Interbody Devices in Deformity Correction (lateral approach)

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Goals of Deformity Correction

- Restore sagittal and coronal balance
  - Posterior column osteotomy
  - Anterior column release
- Relieve pain
- Obtain solid fusion
  - Anterior column support
- Traditional techniques to correct sagittal imbalance include extensive procedures such as Smith-Petersen and Pedicle Subtraction osteotomies

Potential Advantages of Lateral Interbody Use

- Less invasive than traditional osteotomies

- Achieve lordosis
- Anterior release
- Anterior column support
- Enhance fusion, lower pseudarthrosis rates
- Indirect decompression of neural structures

J Neurosurg Spine. 2011 Jul;15(1):92-6. doi: 10.3171/2011.3.SPINE10425. Epub 2011 Apr 8.

Changes in coronal and sagittal plane alignment following minimally invasive direct lateral interbody fusion for the treatment of degenerative lumbar disease in adults: a radiographic study.

Acosta FL[1], Liu J, Slimack N, Moller D, Fessler R, Koski T.

- Series of 36 patients with lumbar degenerative disease undergoing lateral lumbar interbody fusion
- Found significant improvements in:
  - Segmental and regional lumbar coronal Cobb angles
  - Mean global coronal alignment
  - Segmental sagittal Cobb angle

J Neurosurg Spine. 2011 Jul;15(1):92-6. doi: 10.3171/2011.3.SPINE10425. Epub 2011 Apr 8.

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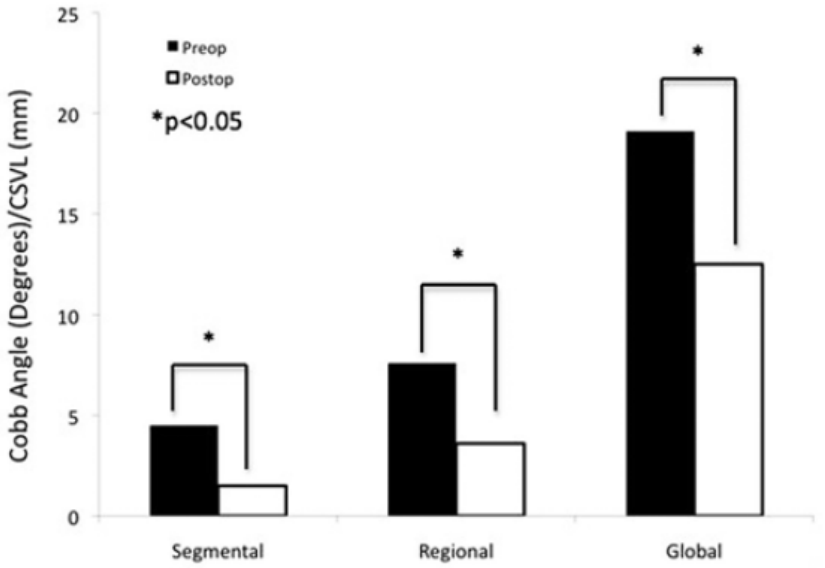


FIG. 2. Bar graph showing changes in coronal plane alignment after DLIF. The *left and center bars* show the segmental and regional Cobb angles, respectively. The *right bars* represent the center sacral vertebral line (CSVL).

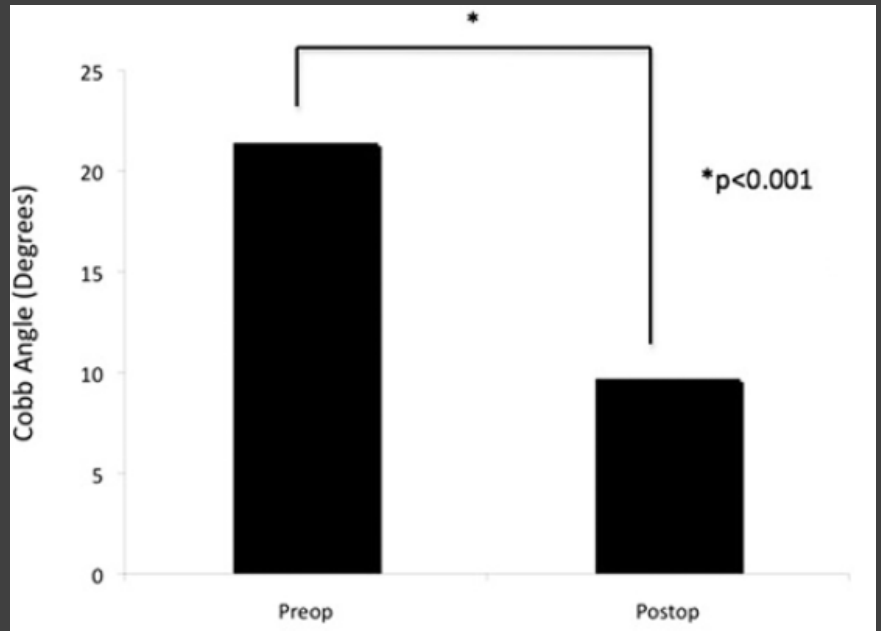


FIG. 3. Bar graph showing changes in regional coronal alignment after DLIF in adults with degenerative scoliosis.

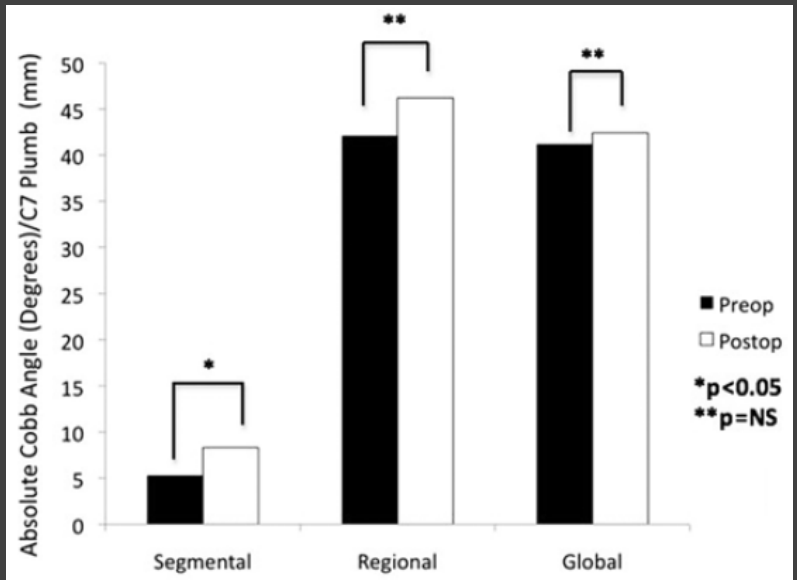


FIG. 4. Bar graph showing changes in sagittal plane alignment after DLIF. The *left and center bars* represent the absolute Cobb angle, and the *right bars* represent the C-7 plumb line. NS = not statistically significant.

Spine (Phila Pa 1976). 2018 Jul 15;43(14):E813-E821. doi: 10.1097/BRS.0000000000002507.

Minimally Invasive Lateral Lumbar Interbody Fusion for Adult Spinal Deformity: Clinical and Radiological Efficacy With Minimum Two Years Follow-up.

Park HY[1], Ha KY[1], Kim YH[1], Chang DG[2], Kim SI[1], Lee JW[1], Ahn JH[1], Kim JB[1].

- 91 total patients: those who underwent minimally invasive LLIF (n=48) with PSF vs those who underwent PSF only (n=43)
- No significant differences in terms of clinical outcomes (ODI, VAS)
- Coronal deformity correction was comparative between the two groups
- LLIF with PSF had significantly greater restoration of lumbar lordosis.
- When LLIF was used with PSF, there was greater indirect decompression (canal area and foraminal height)
- PJK was higher in the LLIF group

J Neurosurg Spine. 2017 Feb;26(2):208-219. doi: 10.3171/2016.8.SPINE151543. Epub 2016 Oct 21.

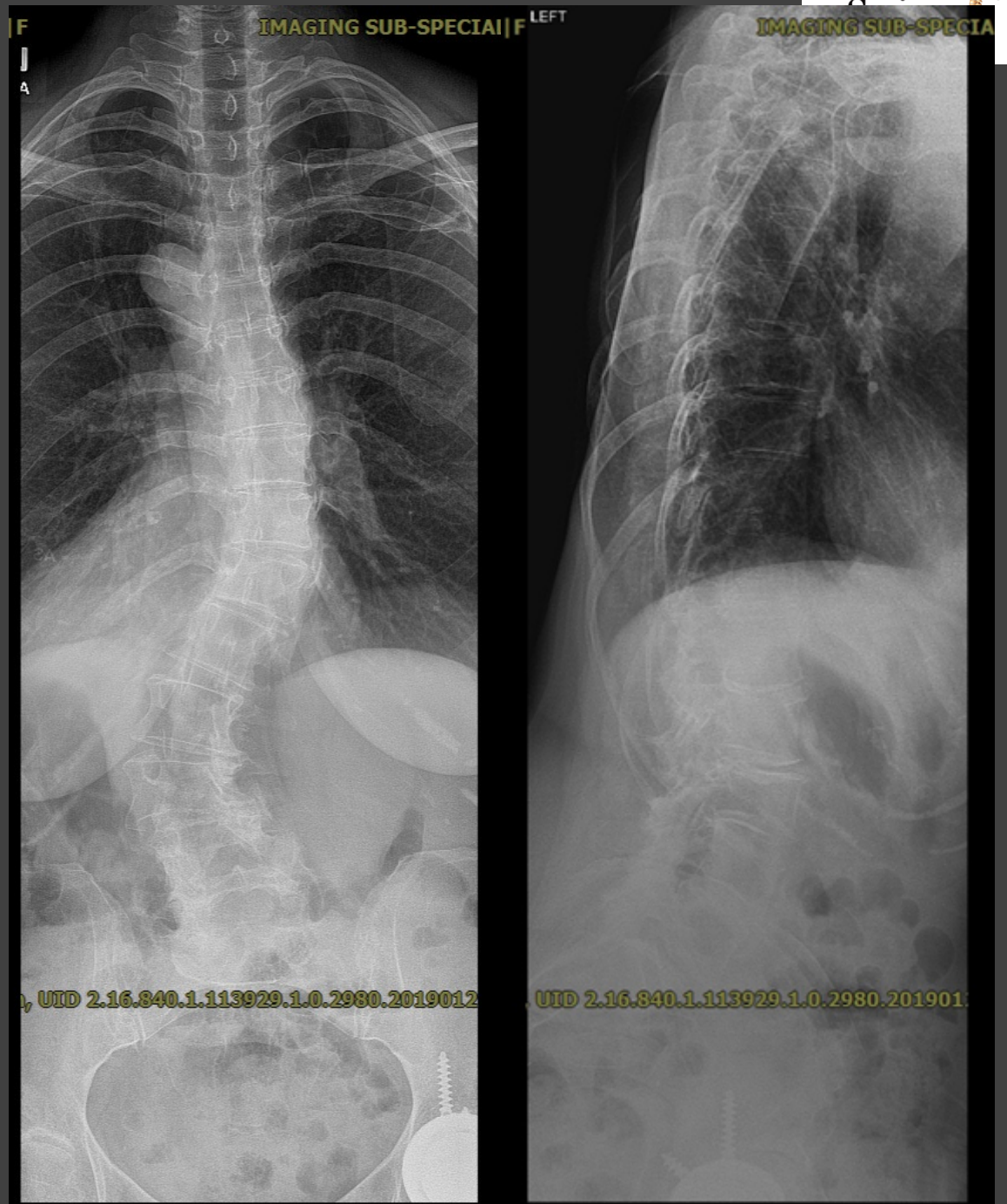
Utility of multilevel lateral interbody fusion of the thoracolumbar coronal curve apex in adult deformity surgery in combination with open posterior instrumentation and L5-S1 interbody fusion: a case-matched evaluation of 32 patients.

