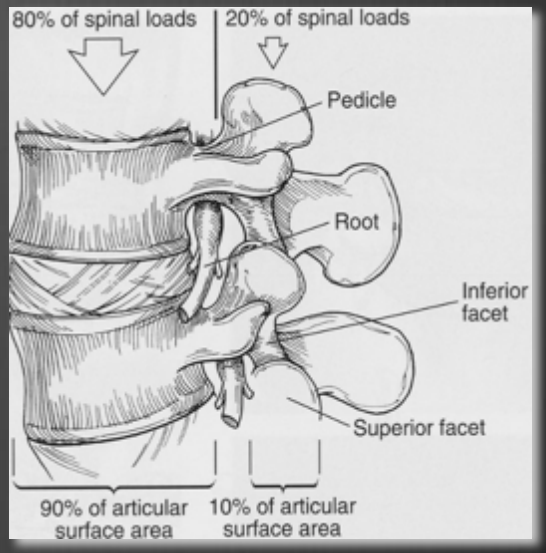
- Alternative posterior procedures
  - TLIF
  - PLIF

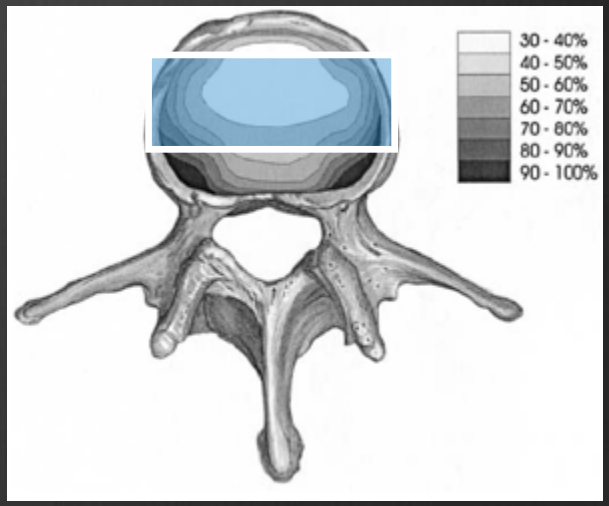
Lateral is better reconstruction, better fusion?



Lateral Interbody Indications

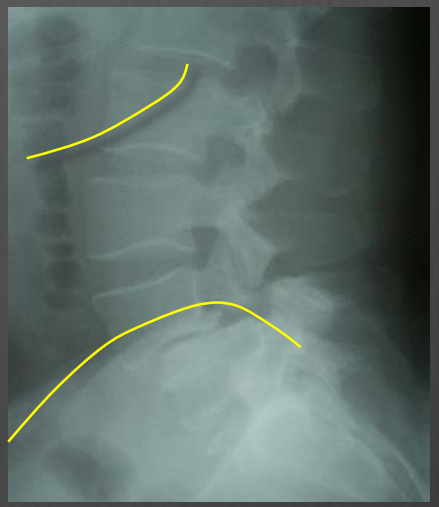
- I have used it for:
  - Degenerative scoliosis
  - Degen/Isthmic spondylolisthesis
  - Non-union
  - Revisions, recurrent compression
  - Adjacent segment disease
  - Infection
  - DDD
- Lateral interbody fusion benefits:
  - Excellent support of axial load
  - Broad fusion surface
  - Can perform bilateral releases
- **Caution**: Sagittal deformity



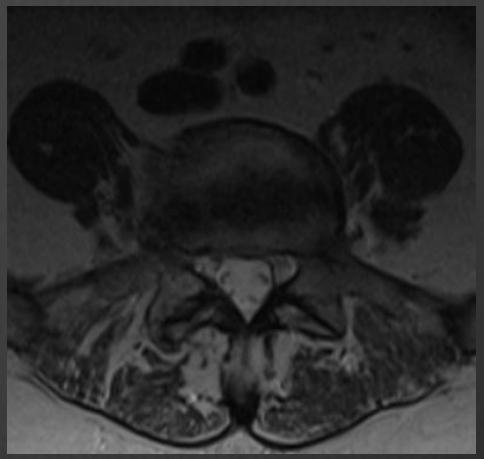


Pre-op Planning Pearls

- Standing X-rays:
  - Check for unfavorable anatomy
  - High iliac crest at L4-5**
  - Long 11th and 12th ribs
    - Go intercostal or remove part of ribs



