

Spine Disease and Surgical Treatment: What to do when all else fails?

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Objectives

“Meant to help not to Hurt”

- ▶ Spine terminology
- ▶ Surgical options
- ▶ Brief overview on Spine surgery and different types of procedures
- ▶ Post operative Rehab course
- ▶ Post op issues
- ▶ Focus on Lumbar

Spine Terminology

- ▶ Spondylosis
- ▶ Spondylolysis
- ▶ Spondylolisthesis
- ▶ Stenosis
- ▶ Discectomy
- ▶ Fusion
- ▶ Total disc replacement

Surgical Options

“What are we trying to achieve”

- ▶ Back pain
- ▶ Back pain and leg pain
- ▶ Leg pain only
- ▶ Deformity- Flat back/Scoliosis
- ▶ Decompression alone
- ▶ Decompression and fusion

Spine

▶ Spondylosis

- Broad term meaning degeneration of the spinal column from a cause.
- Degenerative process, wear and tear type phenomenon
- Bottom line Spine arthritis!!

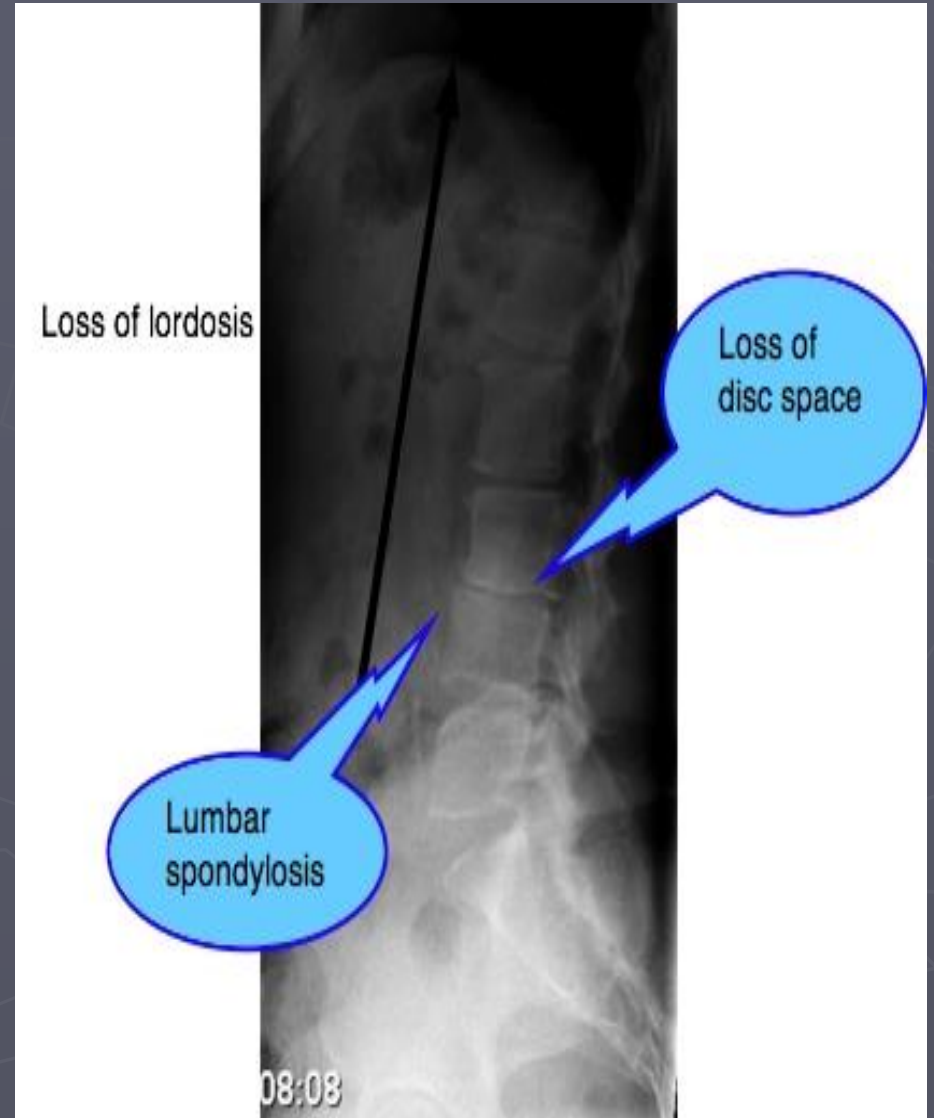
NORMAL



Spondylosis



Spondylosis



Spondylosis

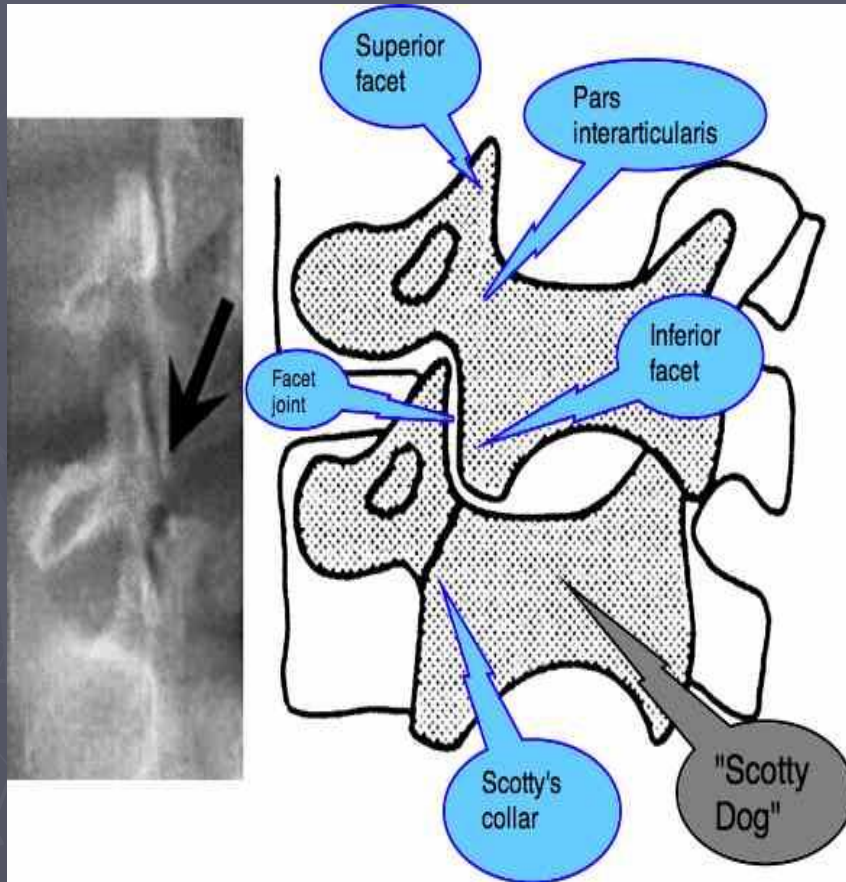
► Signs and symptoms

- Diffuse low back pain
- Activity related pain
- Sitting intolerance
- May or may not have radicular symptoms
- Difficulty bending
- May or may not have issues laying down.

Spondylolysis

- ▶ Defined as a defect or stress fracture in the pars interarticularis of the vertebral arch.
- ▶ Congenital or traumatic
- ▶ Most commonly occurs at L5
- ▶ Most common in the Lumbar spine
- ▶ Young athletes, males > females
- ▶ Accounts for near 50% of adolescent back pain
- ▶ Sports related-Hyperextension

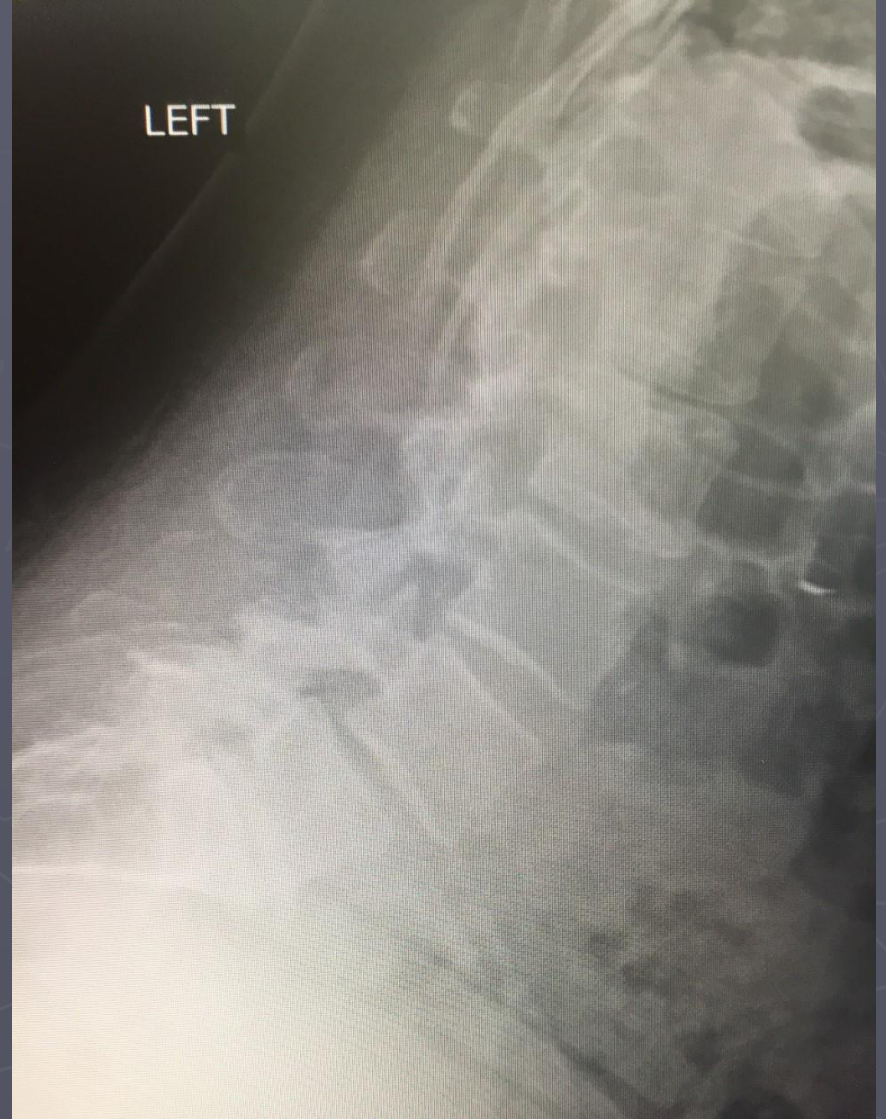
Spondylolysis



Spondylolysis



Spondylolysis



Spondylolysis

▶ Signs and symptoms

- Back pain-worsened with Extension
- Improved commonly with Flexion
- Can tolerate sitting or recliner position posture
- +/- Leg pain, commonly unilateral
 - ▶ Leg pain different than disc herniation pain

Spondylolisthesis

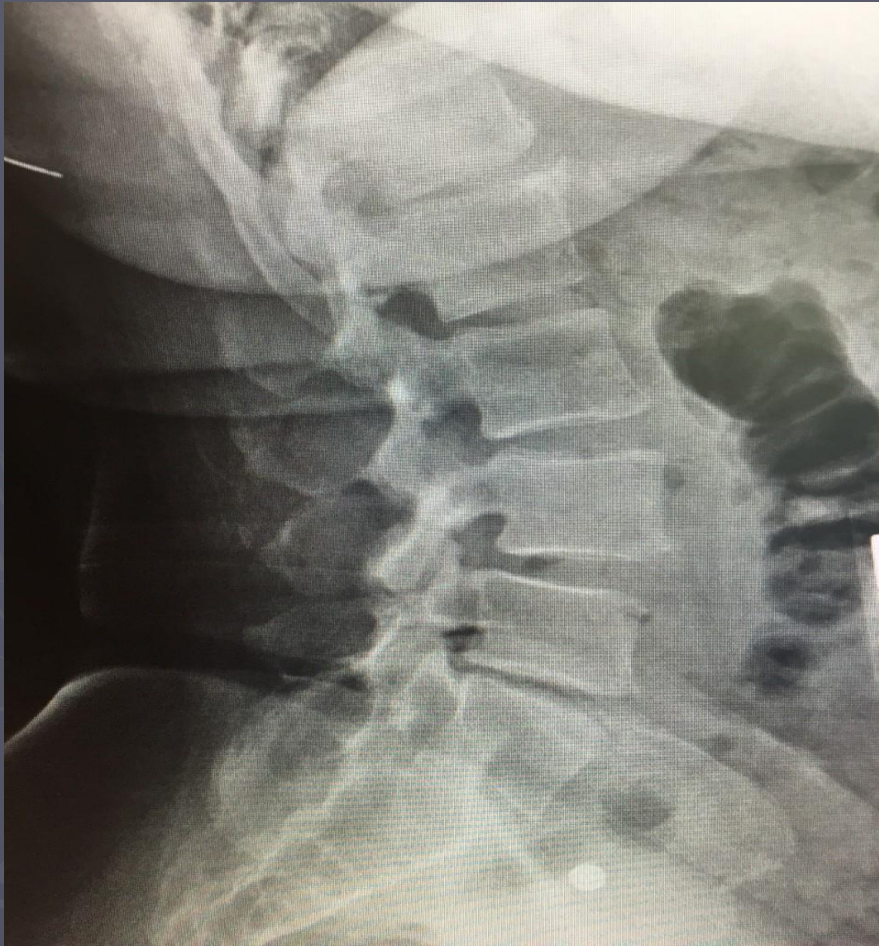
- ▶ Slippage or displacement of one vertebra compared to another
 - Anterior (Anteriorlisthesis) or posterior (Retrolisthesis)
 - Mostly discussed as anterior
 - Grade I-IV (25%-100%)
 - Most often degenerative in nature

Spondylolisthesis

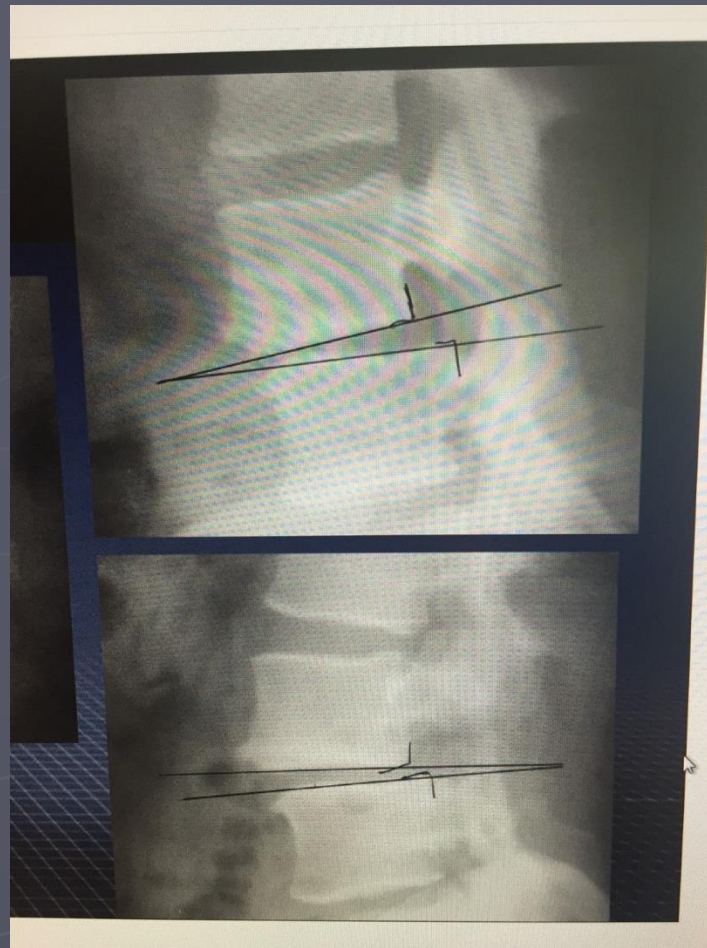
► Causes

- Degenerative
- Congenital Isthmic type
- Iatrogenic
- Traumatic
- Dysplastic
- Pathologic

