

ADULT SPINAL DEFORMITY: APPROPRIATE USE OF SURGERY AND NON-OPERATIVE CARE

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Feb, 2018
Park City, UT



**COLLEGE
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PHOENIX**

Adult Concerns

Pediatric

- ⊙ Progression
- ⊙ Cosmesis
- ⊙ Pain

Adult

- ⊙ Pain
- ⊙ Neurological complaints
 - Radiculopathy
 - Neurogenic claudication
- ⊙ Postural stabilization
- ⊙ Balance restoration
- ⊙ Progression

Technical Challenges

- ◎ Less flexible curves
- ◎ Less optimal bone quality
- ◎ Canal Interventions
- ◎ Co-morbidities
- ◎ Higher complication rates
 - Pseudarthrosis
 - Junctional issues
 - Inferior recovery



Should I even offer surgery?

- ◎ Real challenge is in deciding between which problems to address and who to operate on
- ◎ Bigger vs. smaller surgery pros/cons

Non-op

- ◎ NSAIDS/Tylenol
- ◎ PT
- ◎ Muscle relaxants/anti-depressants/steroids
- ◎ Chiropractic manipulation/massage
- ◎ Cupping/Charismatic Healing/Nothing
- ◎ **NO** opioids



Sketchiness

Non-op

⊙ Interventional

- Facet Injections
- Medial Branch Blocks
- Rhizotomies
- Discogram

⊙ Generally inconsistent data

- Temporary relief

ASD: Operative vs. Non-op

◎ ISSG

- 268 op vs. 403 non-op
 - Significant improvement with surgery
 - No substantial improvement with non-op
- 215 non-op pts
 - 86 MCID vs 129 not MCID at 2 yrs
 - MCID tended to have less baseline deformity and pain

◎ Bridwell et al

- 160 ASD
 - No significant improvement with non-op

Surgery is effective...

- ◎ Albert, et al. Spine 1995

55 pts adult deformity

No difference in <40yr vs >40yr old outcomes

- ◎ Glassman, et al. Spine 2007

97 pts >65 yrs old, lami/fusion

Complications did not affect outcome

- ◎ Glassman, et al. Spine 2007

46 pts adult deformity, major/minor/no comp.

10% major complications affect outcome

Minor and no comp. similar outcome



...But not without risk

- ◎ Cho, et al. Spine 2007

47 pts with DLS, age 67 yrs

Posterior fusion, 68% complications (acute plus chronic)

- ◎ Buchowski, et al. SRS 2006

110 pts PSO, age 54, 11% neuro deficit

- ◎ Crandall, et al. Spine 2009

40 pts with DLS, 15% NU, 18% adjacent Fx
20% revision surgery

- ◎ Charosky, et al. SRS 2006

21 pts PSO for *revision* scoliosis, 4 yr follow-up
5 neuro deficits, 4 dural tears, 3 nonunions



Surgical Decisions

- ◎ Goal should be to treat primary symptoms with least amount of surgery while minimizing future problems

Goals for Adult Scoliosis Surgery

- ◎ Address symptoms
- ◎ Achieve a balanced spine
 - Balance > coronal Cobb correction
- ◎ Maximize motion
- ◎ Minimize risk to patient

Radiographic Factors to Consider

- ◎ Stenosis – Location & severity
- ◎ Stability – Listhesis, osteophytes
- ◎ Curve size/flexibility
- ◎ Spinal balance – Coronal/sagittal
- ◎ Prior spinal surgery

Clinical Factors to Consider

- ◎ Overall health
 - Physiologic Age
 - Co-morbidities
 - Activity level
 - Motivation/Expectation
 - Social Support
 - Bone density
- ◎ PE
- ◎ Size of surgery needed
 - Approaches
 - Need for Osteotomies
 - Revision

Age

◎ Smith JS et al: Spine. 2011

- 206 pts age 25-85 for scoliosis surgery
- Complication rates increased with age:
 - 25-44: 17%
 - 45-64: 42%
 - 65-85: 71%
- Significant functional improvement (SRS-22, ODI, back pain, leg pain)
 - Trend of improved result with greater age

Impact of Overall Health

◎ Fu KM et al: Spine 2011

- 22,857 pts undergoing spine surgery
- Overall complication rate: 8.4%
- Higher ASA grades had significantly higher complication rates:
 - ASA 1 had 5.4%
 - ASA 2 had 9%
 - ASA 3 had 14.4%
 - ASA 4 had 20.3%
 - ASA 5 had 50%