Theologis AA[1], Mundis GM Jr[2], Nguyen S[2], Okonkwo DO[3], Mummaneni PV[4], Smith JS[5], Shaffrey CI[5], Fessler R[6], Bess S[7], Schwab F[8], Diebo BG[9], Burton D[10], Hart R[11], Deviren V[1], Ames C[4]; for the International Spine Study Group.

- Multicenter study consisting of 32 patients
- 16 patients underwent PSF with L5-S1 interbody fusion; 16 underwent PSF with L5-S1 fusion and multilevel lateral interbody fusion of the coronal curve apex
- The addition of multilevel LIF was used in more severe deformities and resulted in better correction of:
    - Major Cobb angles
    - Lumbopelvic parameters
    - SVA
- However there an increase in complication, blood loss, operative times and LOS

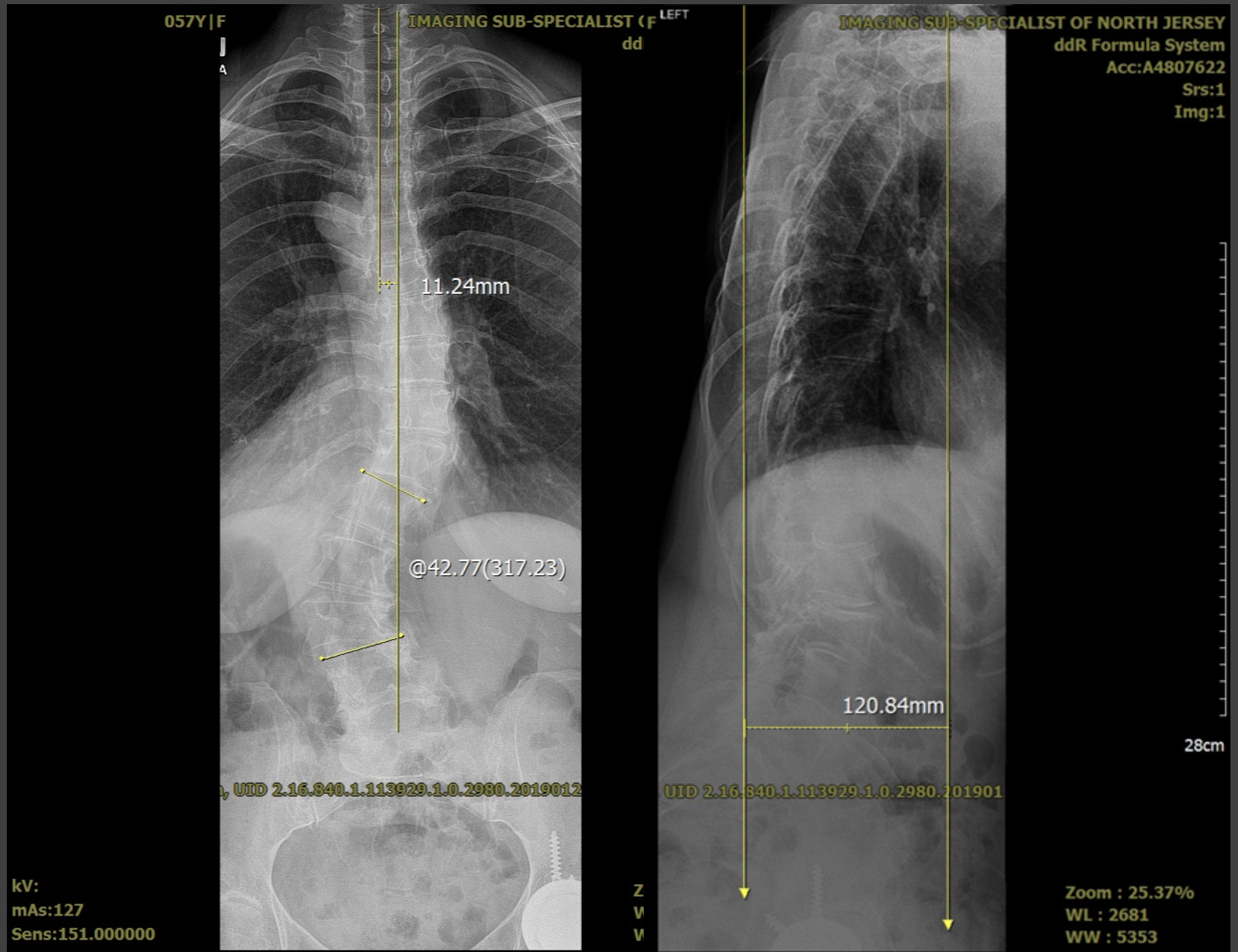
Case #1

- 57 F
- History of scoliosis with degenerative hip changes
- Significant low back pain and difficulty ambulating
- Weakness in bilateral lower extremities
- Forward lurched gait, sagittal imbalance