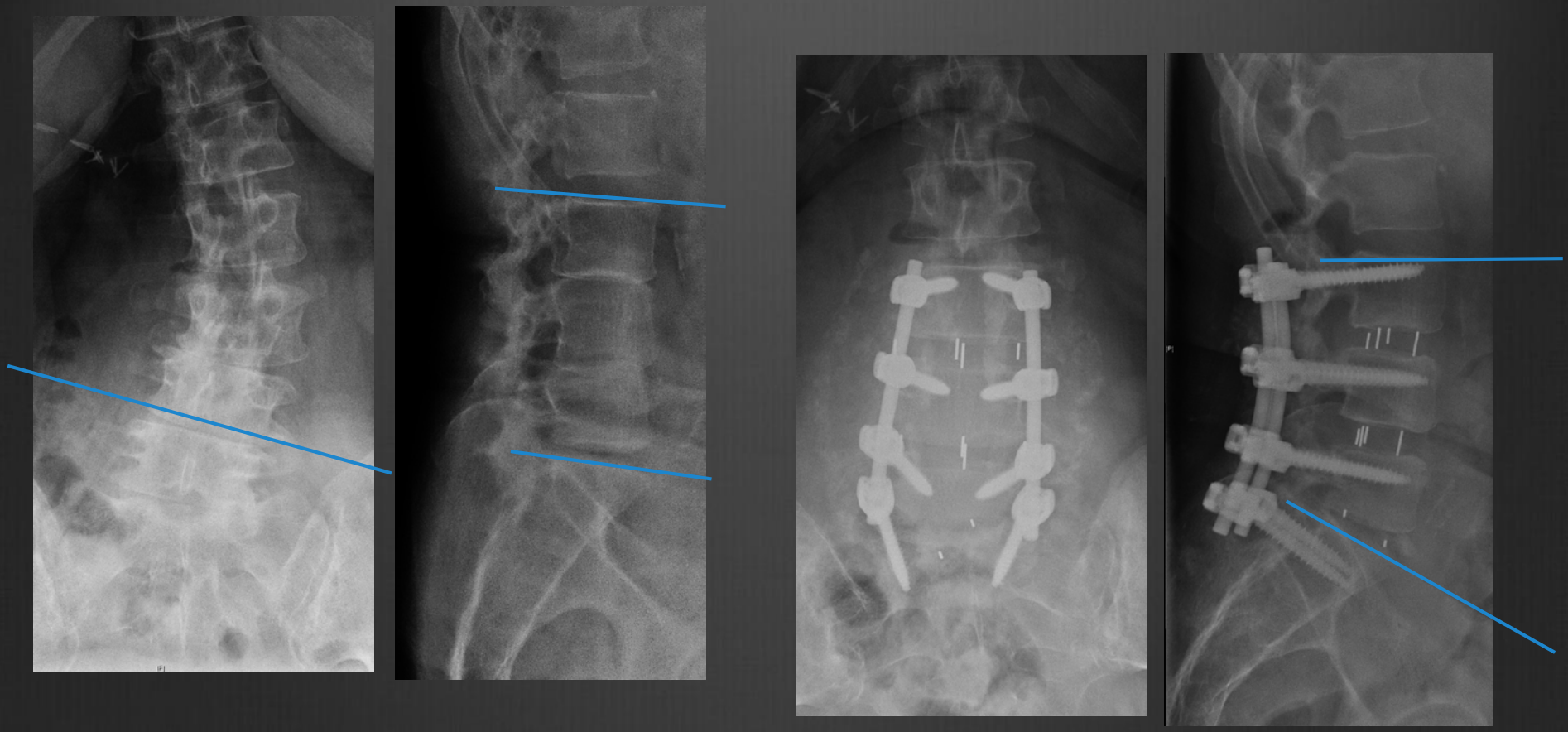
- MRI:
  - Find the vessels
    - (esp in DEFORMITY)
  - Psoas size, shape, position?
    - Beware Mickey Mouse Sign



Left or right approach?

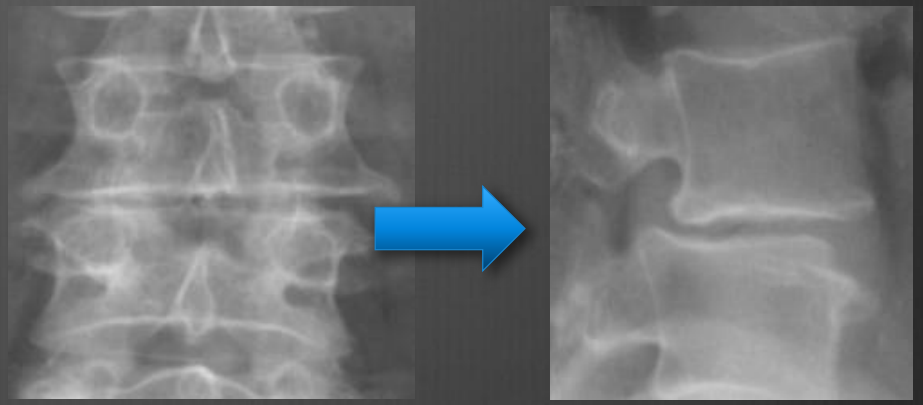
- Deformity correction good on either side
  - Go on side easiest to enter disk
  - Convex side for easier entry
  - Concave side for multilevel
  - L4/5 often has only one option
- Retroperitoneal anatomy – look at MRI
  - Psoas, lumbar plexus, ureter
  - Low Kidney
- Prior retroperitoneal surgery
  - Contralateral ideal
- Tough lateral osteophyte
  - Use contralateral or plan osteotomy
- Unilateral leg pain
  - Use ipsilateral