Osteoporosis

- ◎ Plays a role in most common spine complications

- Adjacent segment degeneration
- Instrumentation failure
- Pedicle fracture
- Increased blood loss



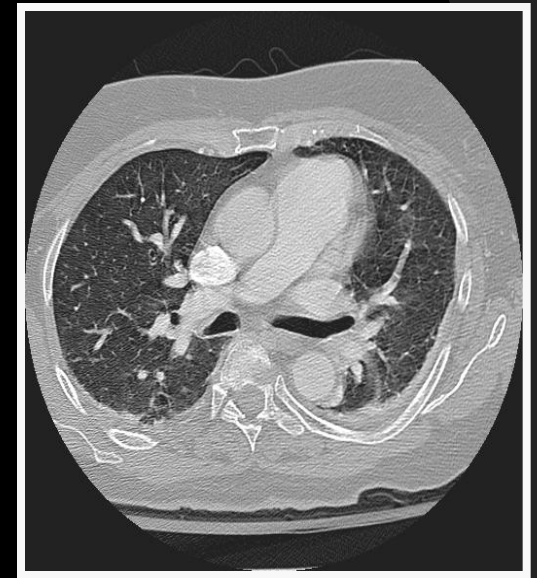
- ◎ **Ding et al., CMJ 2011**

- 192 pts age >50 DLS vs. stenosis
 - 74% osteoporosis in DLS vs. 31% in stenosis alone

PE

◎ Most common life-threatening complication in spine surgery

- Mortality: 0.7%
- DVT: 1-12%
- PE: 1-2%
 - AP Surg: 3-6%



Anticoagulation

- ◎ Acute post op complication rate:
 - Prophylactic: 5.7% to 18 %
 - Therapeutic: 12 % to 67 %

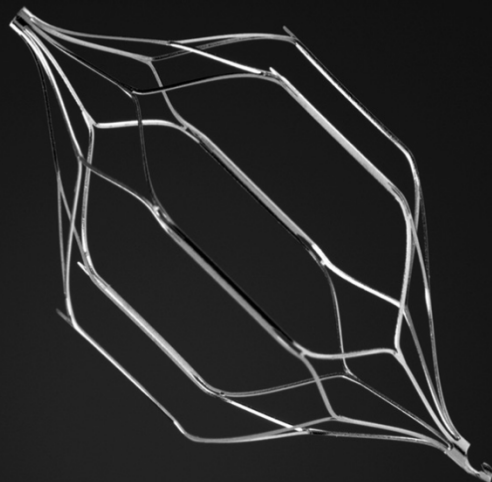
DVT/PE Study of High Risk Pts

- ◎ 67 consecutive patients treated without prophylactic IVC filter

- Pulmonary Embolism: 12.0 % (8 pts)
- PE mortality rate: 1.5 % (1 pt)

- ◎ 22 prospectively followed patients with prophylactic IVC filter

- No symptomatic PE
- IVC insertion complications: 0.0 %
- Filter related complications: 4.5 %



Size of Surgery

◎ Sansur CA et al, Spine, 2011

- 669 complications in 4980 SRS pts
- Higher rates associated with osteotomies, revisions, and AP approaches

◎ Smith JS et al, Spine, 2011

- 578 SRS pts for FSI correction
- 29.4% short term complications
- More aggressive osteotomy yielded higher complication rates
 - None 17%
 - SPO 28%
 - PSO 39%
 - VCR 61%

Revision Surgery

- ◎ Cho, et al. Spine 2012

166 pts for revision deformity surgery, 34.4% major complication rate

- ◎ Glassman, et al. Spine 2007

62% vs. 48% complication rate revision vs. primary deformity surgery

- ◎ Chang, et al. SRS 2012

99 pts >75 age, 53% vs. 71% total complication rate in primary vs. revision surgery

