

Growing Rods: Rib Fixation

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-Disclosures-

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Disclosure: I DO have a financial relationship with a commercial interest.

Royalties: Biomet

Consultant: Stryker, Biomet

Research Support: CWSDRF, SRS, POSNA; OREF

Travel Support: CWSDSG, FoxPSDSG

Other: CSSG - BOD

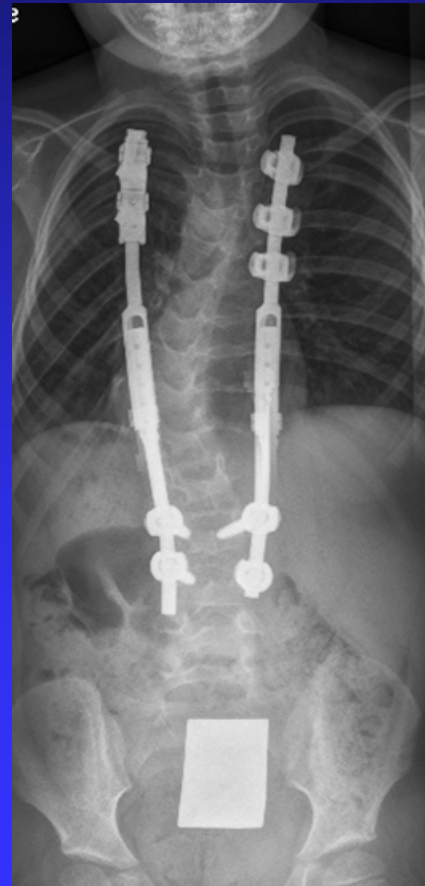
POSNA – BOD

IPOS- Chairman

Some Relevant

I prefer proximal rib fixation especially in younger children (<5yo)

- **Safer**
- **Lower Profile**
- **Less Fusion**
- **More Growth**

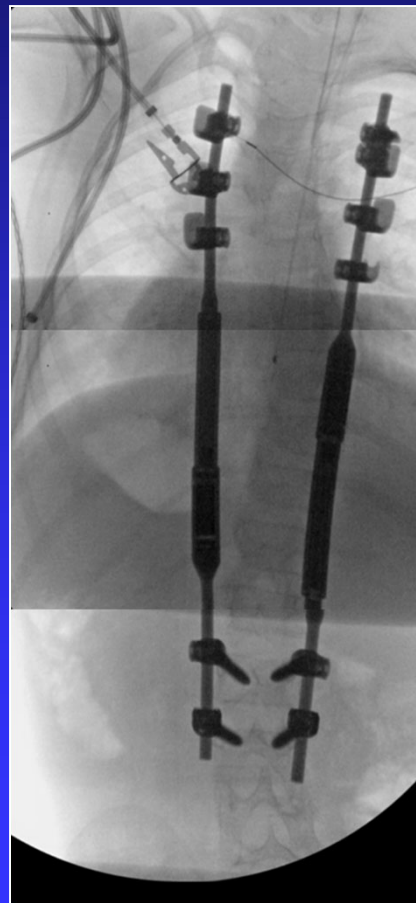


Rib Fixation Options: VEPTR, Traditional Growth Rods, +/- MAGEC

TGR



TGR+MAGEC



VEPTR

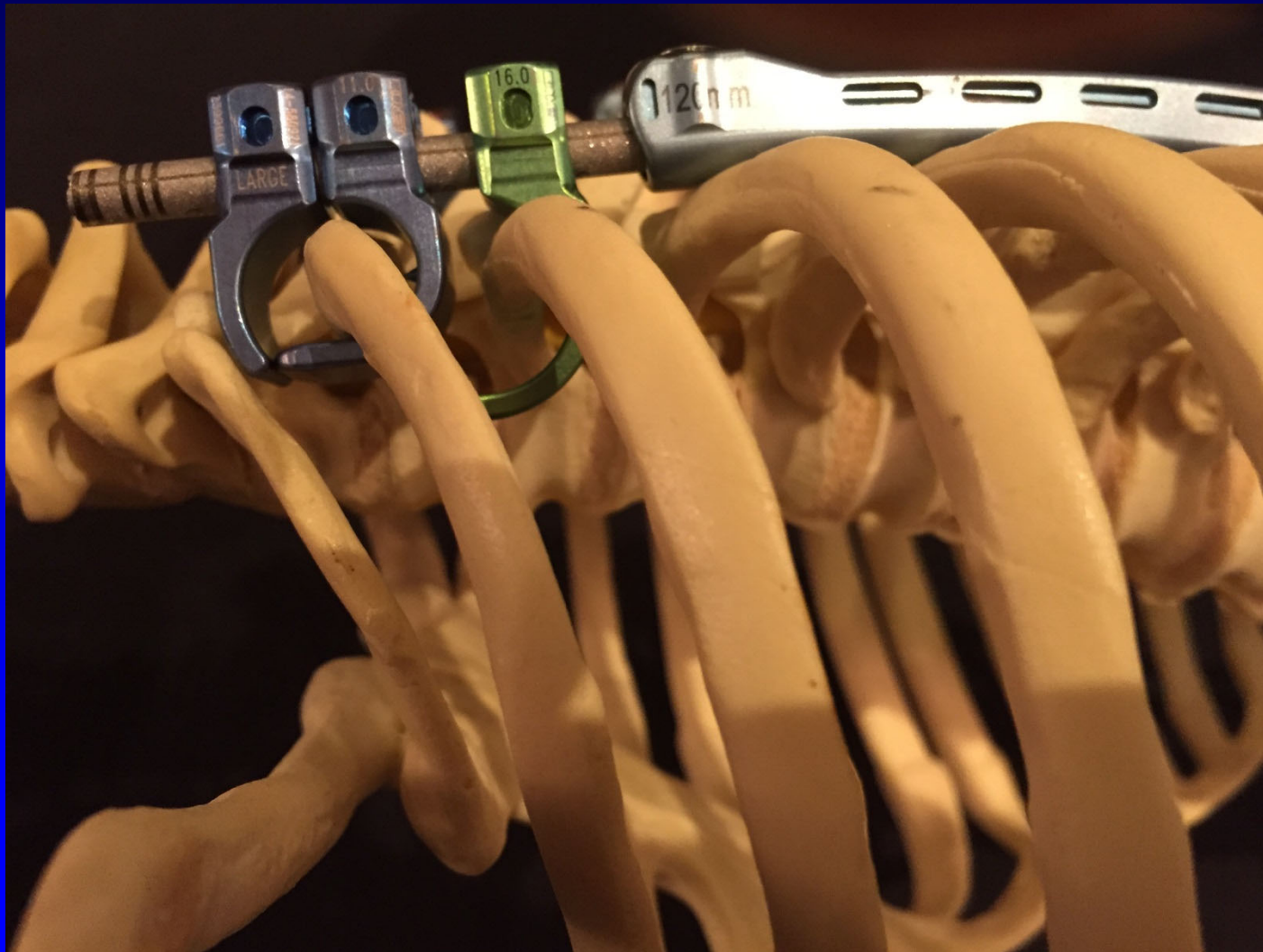
Proximal Implant Number Matters

The more proximal anchors, the greater Cobb correction and less device migration

	≥ 5 Prox Anchors	<5 Prox Anchors
Patients (18)	4	14
Device Migration Events	0	4
	0%	29%

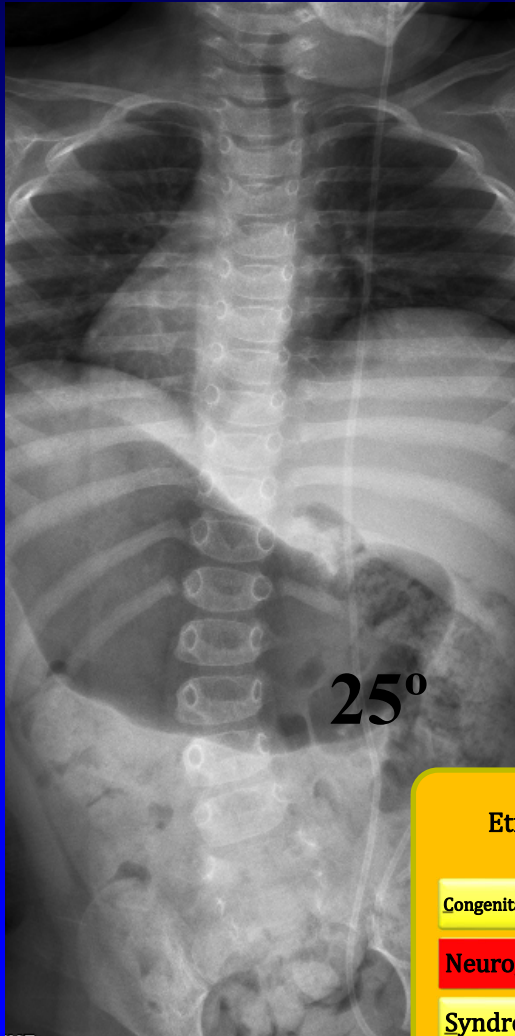
Vitale, Skaggs et al ICEOS 2015

Optimal Rib Fixation Construct Utilizes 5-6 equally loaded hooks



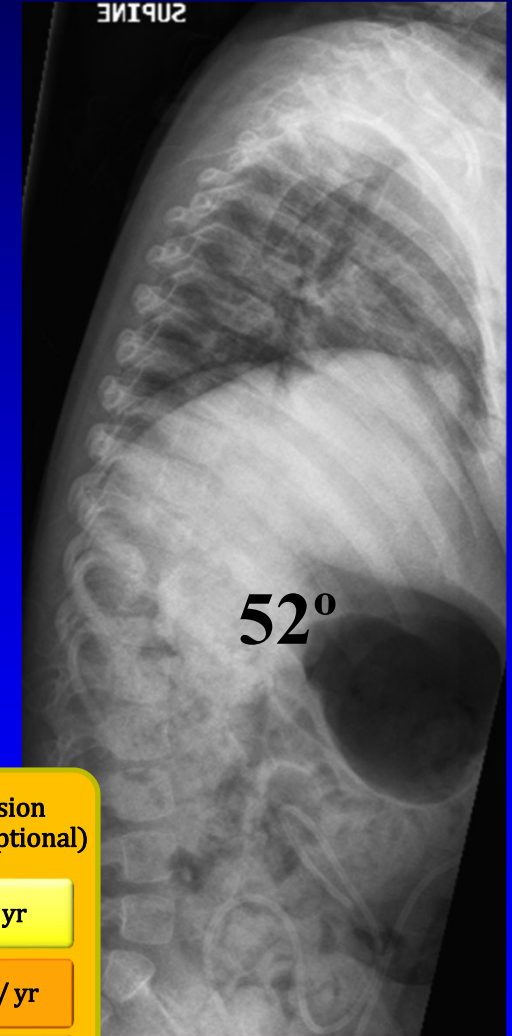
Patient TW: 11/30/13

Initial Spine Evaluation



- 3yo Female with myelomenigocele
- Ambulates with HKAFO's

CEOS: N 2 +



Etiology

Congenital/Structural

Neuromuscular

Syndromic

Idiopathic

Cobb Angle (Major Curve)

1: <20°

2: 20-49°

3: 50-89°

4: ≥90°

Maximum Total Kyphosis

(-) <20°

N: 21-49°

(+): ≥50°

Progression Modifier (optional)