Spondylolisthesis



Spondylolisthesis



Flexion/Extension views



Spondylolisthesis

► Signs and Symptoms

- Back pain-improved with flexion
- Worse with extension
- Leg pain, unilateral or bilateral
 - Worse or better with walking
- Fetal position sleeping or recliner
- Sitting ok

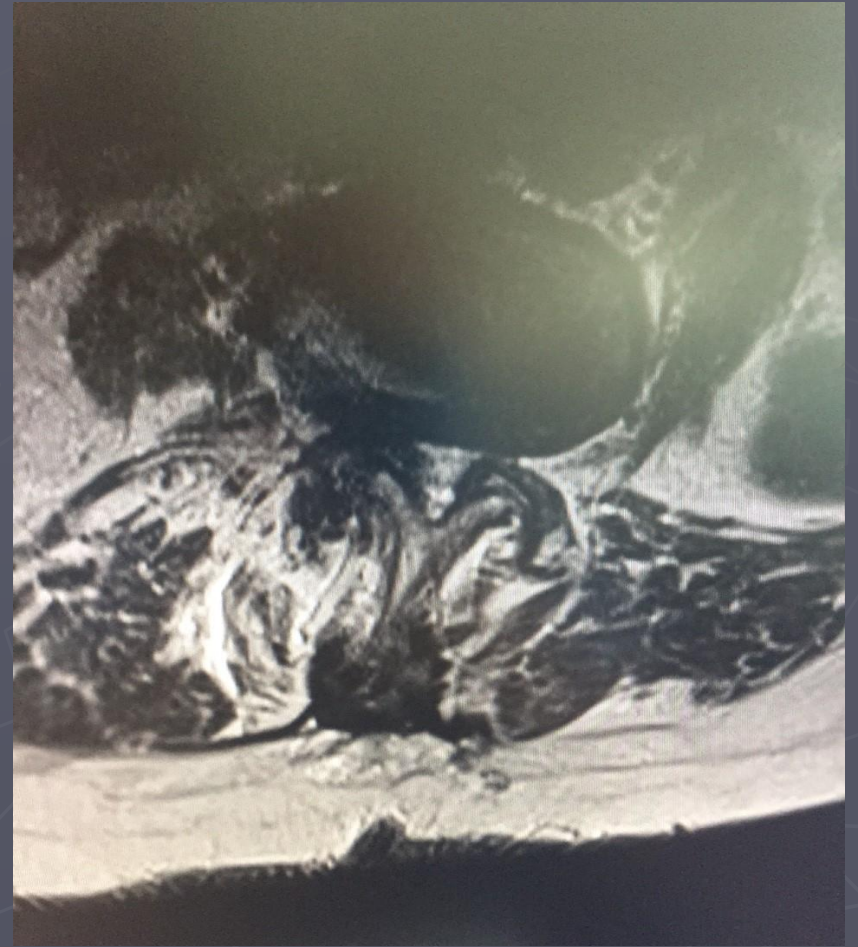
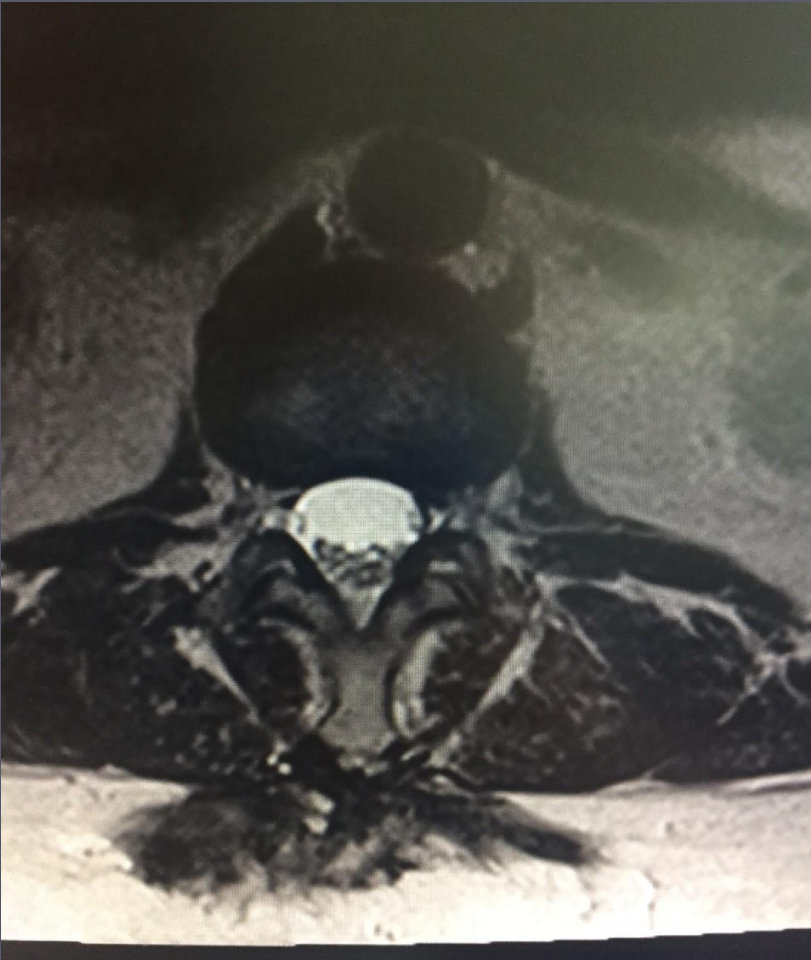
Stenosis

- ▶ Spinal canal diameter narrowing
 - Degenerative process
 - ▶ Hypertrophy of ligaments, facet joints
 - ▶ Combination with Spondylolisthesis
 - ▶ Most often after 6 decade, but can be any age
 - ▶ MRI-for evaluation

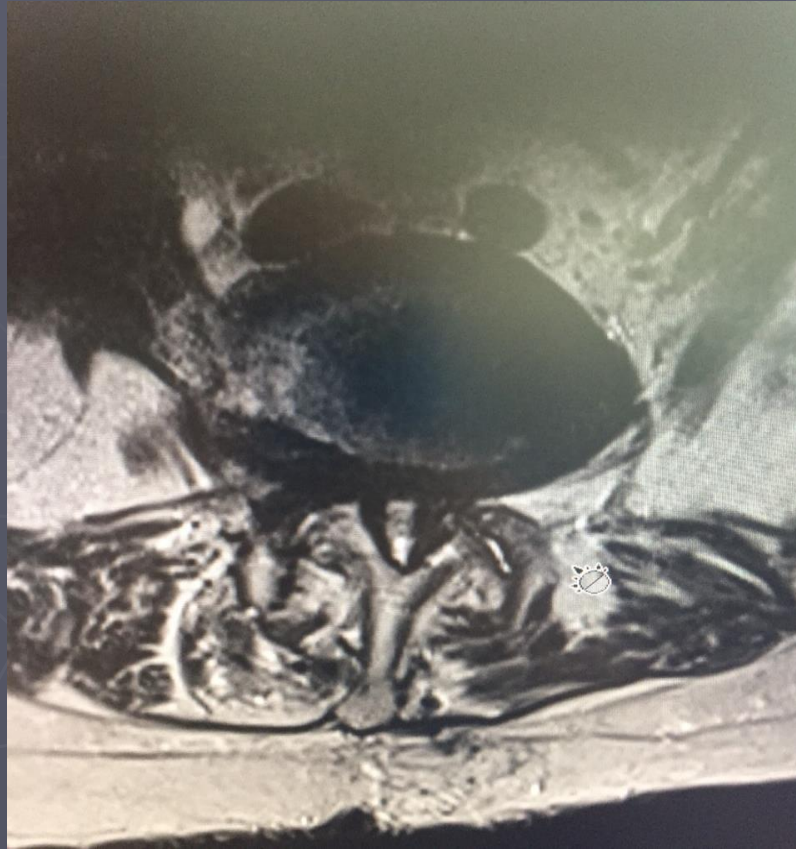
Stenosis



Stenosis



Stenosis



Stenosis

- ▶ Signs and symptoms
- ▶ Classically back pain and bilateral leg pain
- ▶ Leg pain worse with ambulation
 - Neurogenic claudication
 - Patient needs to sit, feels better
 - Forward bending-flexion improved symptoms
 - Classic “shopping cart” patient

Options for Tx:

- ▶ Rest/NSAIDS
- ▶ Physical Therapy
- ▶ Injections
 - Epidural-intralaminar injection
 - Selective Nerve Root Block
 - Facet injections

Basic Surgical Options

- ▶ Discectomy
- ▶ Total disc replacement - LDR
- ▶ Fusion
 - Direct or indirect decompression
 - Anterior/Posterior
 - Lateral/Oblique
 - Posterior
 - ▶ TLIF
 - ▶ PLIF

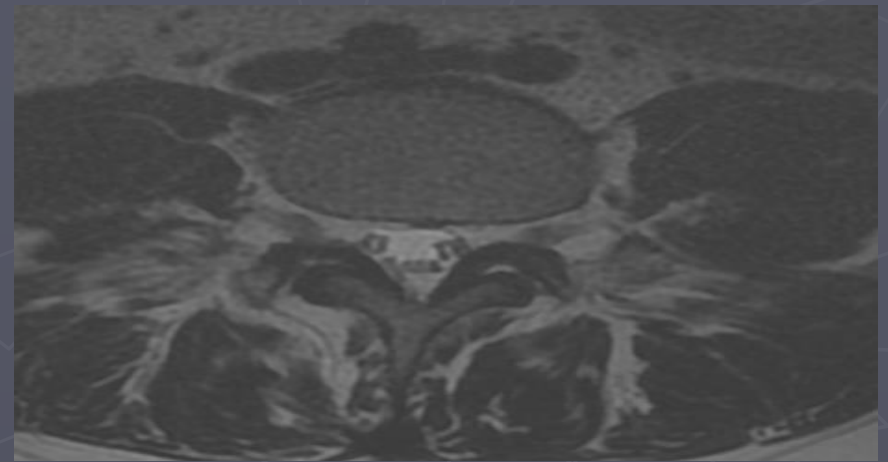
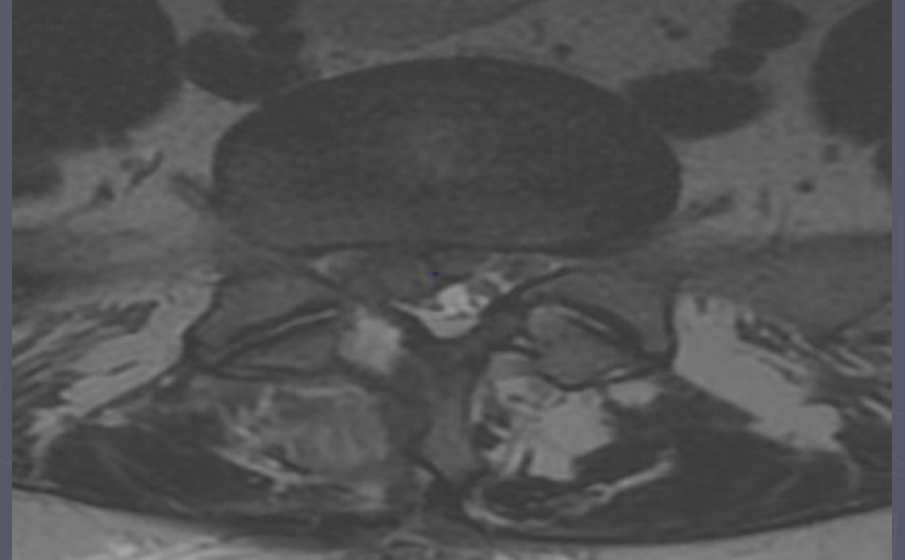
Dealer's Choice

- ▶ What is the goal of surgery
 - Relieve leg pain? Decompression
 - Relieve back pain? Fusion/LDR
 - Relieve both?
 - Which approach does the team have most comfort with?
 - What level is the pathology at?
 - Lengthy discussion with patient – EDUCATION!