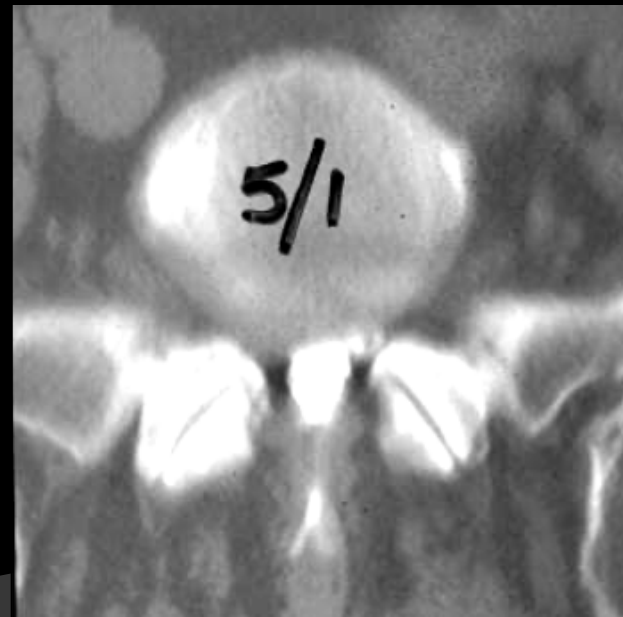
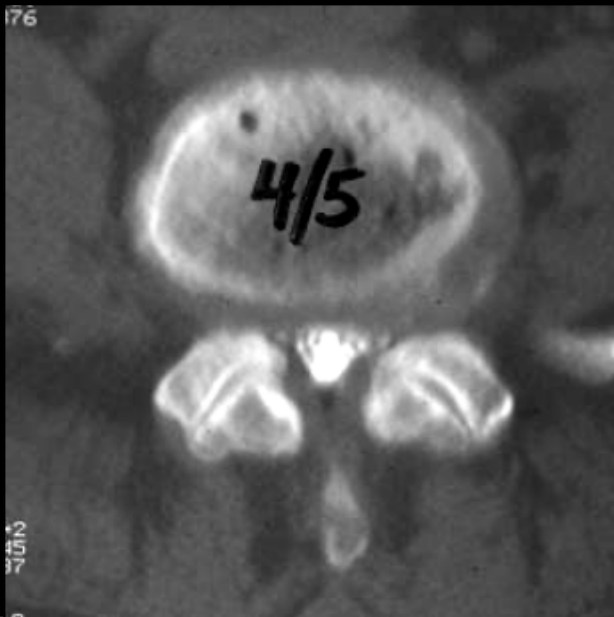
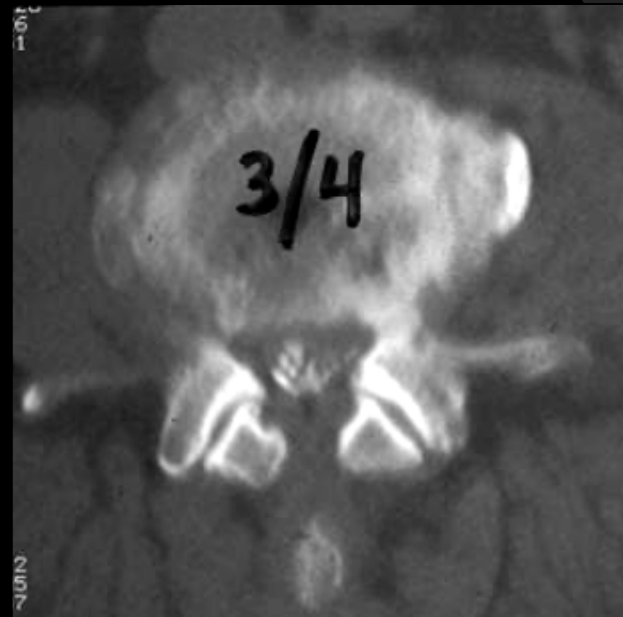
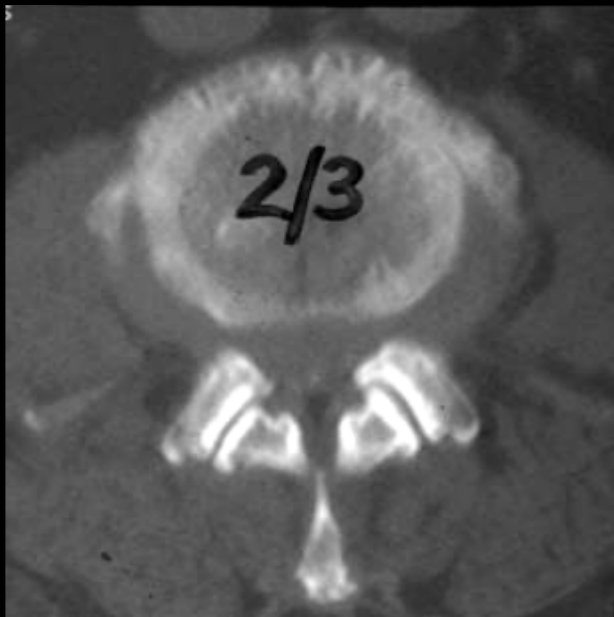
Surgical Options