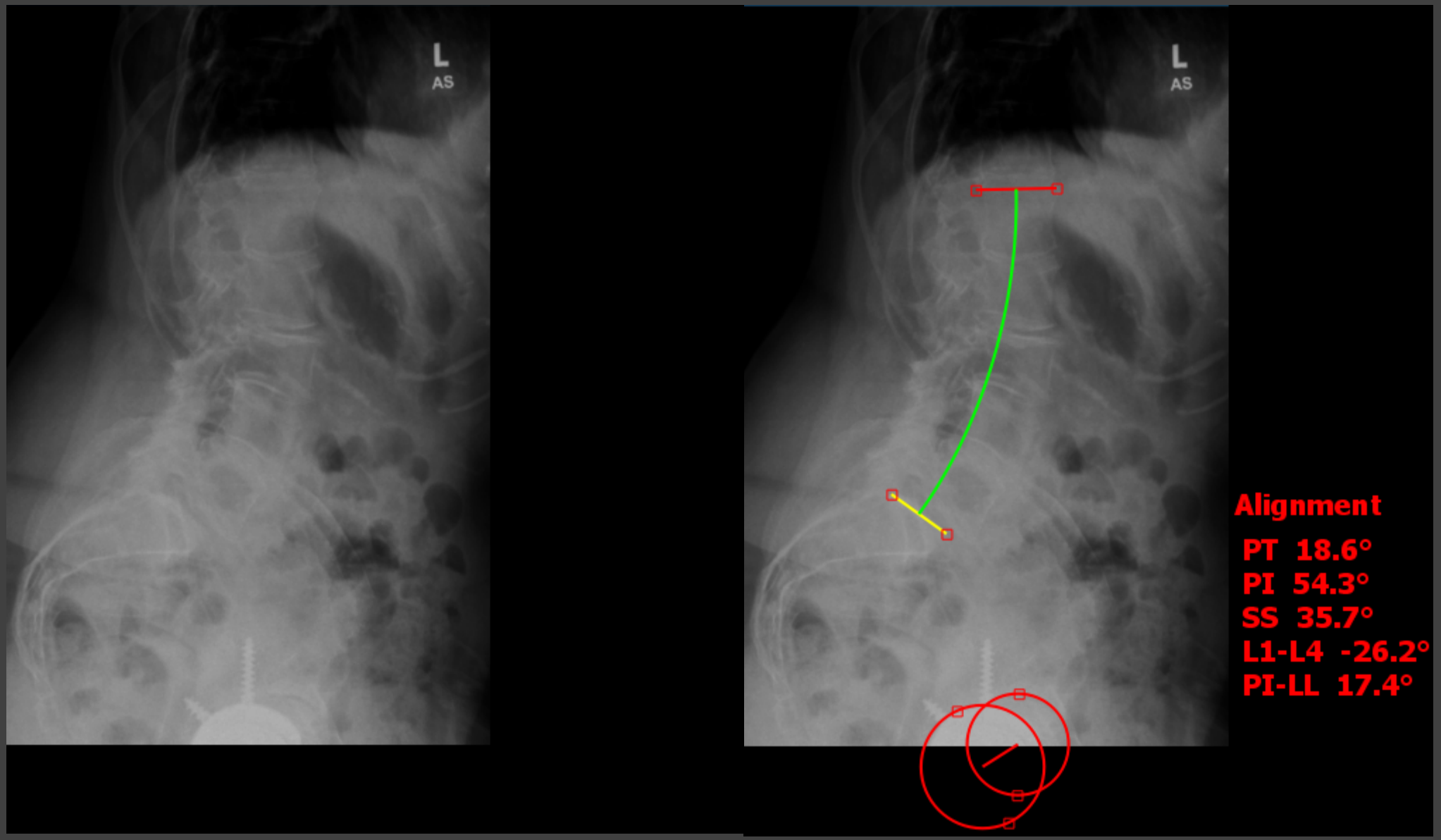


Case #1

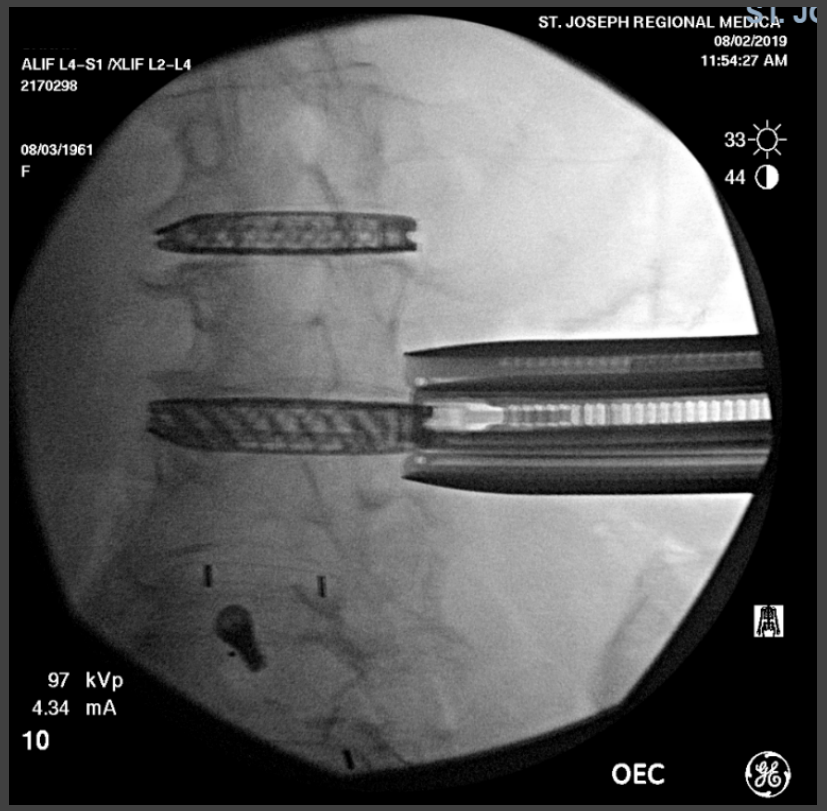
CBD, type A



Case #1



Case #1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08/03/1961
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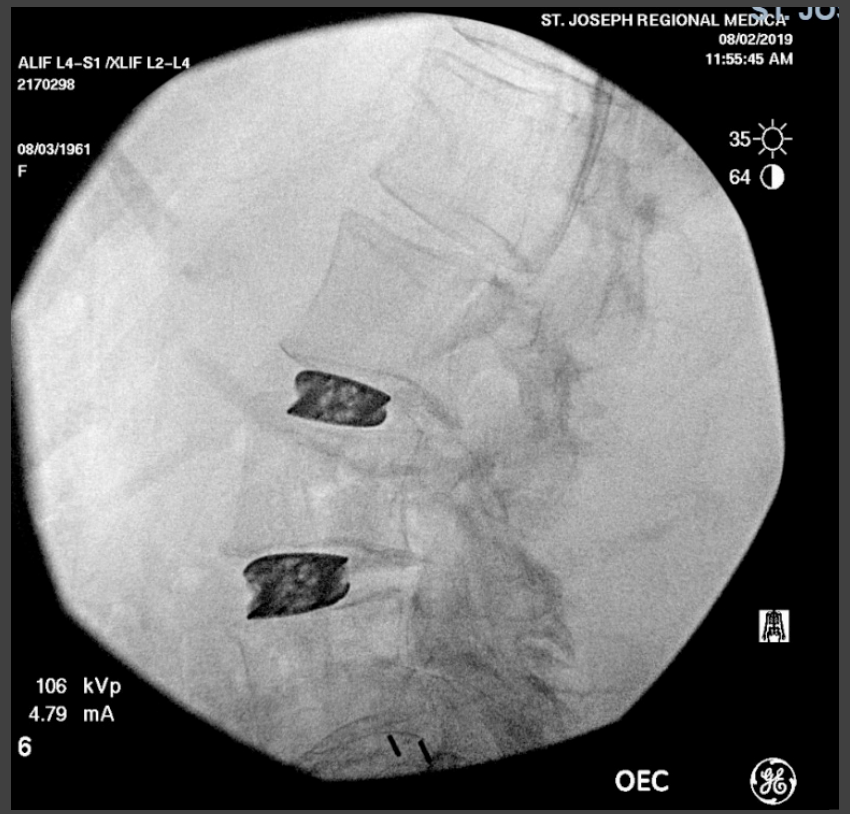
33
44
97 kVp
4.34 mA
10
OEC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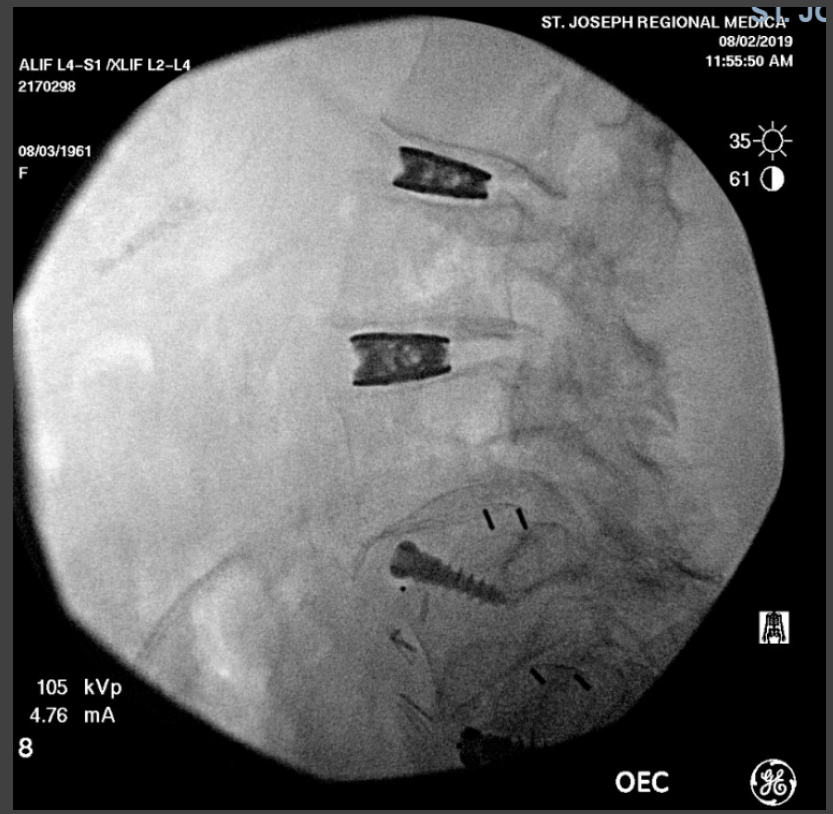
OEC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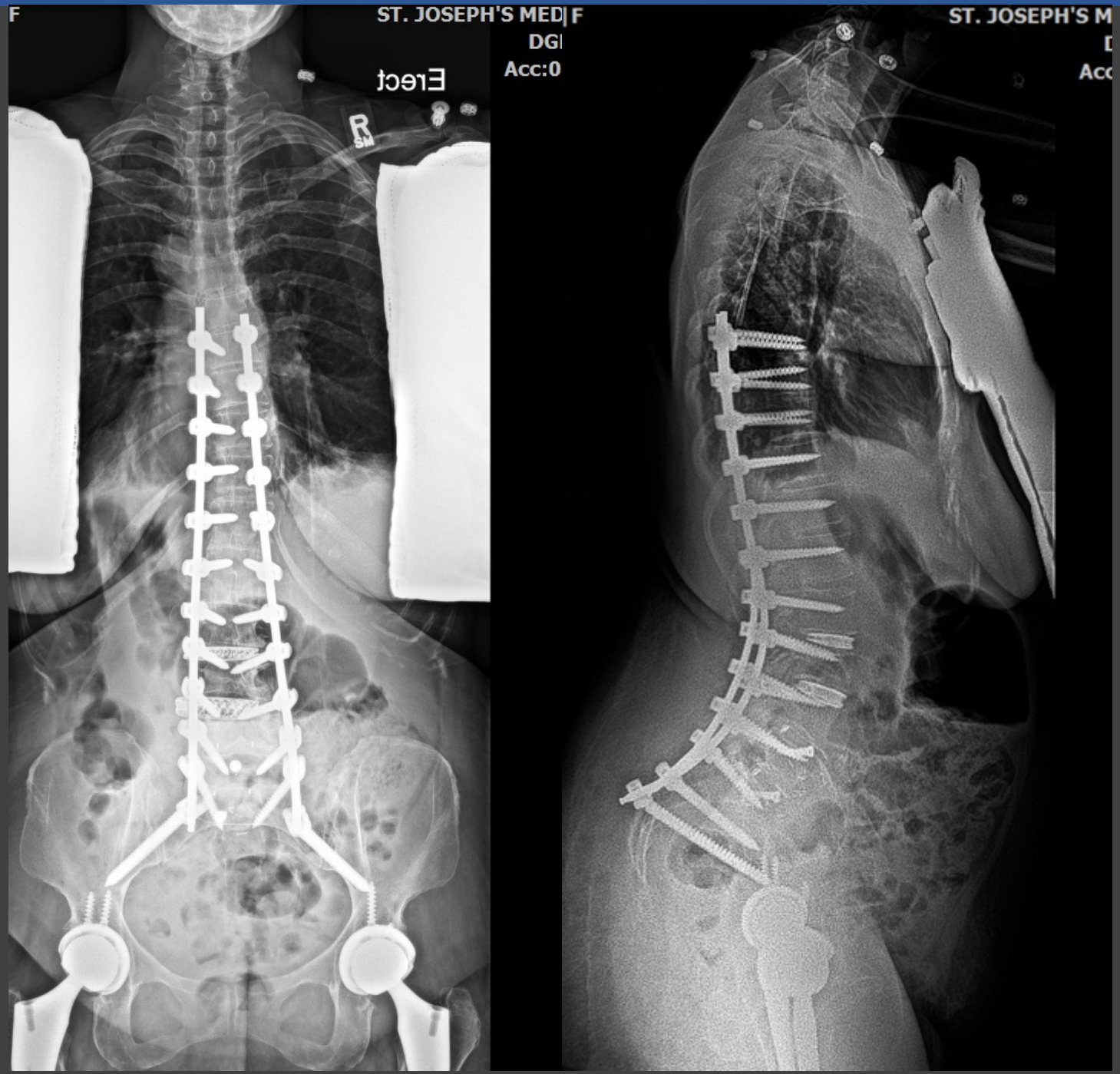
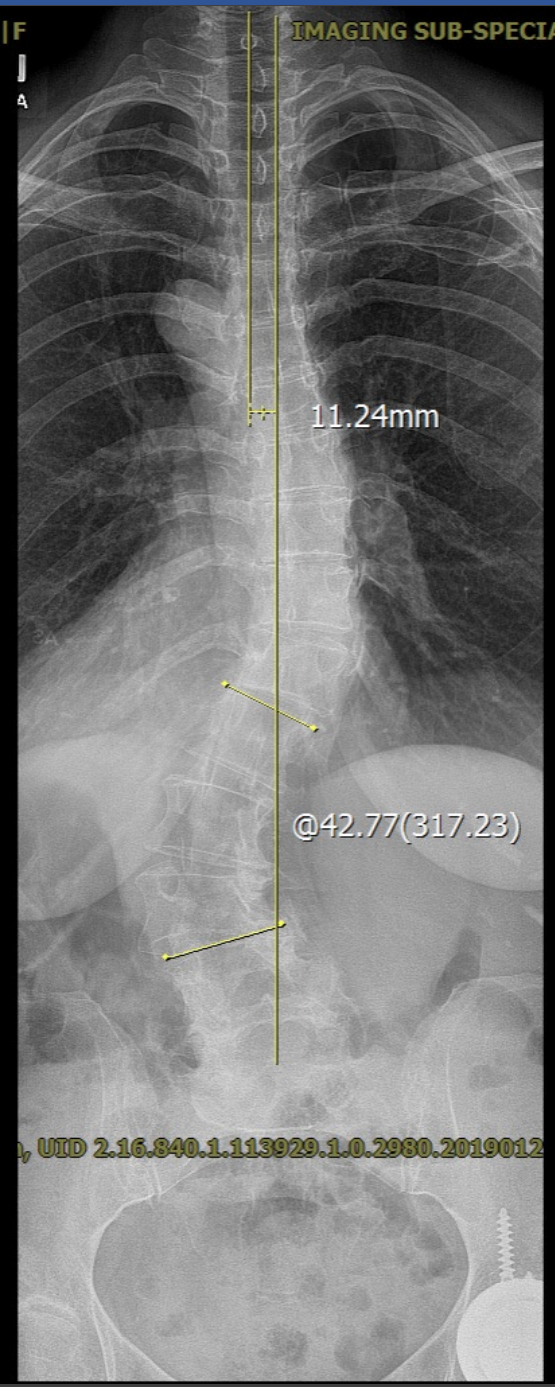
2170298
08/03/1961
F
35
61
105 kVp
4.76 mA
8
OEC