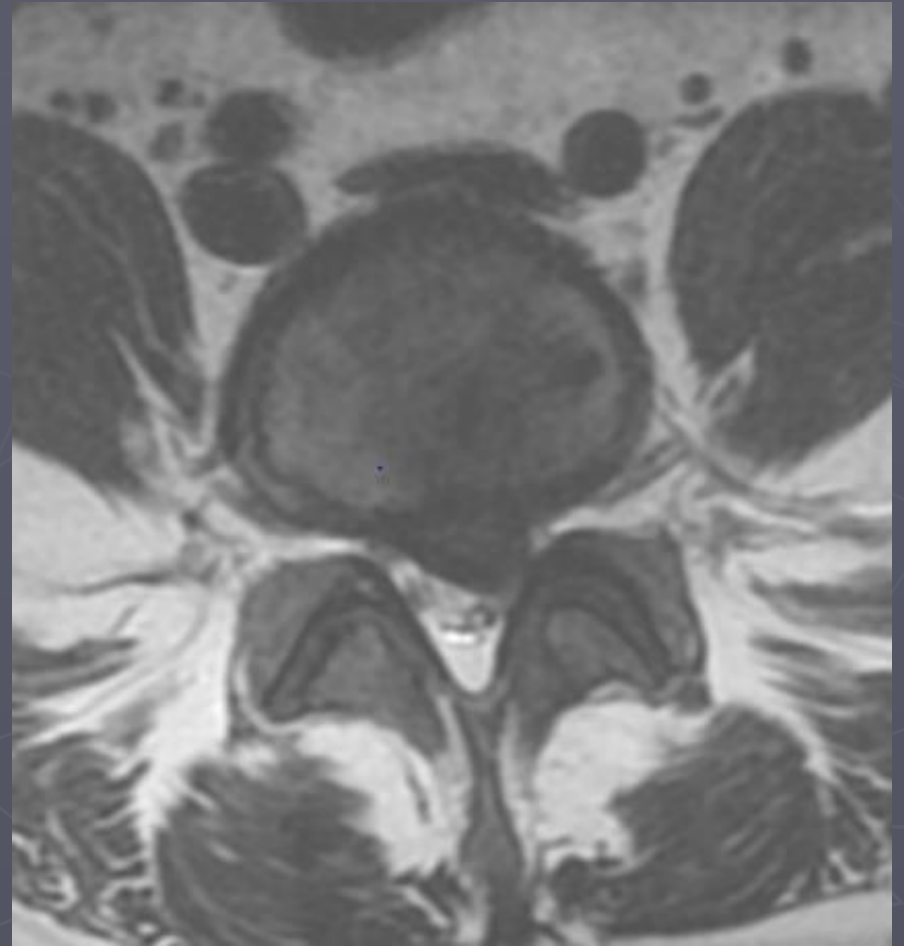
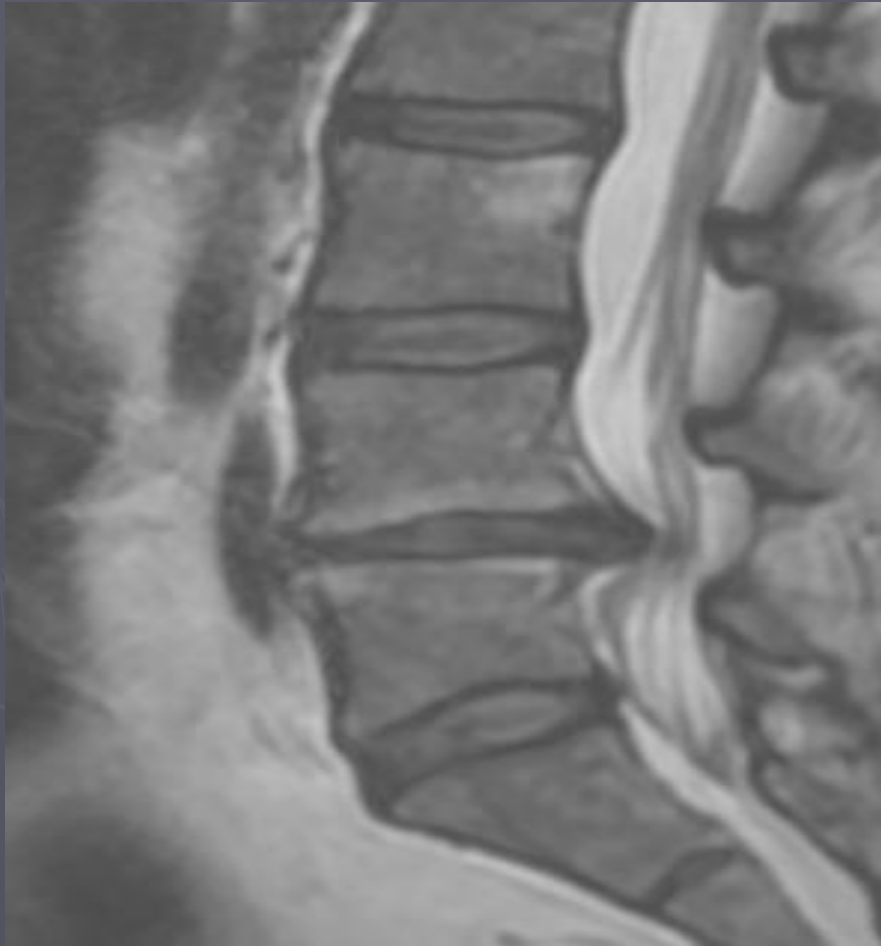
Discectomy

- ▶ Unilateral leg pain
- ▶ Some back pain, but mainly leg pain
- ▶ Failed conservative measures
 - NSAIDS, PT, injections

Discectomy

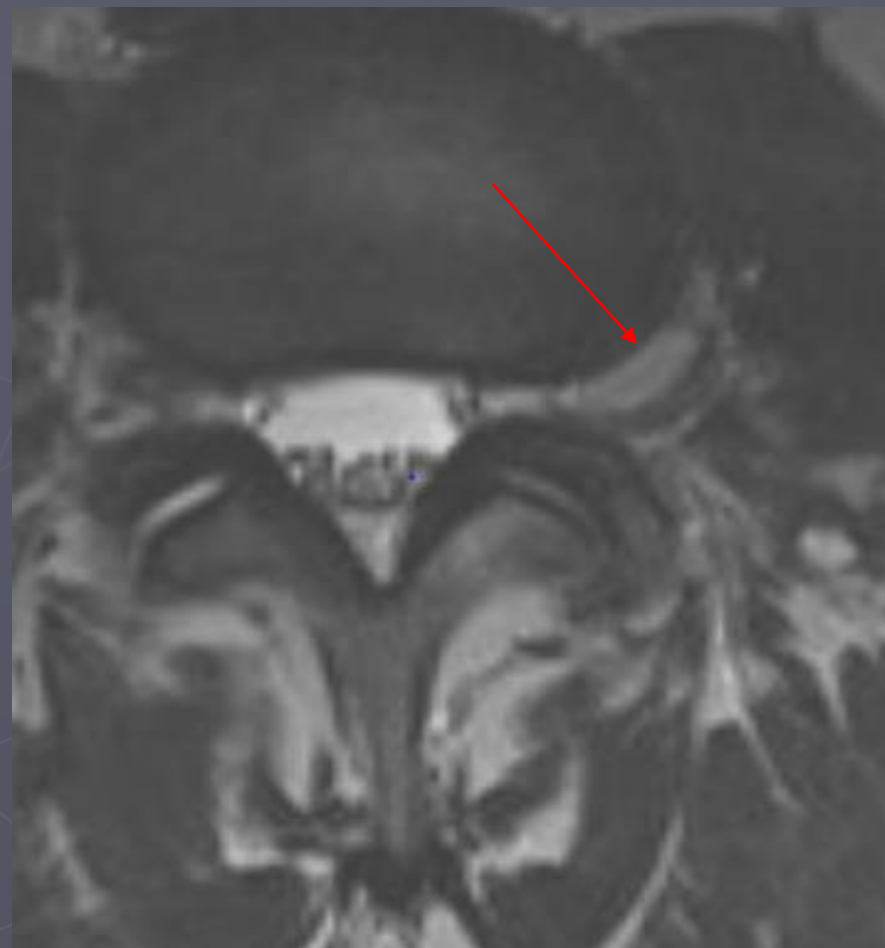
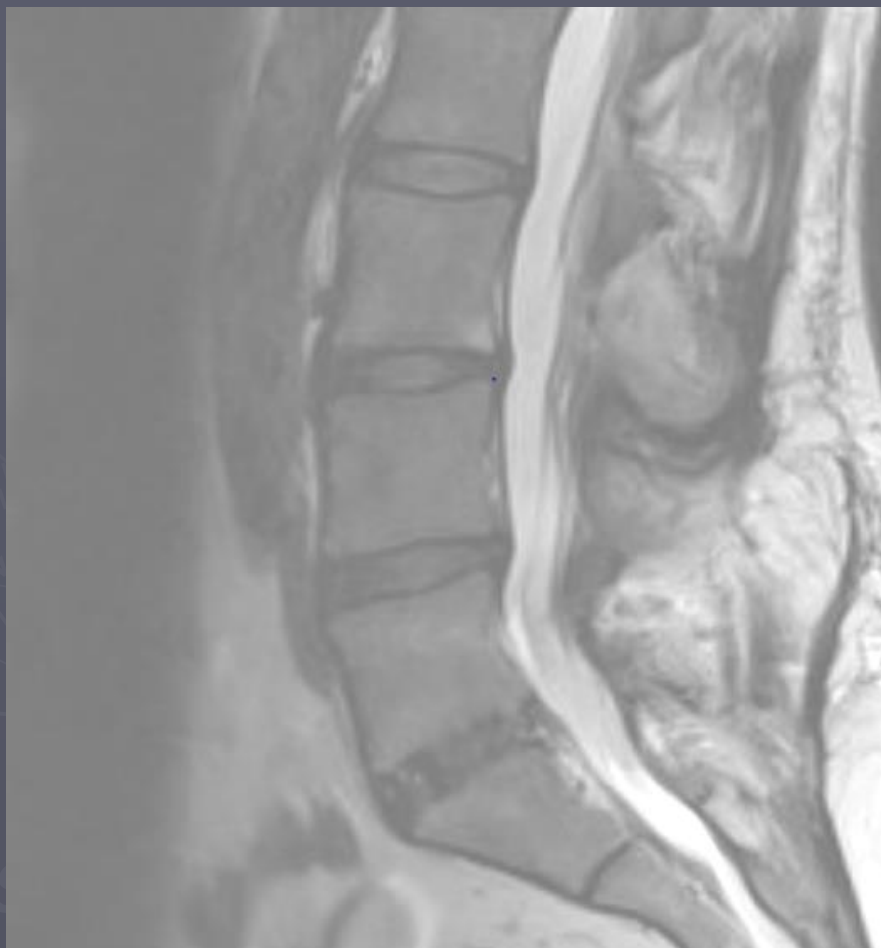


Disc Herniation



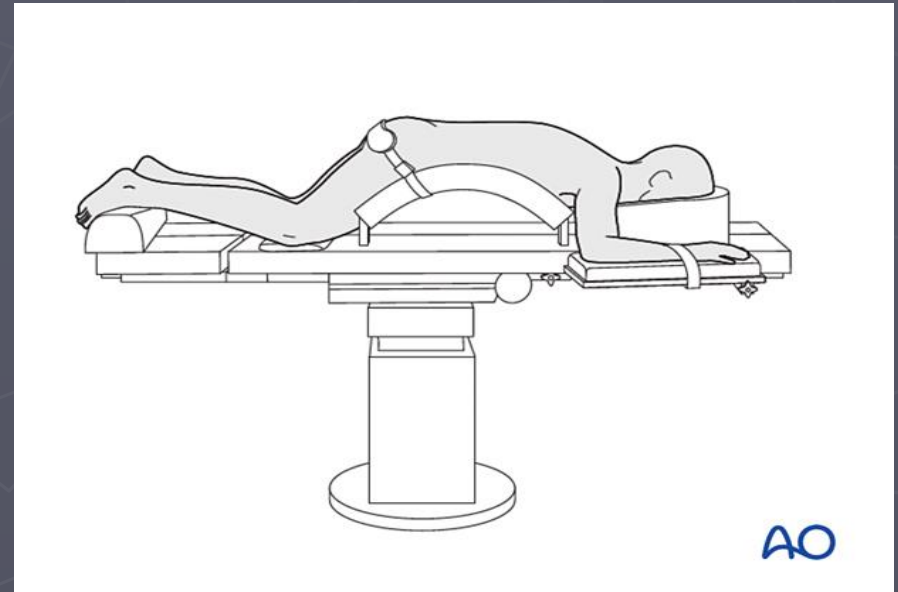
HNP

Far Lateral



Discectomy Surgery

- ▶ Prone position
- ▶ 45-60 min
- ▶ +/- Microscope
- ▶ Fluoroscopy-(C-arm)



Post op Course

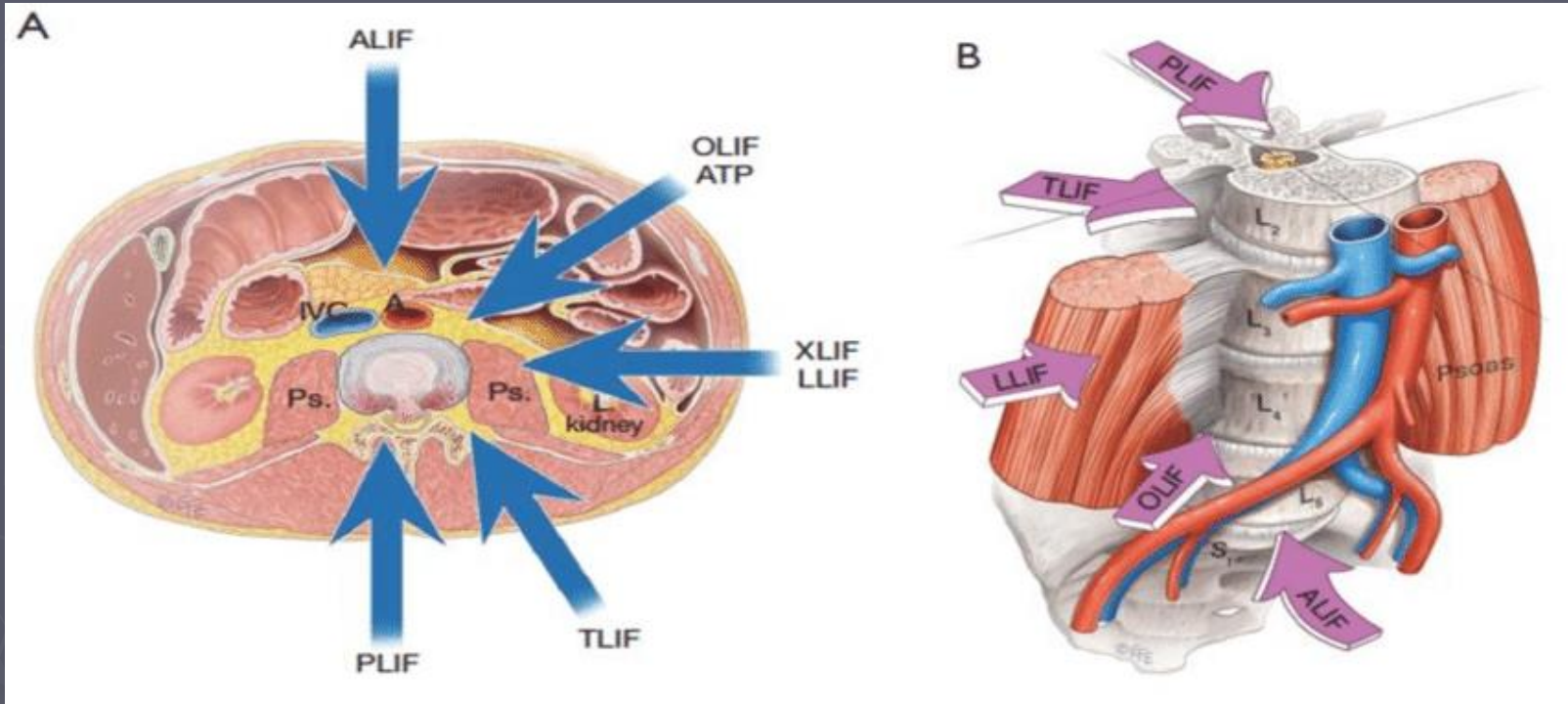
Simple Decompression-Discectomy

- ▶ First 6 weeks no lifting >10lbs
- ▶ No repetitive bending or twisting
- ▶ May return to driving after 1st post op visit
- ▶ Gradual return to activities after 6 weeks
- ▶ Resume full activity after 3 months