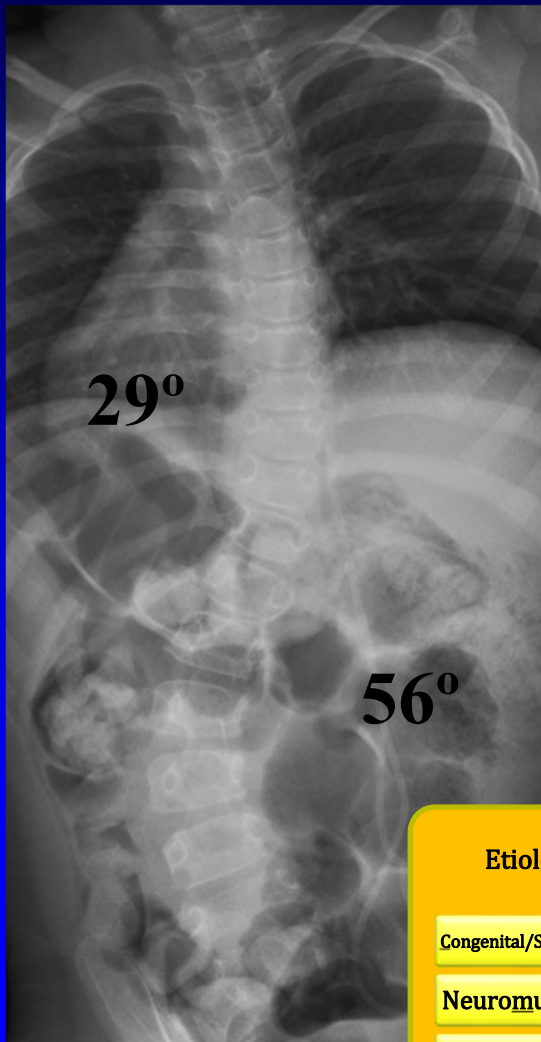
P0: <10°/yr

P1: 10-19°/yr

P2: ≥20°/yr

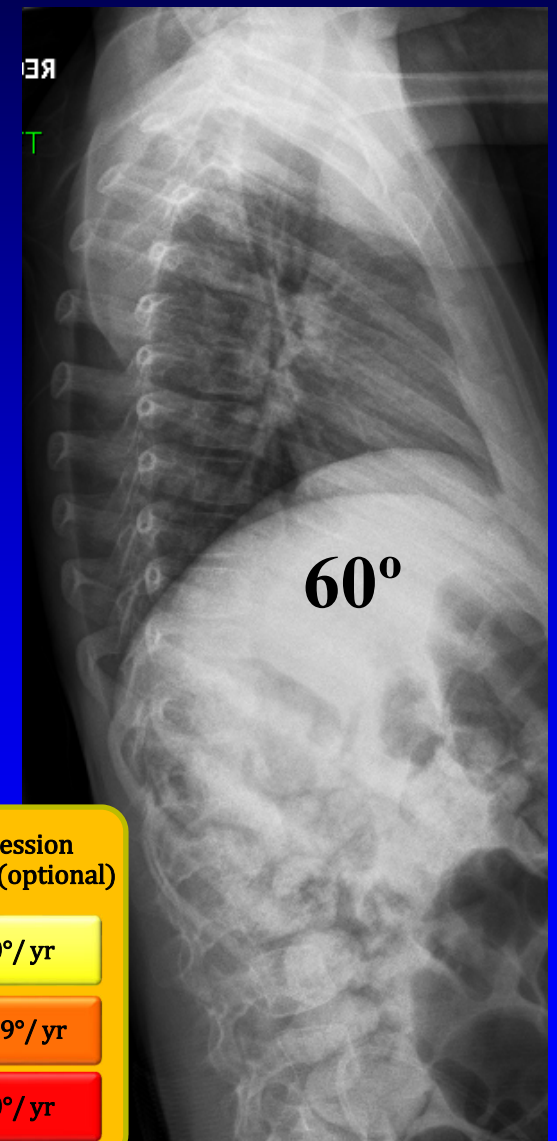
Patient TW: 5/23/14

Preoperative Visit



4 yo with MM

Significant curve
Progression
(31 degrees/6 mo)...P2



C-EOS: N3+P2

Etiology

Congenital/Structural

Neuromuscular

Syndromic

Idiopathic

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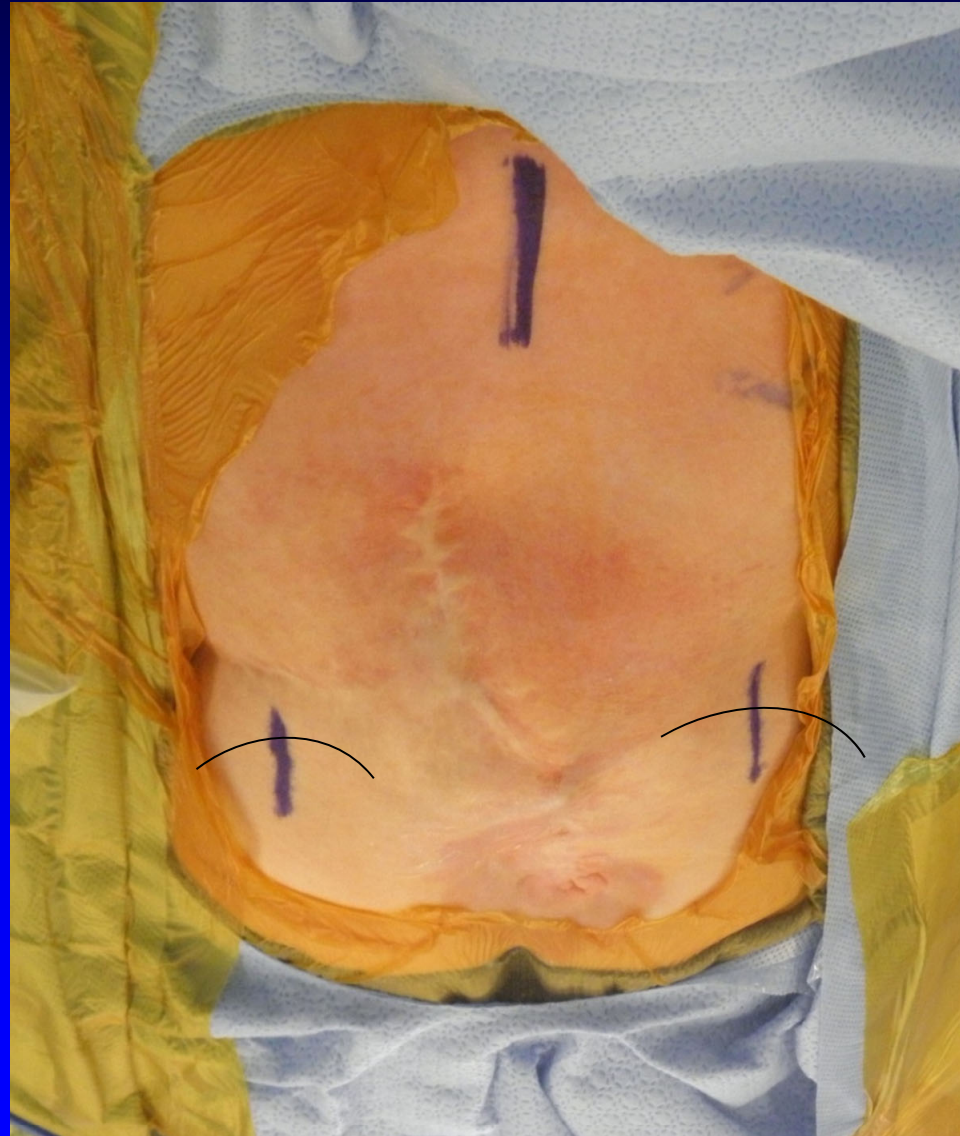
P2: ≥20°/yr

Patient Marking

Saddles directly over midline Crest; Hooks 2,3,4 B

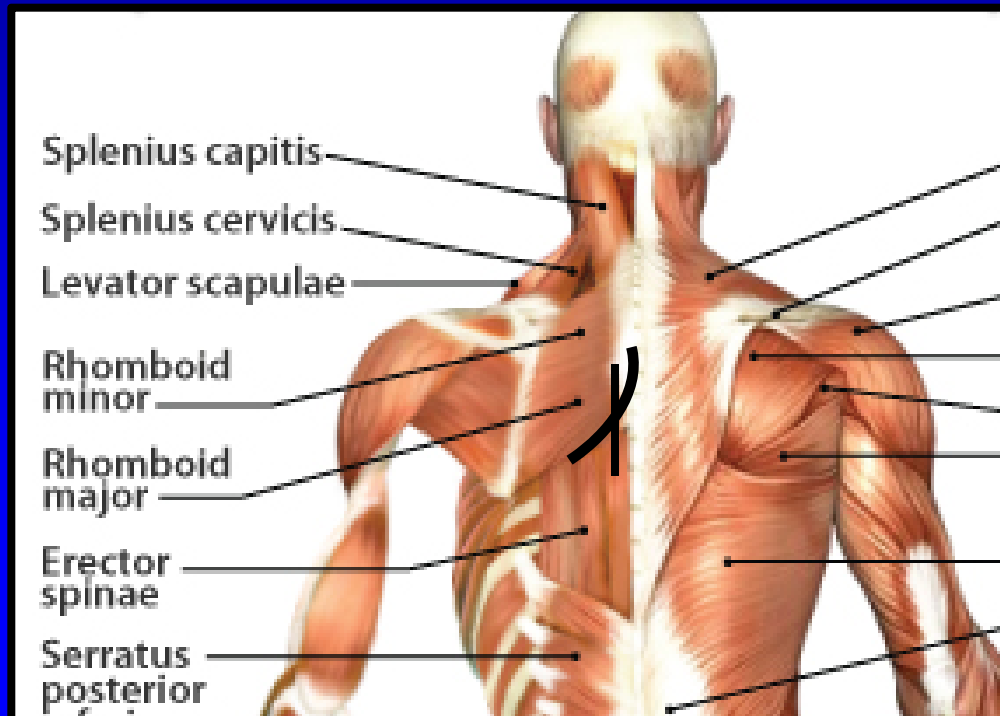


Bad Midline Skin

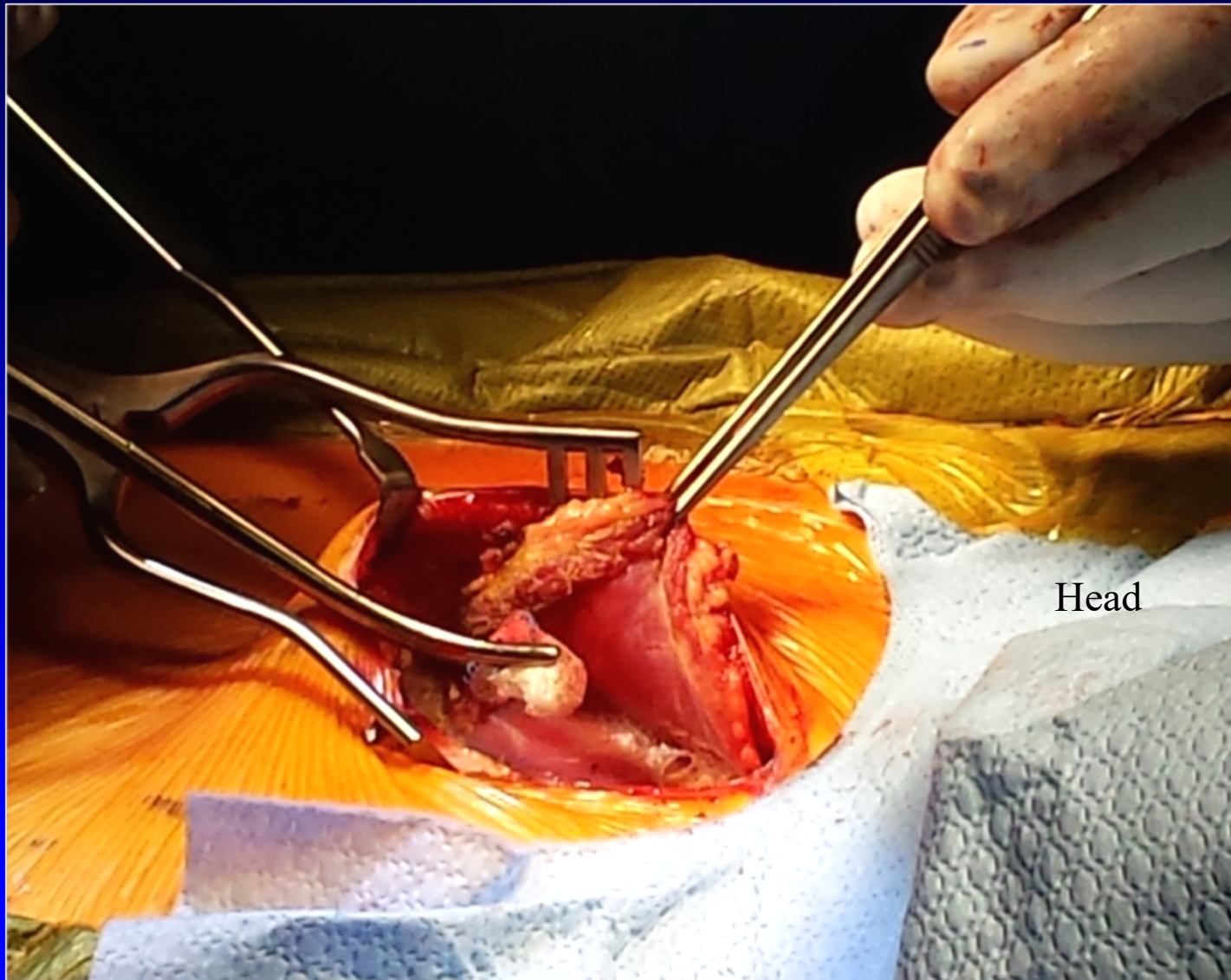


Proximal Approach

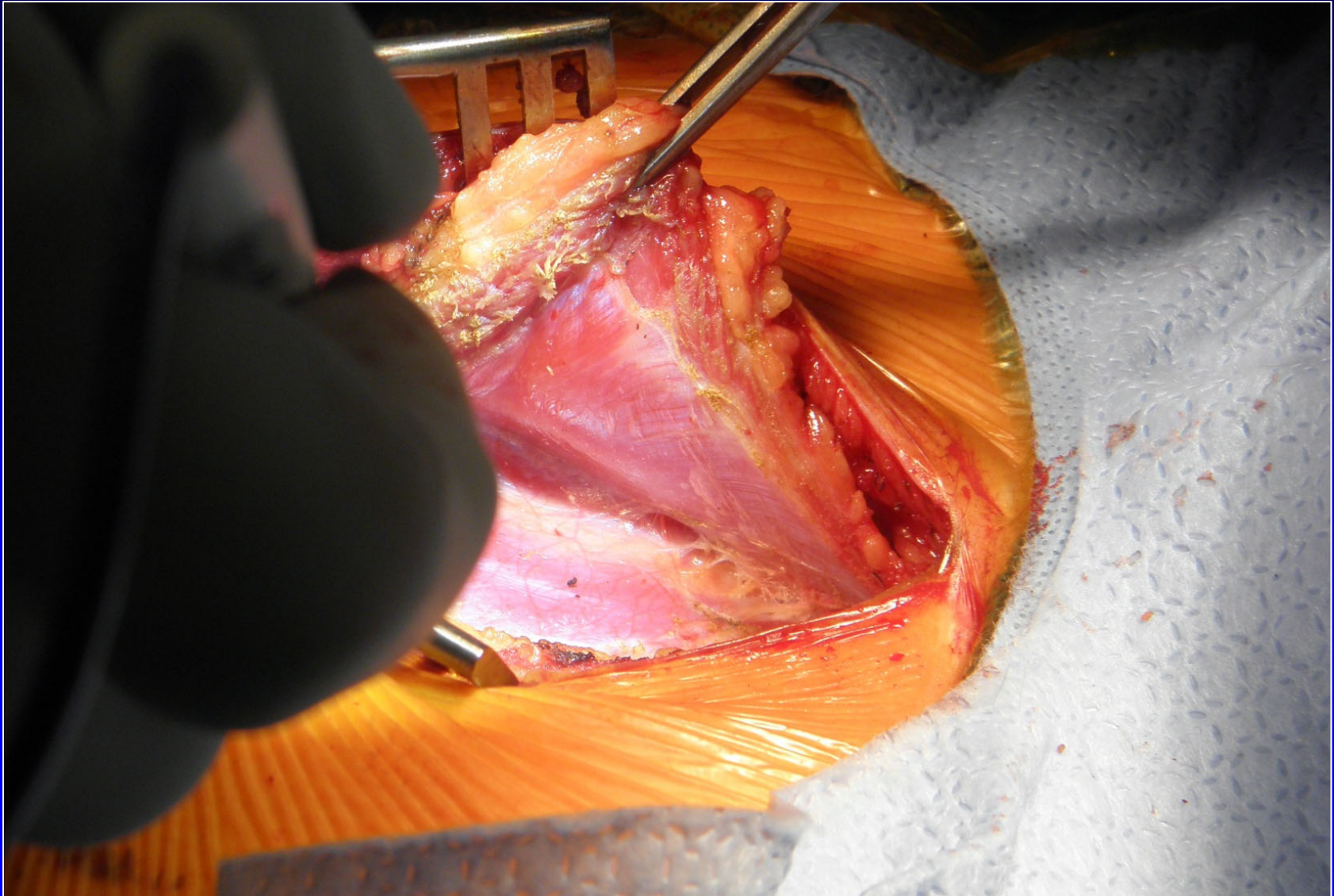
- Single Midline Skin Incision
- Split Rhomboids (J) then split paras