Example; Degenerative scoliosis, stenosis



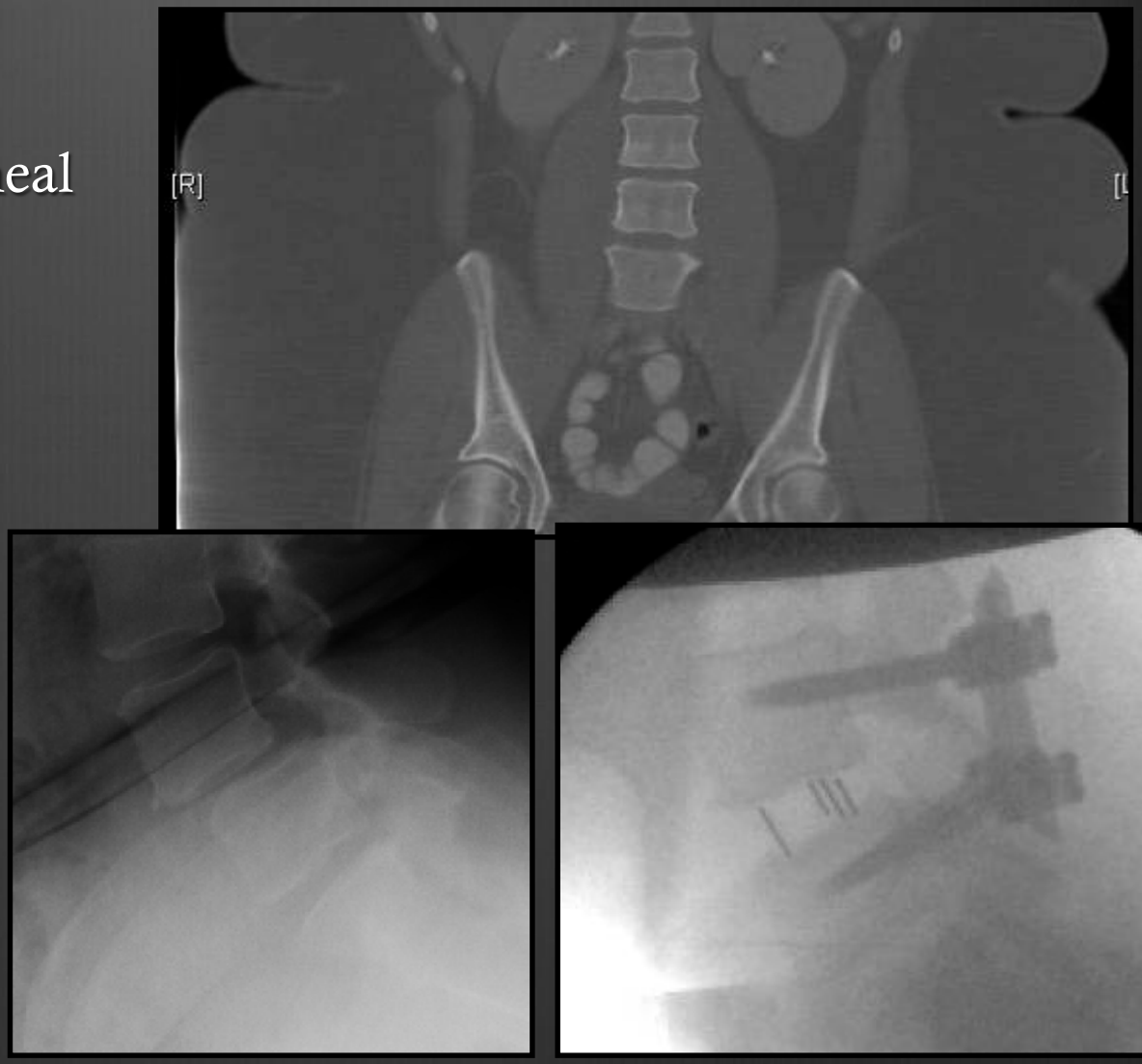
Fluoroscopy Pearls…

- Provisionally tape pelvis and chest
- Get perfect AP view
- Finish taping and flex patient
- Laterally typically perfect or nearly so this way
- Avoids lots of re-taping
- Add tape straight from crest to foot of bed to rock pelvis out of the way



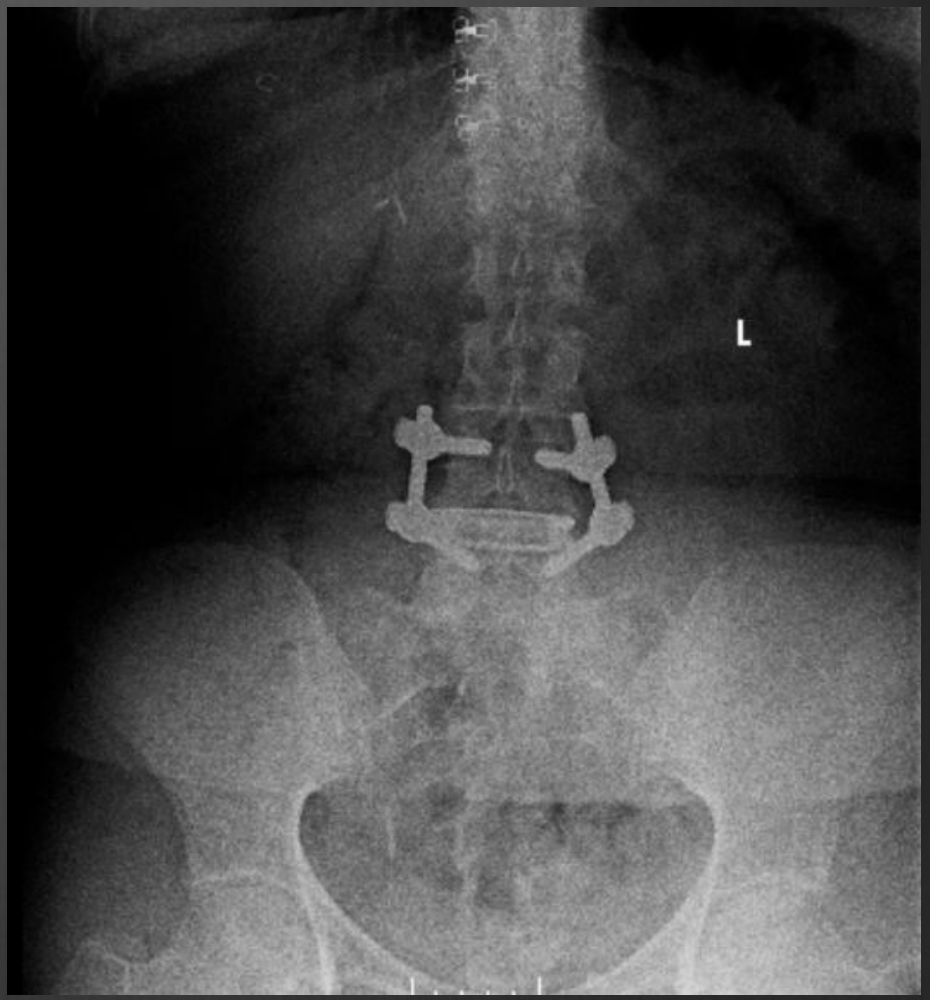
Excellent for obese patients

- In lateral position, the abdominal and peritoneal fat fall anterior
- The trans-psoas procedure is not much different (or harder) in obese patients
- Longer tube / portal