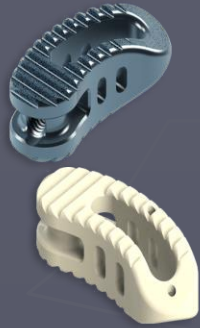
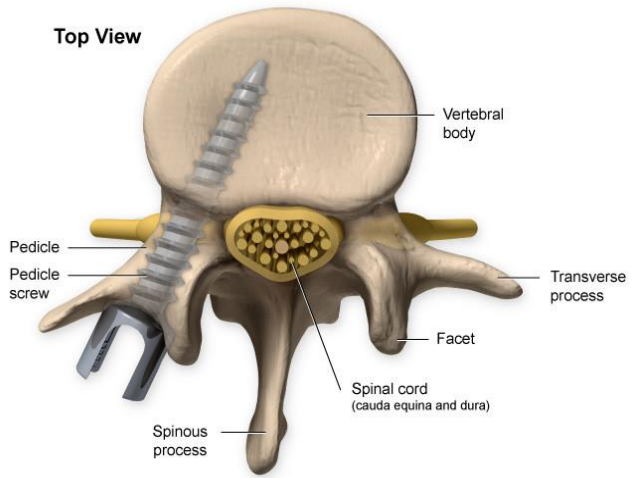
Post op RED FLAGS

- ▶ Neuro examine declining-Hematoma
- ▶ Foot drop
- ▶ Persistent leg pain- no change
- ▶ Worsening numbness
- ▶ Spontaneous development of headache
- ▶ Bowel bladder issues
- ▶ Wound issues

Approach to Fusion Construct



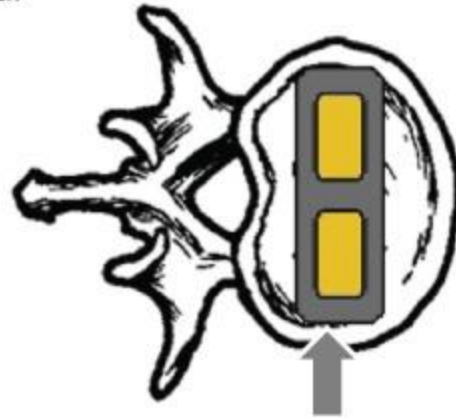
Top View



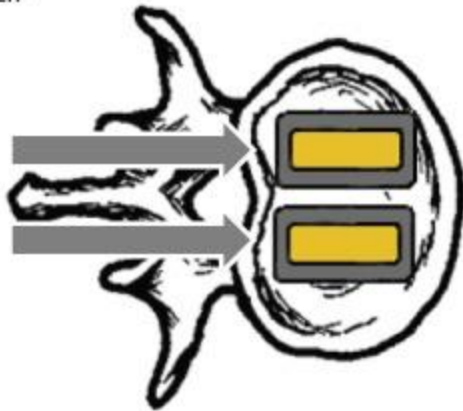
ALIF



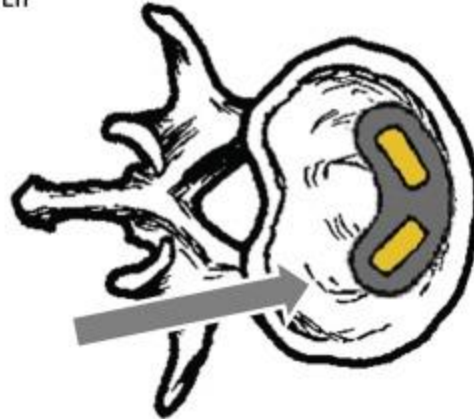
LLIF



PLIF



TLIF



Fusions

- ▶ Goal- fuse/weld the segment
 - 1st documented 1911 Dr. Russell Hibbs-NYC
- ▶ Chronic back pain
- ▶ Deformity scoliosis
- ▶ With or without leg pain
- ▶ Failed conservative measures
 - NSAIDs, PT, injections, bracing
 - Possibly even previous surgery
 - ▶ Discectomy, laminectomy

Fusion Approach

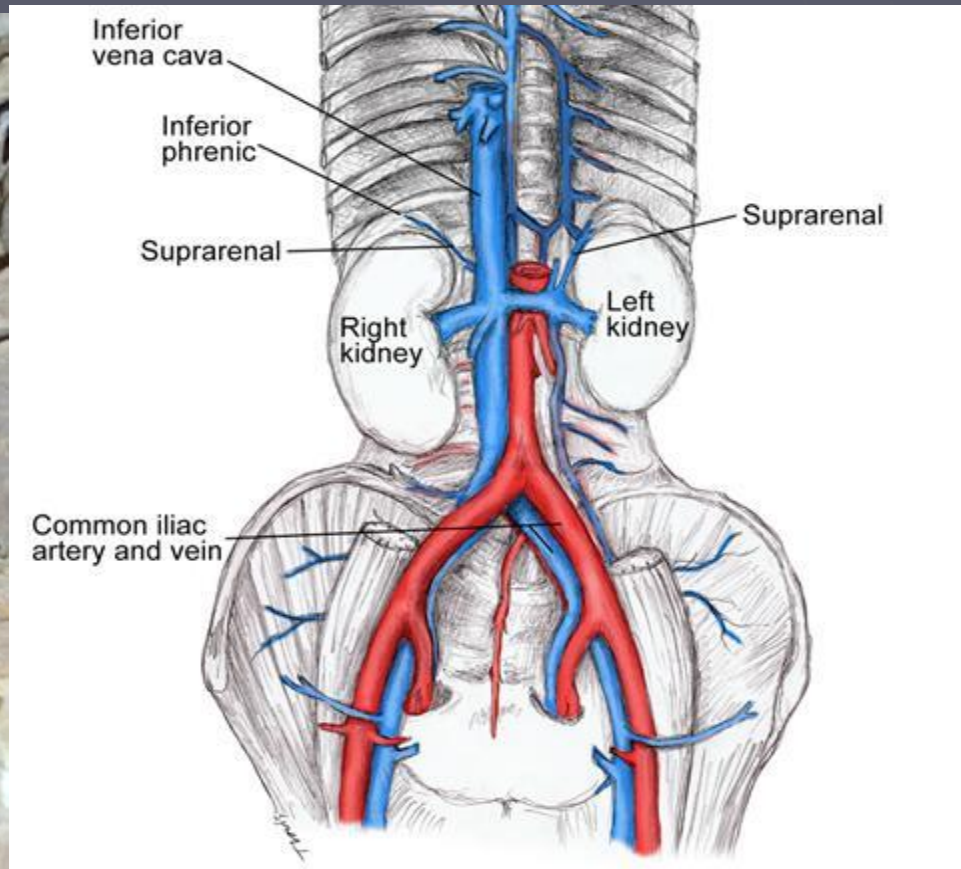
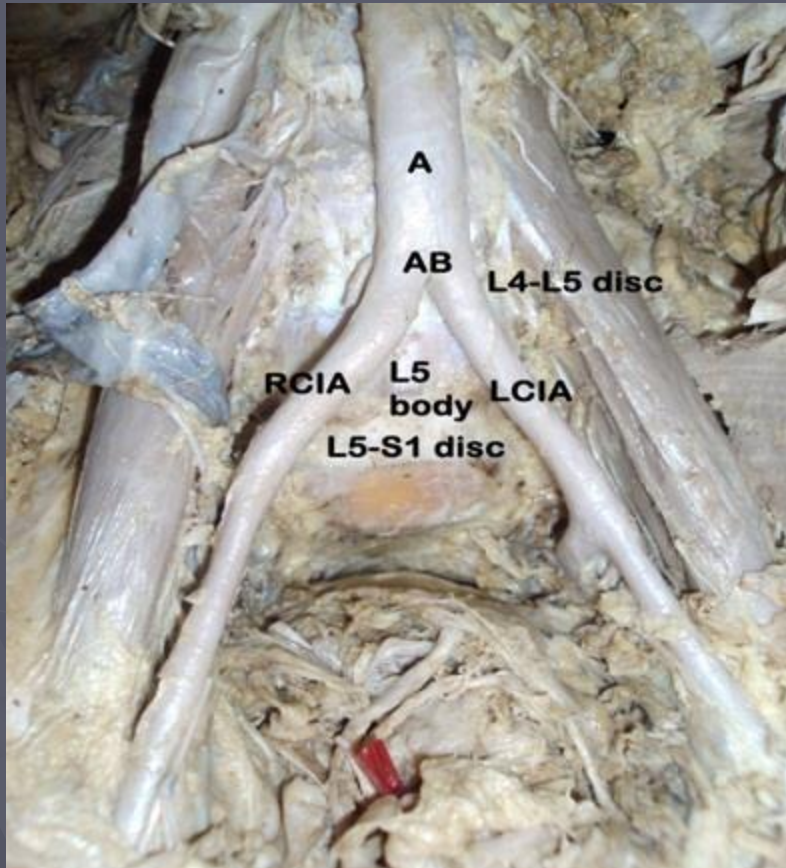
- ▶ ALIF (Anterior Lumbar Interbody fusion)
- ▶ ATP (Anterior trans-psoas) aka Oblique
- ▶ PTP
- ▶ Lateral XLIF
- ▶ TLIF (Transforaminal)
- ▶ PLIF

ALIF

Thoughts to consider

- ▶ Need access surgeon – very important
- ▶ Supine position
- ▶ Previous abdominal surgery? Adhesions
- ▶ Calcification of Vessels
- ▶ Fairly big consequence of vascular injury
 - venous, 2-6% (Ho et al. 2021), arterial 1.5% (Manunga et al 2020)
- ▶ Retrograde ejaculation
 - (1934-2008) up to 50%
 - Ho et al. (2021) 200 patients 0%
- ▶ Large foot-print for graft positive
- ▶ Recreate Lordosis 25-30 degrees

Vessels

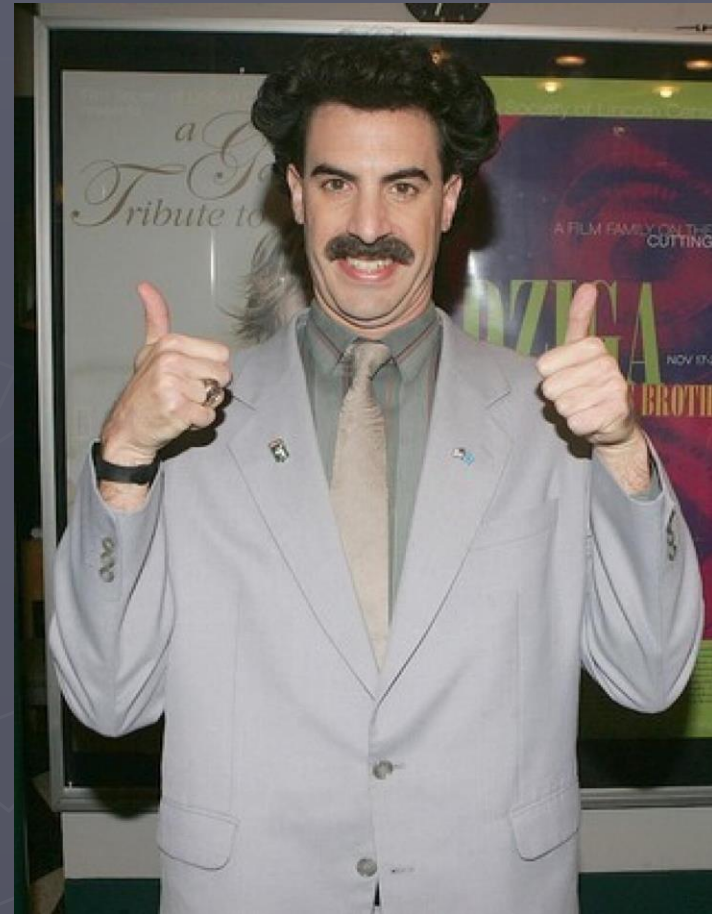
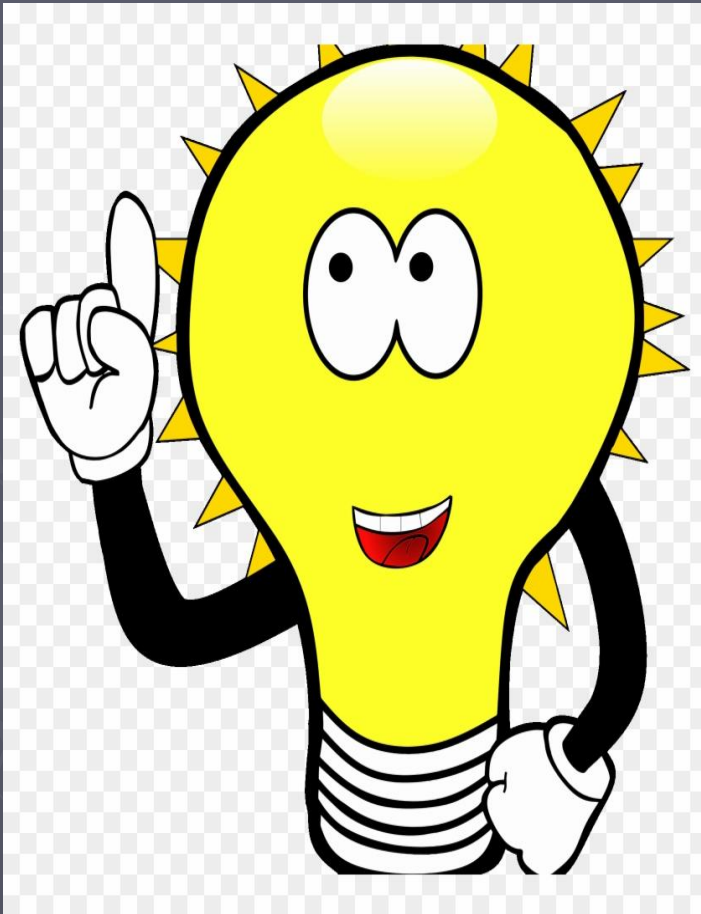


Anterior Posterior 360

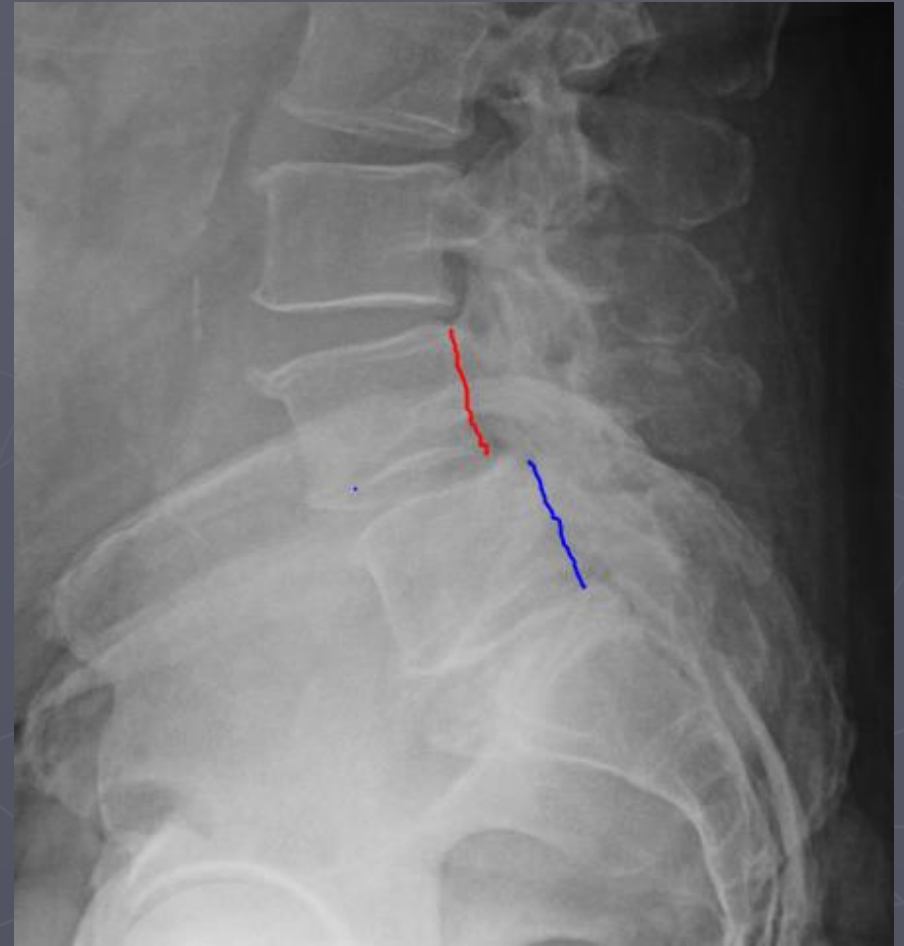


LDR???