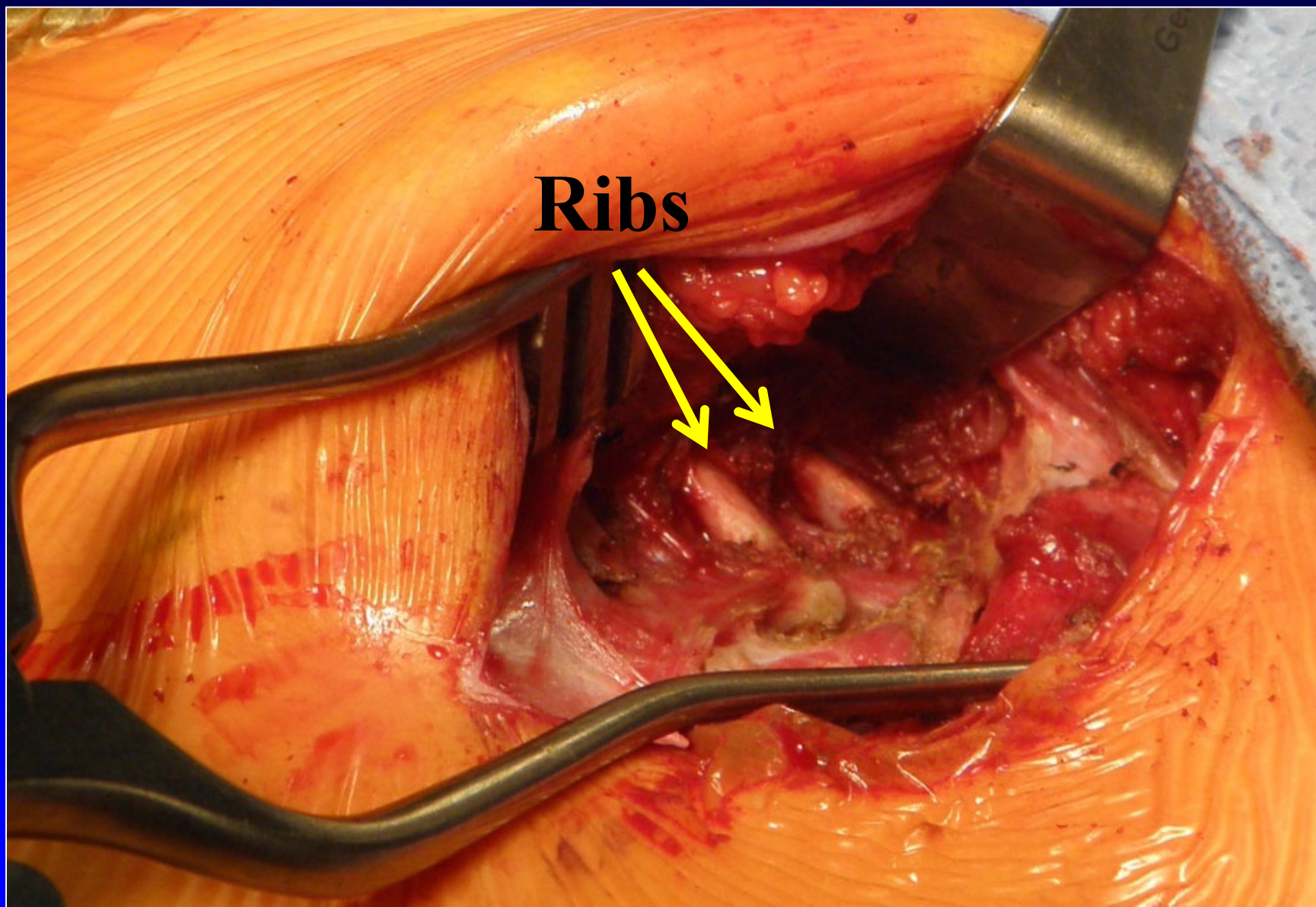
Rhomboid J Flap



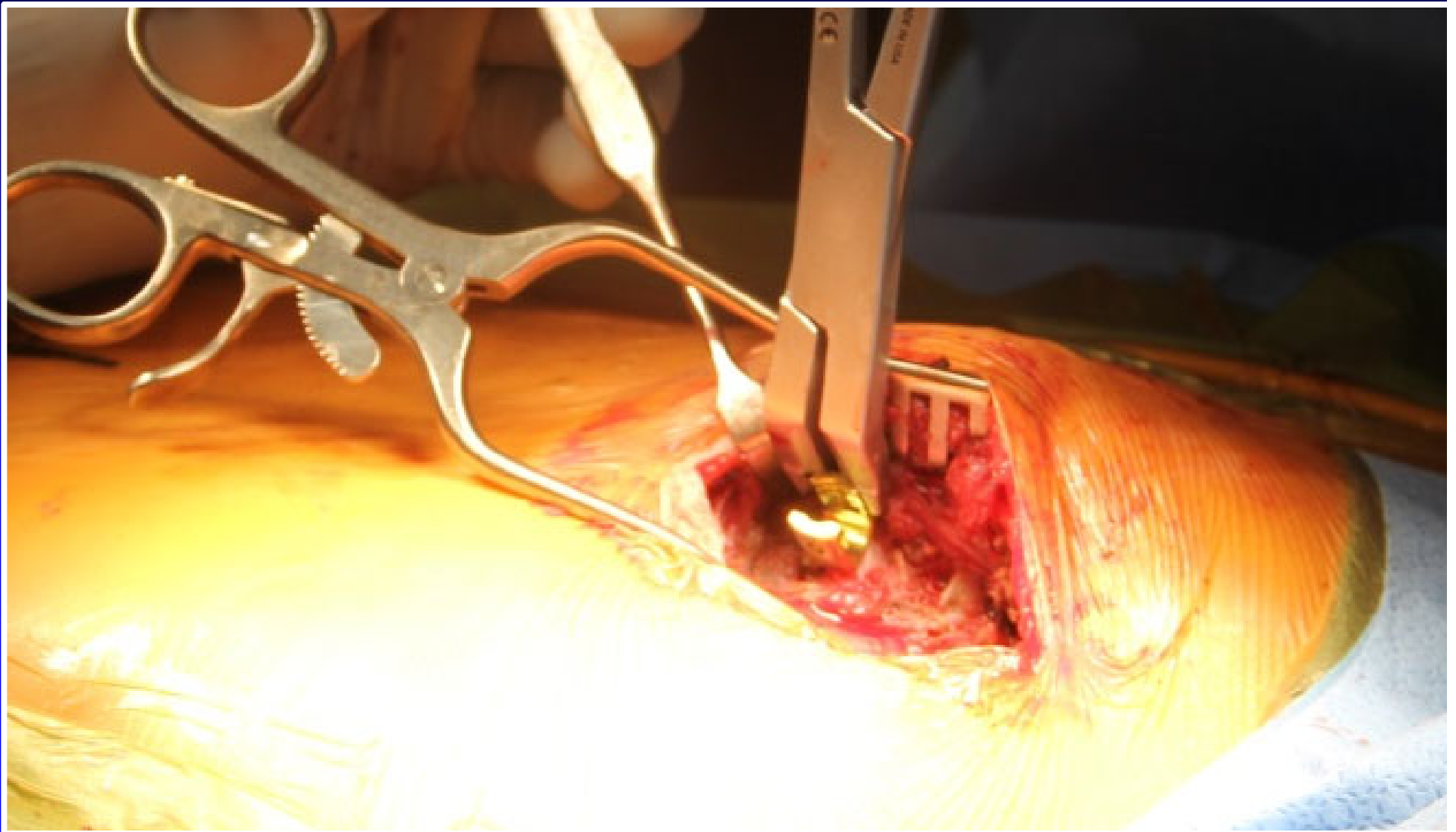
Rhomboid J Flap



Rib Exposure



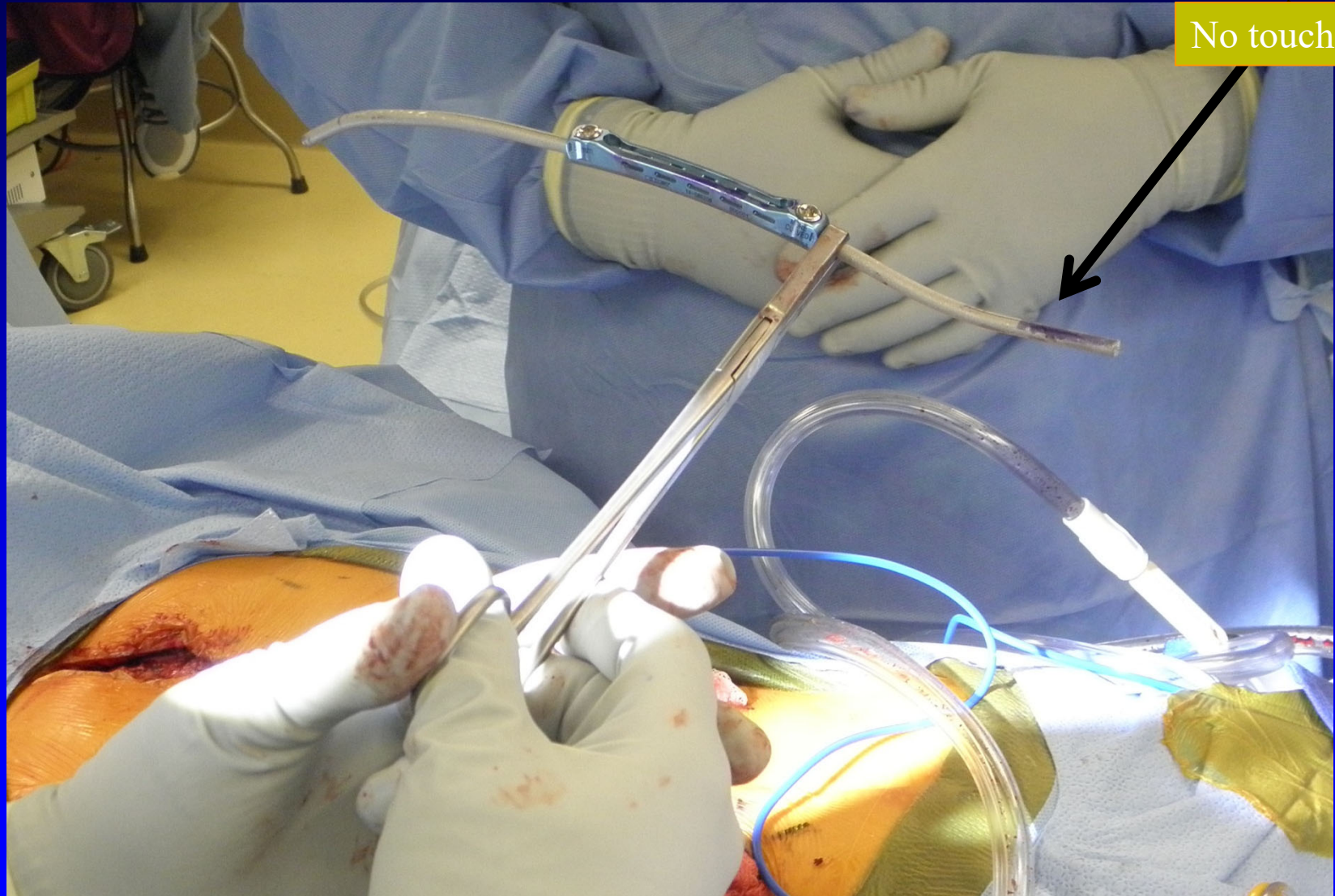
Rib Hook Insertion



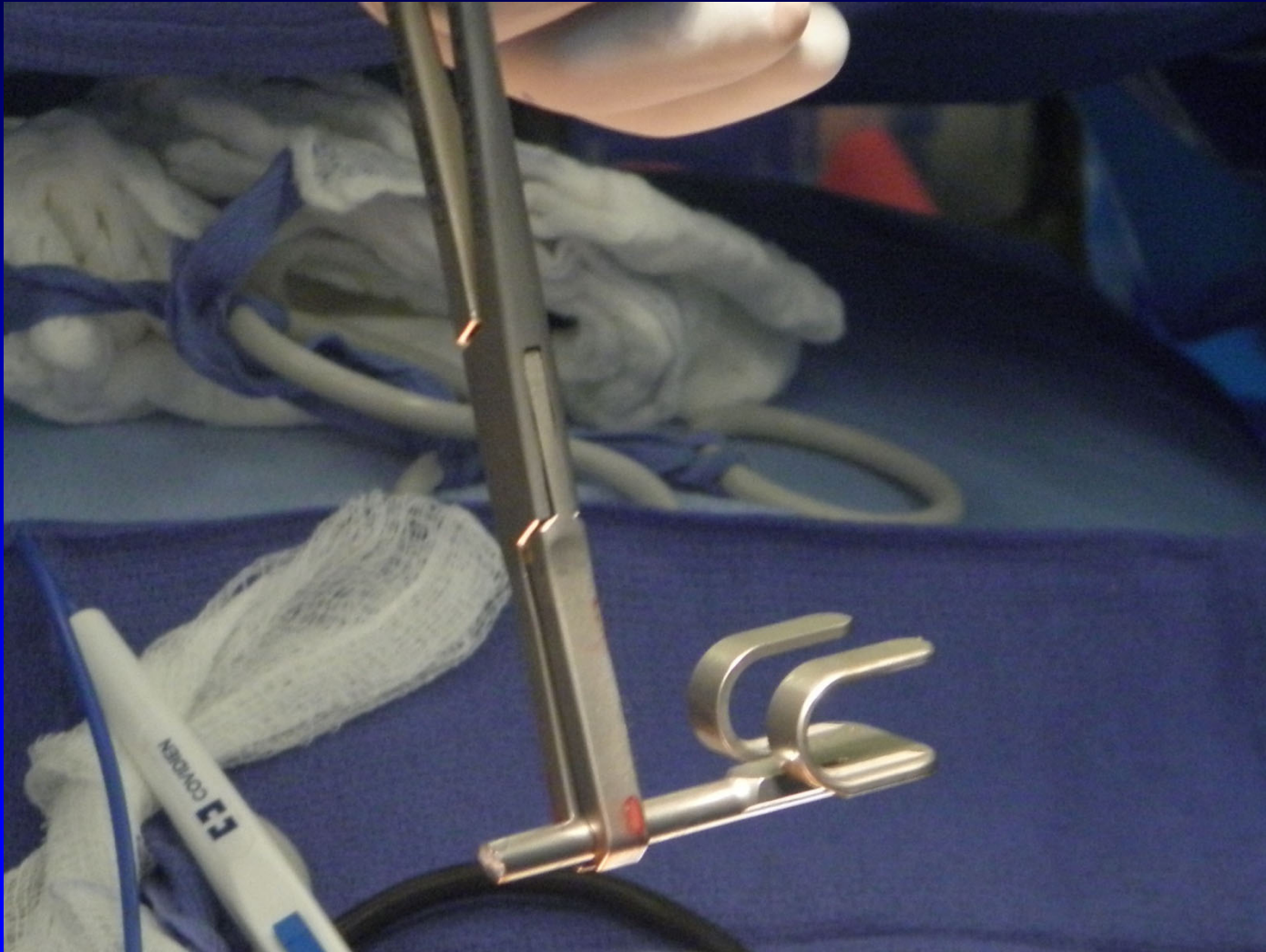
Rib Hooks Inserted



Bend Appropriate Sagittal Plane

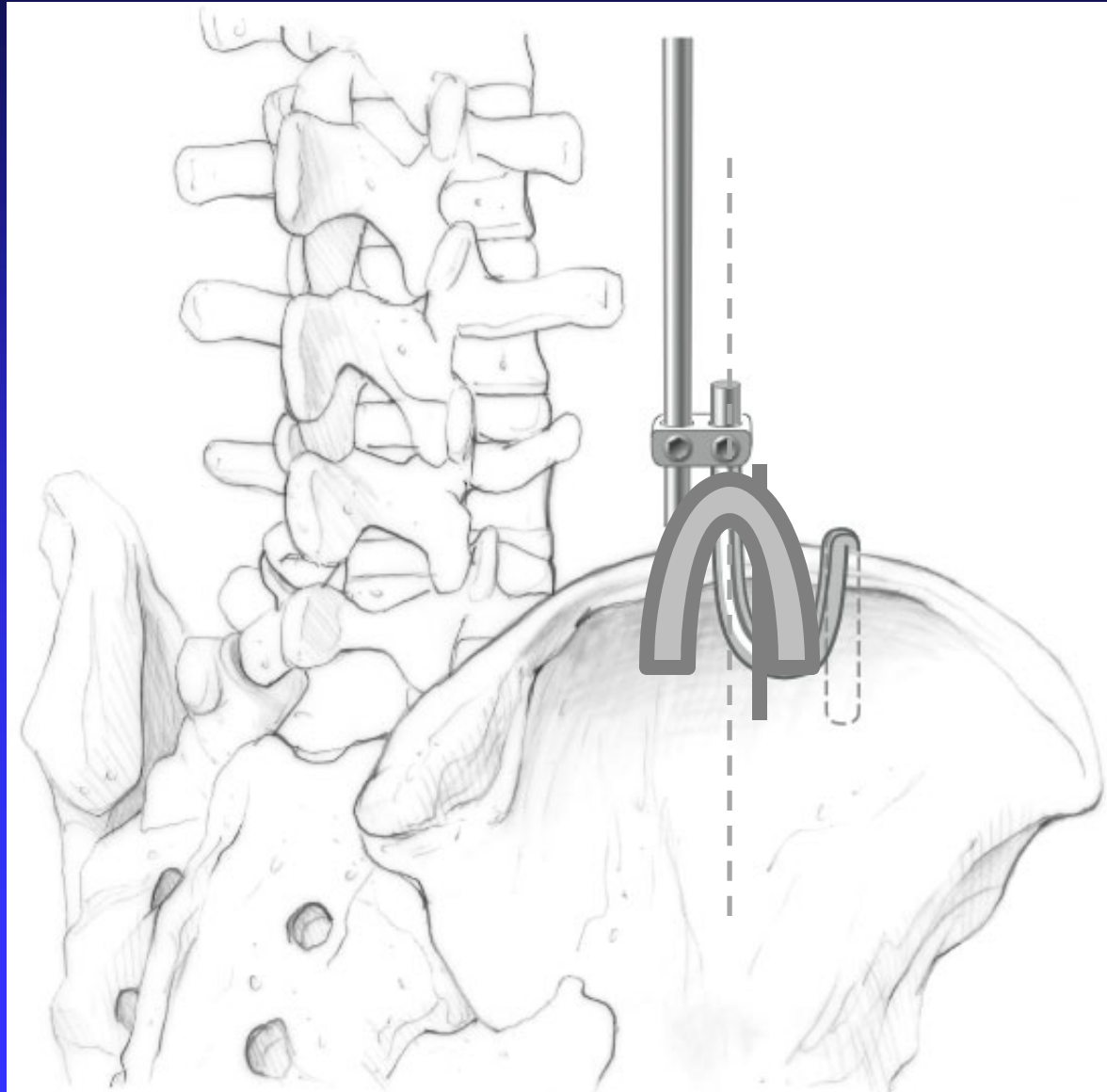


U Hooks spread load on pelvis



Note “reversed” position (connects more anterior) to maximize lordosis