BMI 49

Patient Discharged Postop Day #1

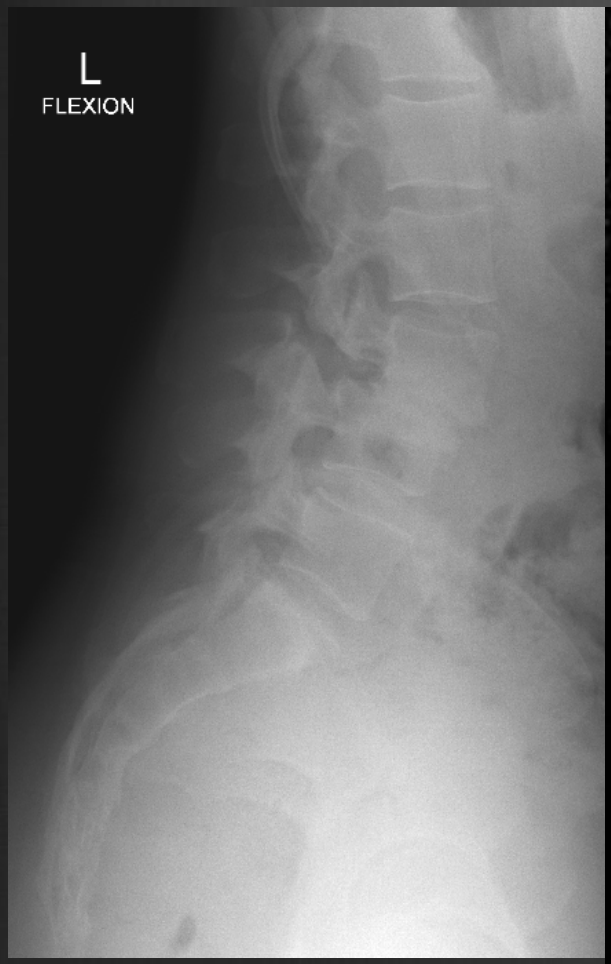


Nerve Injury Avoidance Pearls

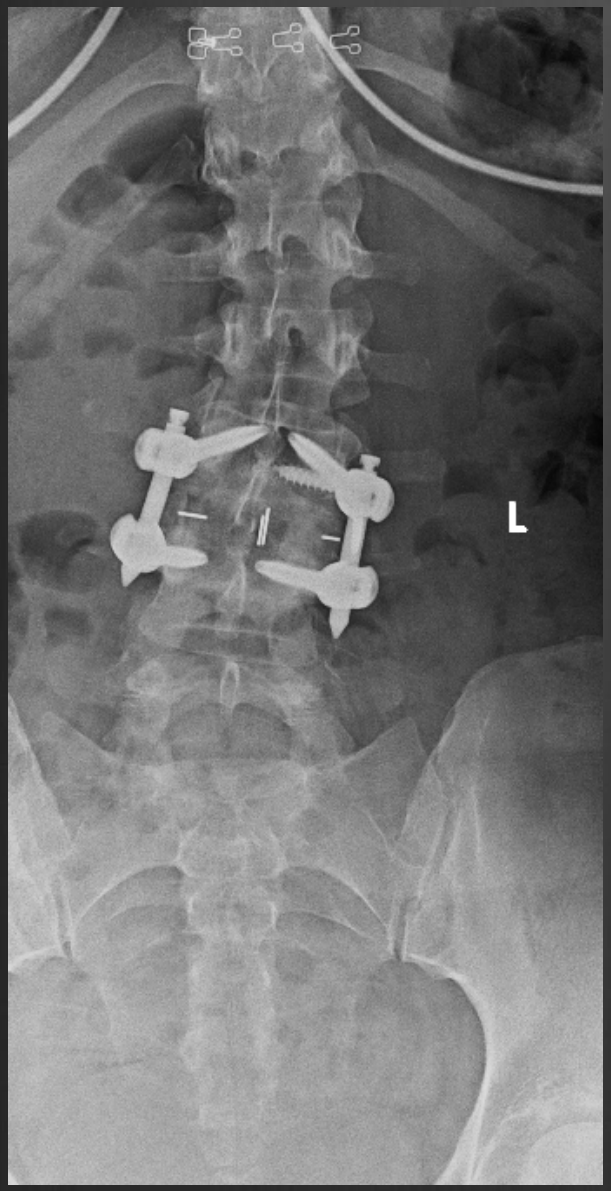
- Use REAL neuro-monitoring
  - Experienced and familiar technician
  - Direct look and manual dissection through psoas (improved my monitoring numbers)
  - Dissect through anterior psoas and pull back before dilator/pin placement