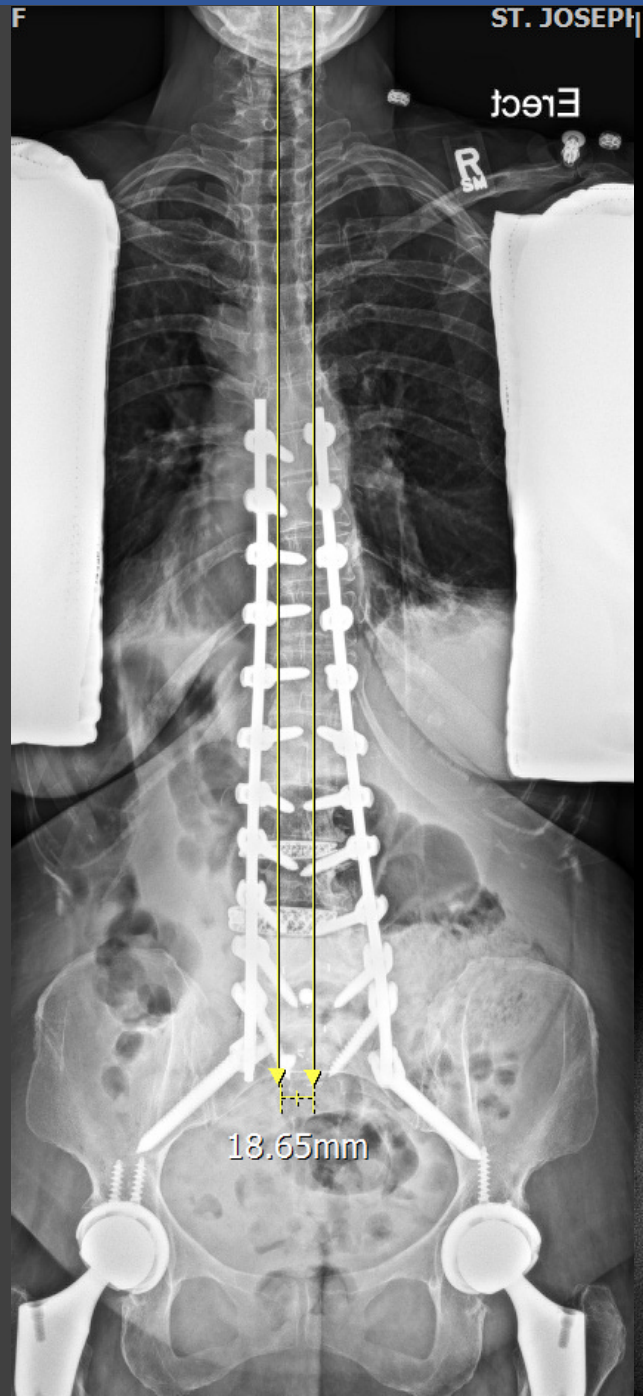
Case #1

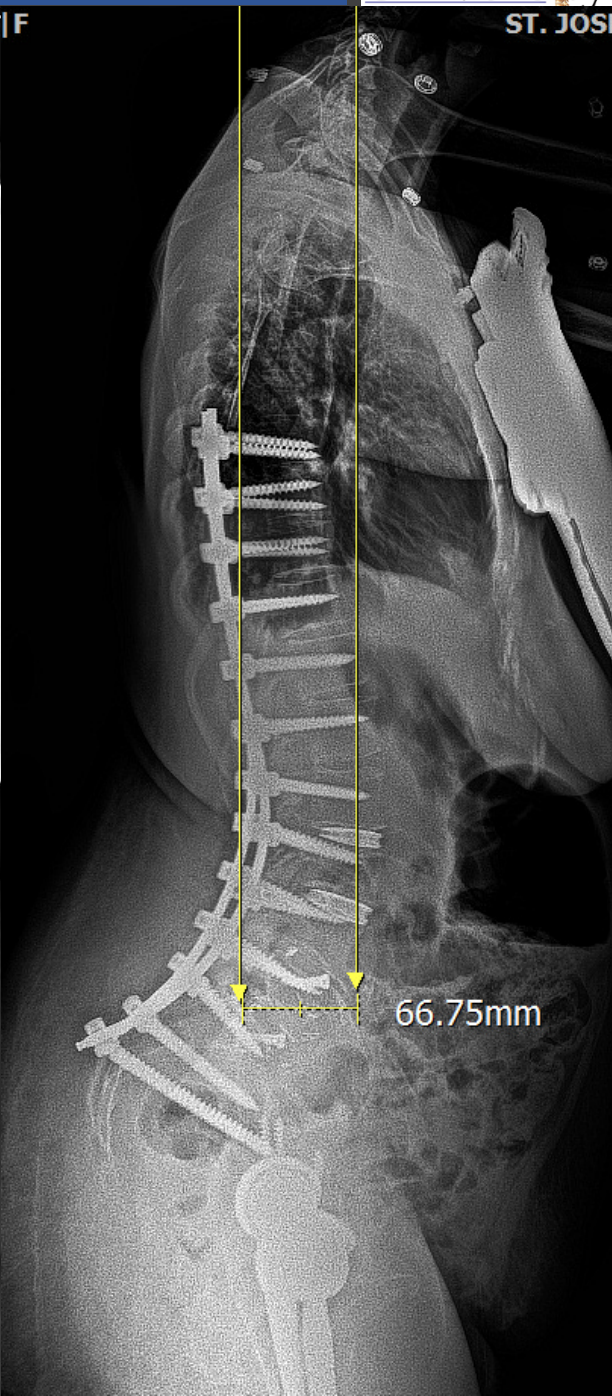
- S/p ALIF L4-L5, L5-S1, Lateral L2-L3, L3-L4 PSFI T8-S1



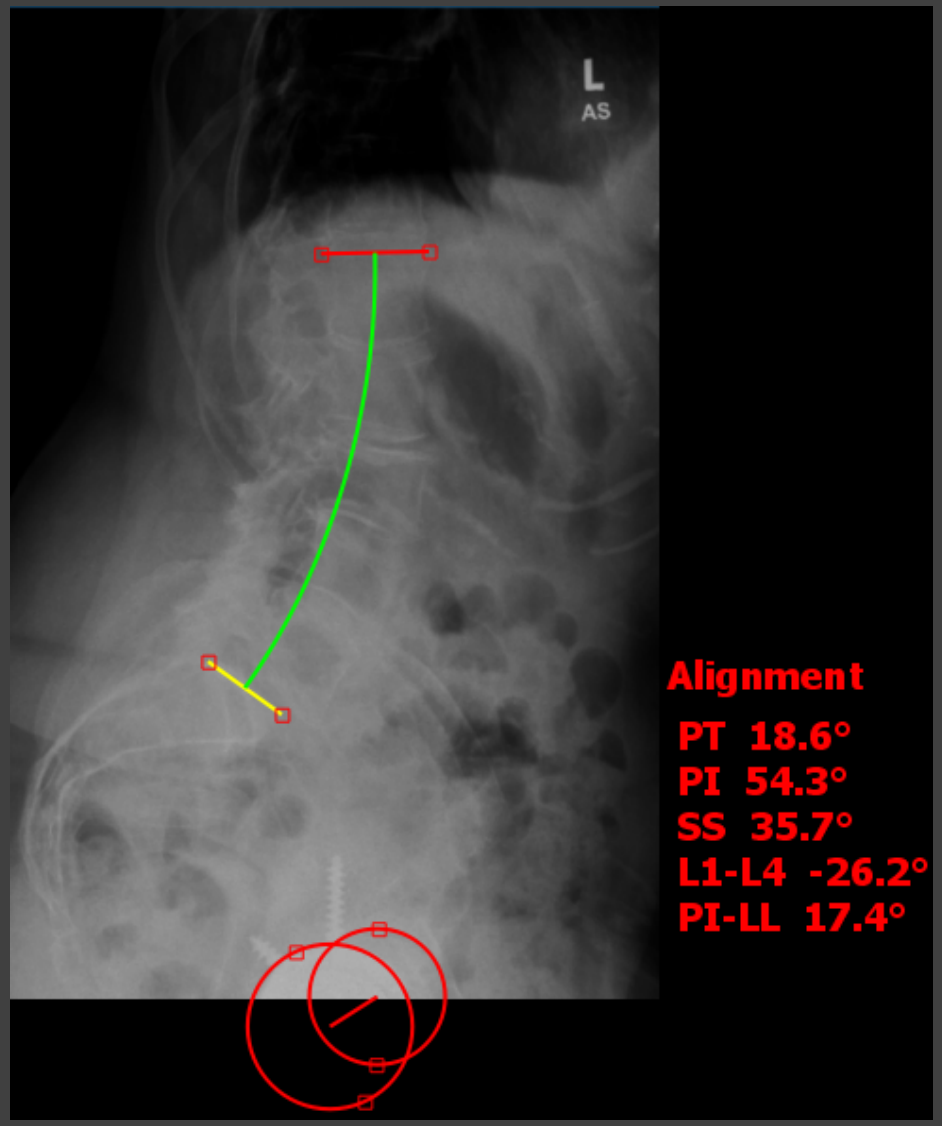

11.24mm
@42.77(317.23)