S Hooks should sit just Lateral to Apex Crest
U Saddle should sit at Apex

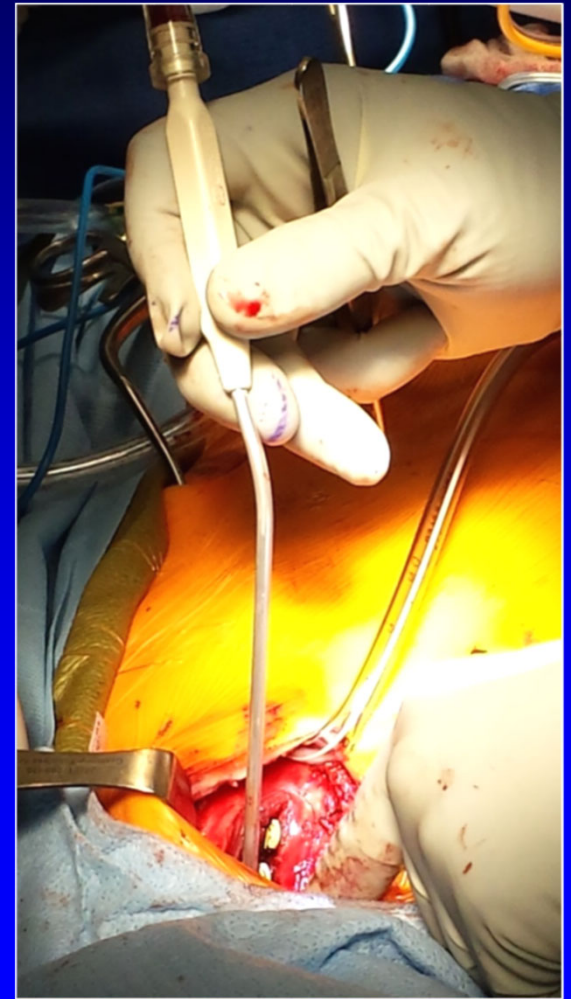
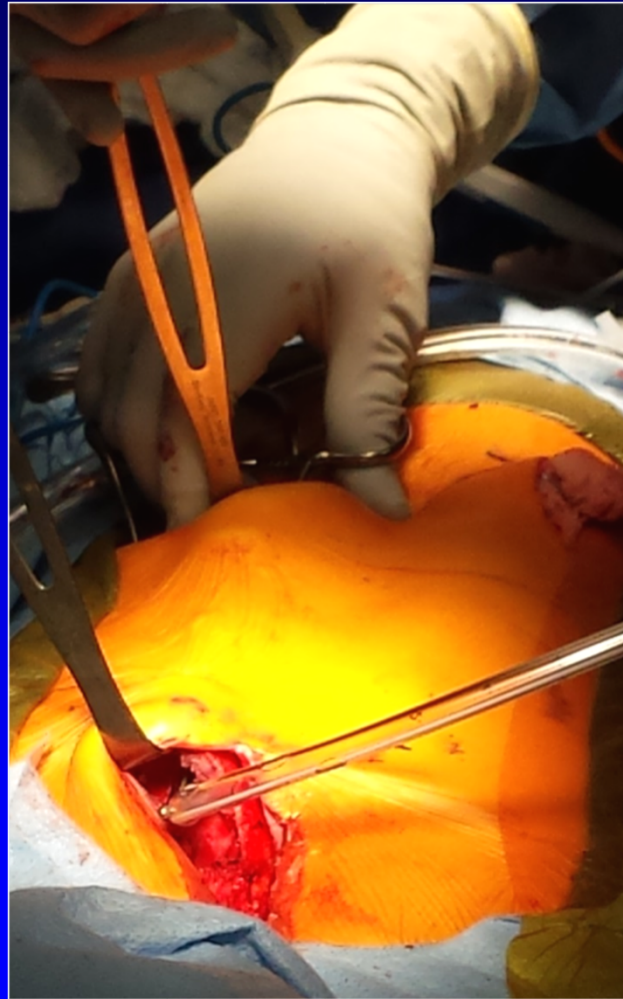


Measure Rod Length and measure radiographically- *adding 3 cm*

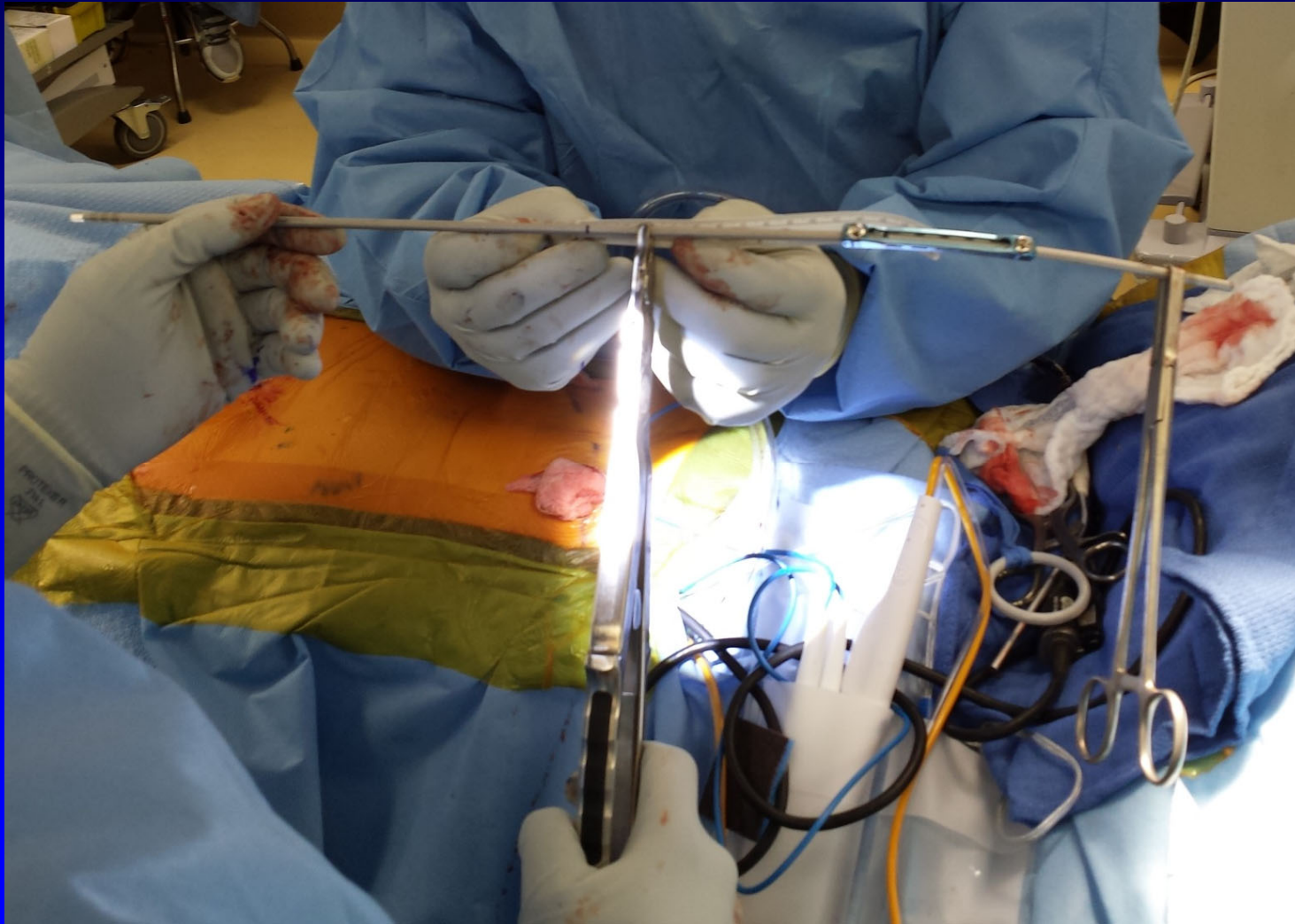


Submuscular Tunneling: Carefully!

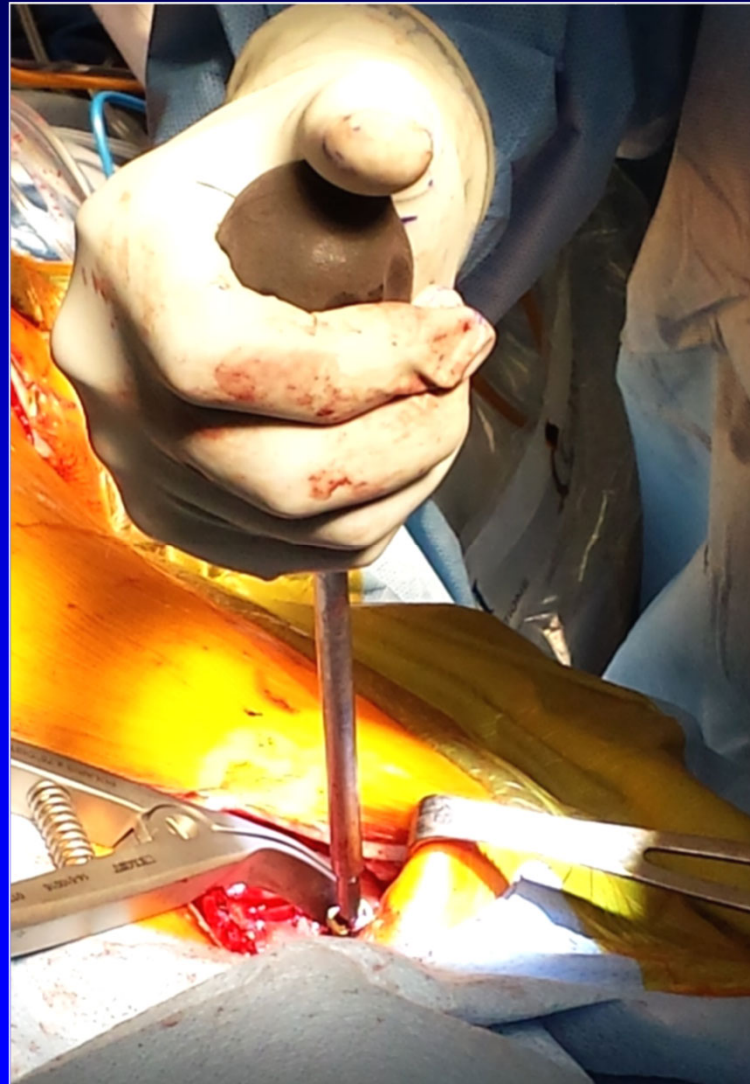
Passing the chest tube proximal → distal