1. Decomp alone
2. Decomp w/limited posterior inst/fusion
3. Decomp w/fusion curve
4. ± Decomp w/fusion and osteotomies

Case 1: 62 F



Neurogenic claudication only



Characteristics

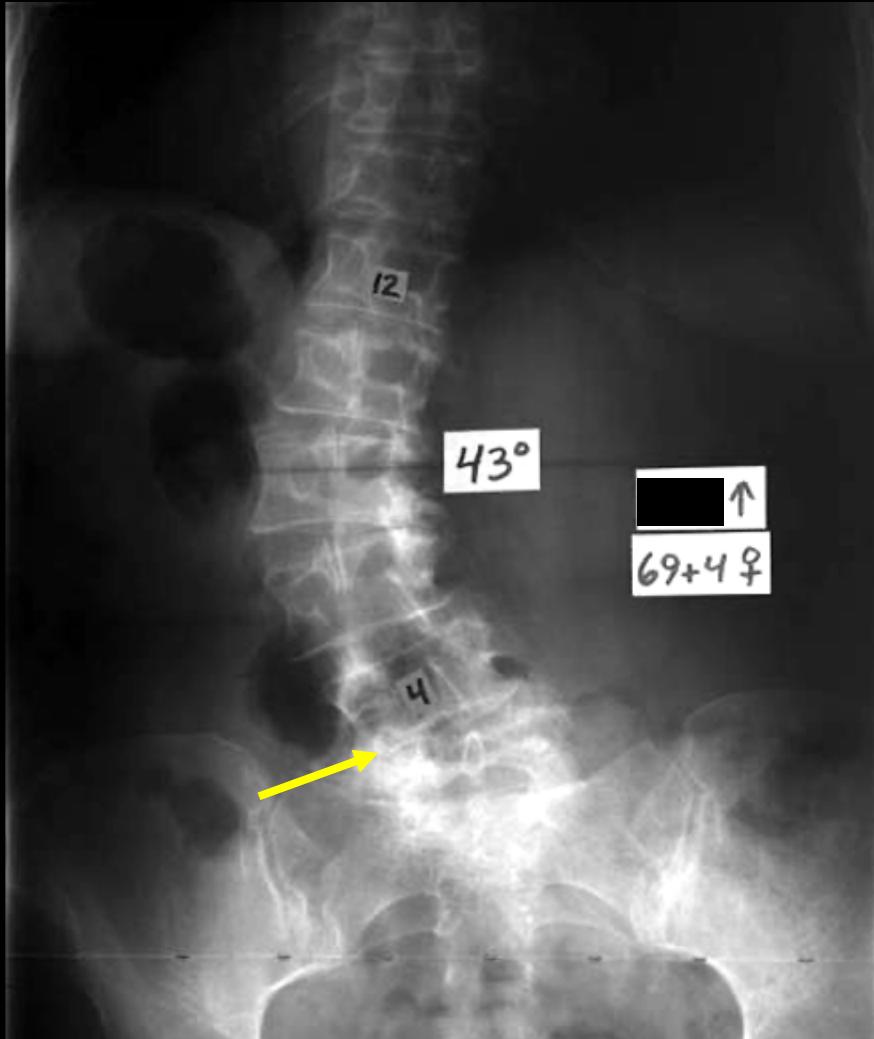
- ◎ Central and lateral recess stenosis
- ◎ “Stable” spines radiographically
 - Minimal/absent rotatory subluxations
 - Osteophytes present