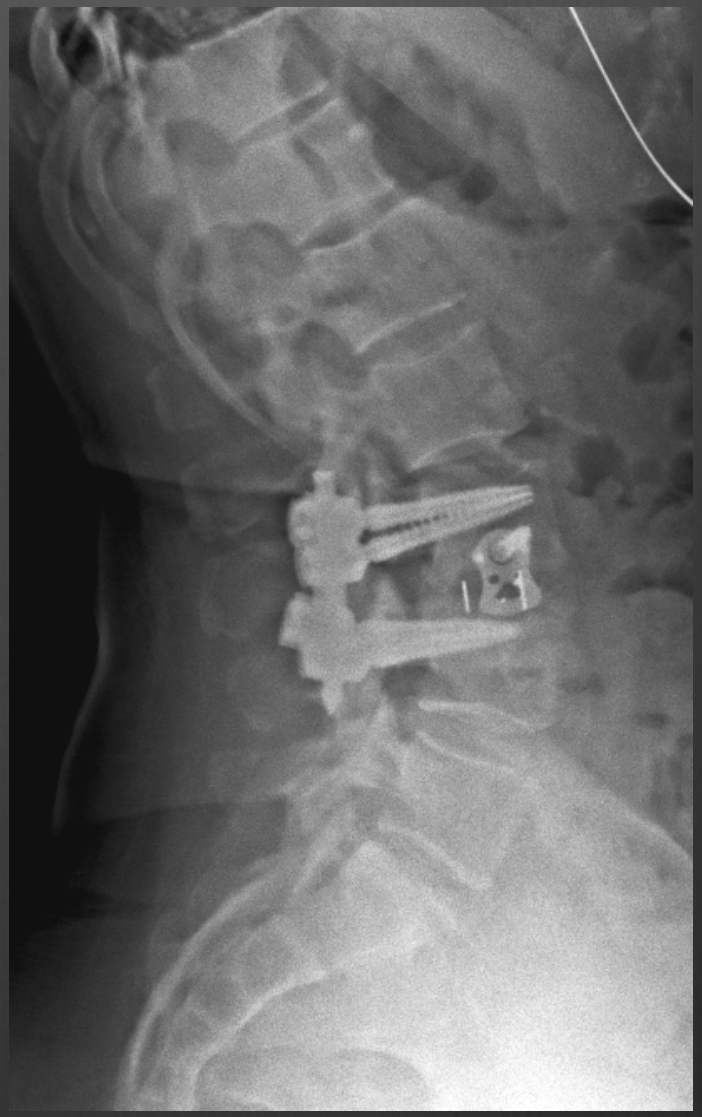
  - Psoas size, position, shape
    - Beware the Mickey Mouse Sign
    - Plan docking site and psoas mobilization preop

Case; Isthmic Spondylolisthesis



Postop Isthmic Spondylolisthesis

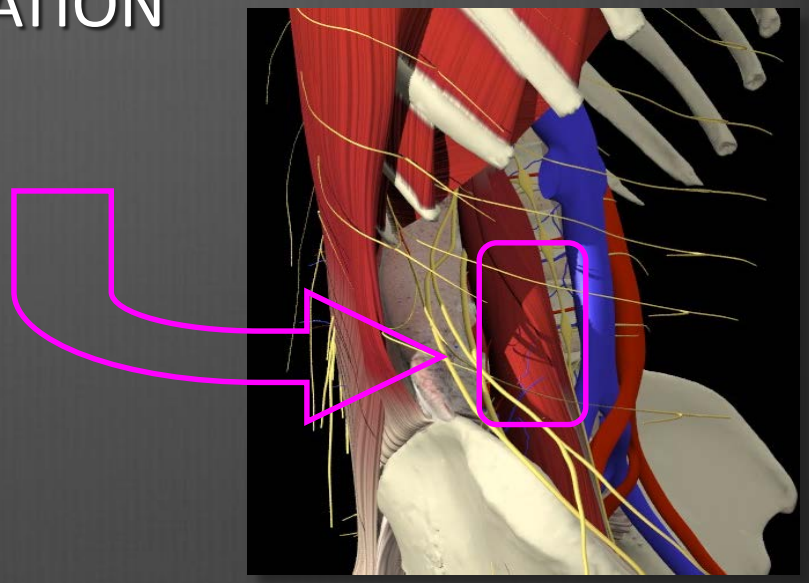


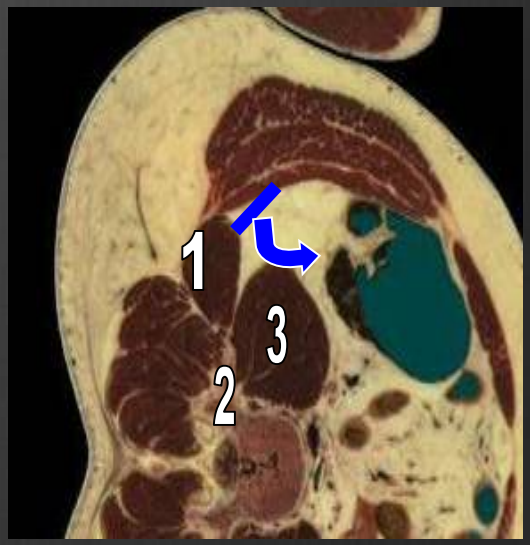


Recurrent disk herniation, segmental collapse

Pearl; use DIRECT VISUALIZATION

- Split muscle layers under direct visualization:
  - External Oblique
  - Internal Oblique
  - Transversalis
- See the retroperitoneal fat
- Sweep posterior to anterior:
  1. Quadratus Lumborum
  2. Transverse Process
  3. Psoas
- Look around - visualize:
  - Psoas shape and position
  - Vessels?
  - Ureter?
  - Genito-femoral nerve?