Mate rods within connector

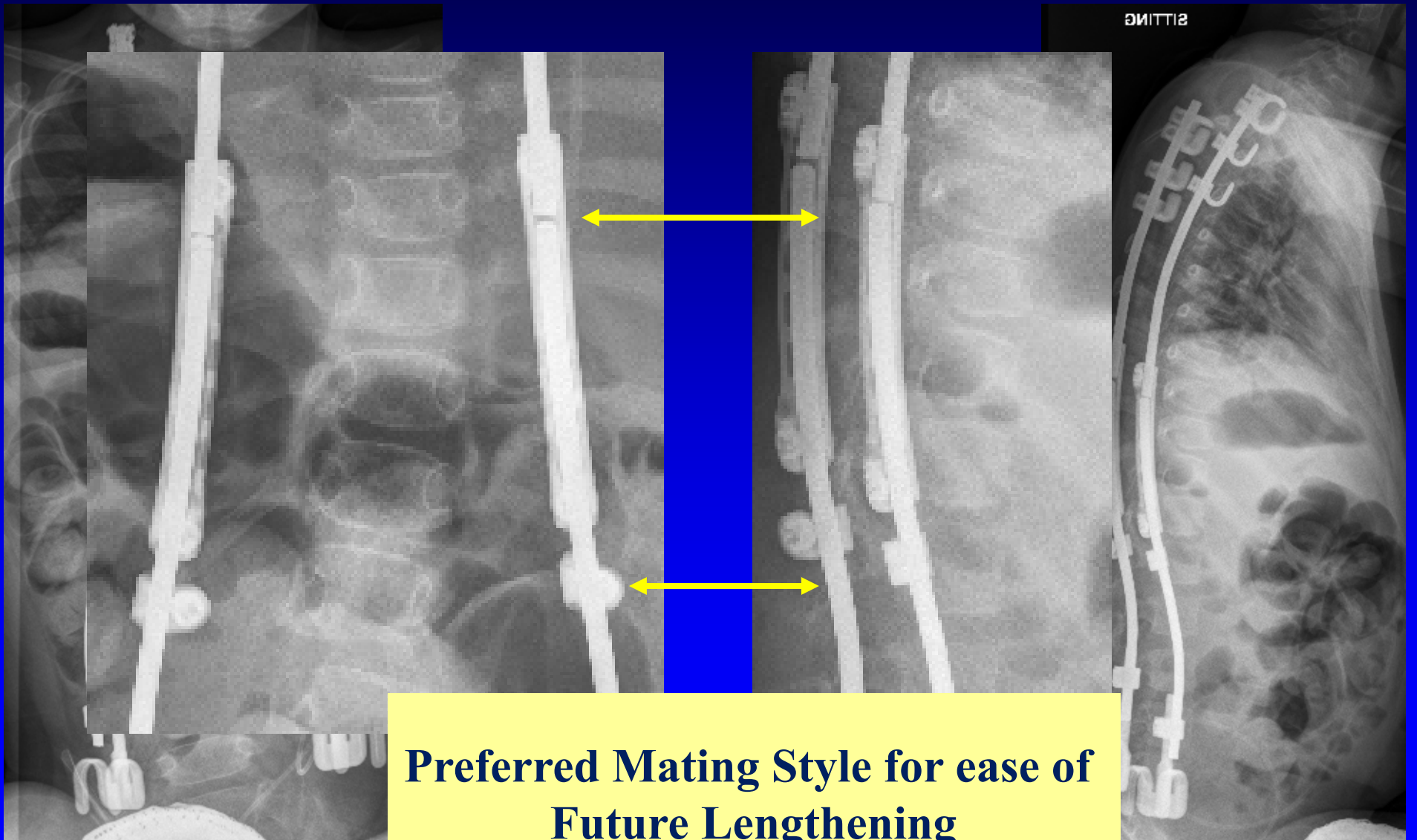


**Tension Rib Hooks Symmetrically...,
then distract at domino distally**

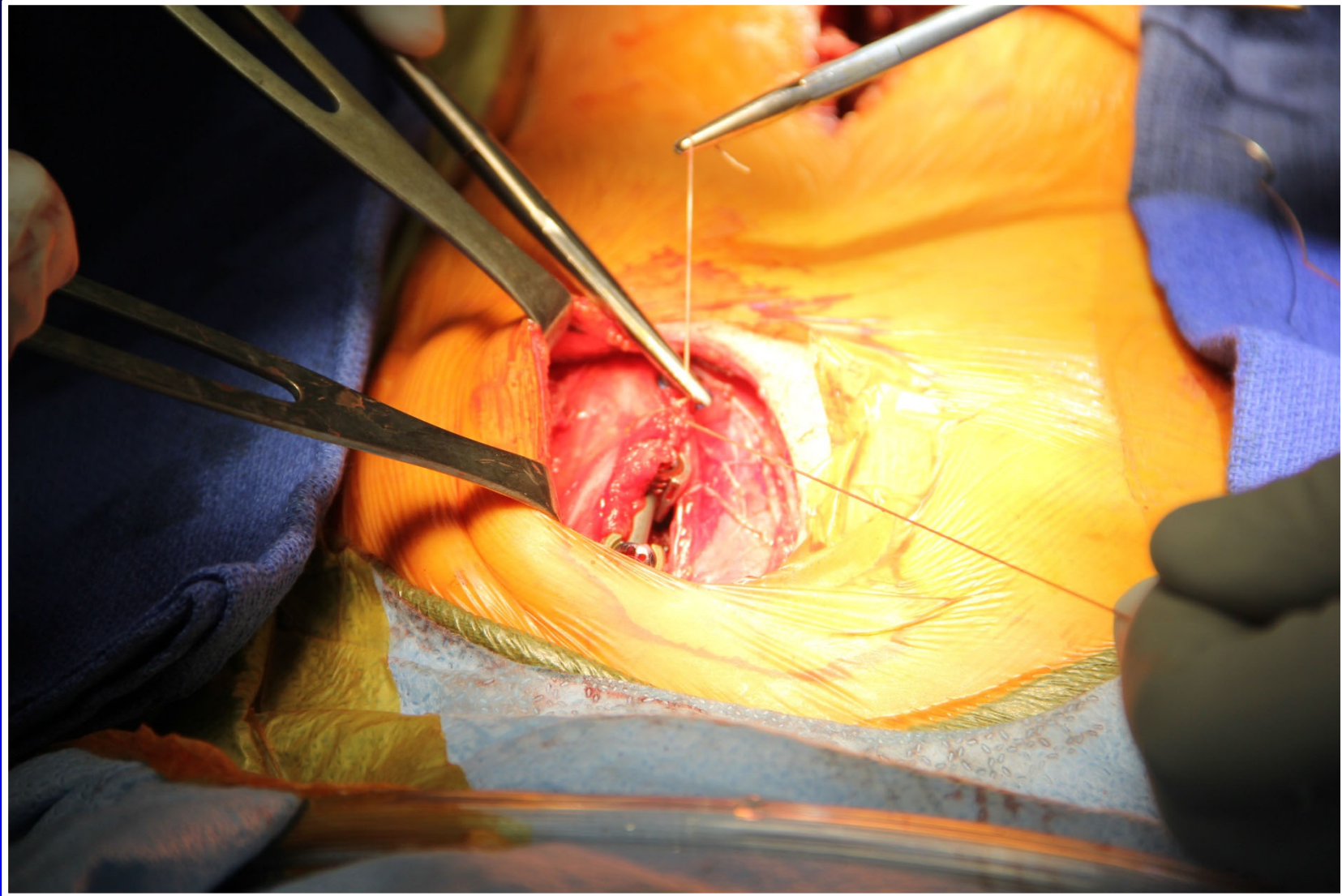


Patient TW: 6/12/14

Postoperative Radiographs

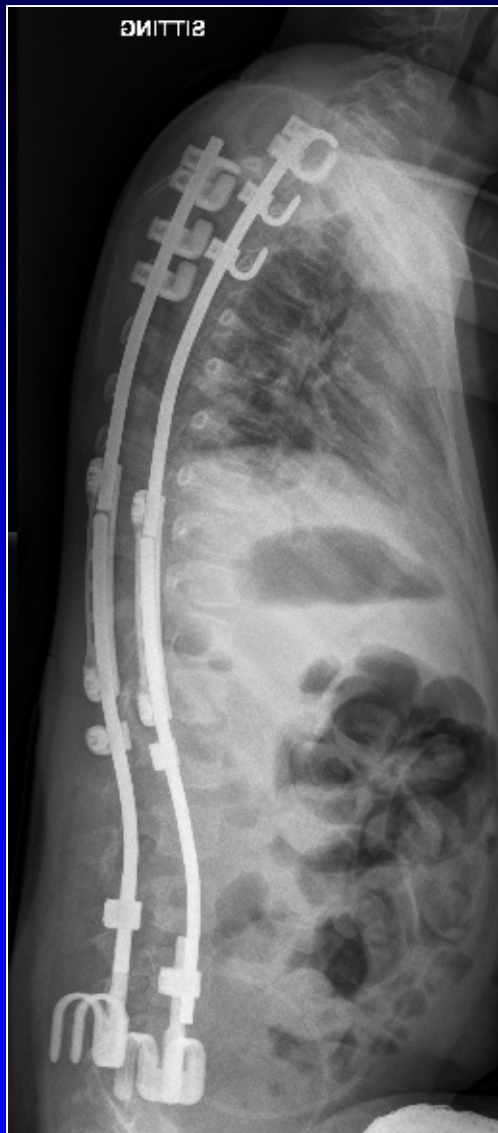


Meticulous Wound Closure

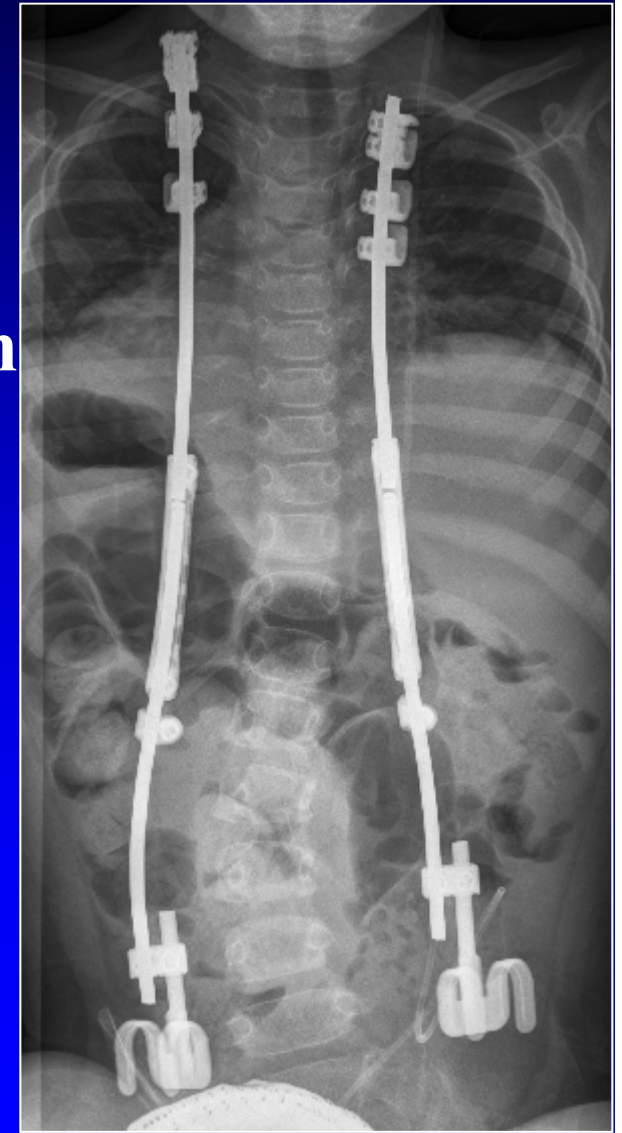
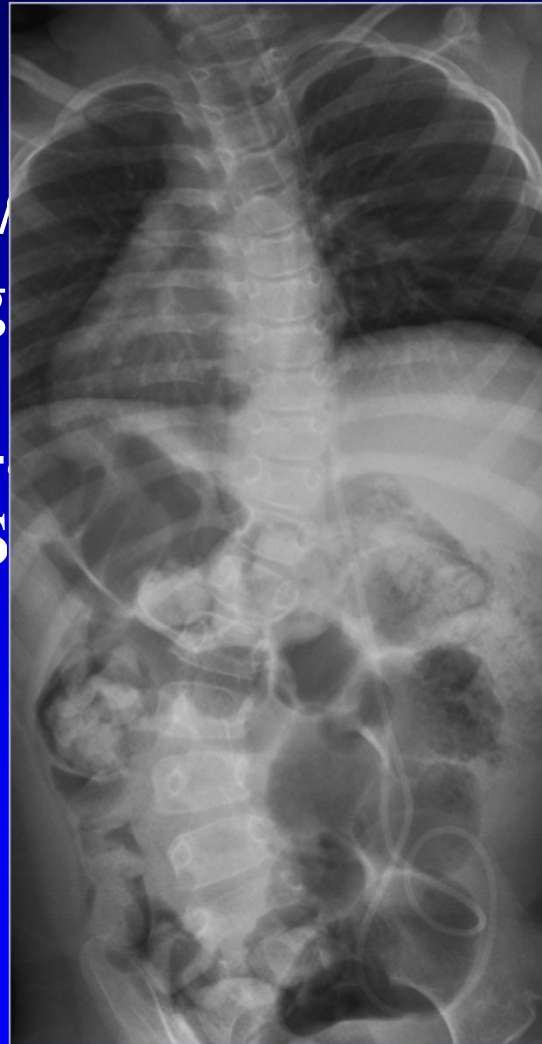