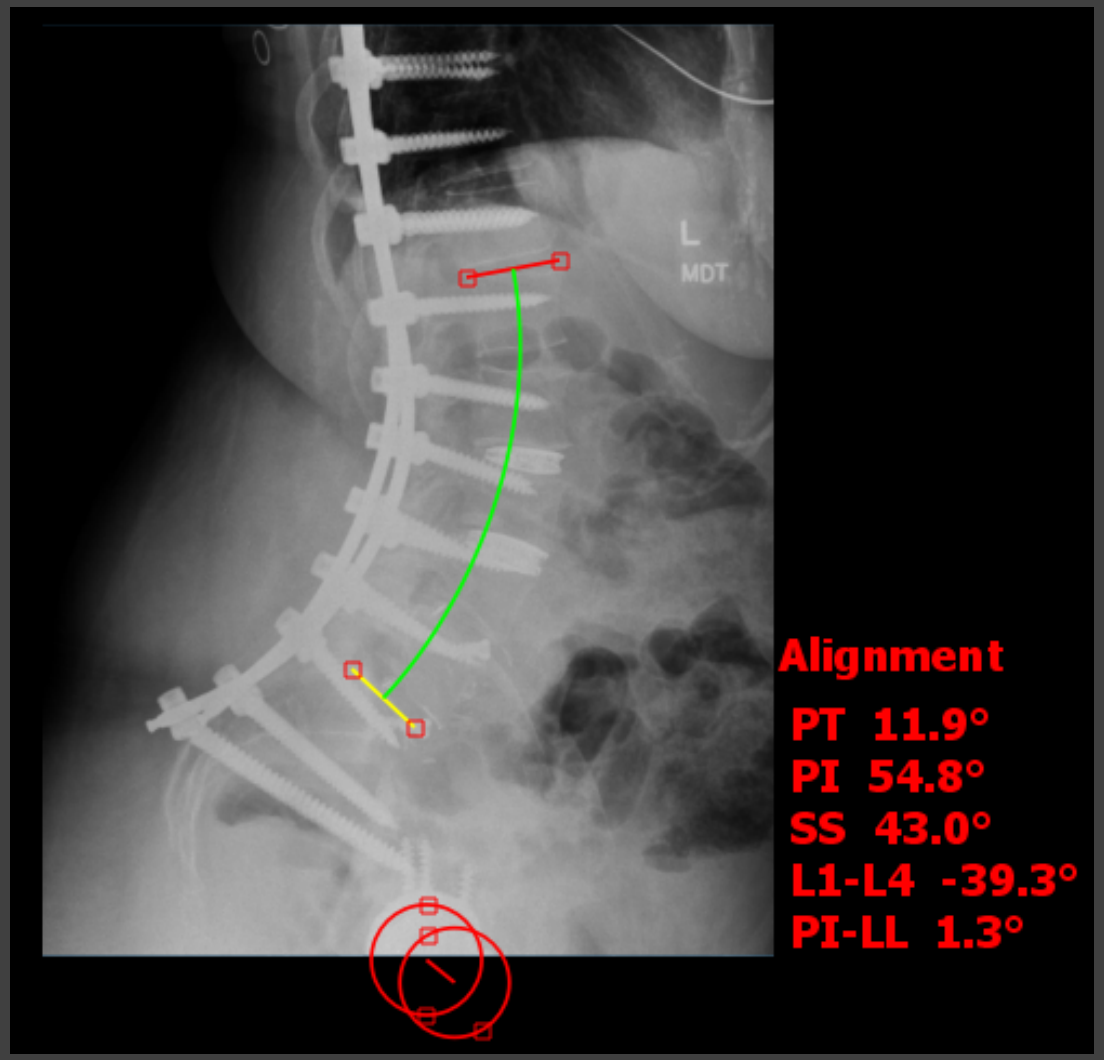

120.84mm


18.65mm


66.75mm

Case #1

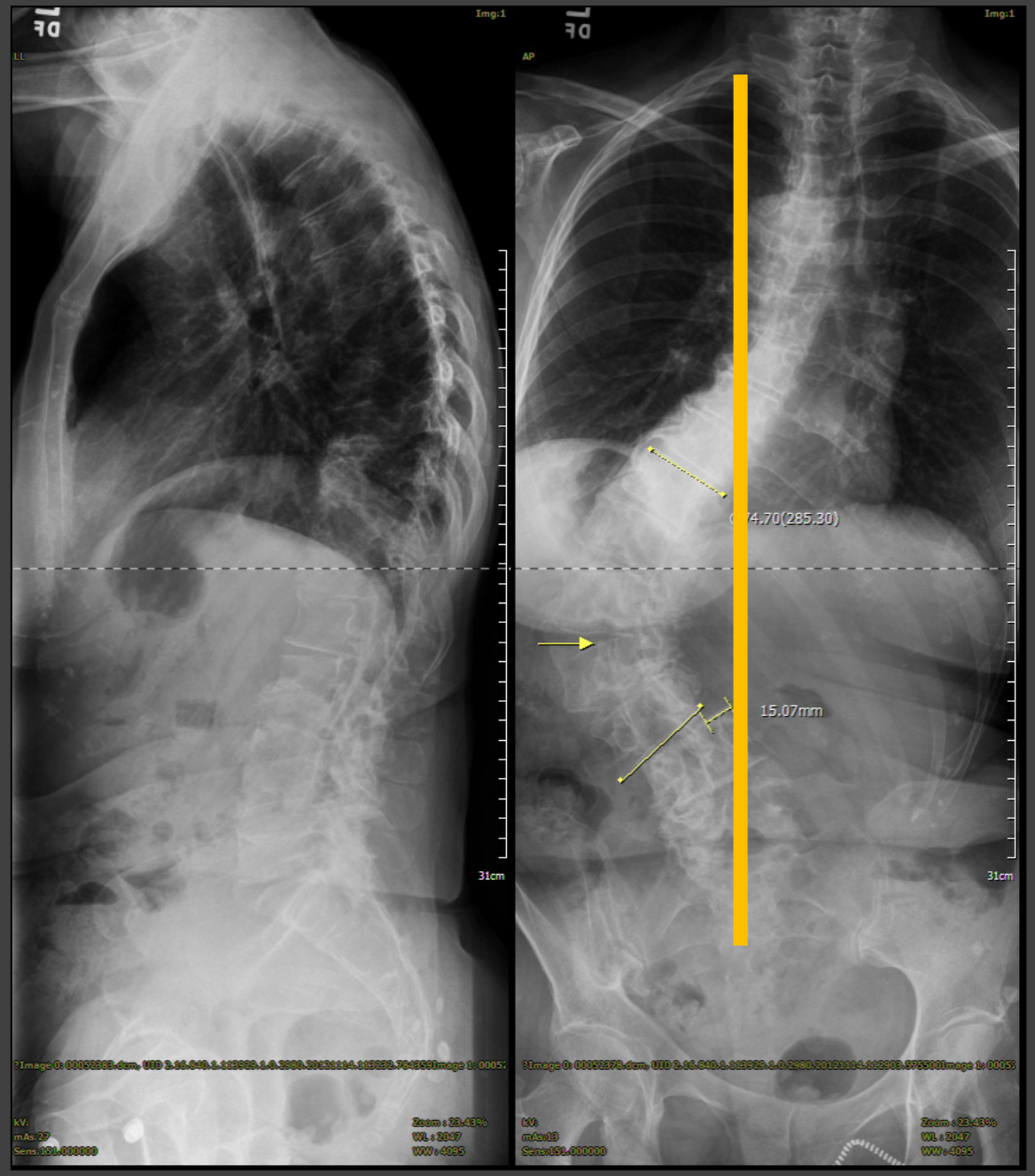

L
AS
Alignment
PT 18.6°
PI 54.3°
SS 35.7°
L1-L4 -26.2°
PI-LL 17.4°


L
MDT
Alignment
PT 11.9°
PI 54.8°
SS 43.0°
L1-L4 -39.3°
PI-LL 1.3°

Case #2

- 69 F
- Progressive deformity
- Intractable back pain

- CBD, type B



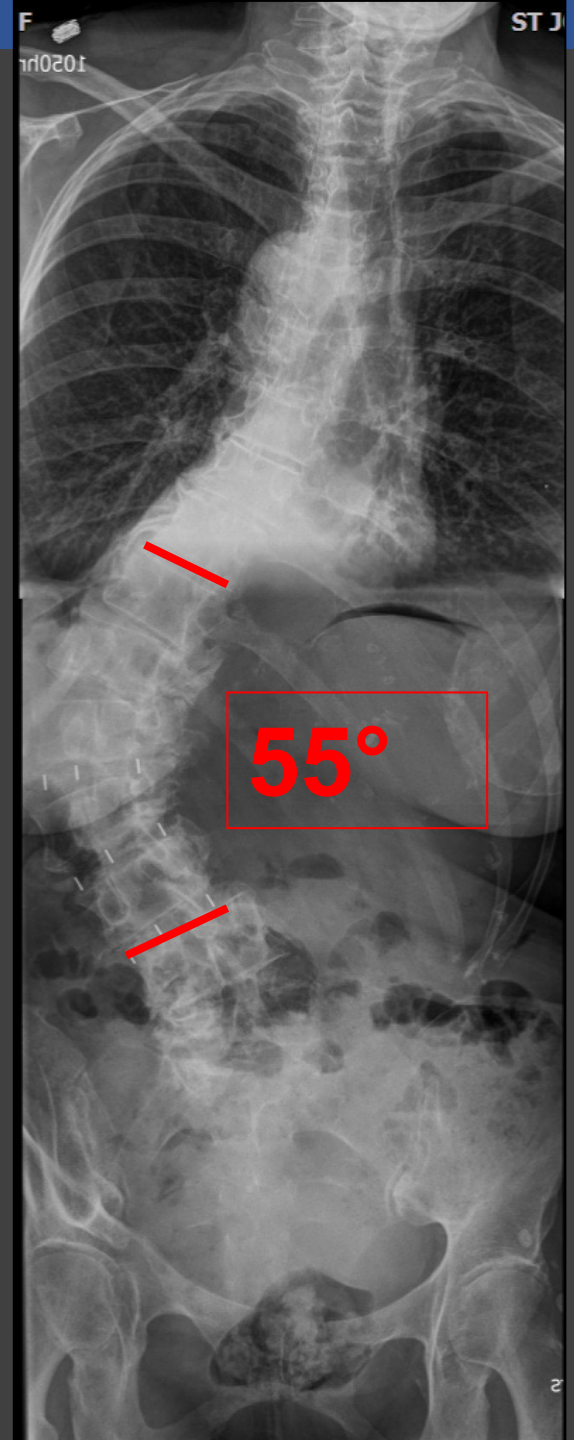
Case #2

- Bending views
- Rigid, fixed deformity

Case #2

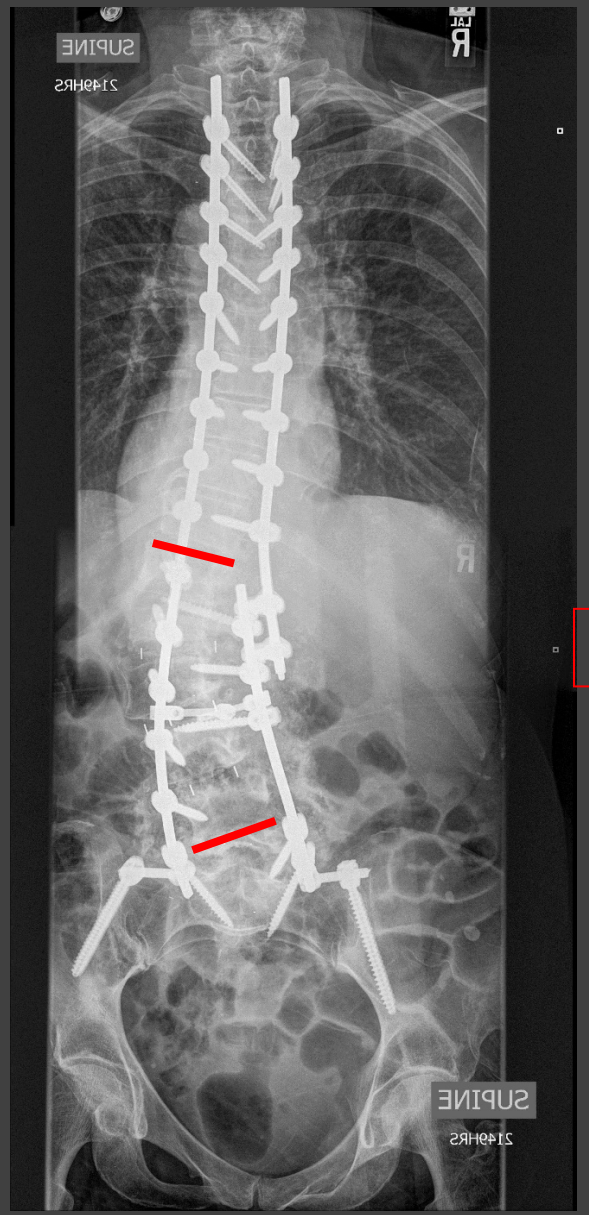
- 3 level lateral interbody fusion
- Anterior release

- Thoracotomy without chest tube
- Avoiding anterior complications
- Easily access several levels with less than 1” incision even for severe deformity