Decompression Only



5 1/2 YEARS POSTOP

Case 2: 69 F



Left leg radiculopathy- L4 & L5

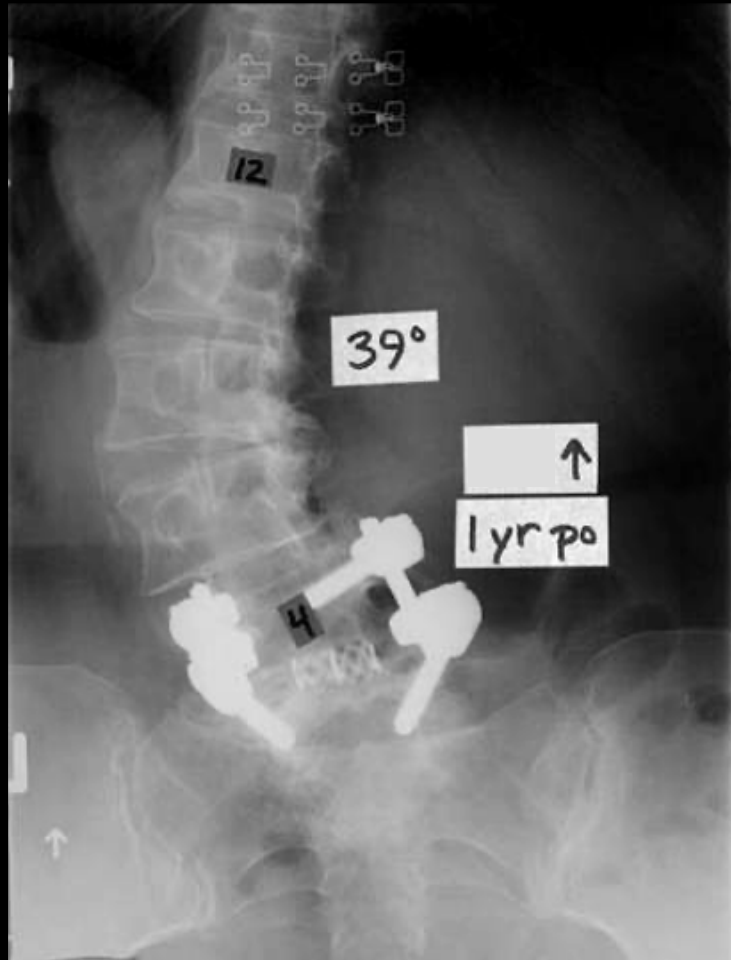
L4-5 Foraminal and Lateral Recess Stenosis



Characteristics

- ◎ Central/lat recess/foraminal stenosis
- ◎ Rotatory subluxations at stenotic levels
- ◎ Lack of stabilizing osteophytes
- ◎ Minimal back pain/deformity complaints