Patient TW: 6/12/14

Postoperative Radiographs

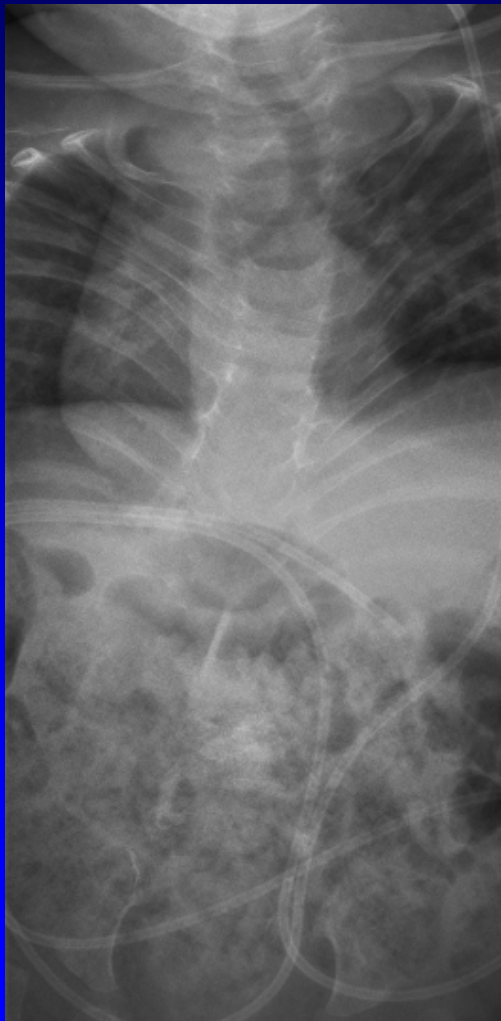


- Surgical approach
- 4 S

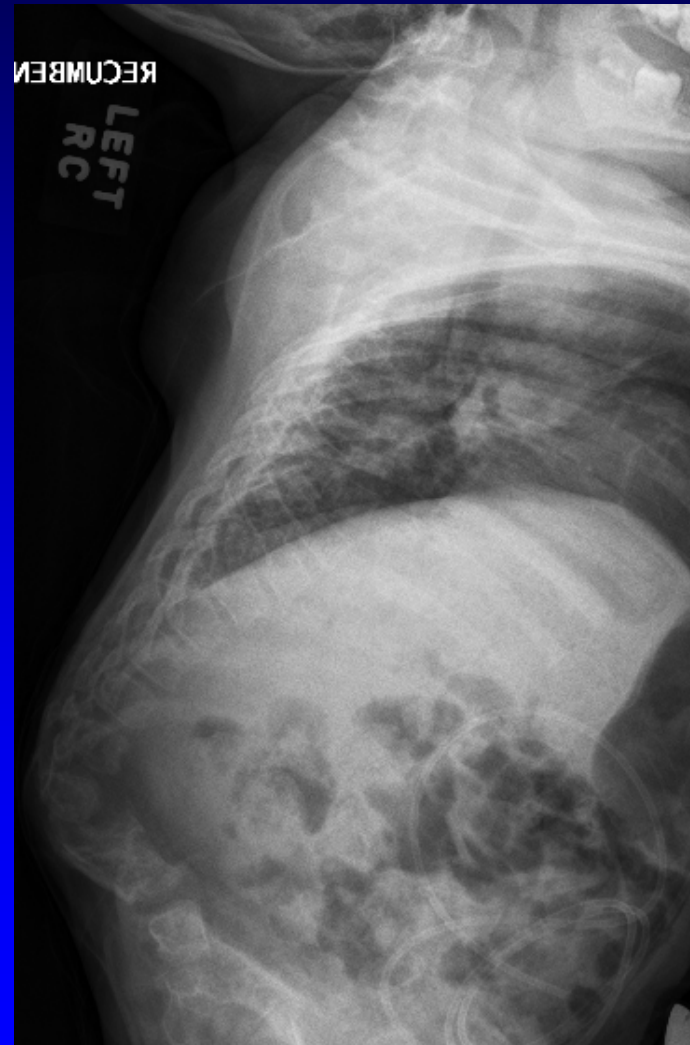


Case 2: Patient NR: 4 yo

Rib → Pelvis is Ideal for Myelomeningocele

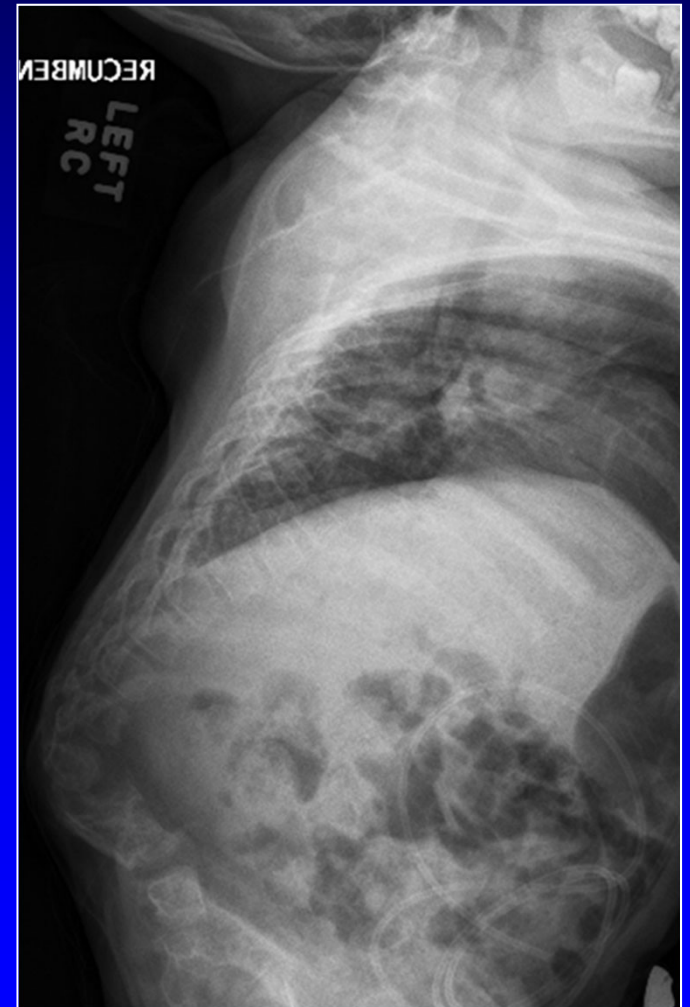
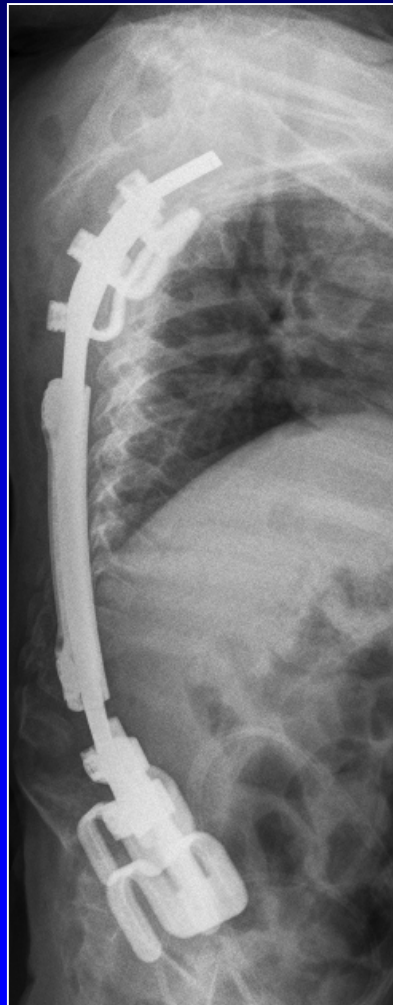
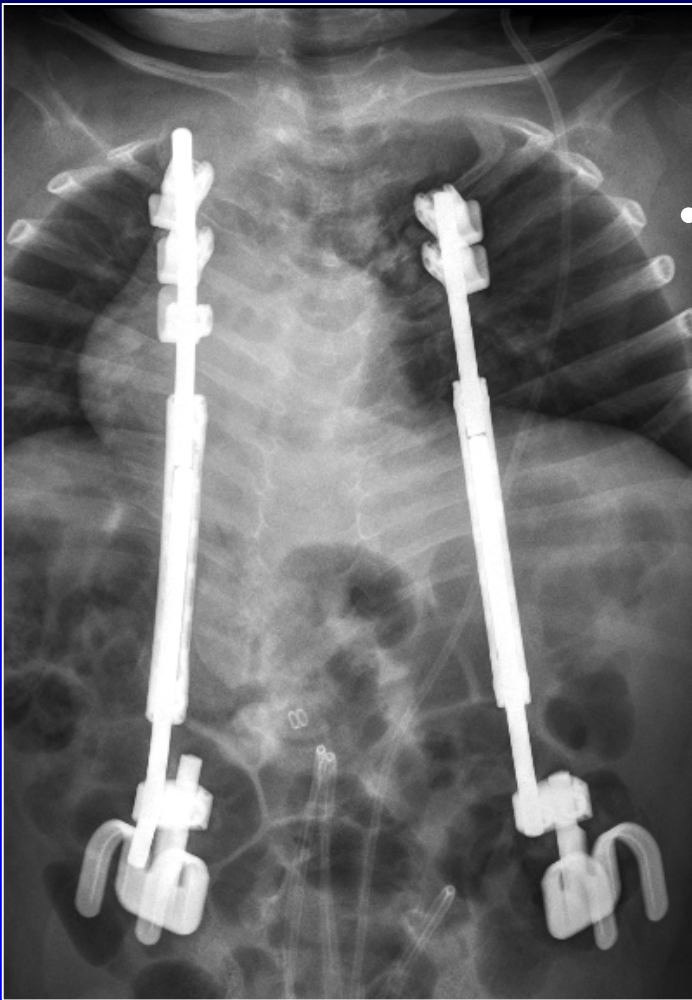


98°

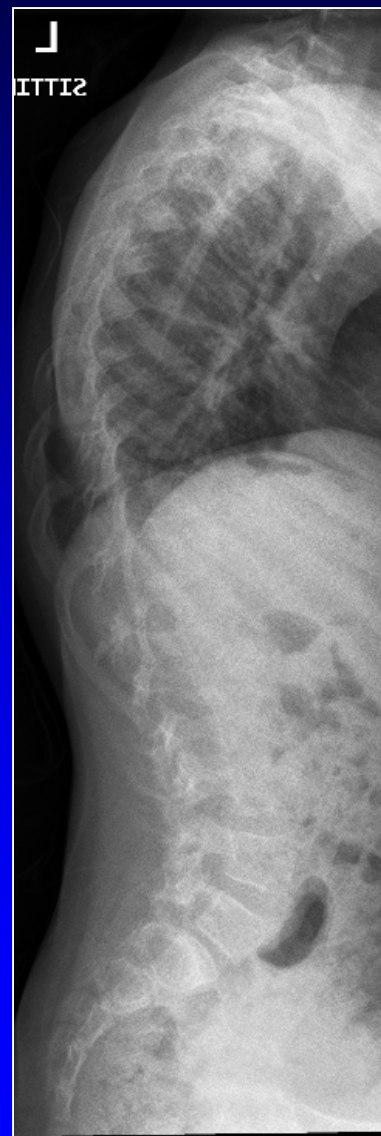
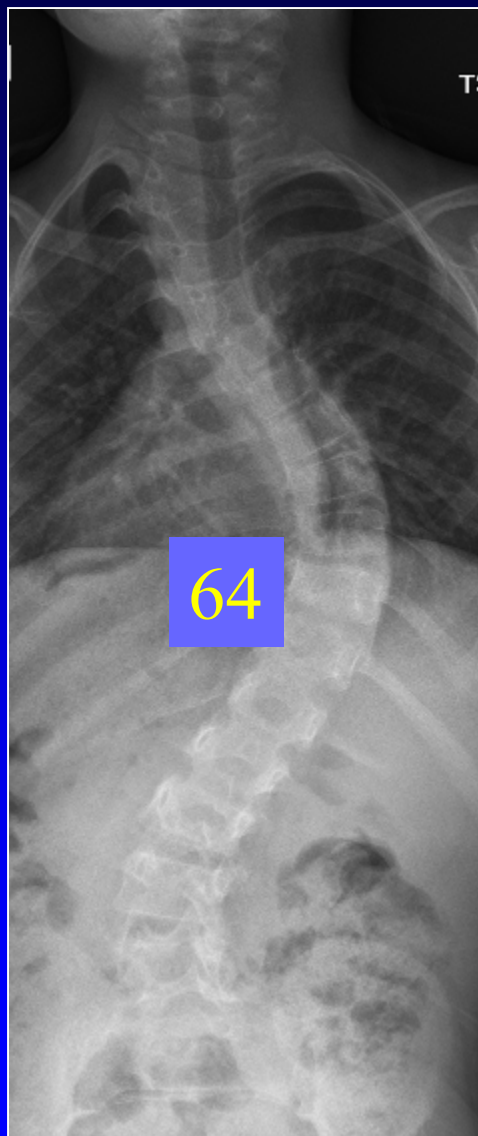