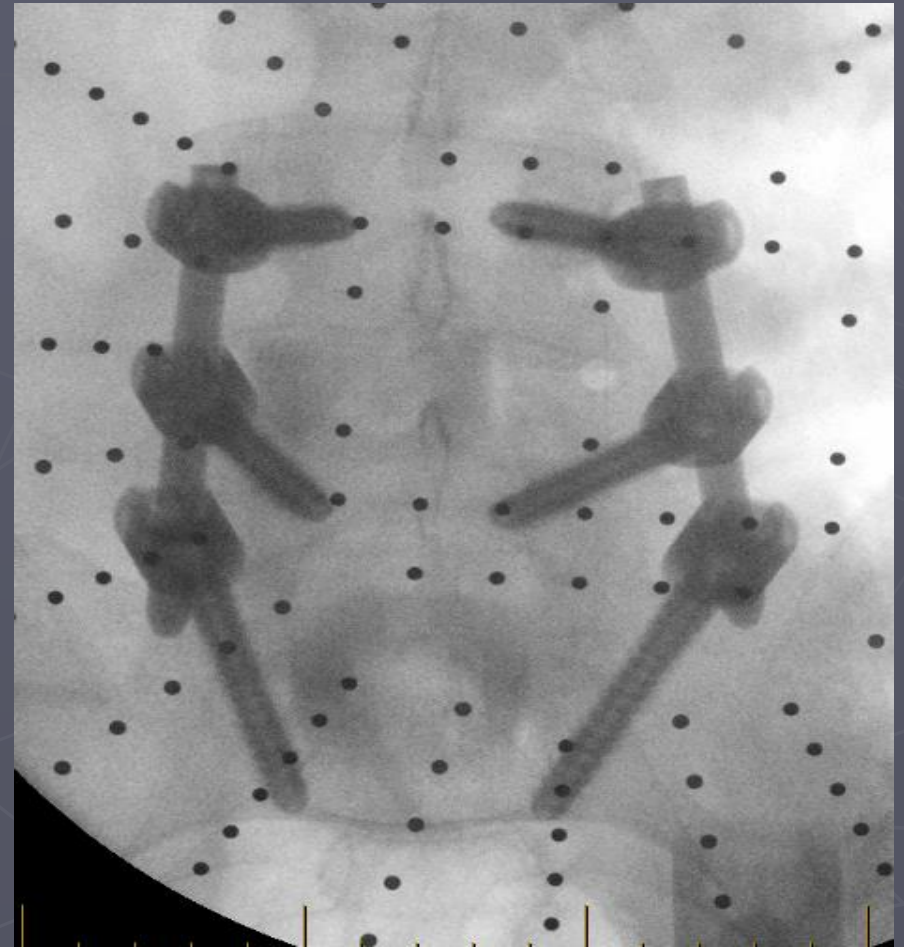
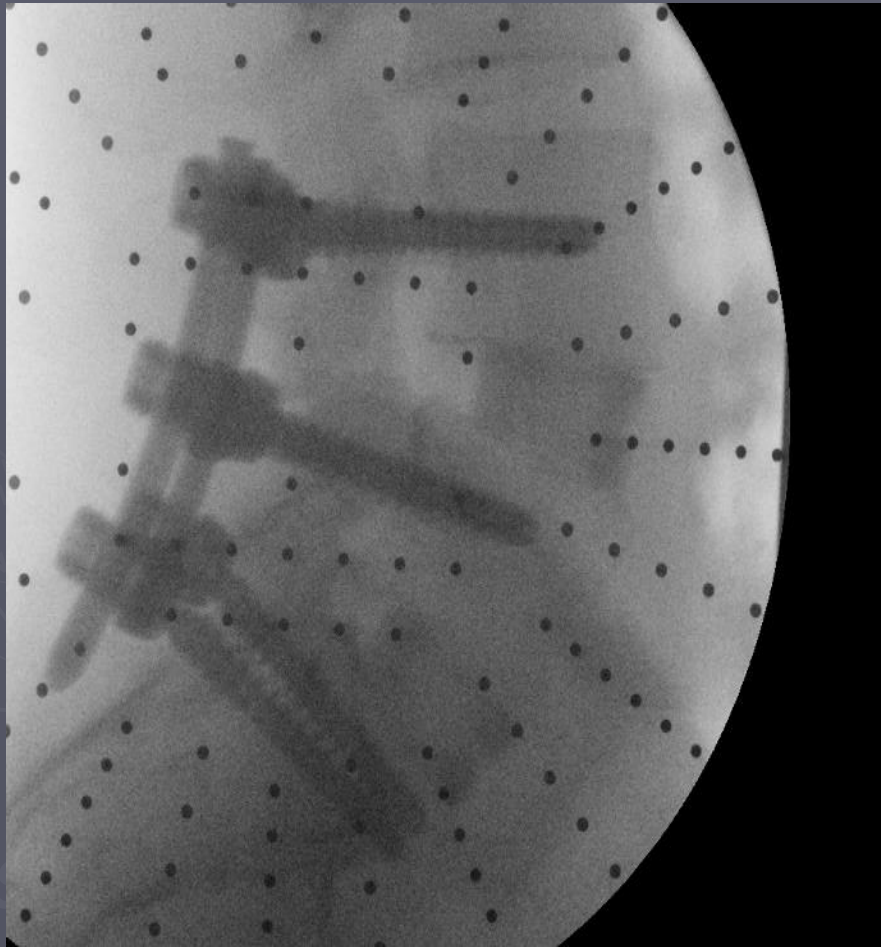
(Lumbar disc replacement)



Prior surgery



360



Post op 360

Immediate care

- ▶ Start clears ADAT
- ▶ Watch for flatus
- ▶ Possible ileus
- ▶ Monitor LE Pulses
- ▶ Monitor for LE skin changes
- ▶ Potential for arterial and/or venous occlusion from traction
 - 1.7-3% risk DVT, operative venous injury increases risk 23%
- ▶ Monitor labs- h/h

ALIF Post op RED Flags

- ▶ Lower extremity edema swelling
- ▶ Cold extremity
- ▶ Falling HCT/Hgb
- ▶ Nausea/Vomiting-ileus
- ▶ Worsening LE radicular pain

Lateral vs Oblique

Lateral (XLIF, LLIF)

- ▶ Through Psoas
 - ▶ Risk-Nerve plexus injury
 - ▶ No access for L5-S1
 - ▶ Mid lumbar levels L1-L4
- **plexus injury high L4-5

Oblique (ATP)

- ▶ Anterior to psoas
- ▶ Risk-Vascular injury
- ▶ Access L1-S1

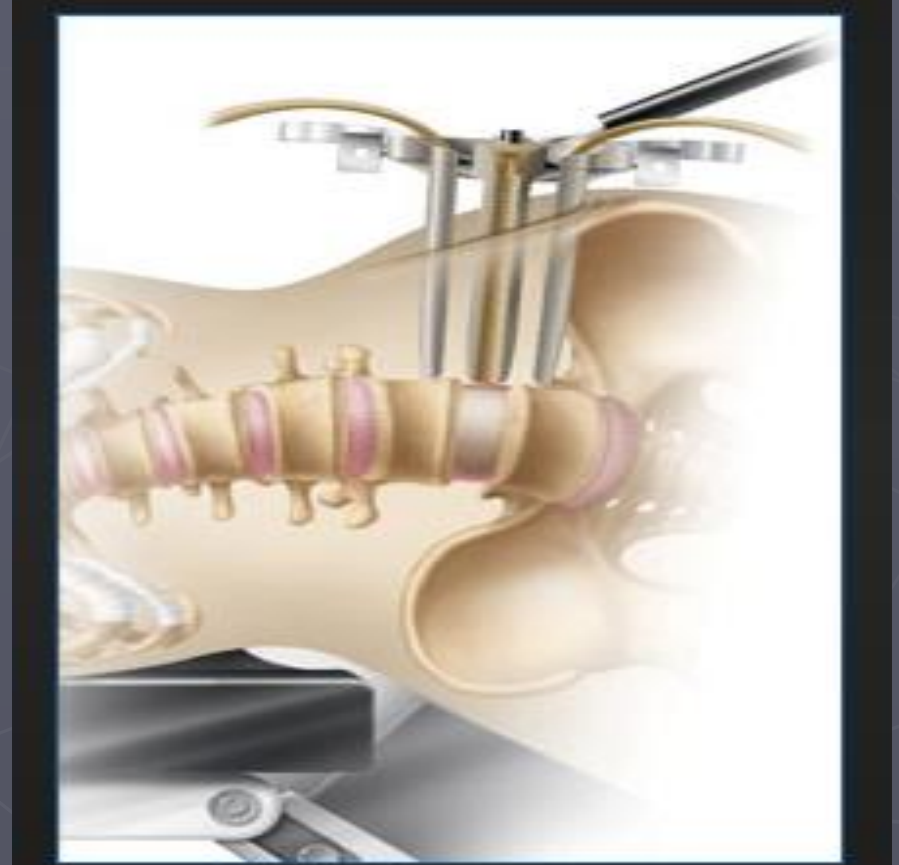
Lateral/Oblique interbody fusion

Thoughts to consider

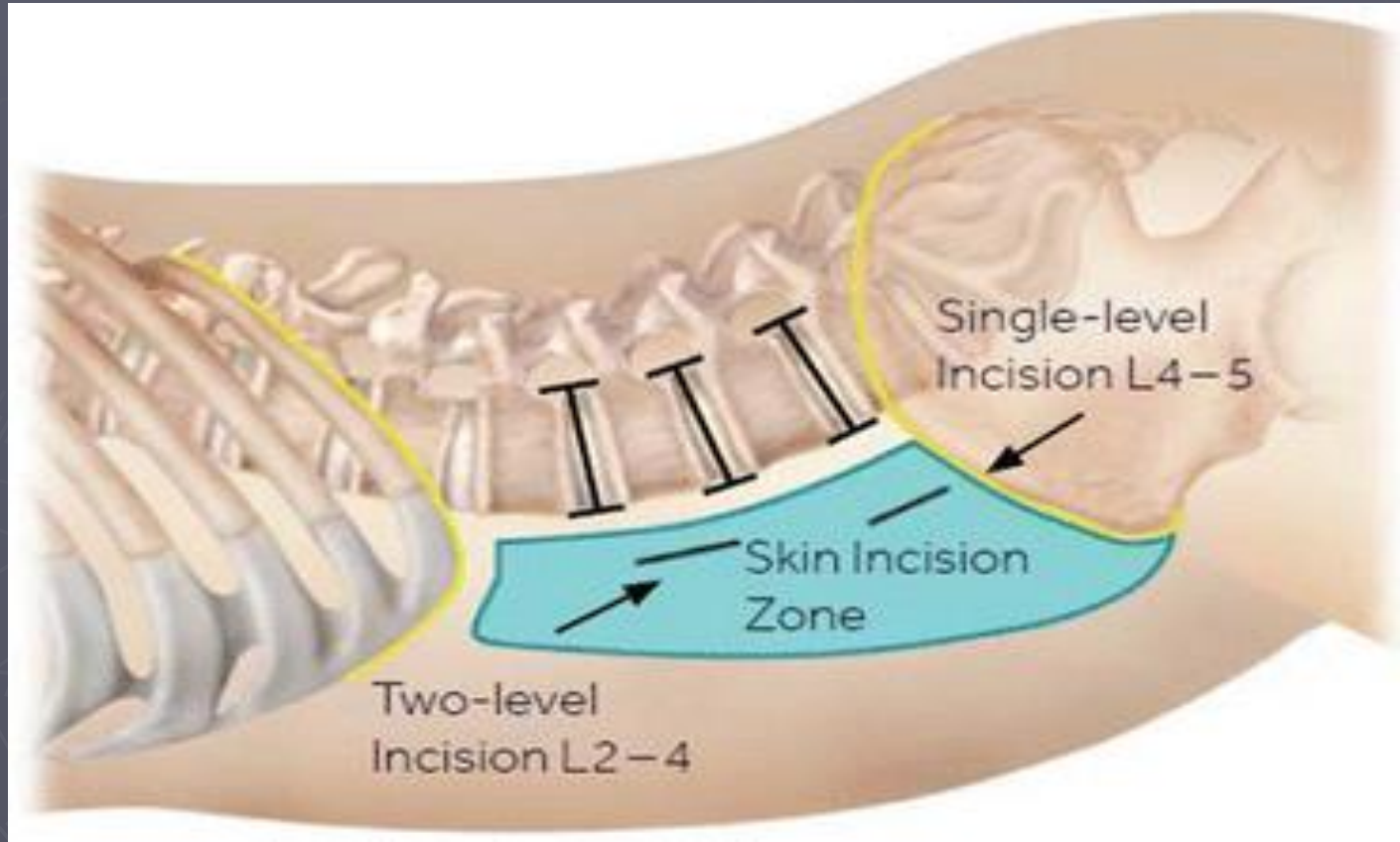
- ▶ Access – Previous Surgery? retroperitoneal space
- ▶ Vessel location
- ▶ Kidney location
- ▶ Awareness of ureter
- ▶ Genitofemoral nerve – Psoas muscle
 - Segment location important
 - Hip weakness, numbness anterior thigh