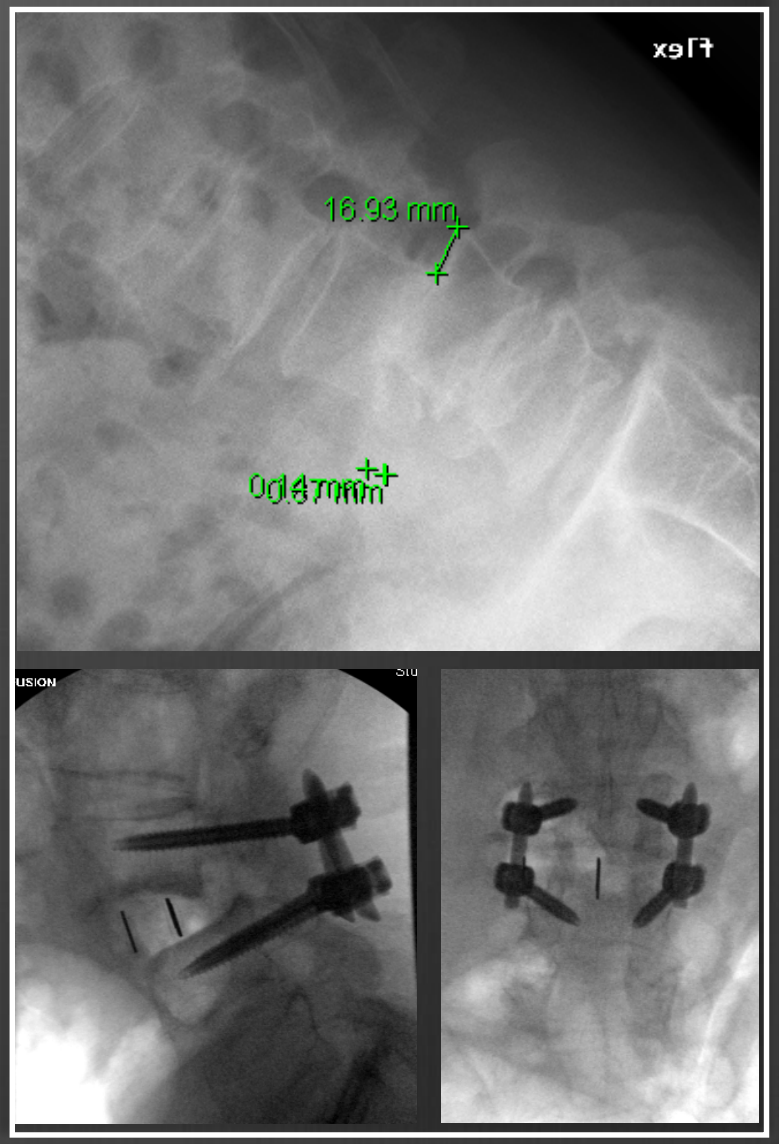


Use wide implants when possible

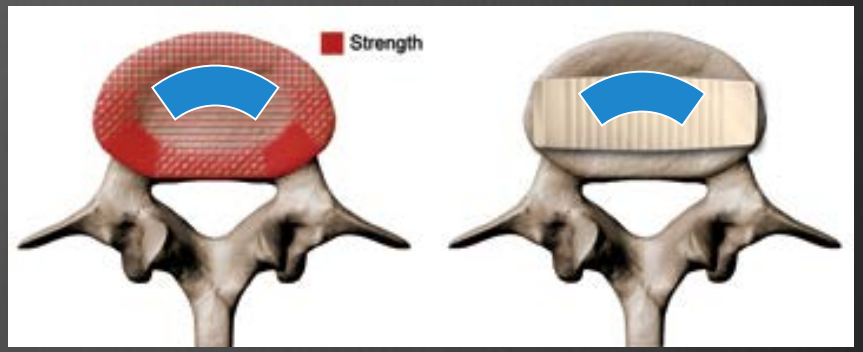
- 22 mm AP dimension may be associated with lower risk of subsidence (Pimenta, 2011)
- Critical for indirect decompression or correction
- Wide implant may not be applicable with significant listhesis (> grade 1)

TABLE 4. Subsidence Rates as They Relate to Implant Width and Length*

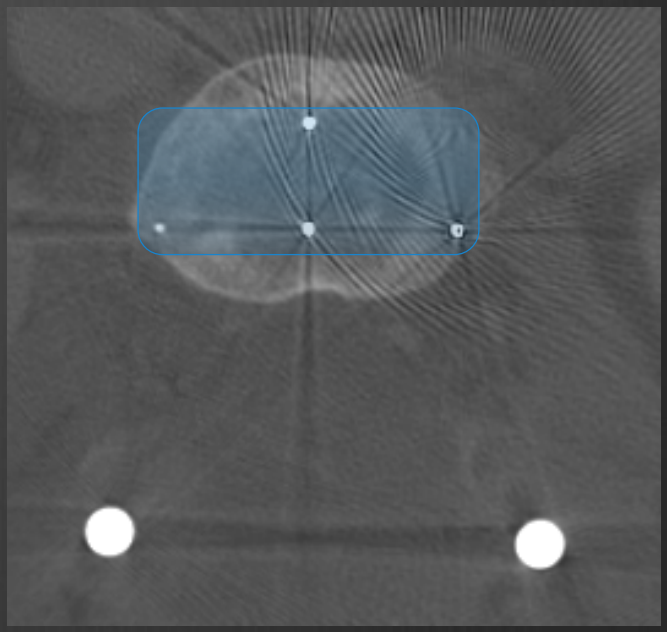
Implant Dimension	Levels	Percentage
Width		
18 mm	19/135	14.1
22 mm	2/103	1.9
Length		
50 mm	2/38	5.3
55 mm	15/119	12.6
60 mm	4/81	4.9



Biomechanical Rationale



- Consider how:
  - Implant surface area
  - Implant bone interface
  - Implant internal volume
  - Where does TLIF cage go?