Patient NR

Postoperative Radiographs

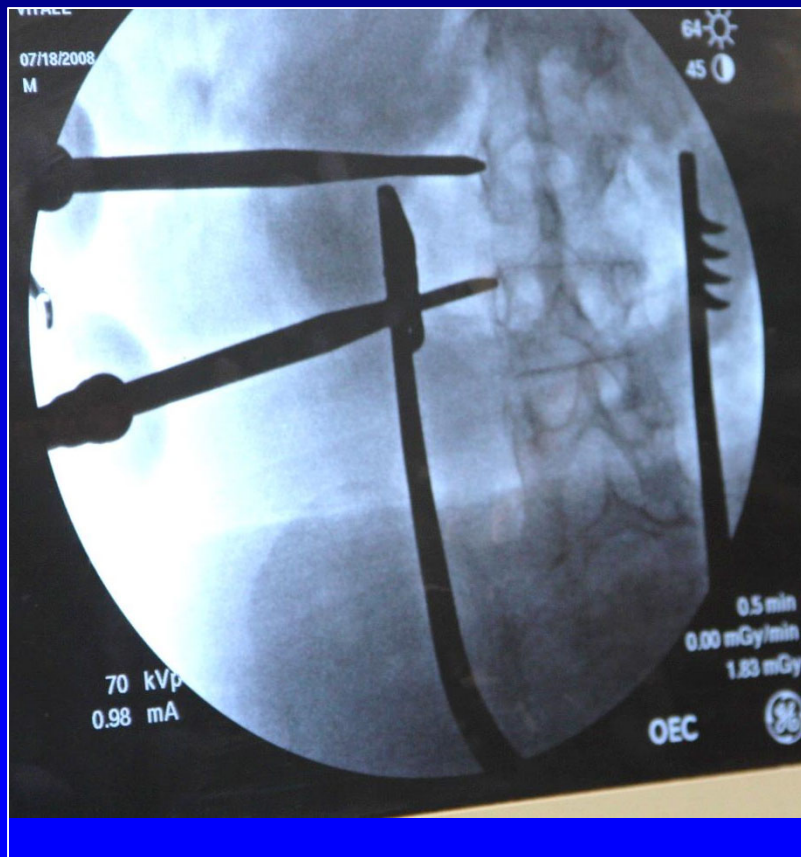


Case 3: 7 year old: S3n,P2

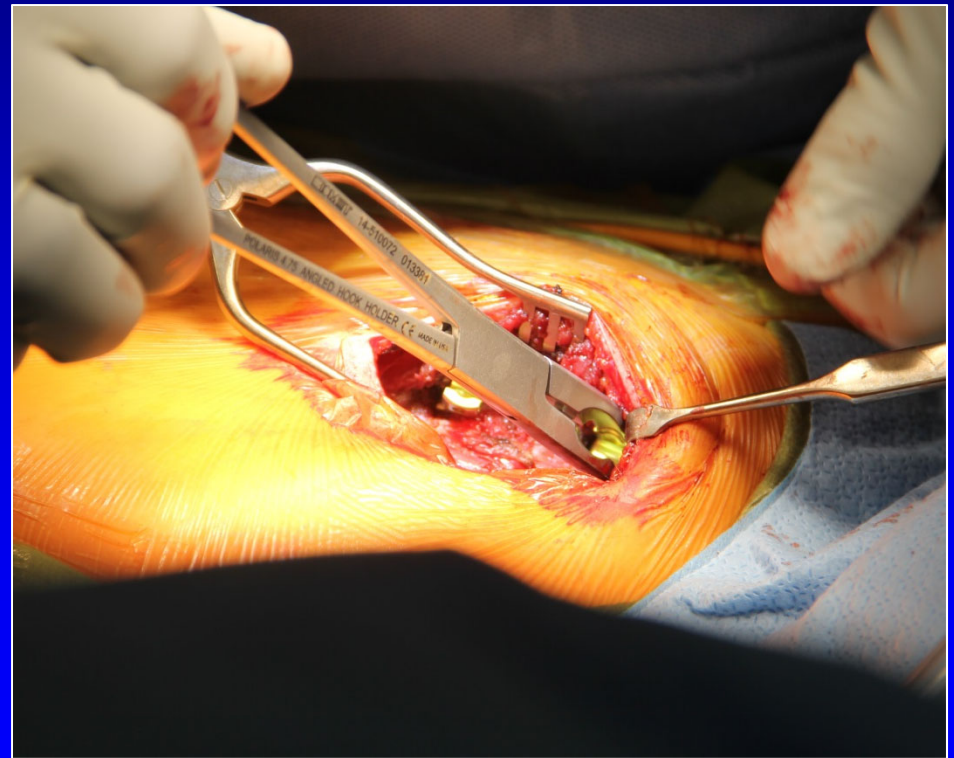


Placement Of Anchors

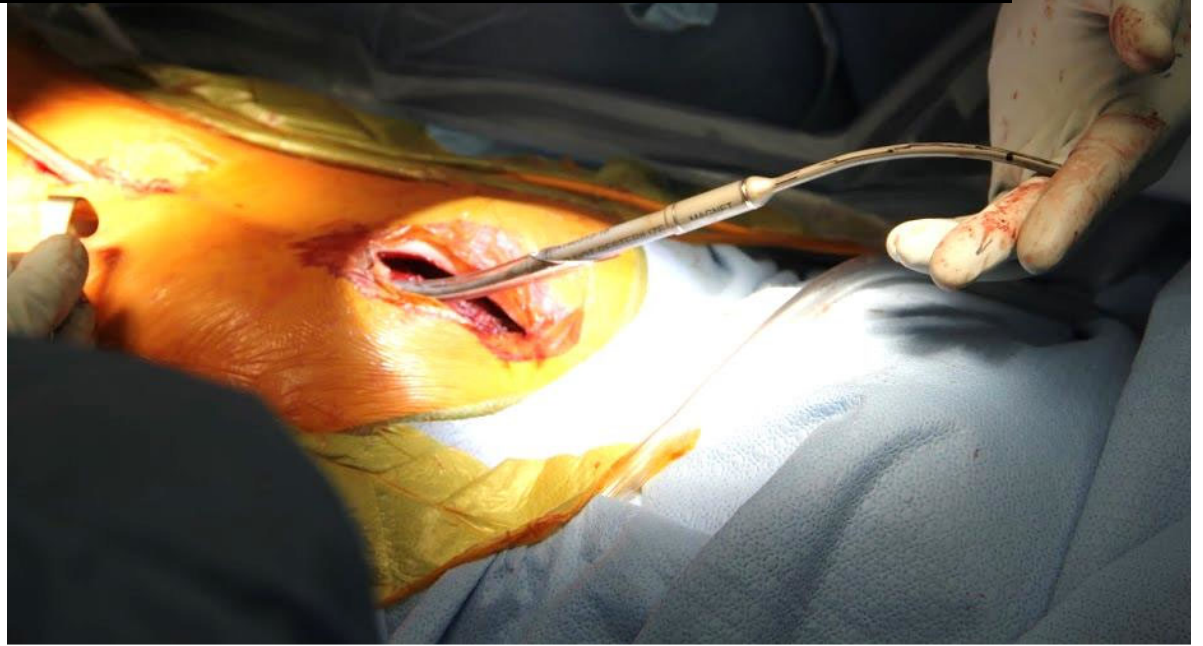
Fluoro Assist for Screws



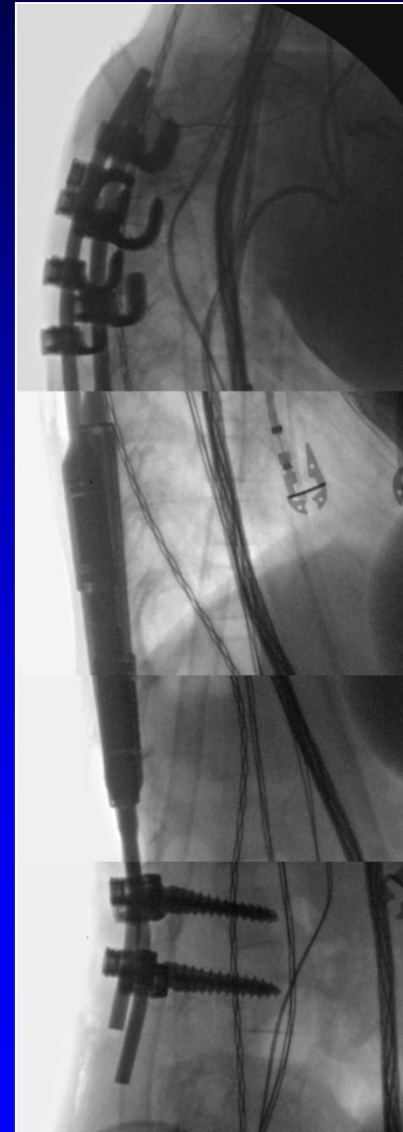
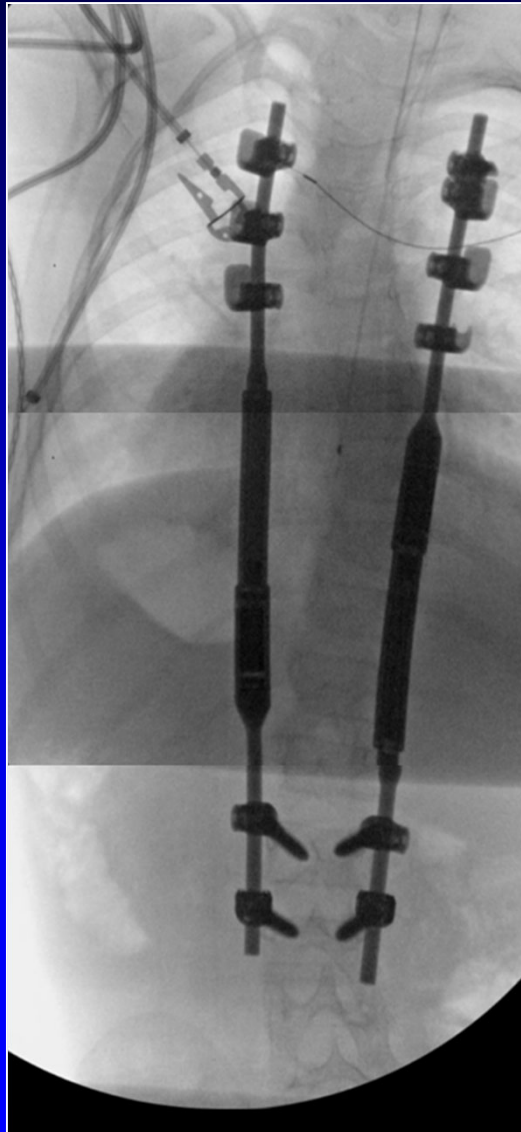
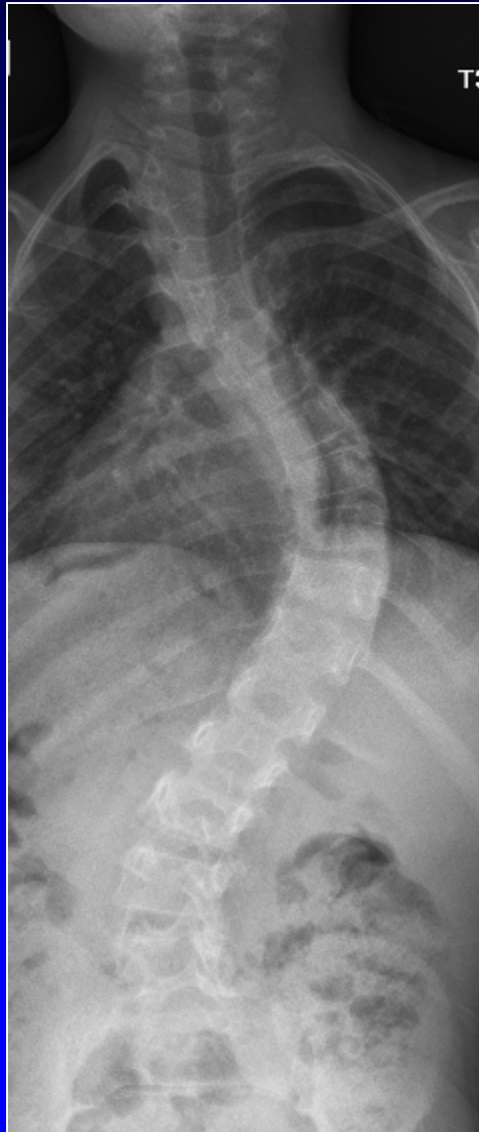
Rib Anchors (5 or more)