Lateral Interbody

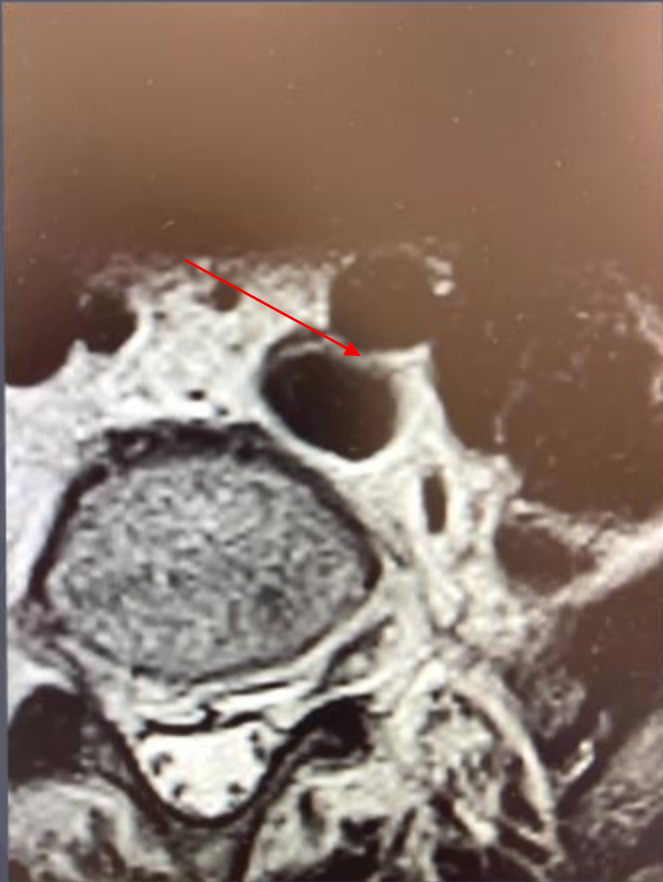
Lateral position



Oblique (ATP)



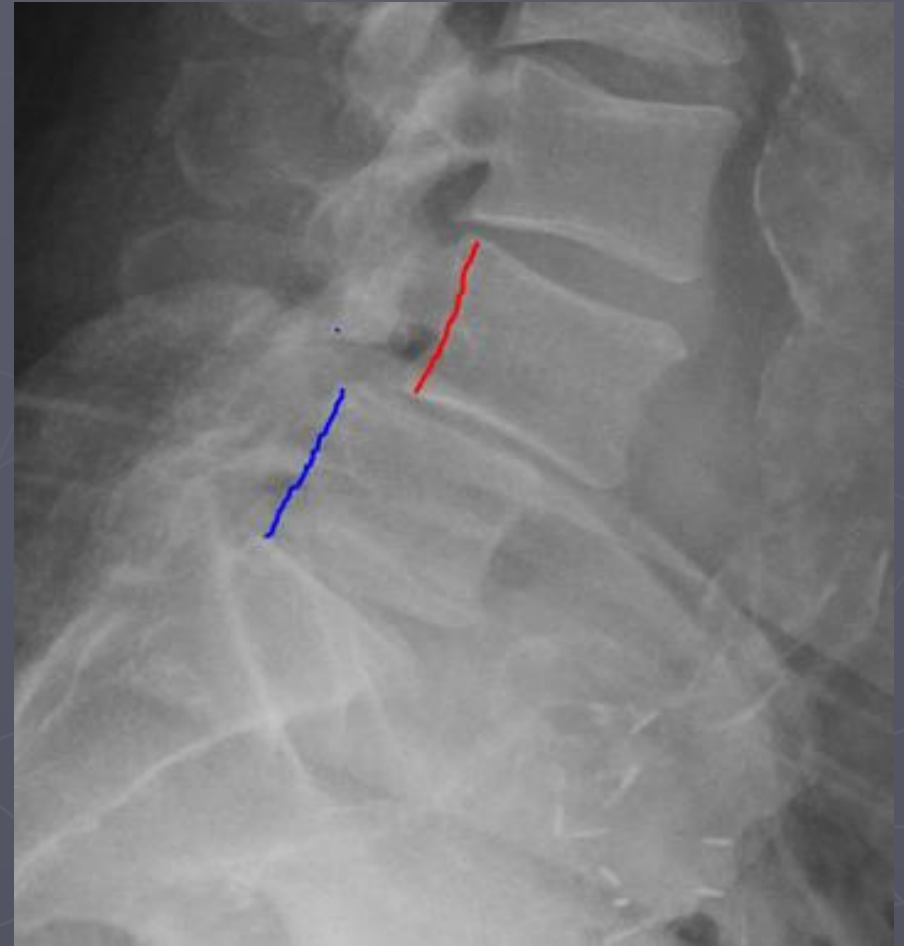
Oblique



Lateral



Oblique



Oblique



Post op care

- ▶ WBAT
- ▶ Monitor for ileus, less common
- ▶ Anterior thigh numbness, weakness
 - More common in lateral vs oblique
 - Genitofemoral nerve
- ▶ Ureter injury ***
 - Urine output
 - Flank pain

TLIF

Transforaminal Lumbar Interbody Fusion



TLIF

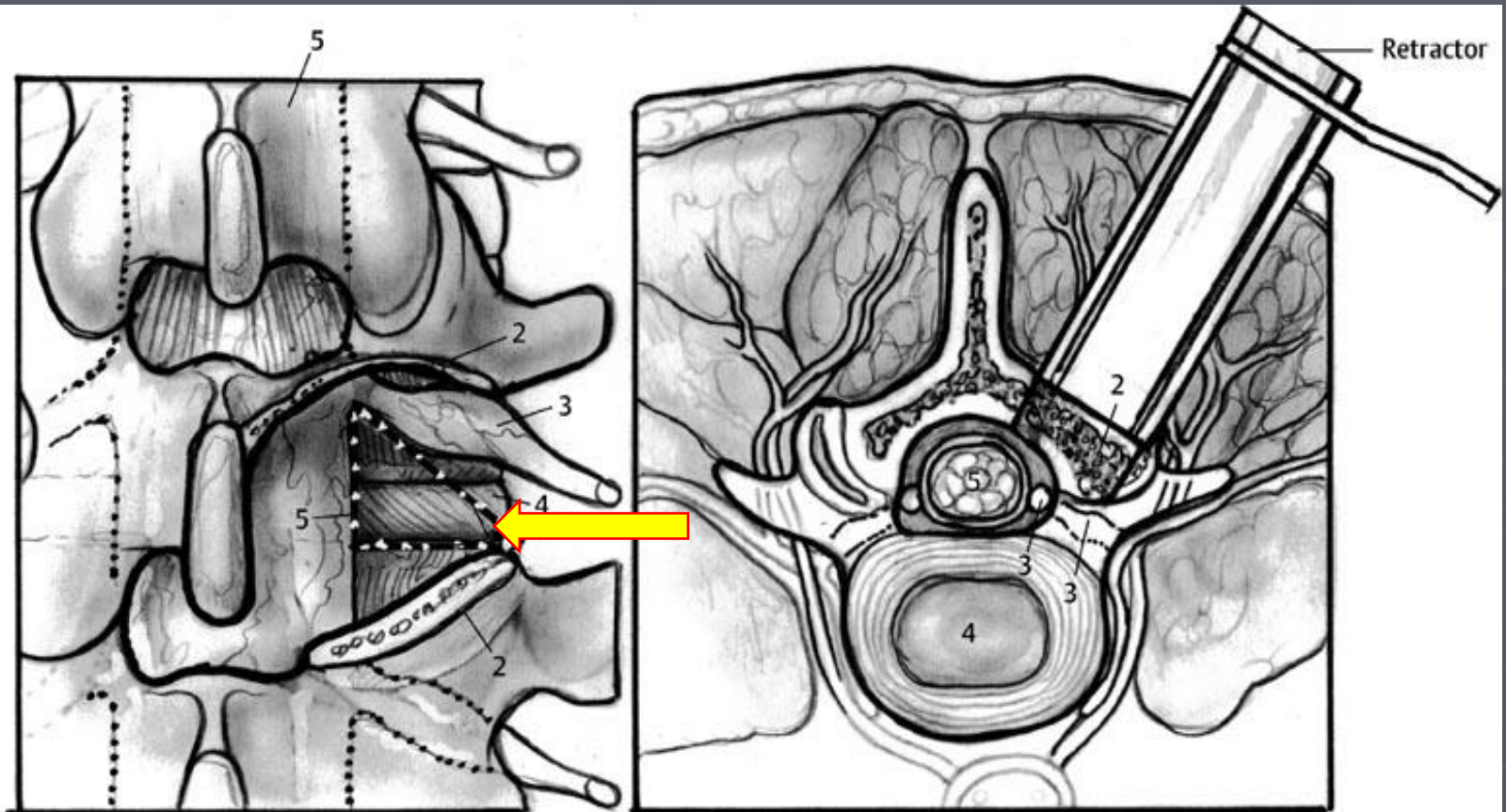
advantages

- ▶ Single posterior approach
- ▶ Direct visualization of decompression
- ▶ Foraminal decompression
- ▶ Lessened risk
 - Vascular
 - Retroperitoneal violation
 - Ureter

TLIF



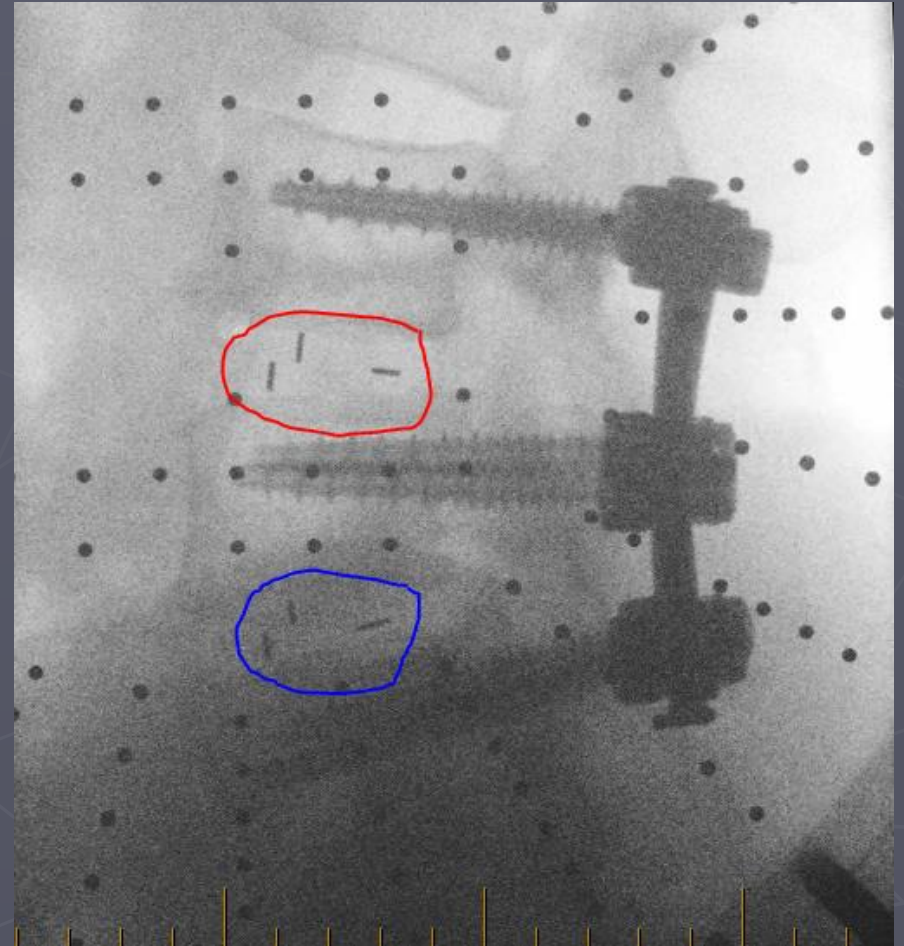
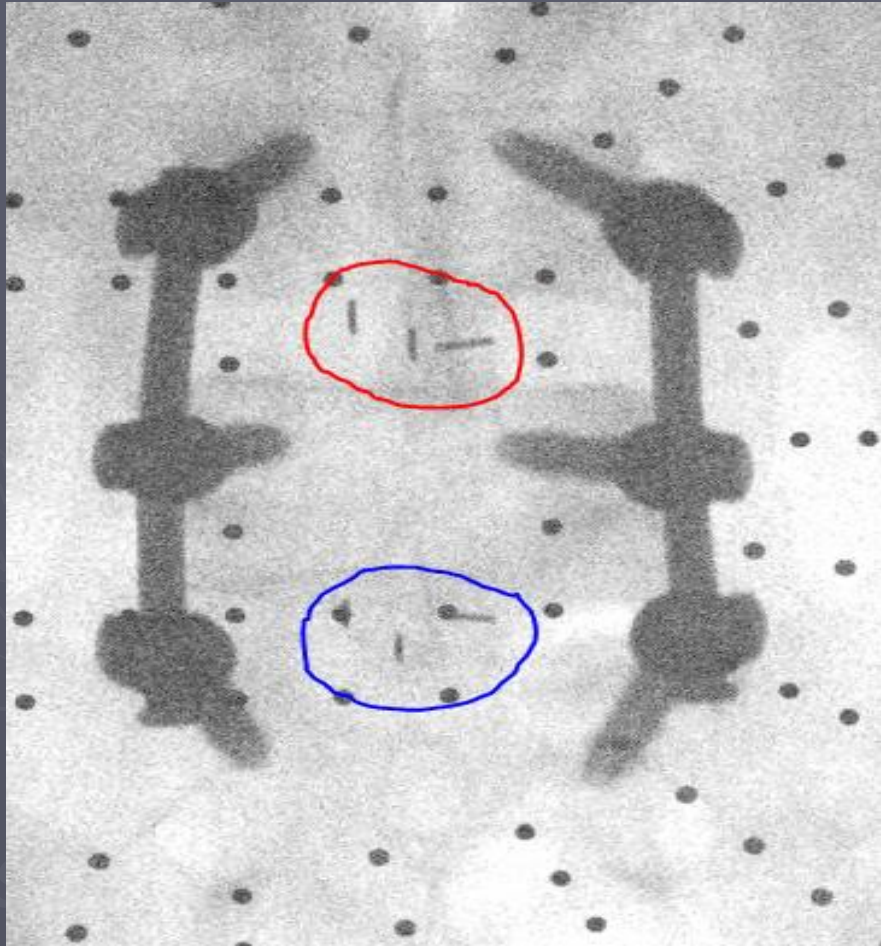
TLIF



1 Kambin's triangle
2 Complete facetectomy

3 Exiting nerve root
4 Disc
5 Dural tube

TLIF



Post op care TLIF

- ▶ WBAT
- ▶ Positional headache – small hole
- ▶ Increased incidence numbness post op
- ▶ Foot drop L4-5, L5-S1
- ▶ Monitor for persistent leg pain or worsening leg pain
 - ? hardware

Fusion long term

- ▶ Mechanical issues?
 - Are we heading to disc replacement more?
- ▶ Non union/Pseudoarthrosis
- ▶ Adjacent segment disease
- ▶ Chronic pain
- ▶ Failure to improve