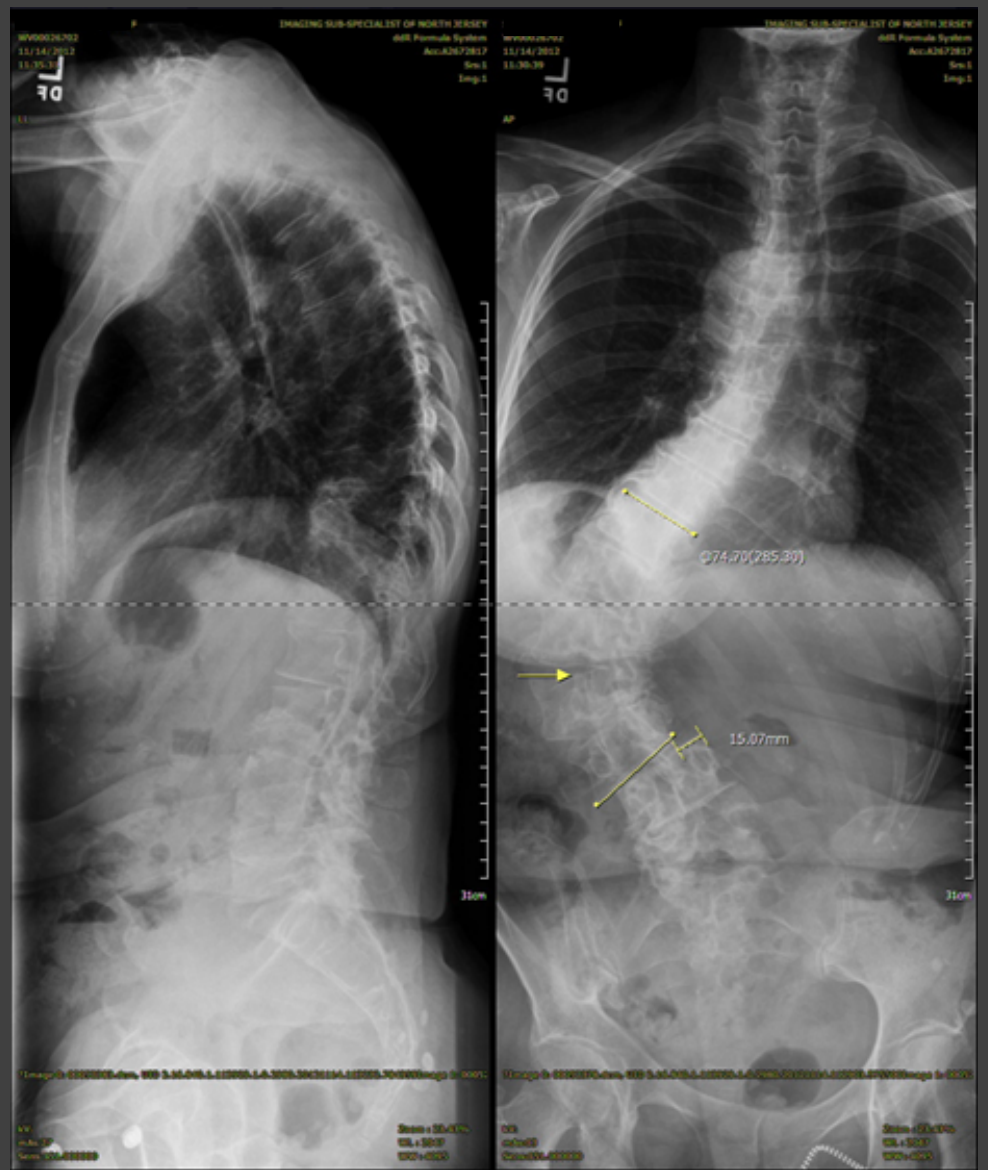
Case #2

- Patient was walking within 24 hours
- Patient was discharged POD # 7



30°

Case #2

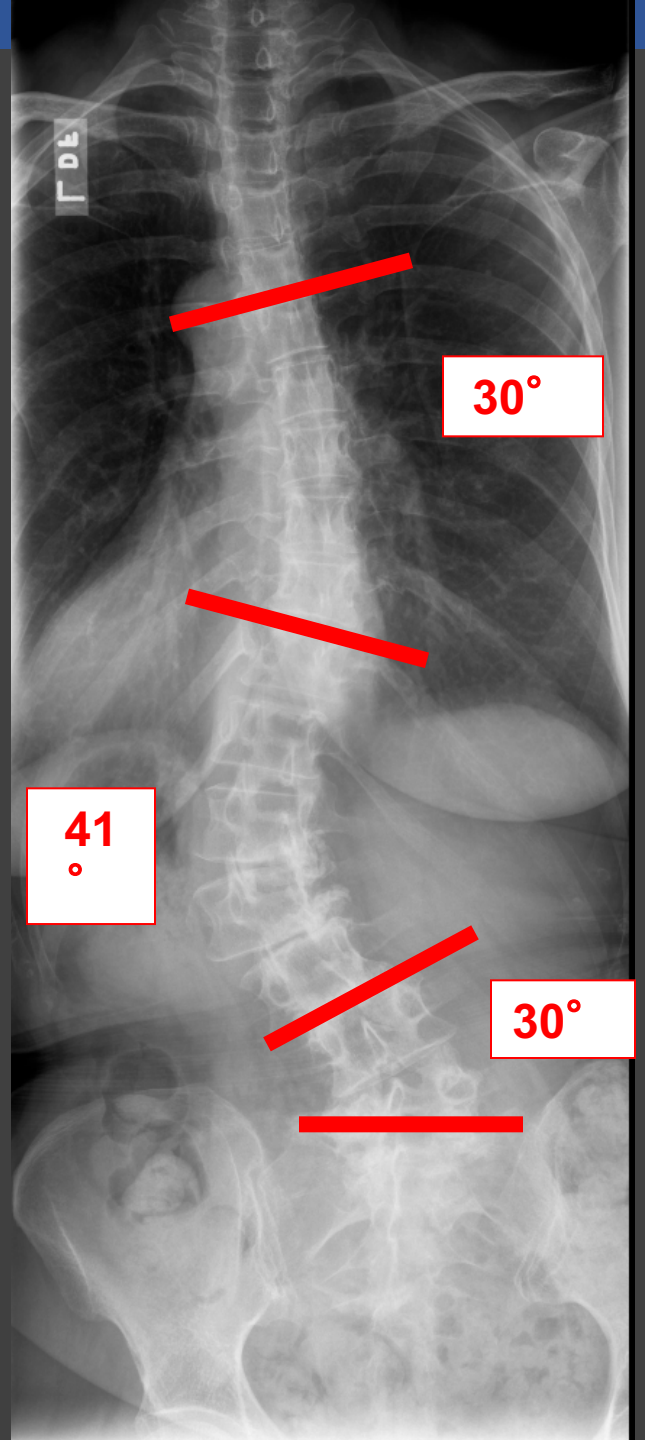


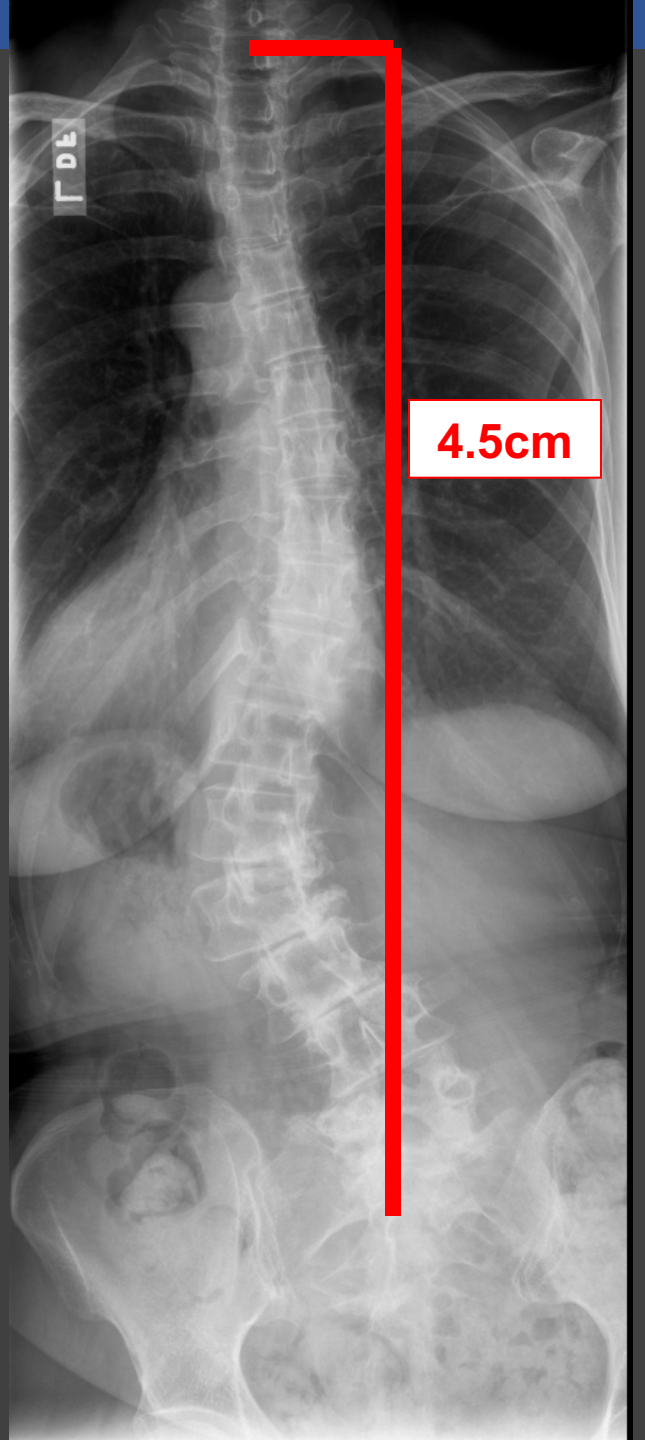
Case #3

- 54 F
- Chronic back pain
- Progressive deformity
- Increasing BLE weakness