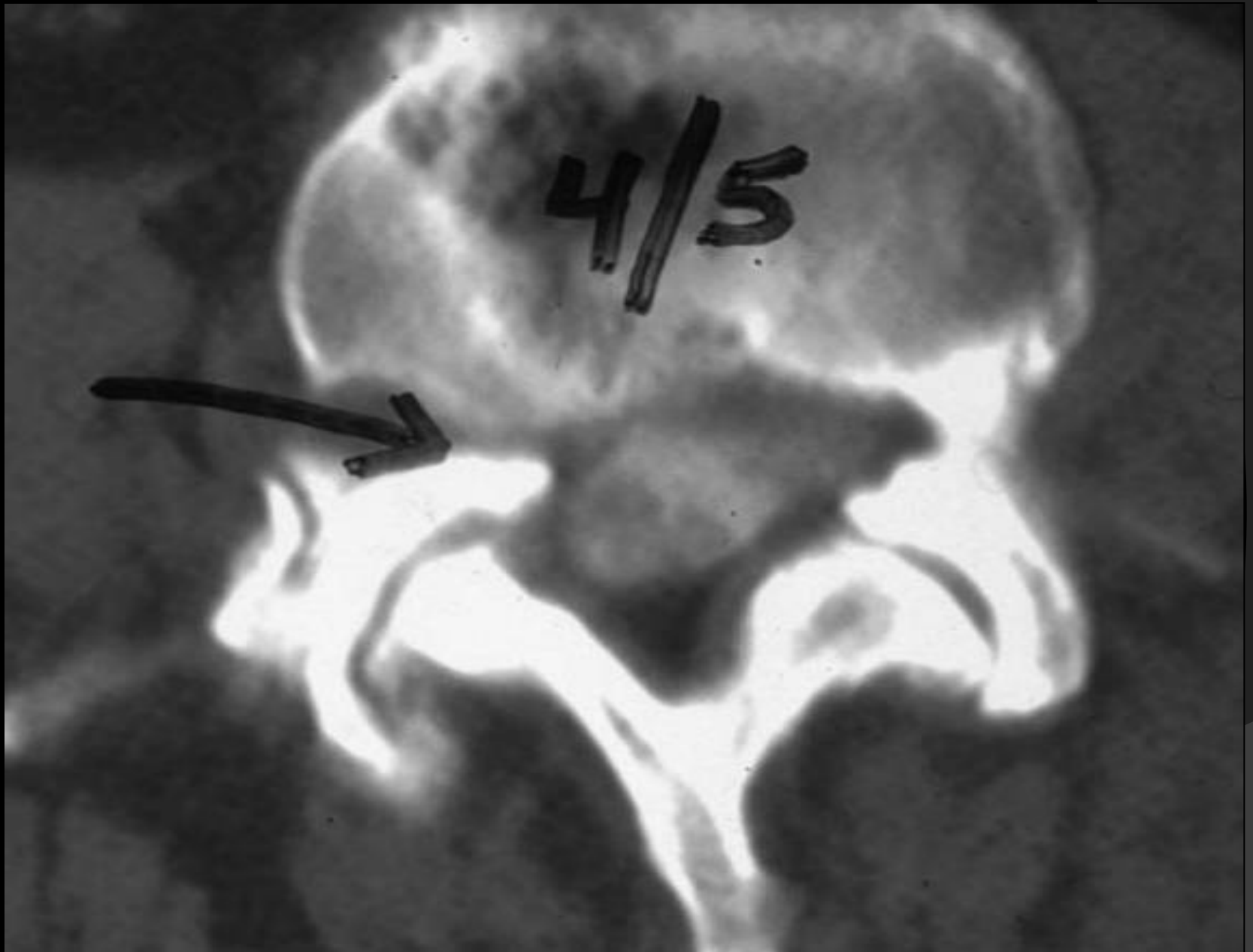
Decompression L4-5 PSF/TLIF



Case 3: 73 F