Supine

ALIF

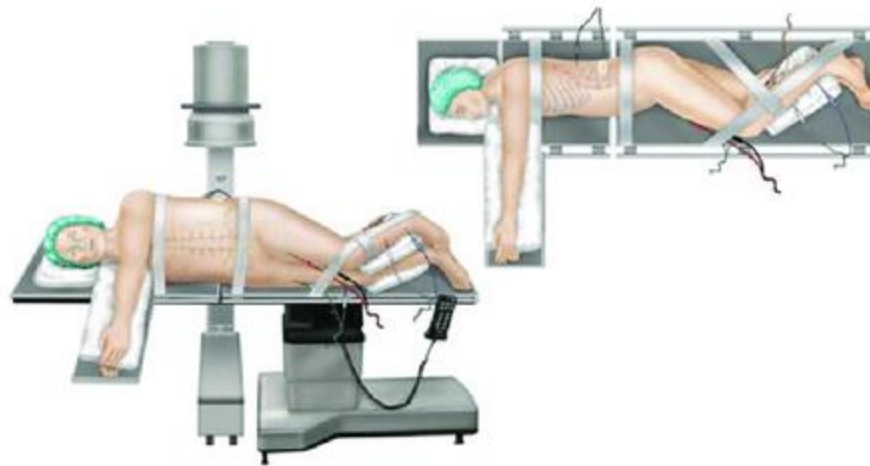


Position

Prone-TLIF



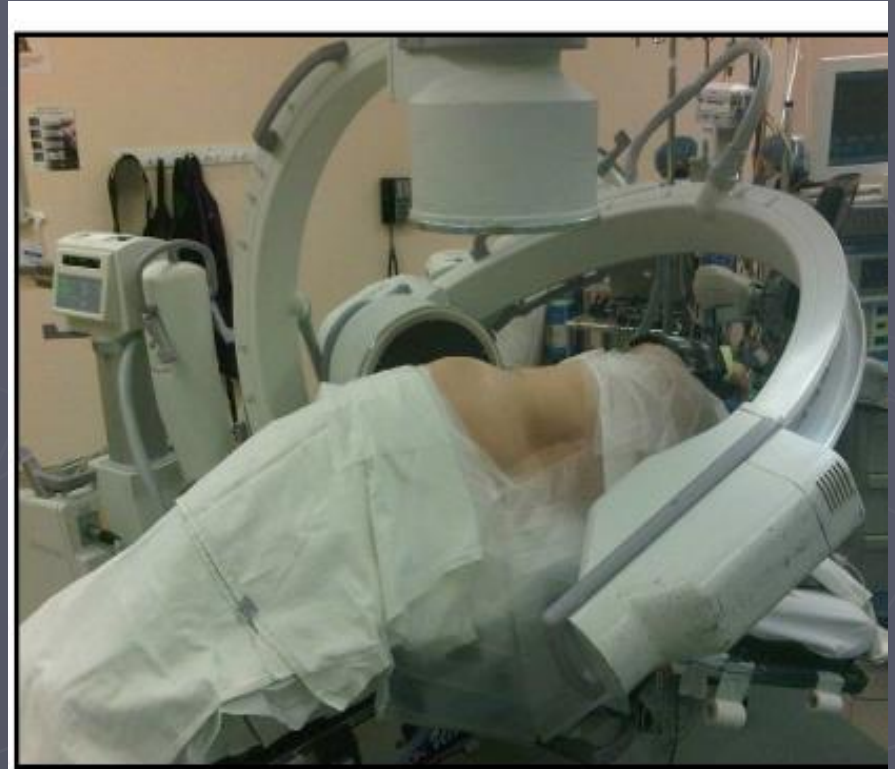
Oblique



Oblique Position



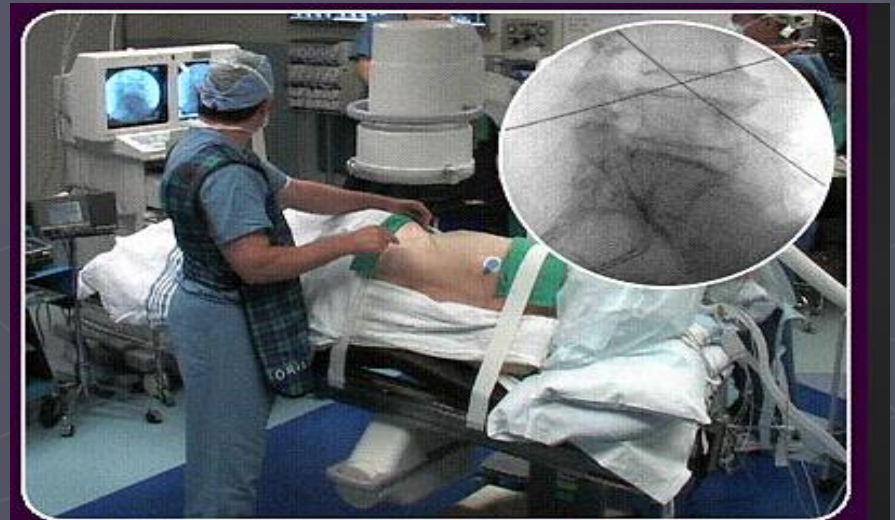
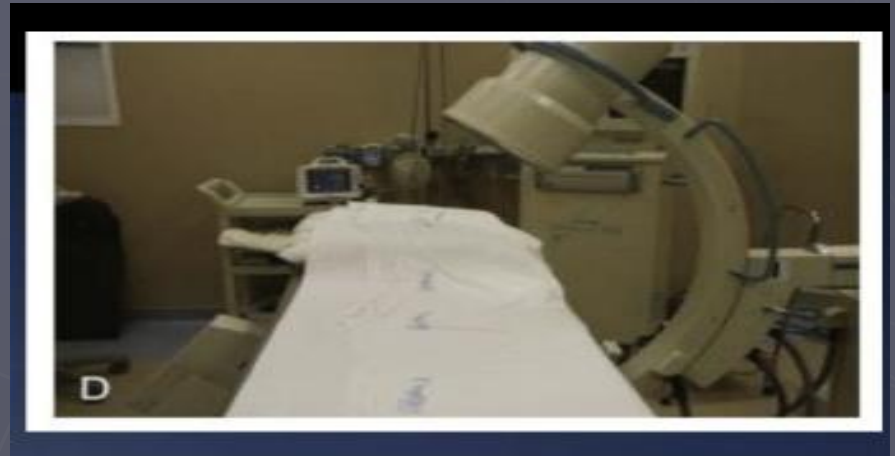
Lateral



Posterior MIS Screws

- ▶ Stabilization fixation
- ▶ Free hand – C-Arm or direct visualization
- ▶ Navigation
- ▶ ROBOT
 - Technology has changed significantly

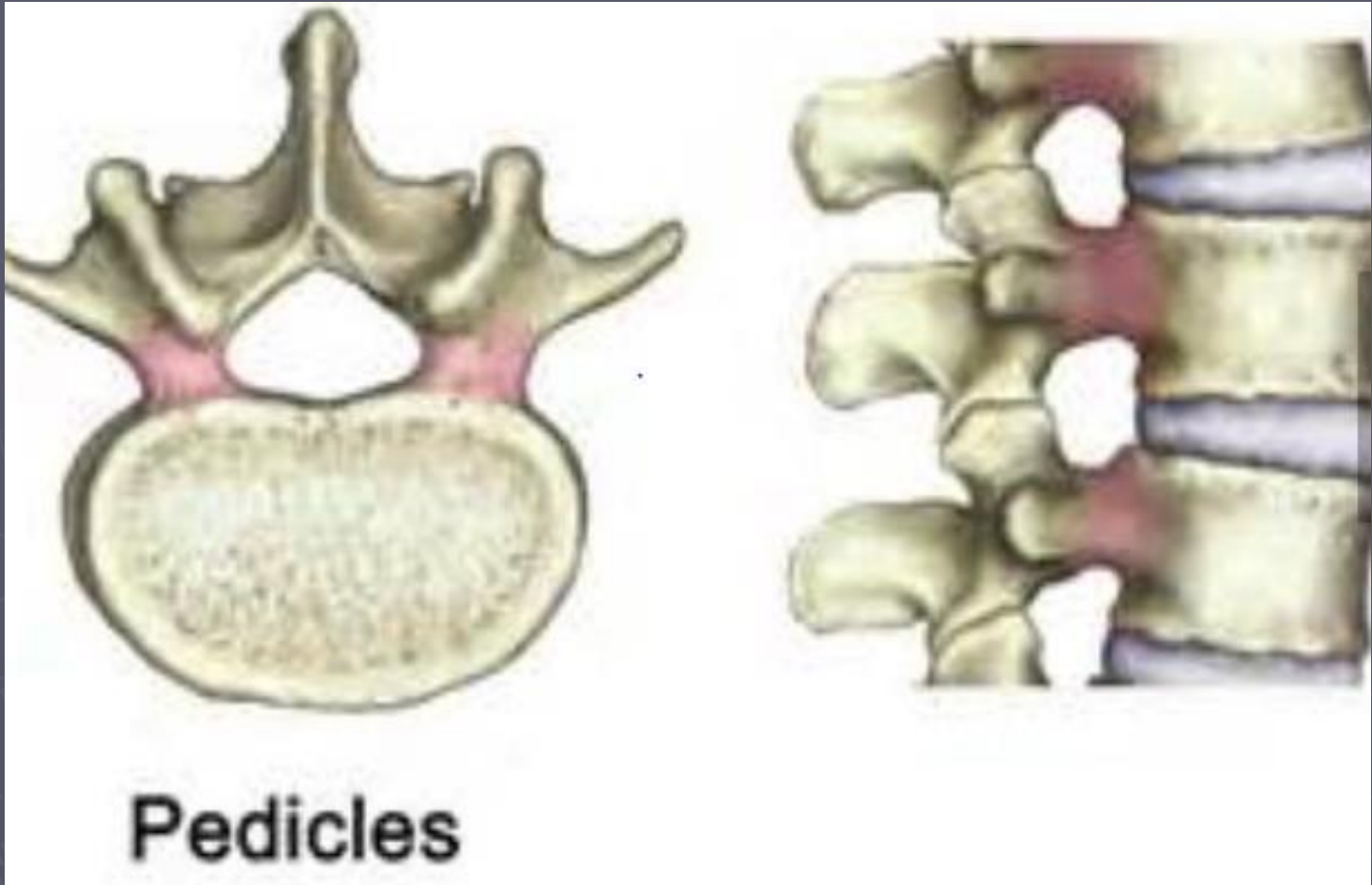
C-arm



Pedicle landmarks



Pedicles



Pedicle Screws

Prone position

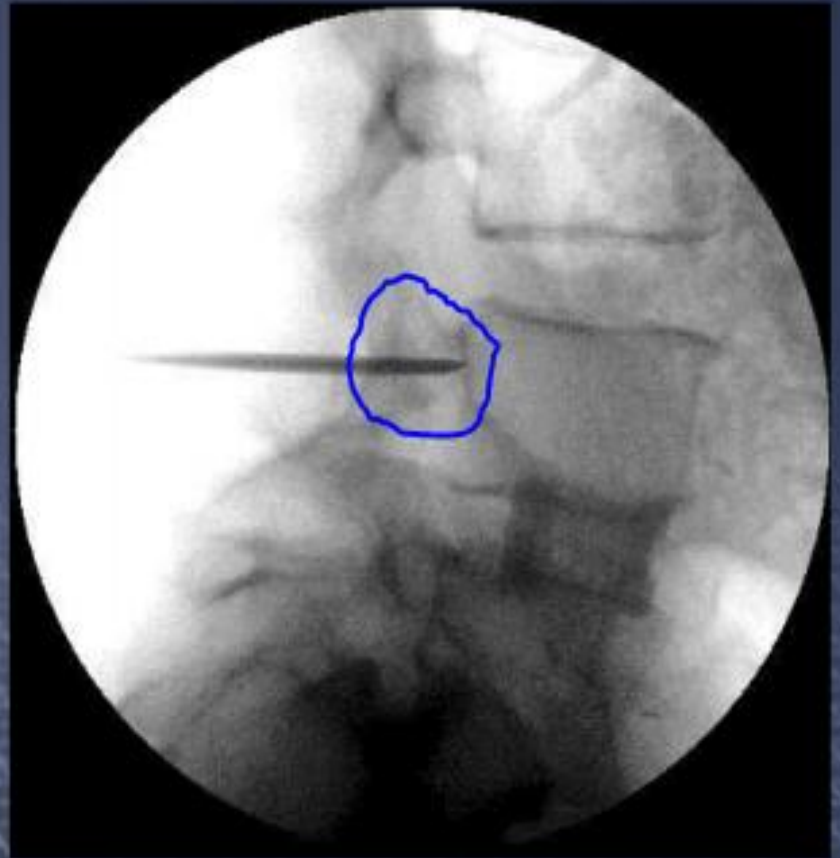
Technique



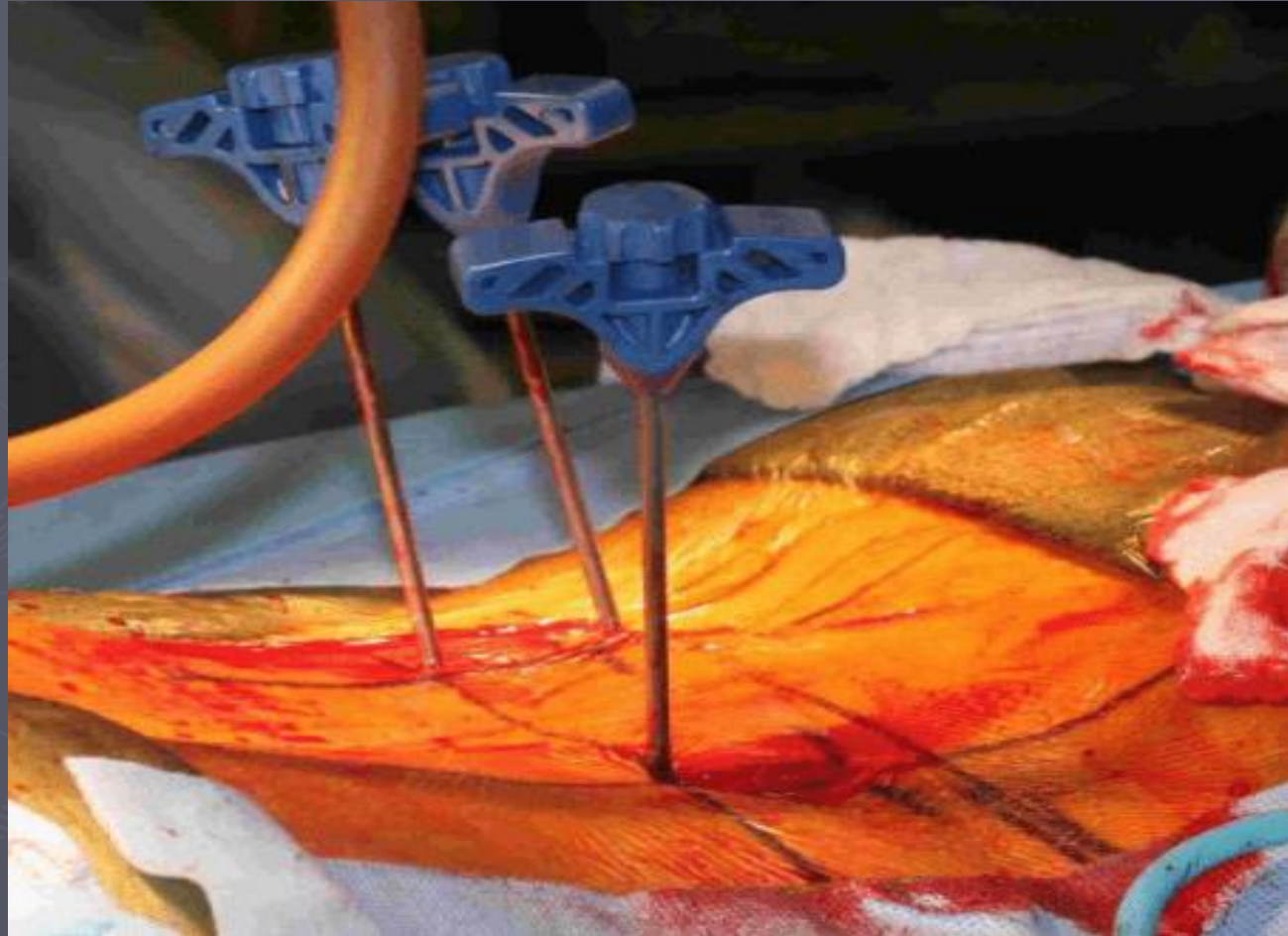
AP Fluoroscopy is KEY to safe pedicle navigation. The critical aspect relates to staying lateral to the medial wall. AP Fluoro is the only view that gives that information. A good AP will also give some sagittal plane information