- Helps patients with:
  - Osteoporosis
  - Segmental deformities
  - Fusion risks

Pearl: do not overstuff

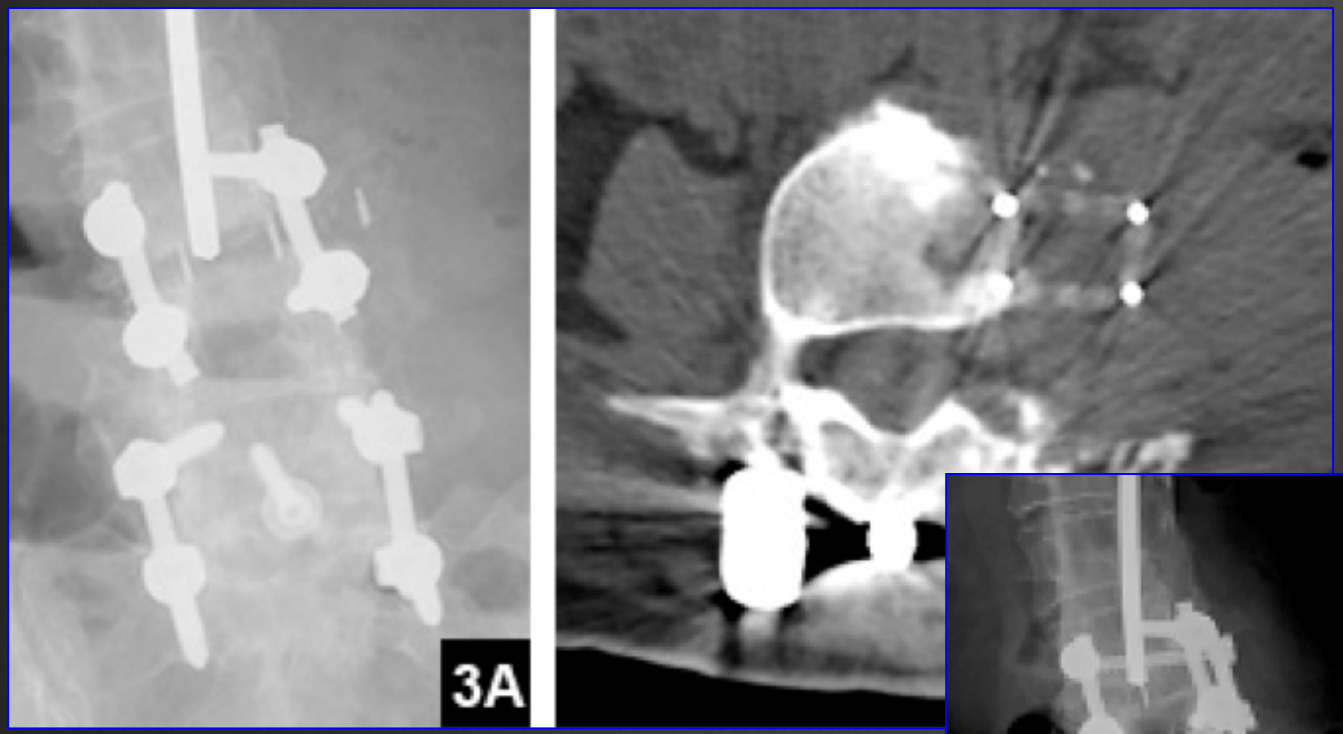
- Apophyseal and marginal cortex bone provide great support for interbody reconstruction.
- Temptation is to oversize, trying to get more lordosis, or more restoration of foramen height (especially if implant bulleted)
- Beware of the ability to oversize the height of the device.
- Overstuffing may be associated with
  - Subsidence
  - Iatrogenic trauma including fracture
  - Postoperative pain from over-distraction (I have seen this…)

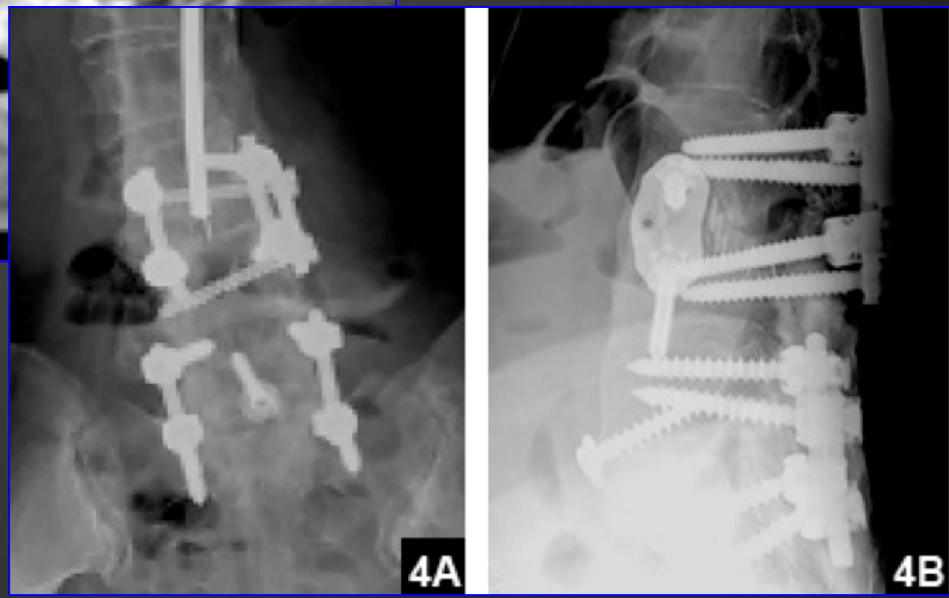
PEEK vs. Titanium

- If reducing posteriorly (titanium purchase too good)
- Scoliosis/rotational deformity (if in foramen, PEEK can be burred away)
- Osteoporotic?