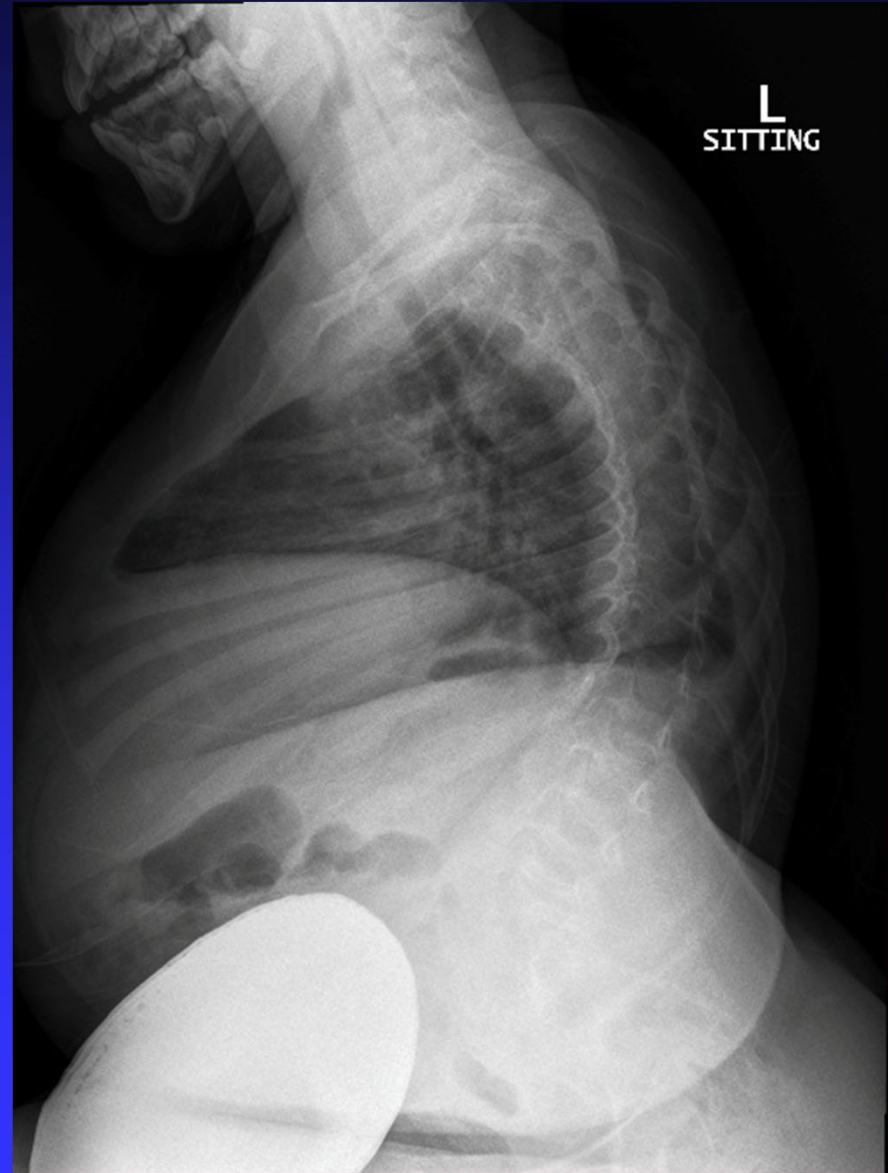


Combination with MAGEC rod

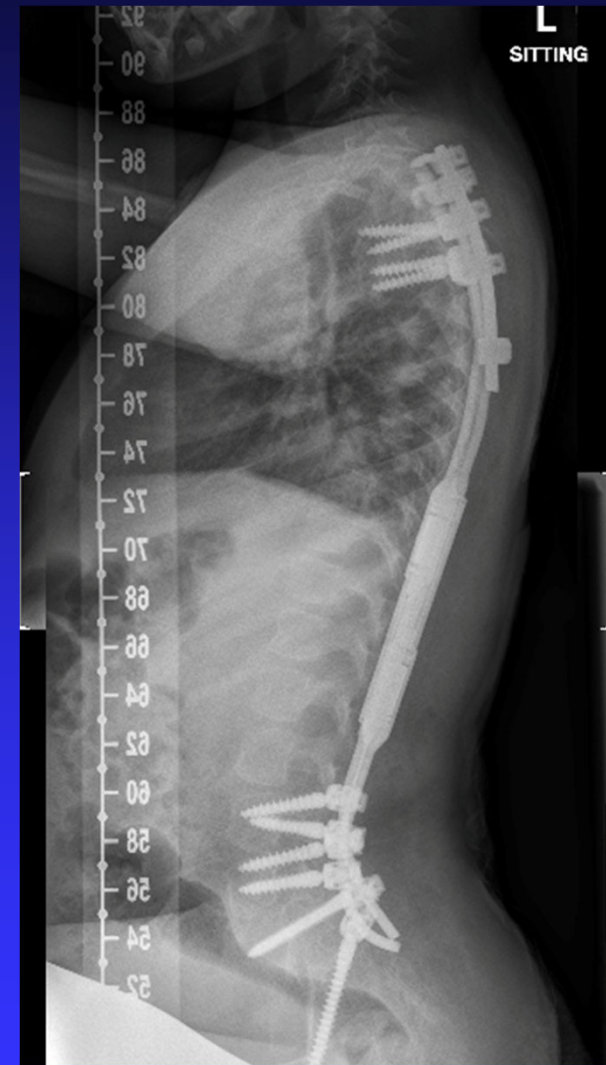
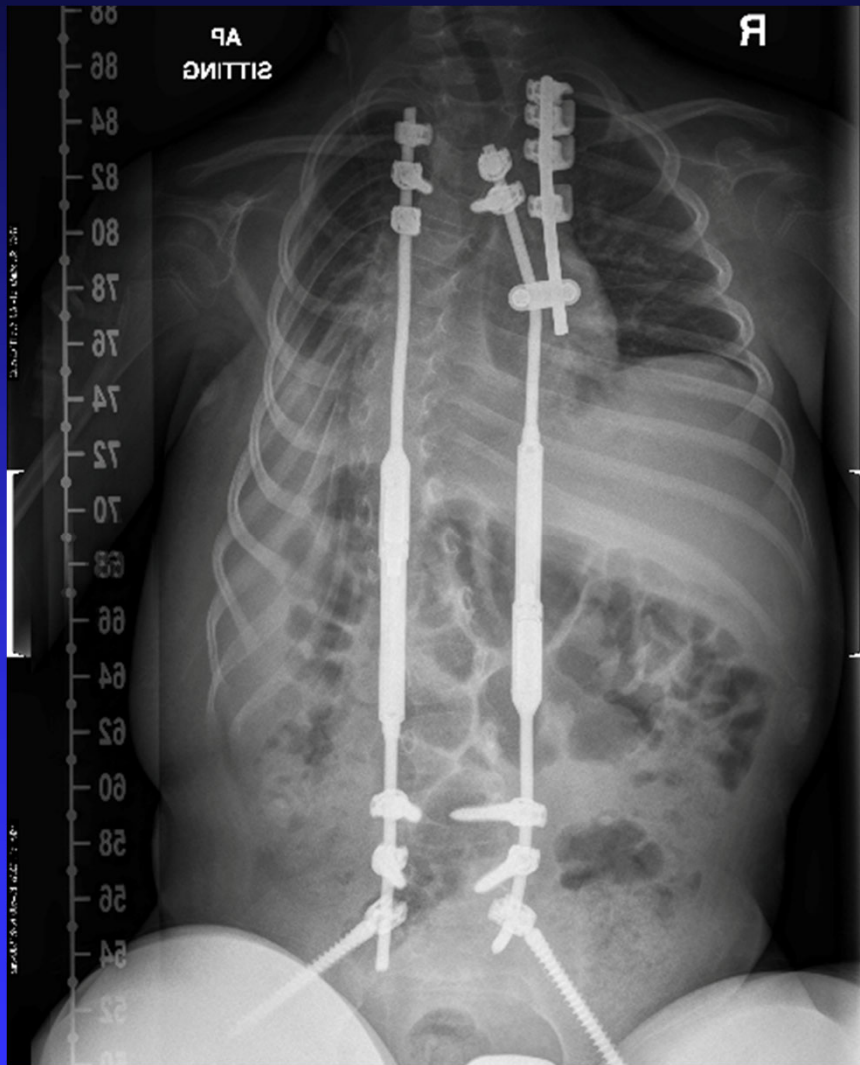


Postop xrays/fluoros: 4/23/2014



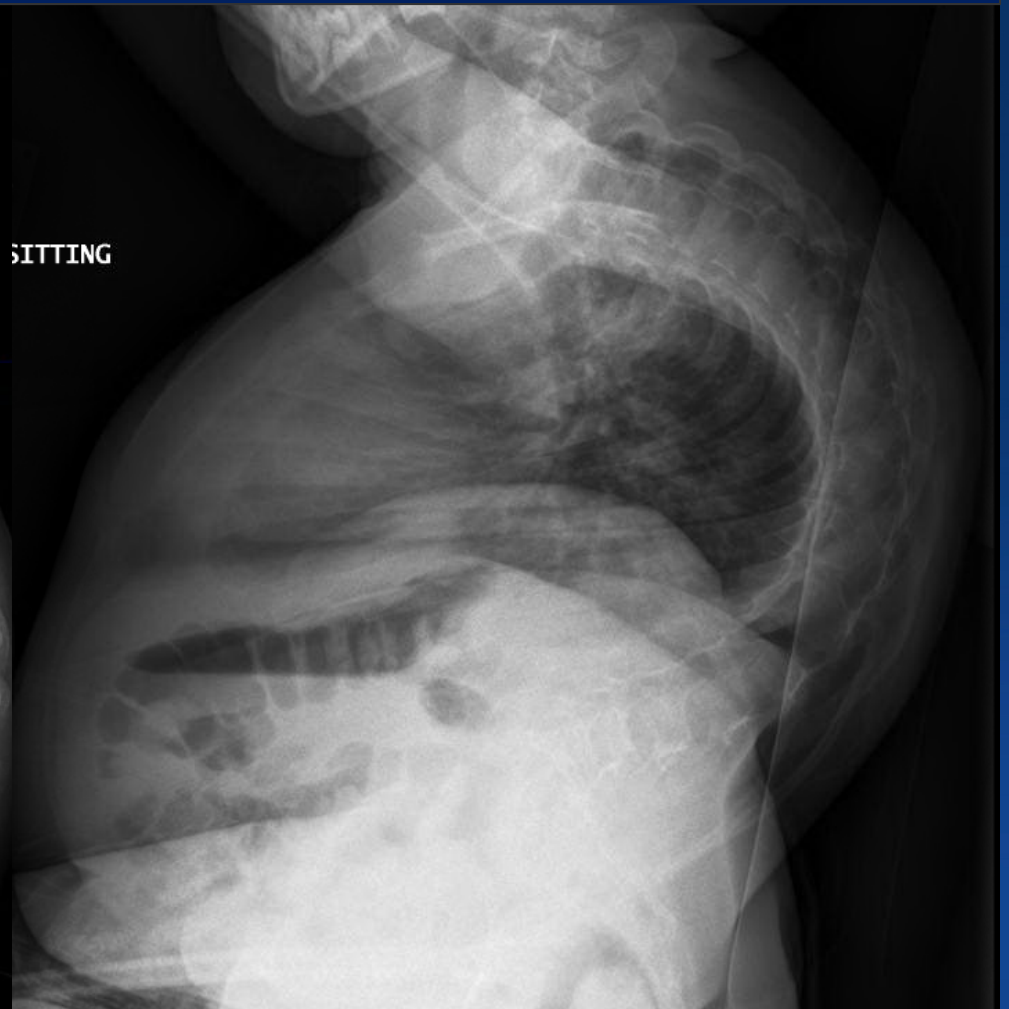


NK 7 y/o boy with SMA - MAGEC with TGR with Rib Fixation

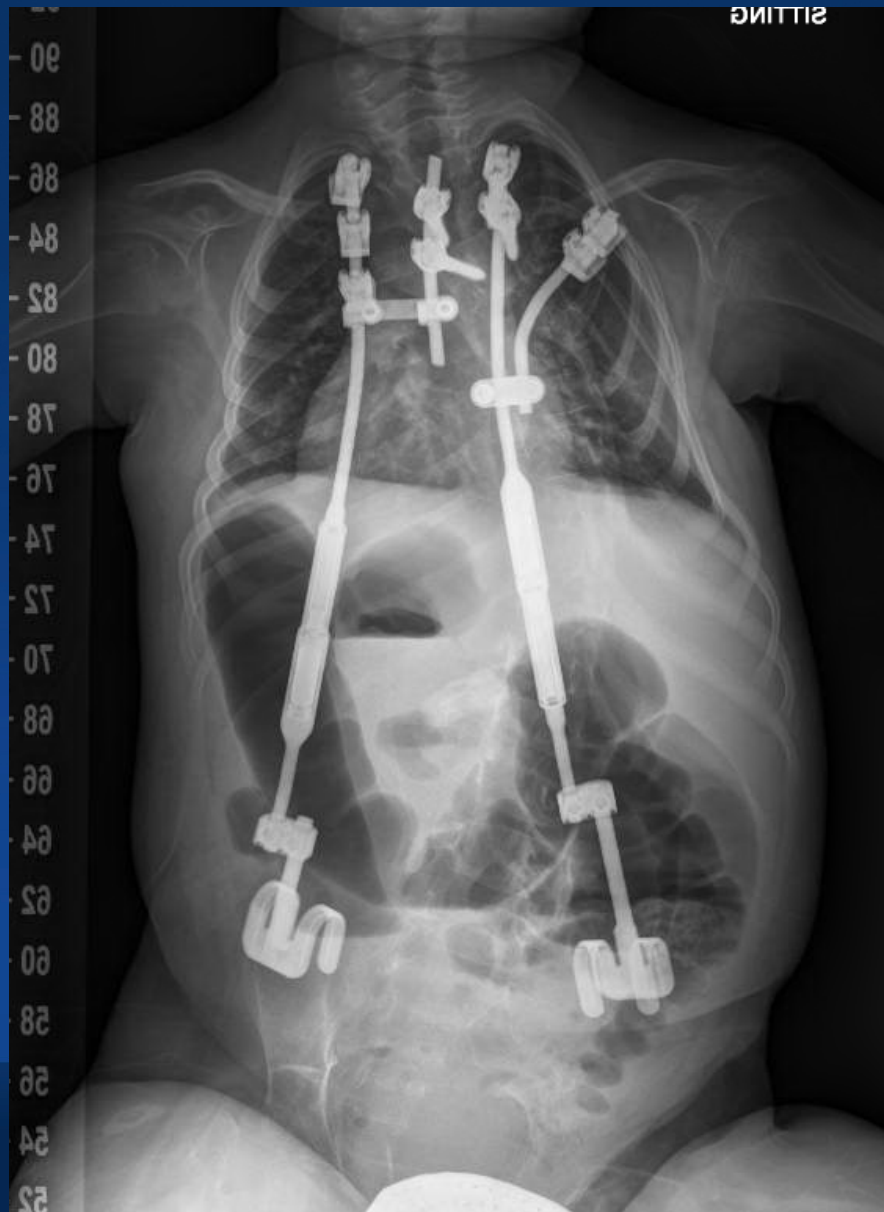


Intervention while curve still flexible with sufficient implant density may allow best radiographic result

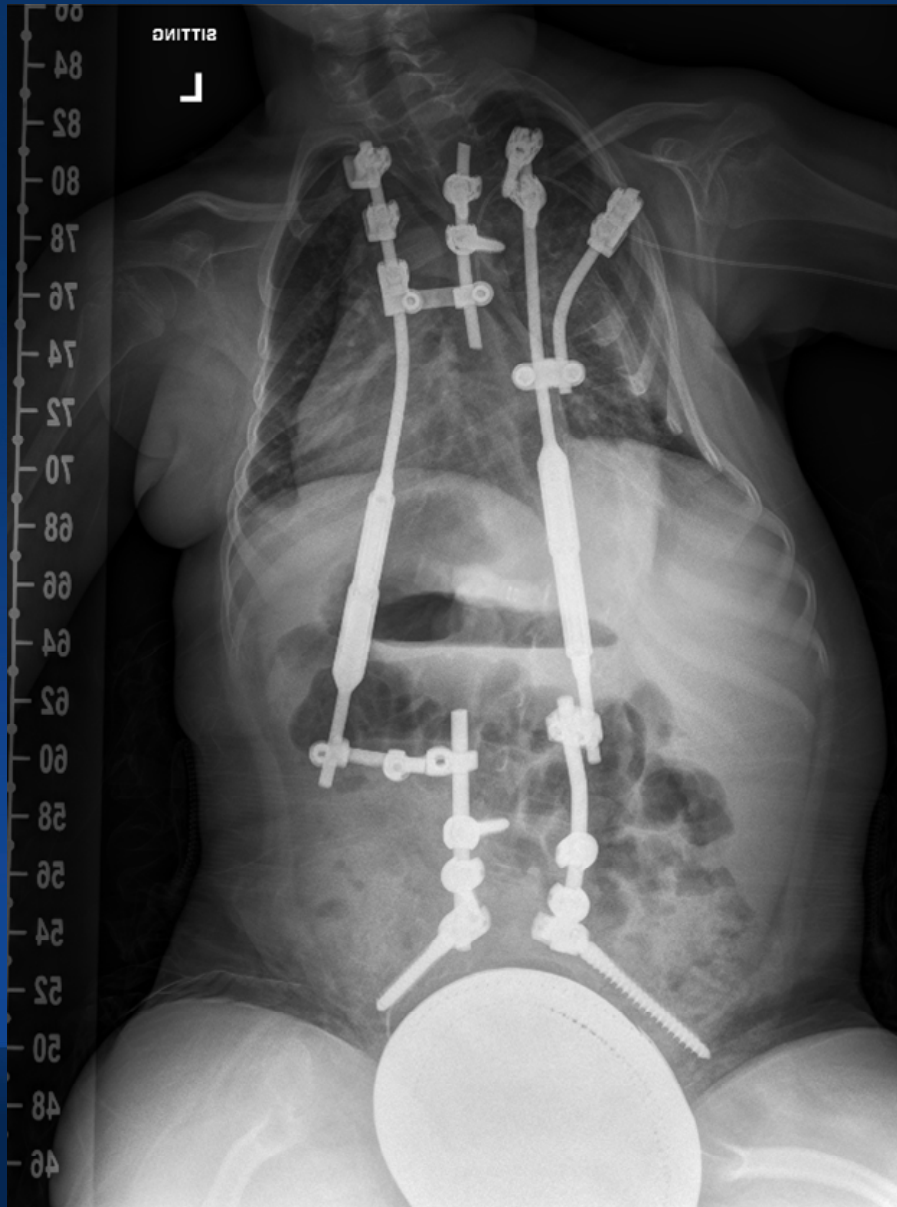
7M w SMA2 w progressive scoliosis
lives in NC, has twin brother with SMA2 as well



Post-op imaging



Revision of Pelvic Fixation



Rib Fixation in Growing Rods

- Ideal for younger children
 - No fusion, safe, easy
- Adequate proximal implant density (>5)
- Multiple hybrid options



THANK YOU

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