Pedicle

MIS-minimally invasive



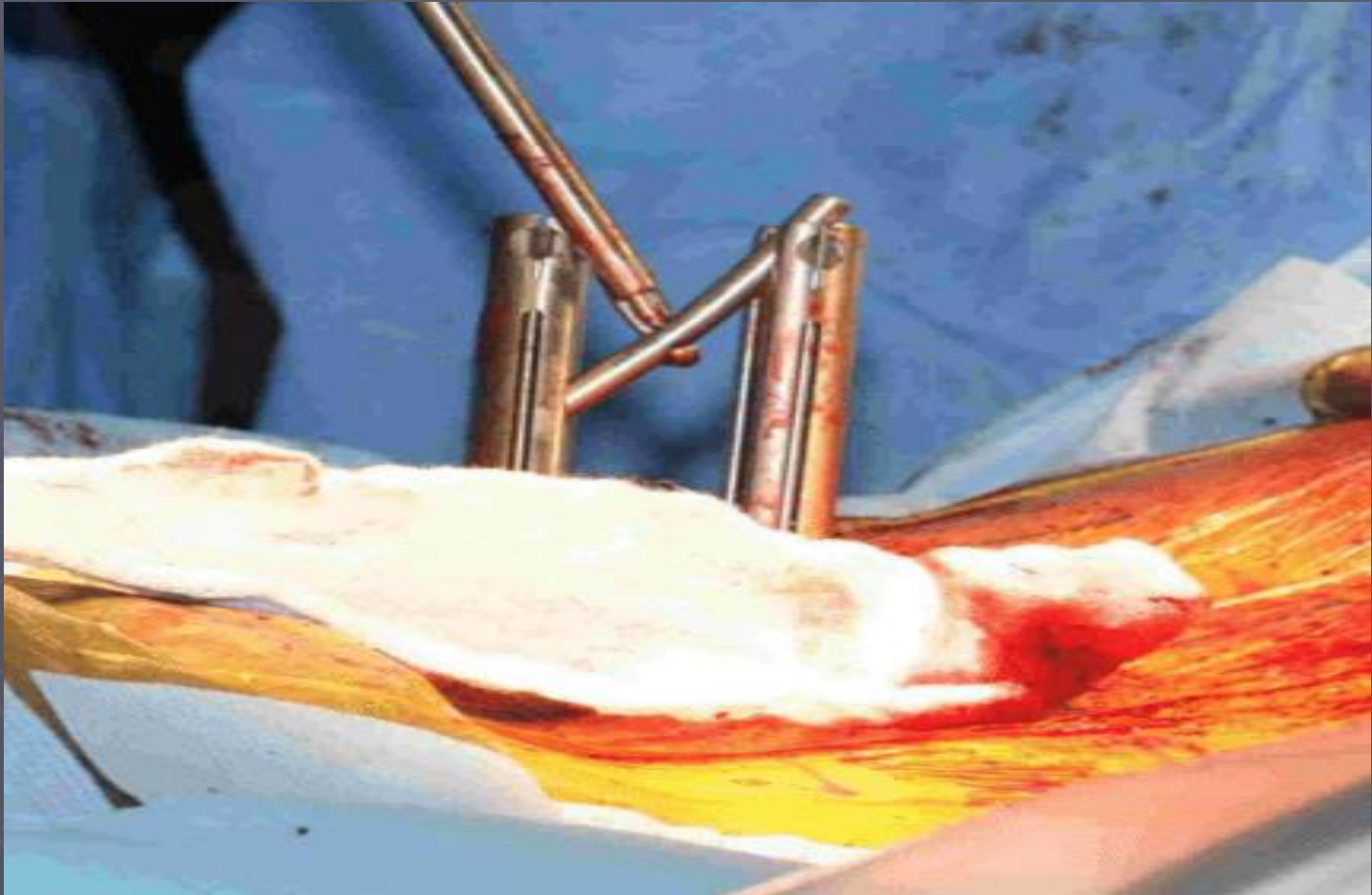
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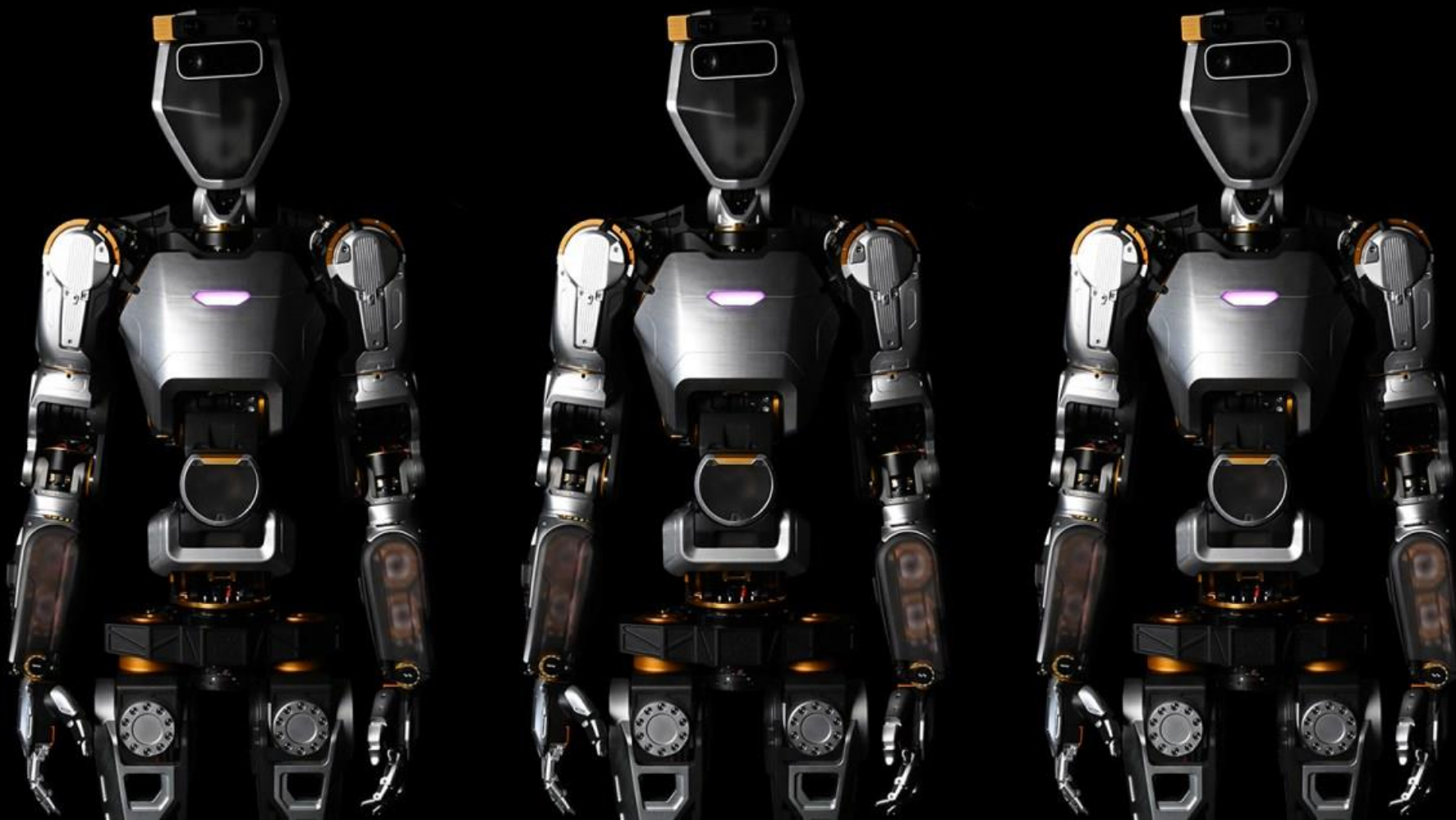
MIS



MIS



The Future is now



ROBOT



ROBOT



MIS-Robot



ROBOTS



What's NEXT in Spine

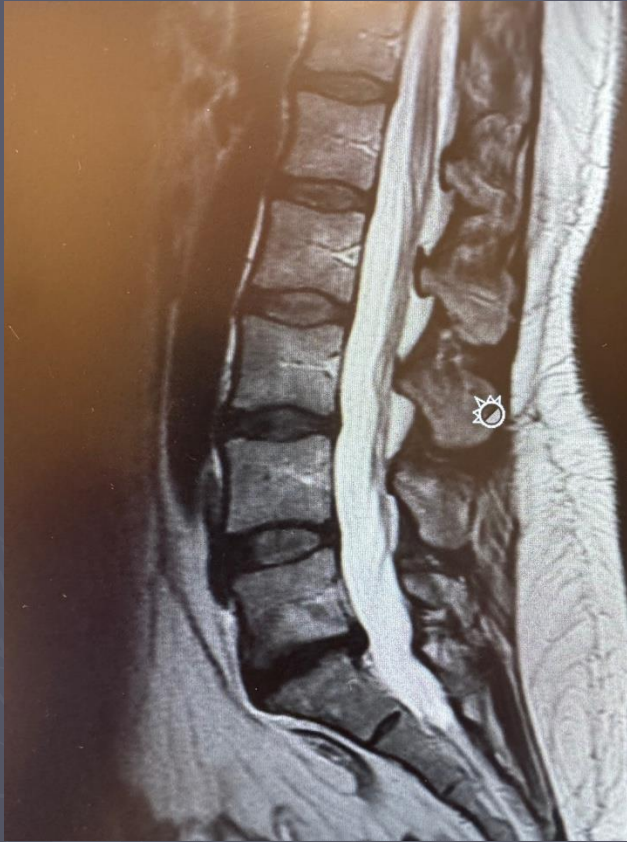
- ▶ Trend – Disc replacement



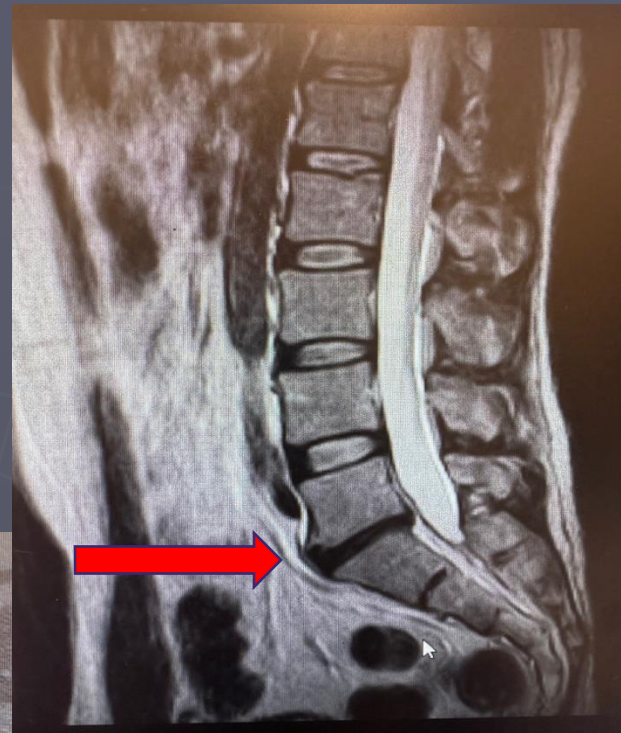
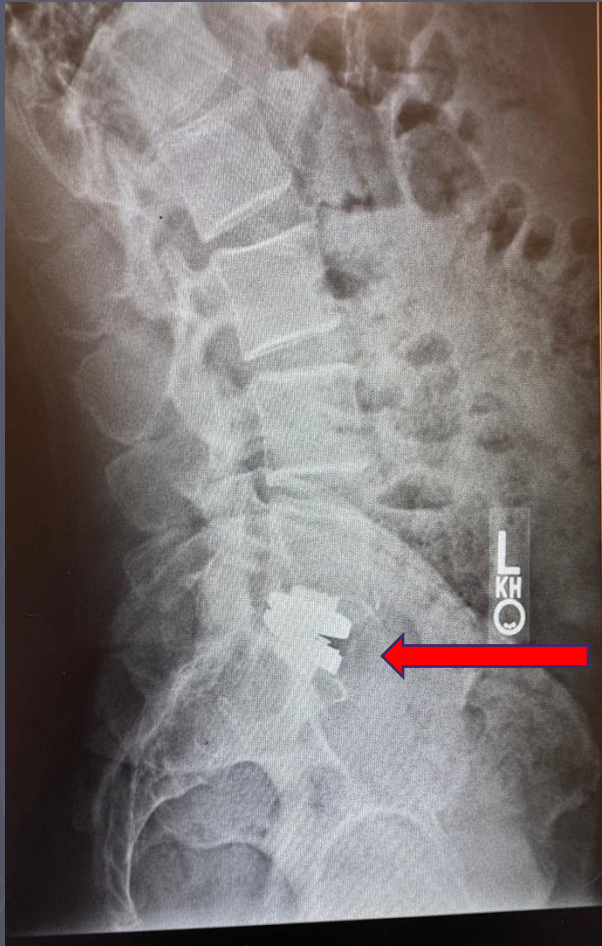
Lumbar Disc Replacement

- ▶ Game changer!
- ▶ Anterior exposure- Need access.
- ▶ Not for everyone
- ▶ Very user dependent
- ▶ Huge INSURANCE issues
 - BCBS 2 level possible
 - All other insurance single level or not at all
- ▶ NO facet arthritis

51 y/o Active female with persistent chronic low back pain



54 y/o chronic back pain failure to improve



The END

Thank you !!!