- Fusion Challenged
- Basic degen
- Minimal deformity

Displacement – Buttress plate can help





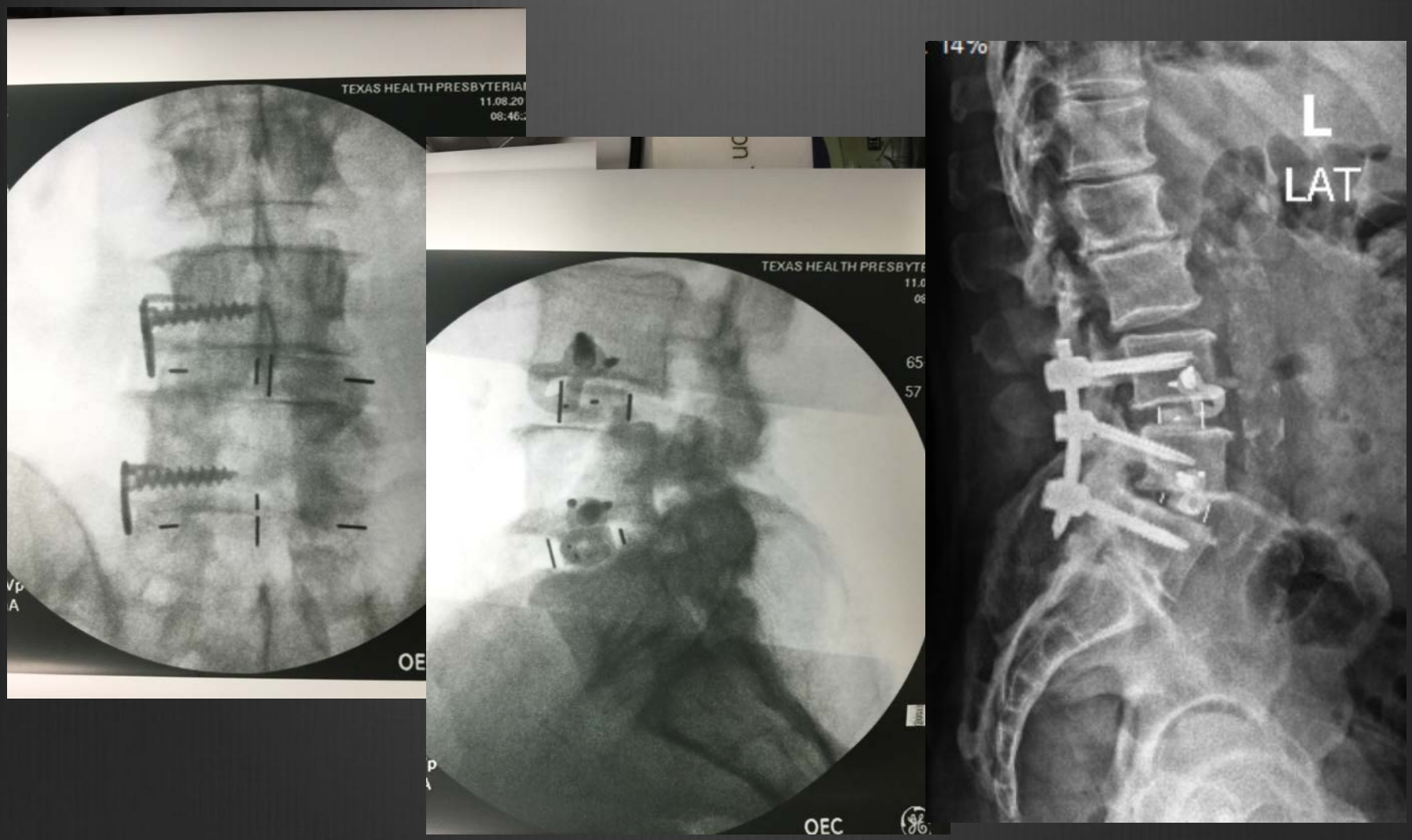
Limit psoas injury

- Limit retraction time
- Limit retraction force (don't open retractor more than needed)
- At end of case:
  - Meticulous hemostasis
  - Withdraw retractor and look for bleeders
  - Wax hole from fixation screw (if needed)
  - Surgiflo in psoas
  - Depo-medrol in psoas muscle
- Inform patient of expectations pre-op (analogous to ACDF dysphagia)

Expanding Lateral Indications

- High crest (past midbody L4 on lateral)
  - If psoas and vessels OK, still a lateral candidate
  - TAKE DOWN SOME CREST
  - Also good for breaking bed less, avoiding angled instruments, avoiding endplate damage
- Incision at top of crest
  - Expose some crest, cobb both surfaces
  - Expose psoas as normal, pin and initial dilator in disc
  - Resect crest around pin until it stands straight
  - Bone wax crest

Case - High Crest and Transitional Anatomy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