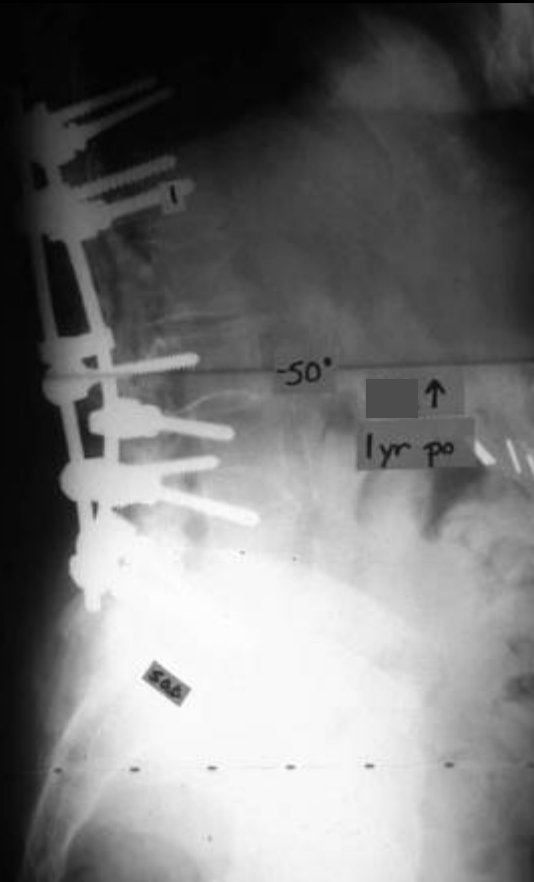
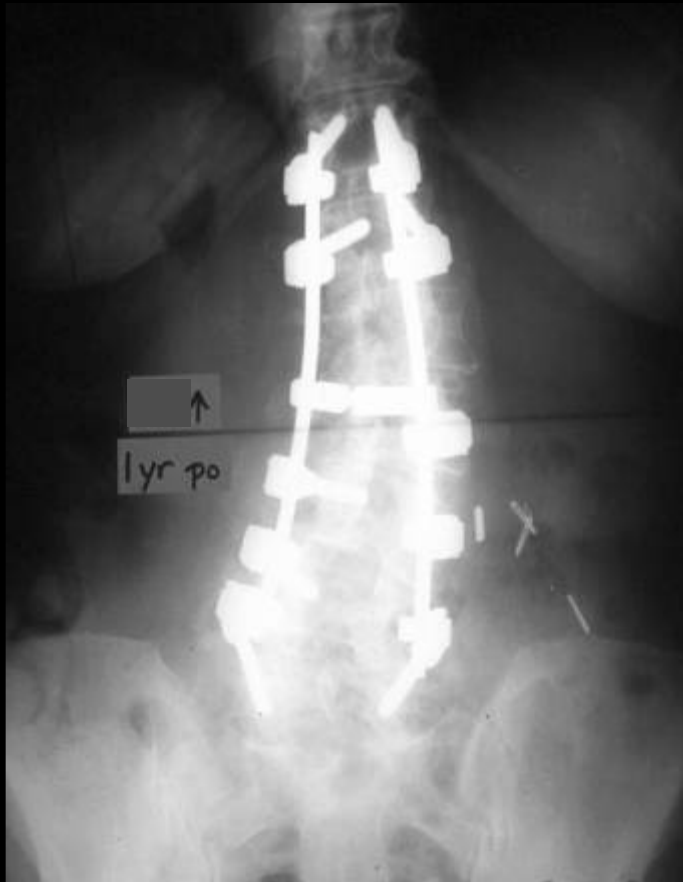
R Post leg pain and LBP