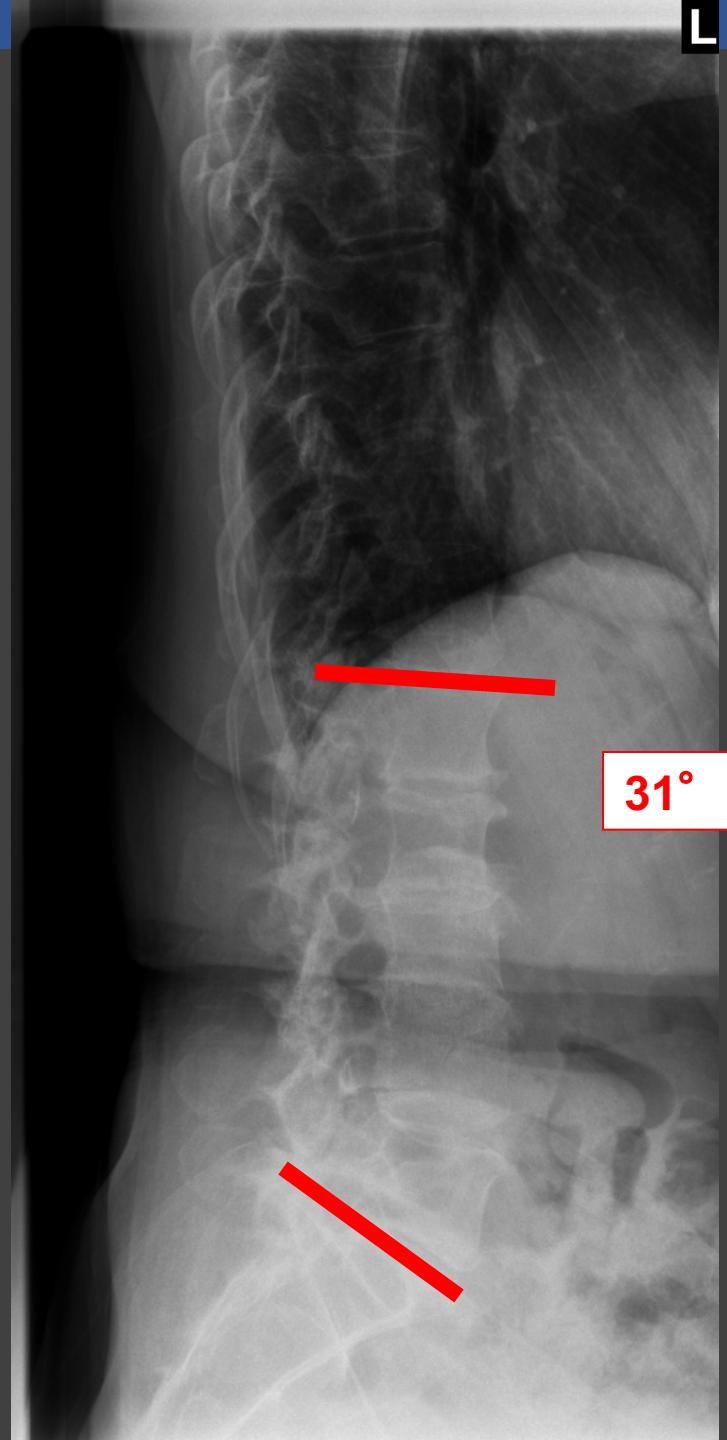
Case #3

CBD, Type C

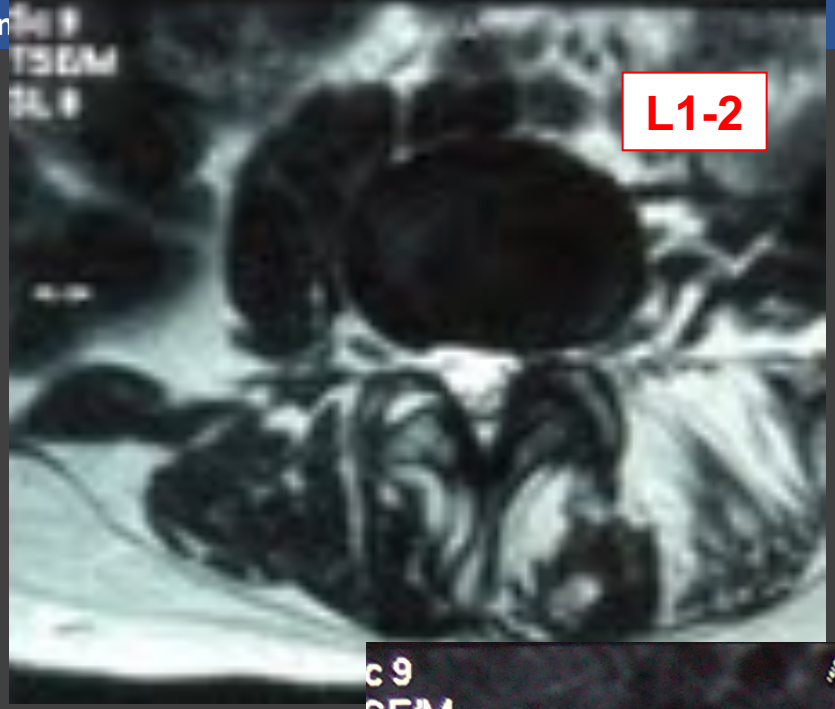


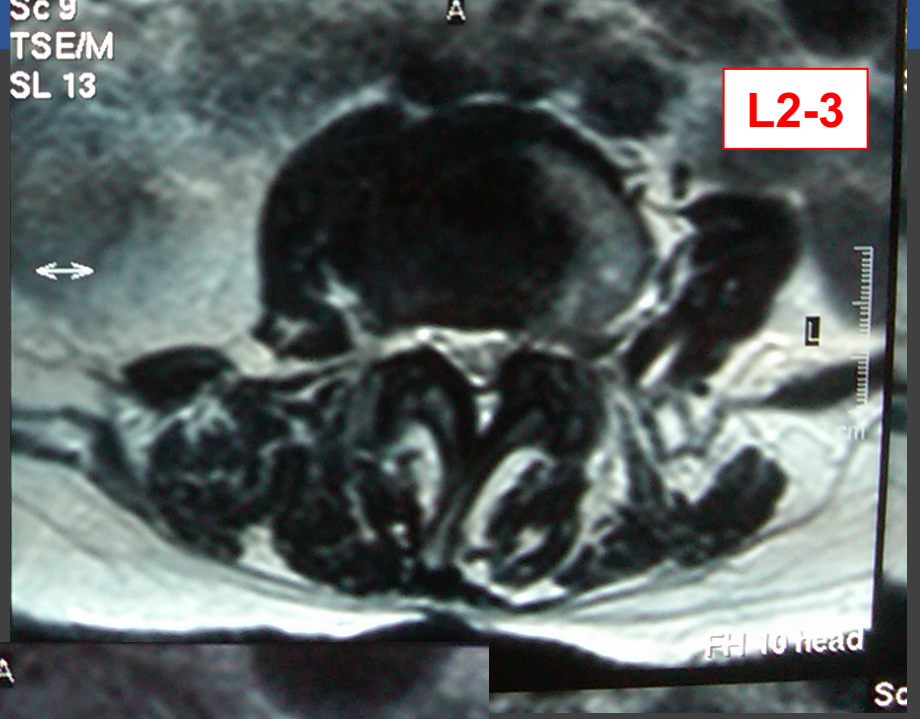


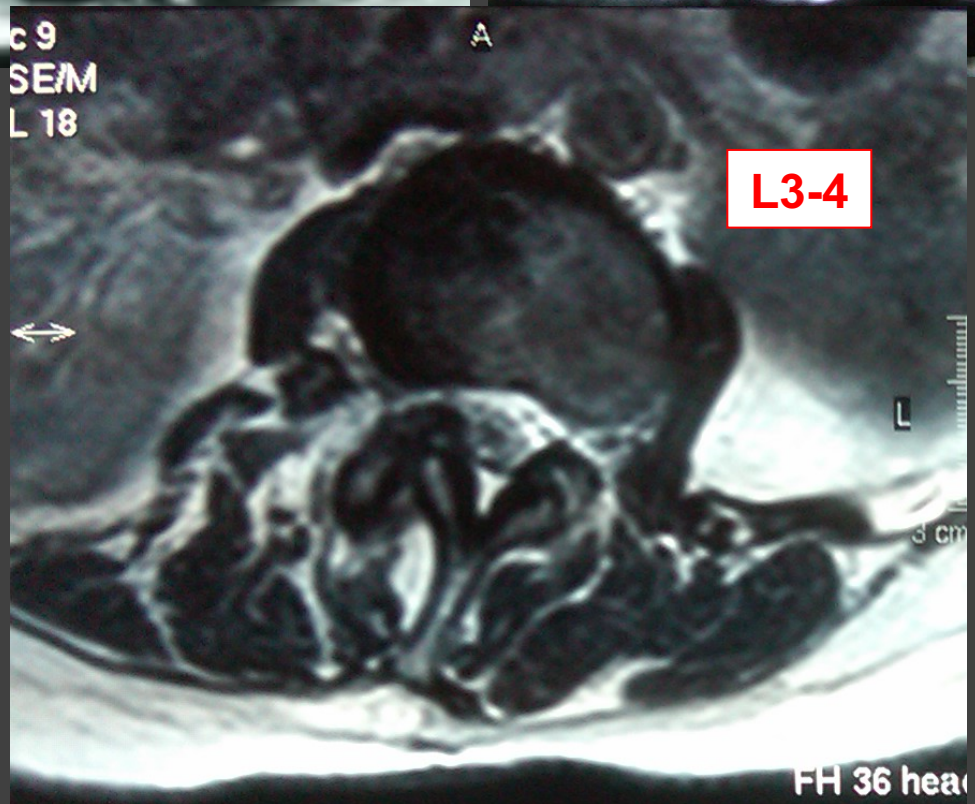
Case #3



Case #3







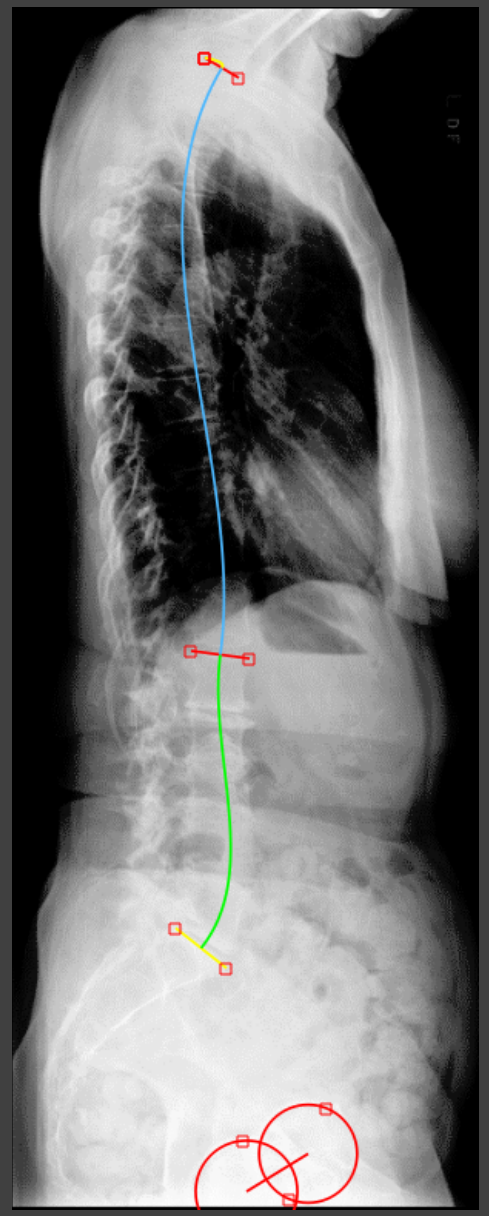
Pre-Op planning

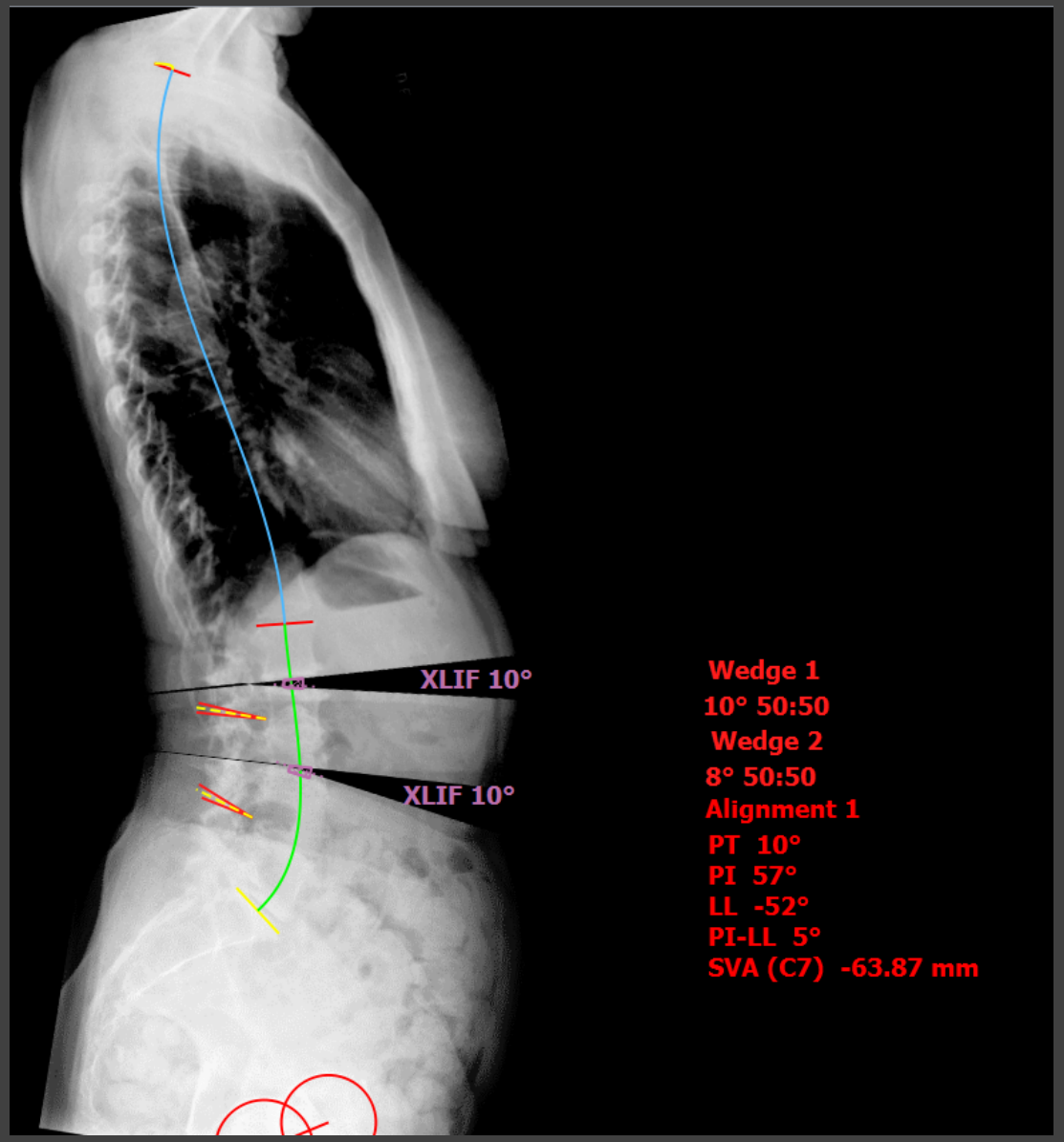
Pre-op Pelvic Parameters:

PI = 57°

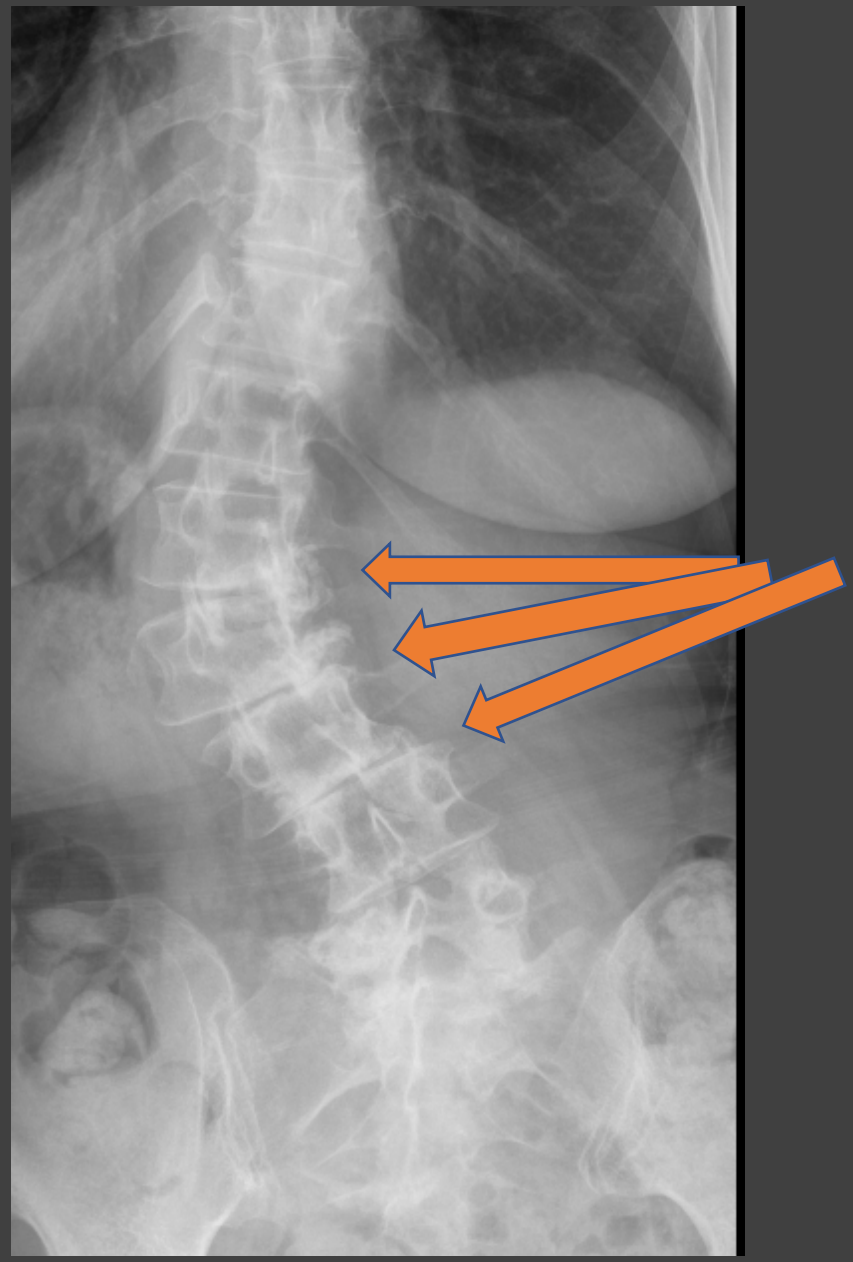
LL = -31°

PI-LL = 26°

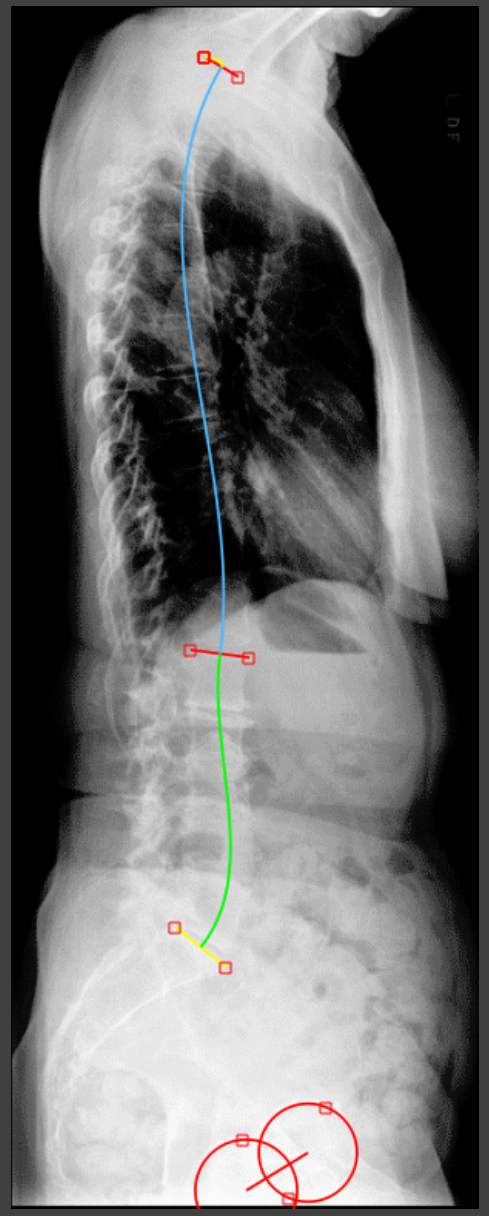




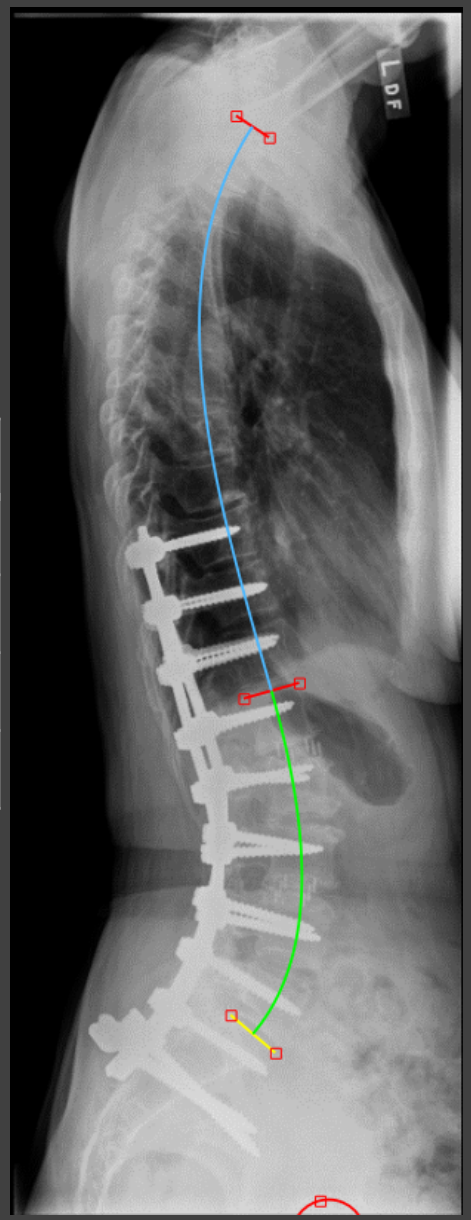
Planning:
1. 3-level release
2. No cage at the apex
3. Concavity



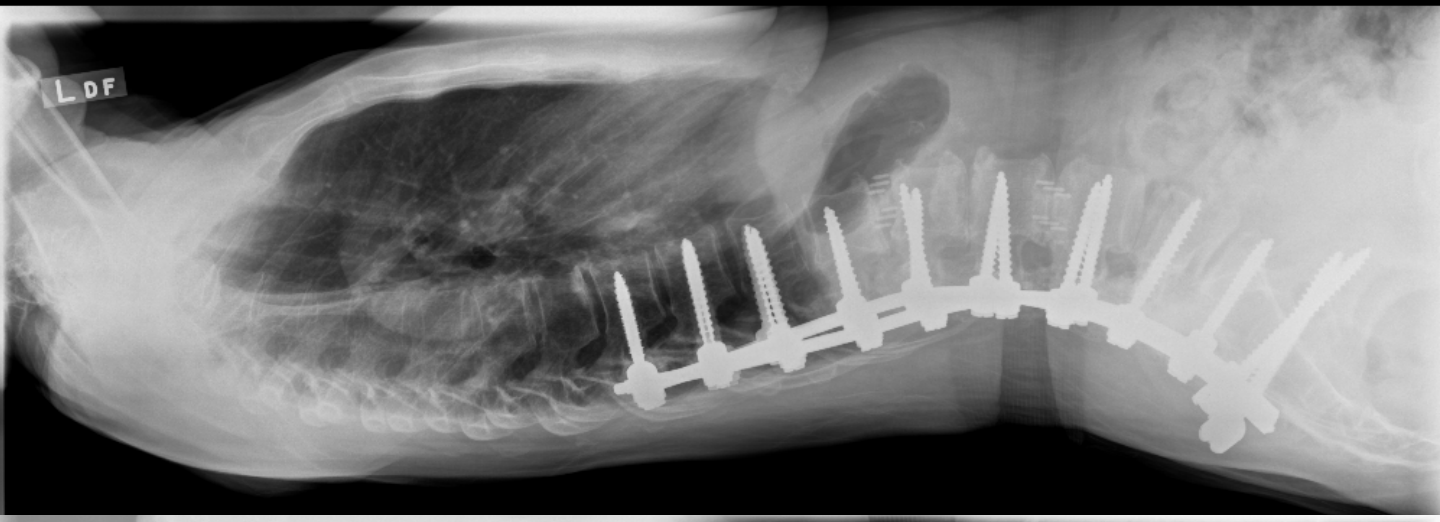
Restoration of Lordosis

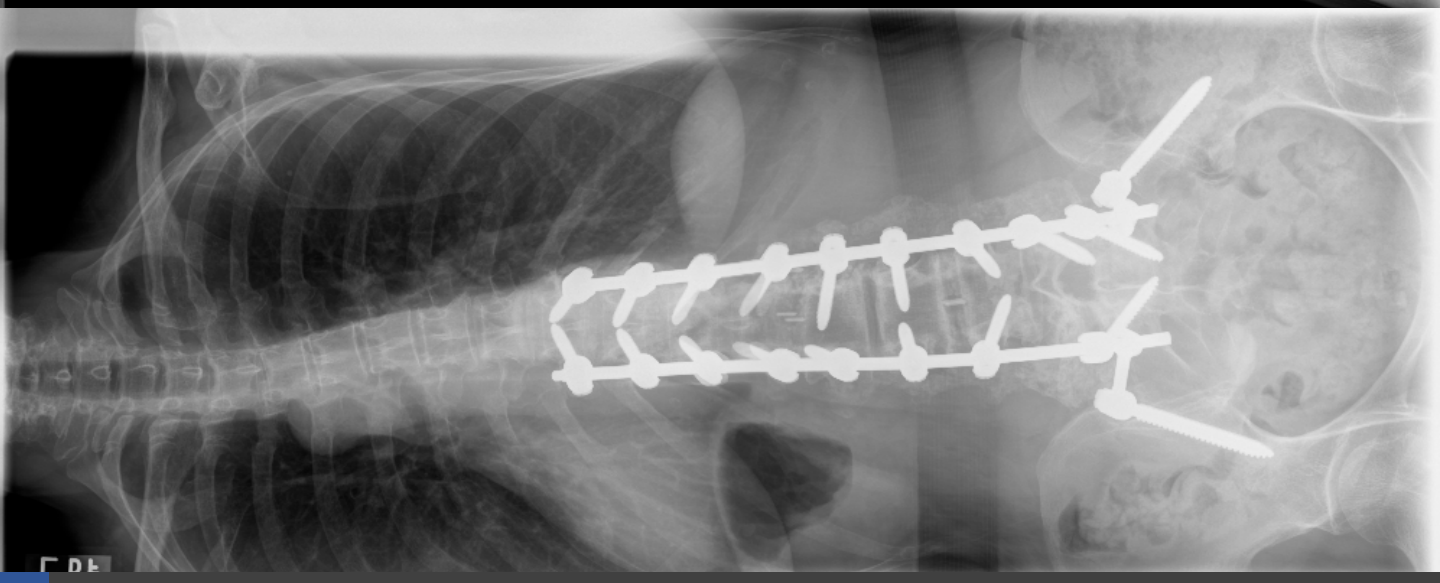


Parameter	Pre	Post
PI	57°	57°
LL	-31°	-56°
PI-LL	26°	1°
PT	19°	17°



- s/p lateral L2-L5 Bilateral wide facet osteotomies L2-L3, L3-L4, L4-L5, L5-S1 PSFI L2-Pelvis


L DF

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