Characteristics

- ◎ +/- stenosis
- ◎ Severe rotatory subluxations/“unstable” spine
- ◎ ↑ back pain/deformity complaints
- ◎ Adequate sagittal/coronal alignment
- ◎ Adequate bone stock (osteoporosis)

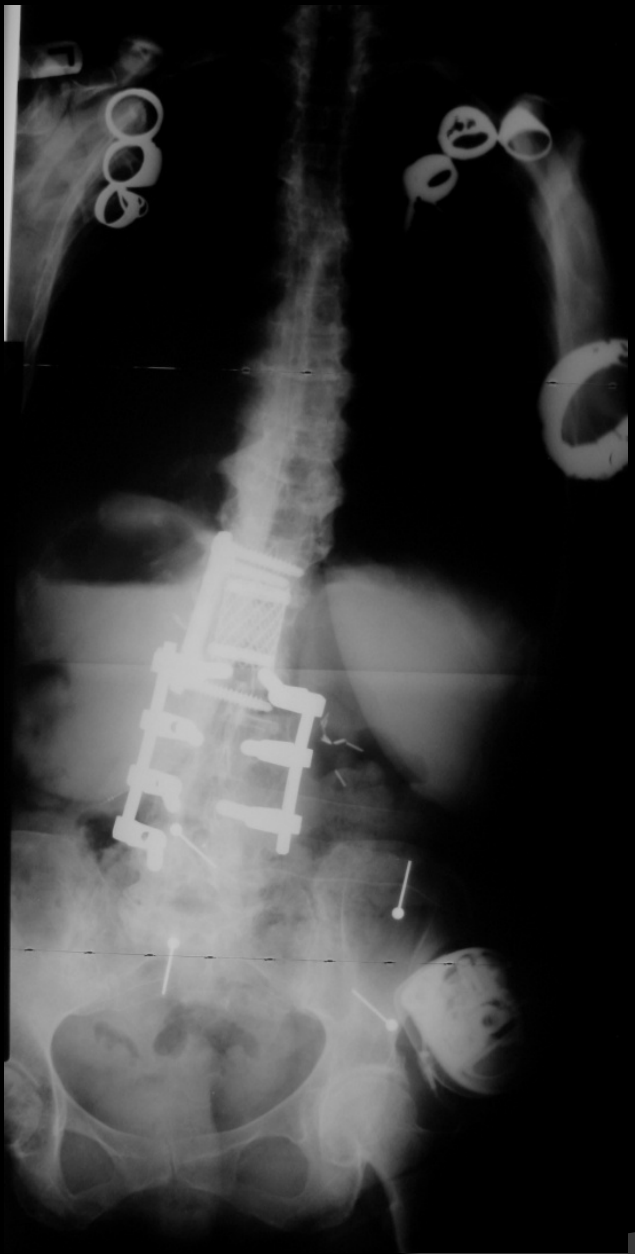
Decompression + PSF T11-L5



Case 4: 68 F



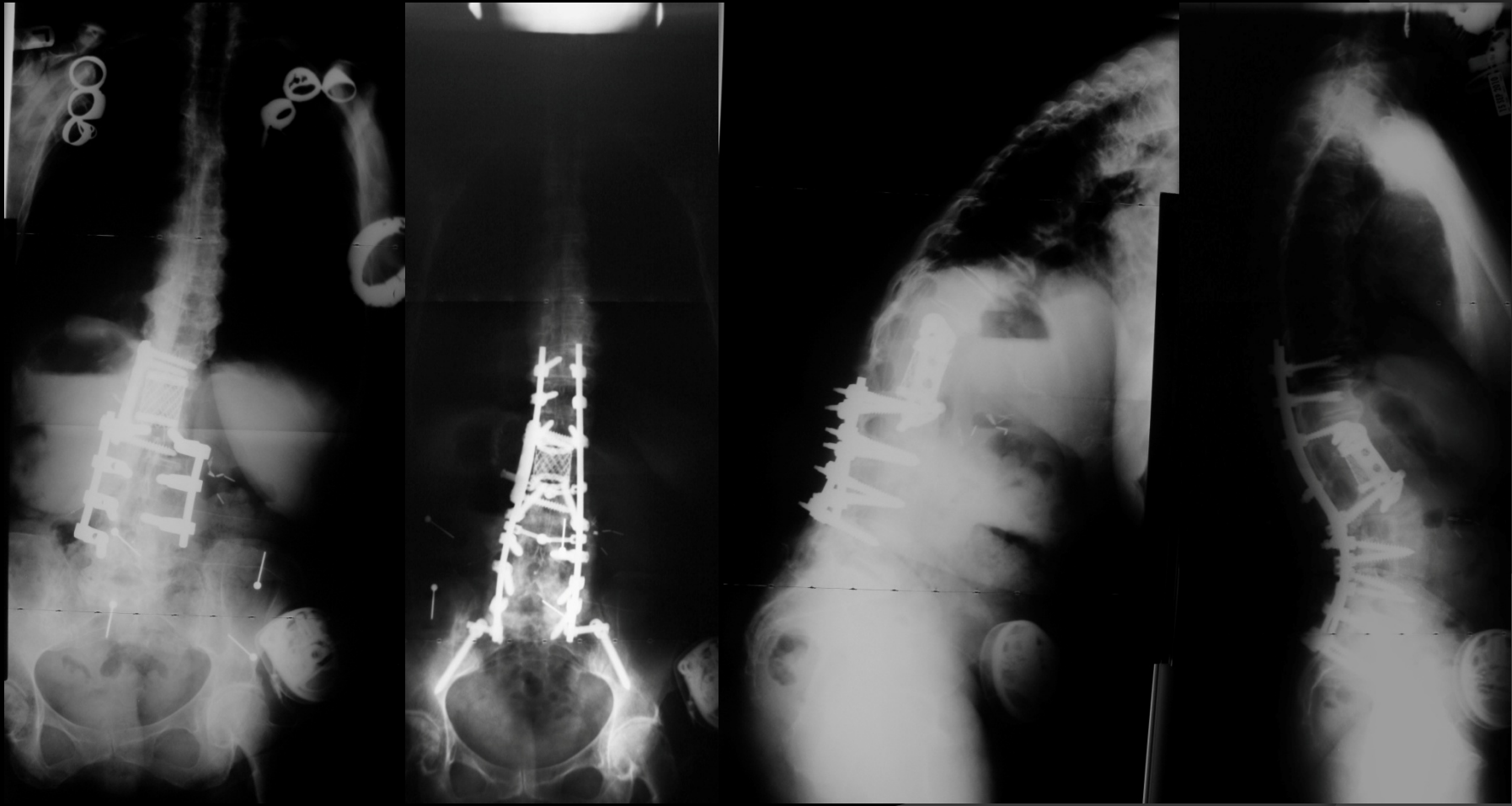
LBP s/p 9 prev back surgeries



Characteristics

- ◎ ± Stenosis
- ◎ Often revision scenario
- ◎ ↑ Back pain/deformity complaints
- ◎ Lumbar flatback/sagittal imbalance
- ◎ Strong protoplasm to tolerate combined procedures

L3 ASx PSO, T10 – Pelvis PSF





Principles of ASD

- ◎ Choose the right intervention for the right patient at the right time
- ◎ “Less is More”
 - The least aggressive procedure for the maximal amount of gain is preferred
 - Short segment fusions are often all that’s indicated over the decompressed levels
 - Pain relief and improved function and overall balance is more important than maximum curve correction

Thank you!

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