

Growing Rod "Graduates" - Spine Length and Pulmonary Outcome

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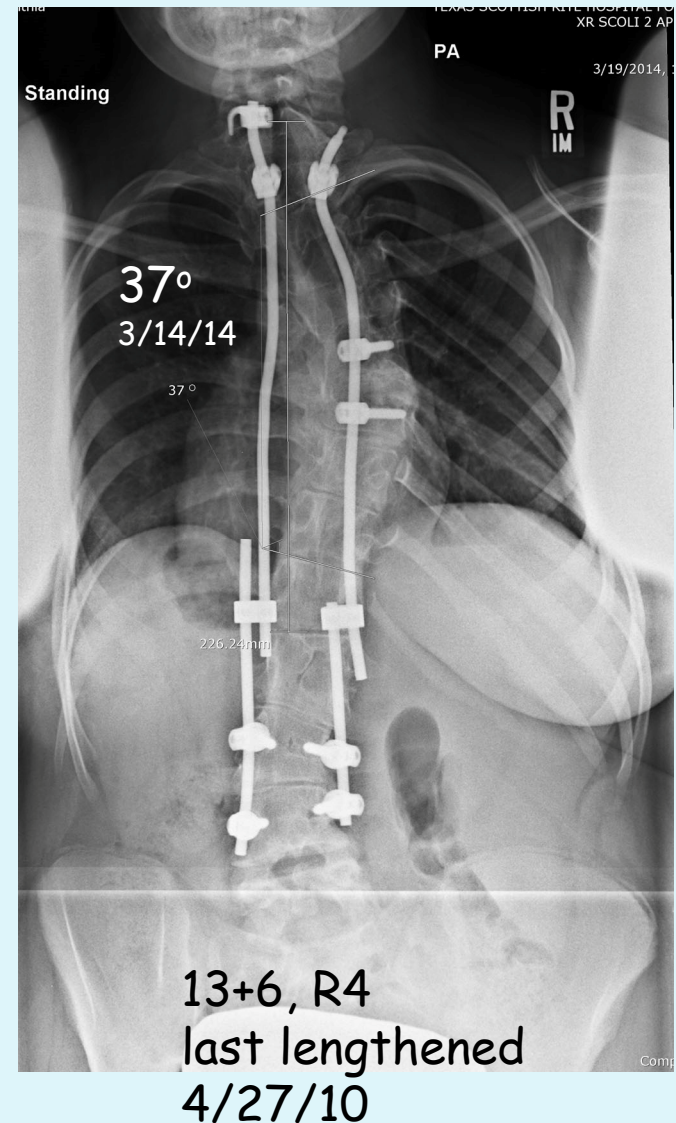
Anna McClung

ICEOS 2014
Warsaw



Graduates

- Patients who have undergone "final" fusion
- Patients no longer being actively lengthened and simply followed for progression



What do we know about outcome ?

Flynn JBJs 2013 - GSSG database

- 93% fused age 11-13
- Reason often obscure
- Extended prox & distal
2°/2 balance issues
 - coronal & sagittal
- 81% autofused / stiff
- Final correction minimal or worse in 37%
- Final fusion may not be final
Poe-Kochert/Thompson SRS

Know a lot about the fusion.....
But how did they really do ?

Lengthening worth it?
PFT's ?
QOL ?

TSRH GR "Graduates" (n=7)

- 4 idiopathic/-like, 1 cong, 1 amb n-m, 1 syndromic (Marfan)
- 77 mo (69-97/ $\sim 6\frac{1}{2}$ yo) @1st surgery
- Last f/u age 156 mo (13 yr - range 11-15)
- 44 mo delay tactics in 4 pts prior to 1st
- Mean 8.0 procedures (5-13, incl. initial), 1 unplanned, 6 lengthenings
- 5 definitive fusion f/u 1-2.5 yr, 2 observed after last lengthen 3-4 yrs

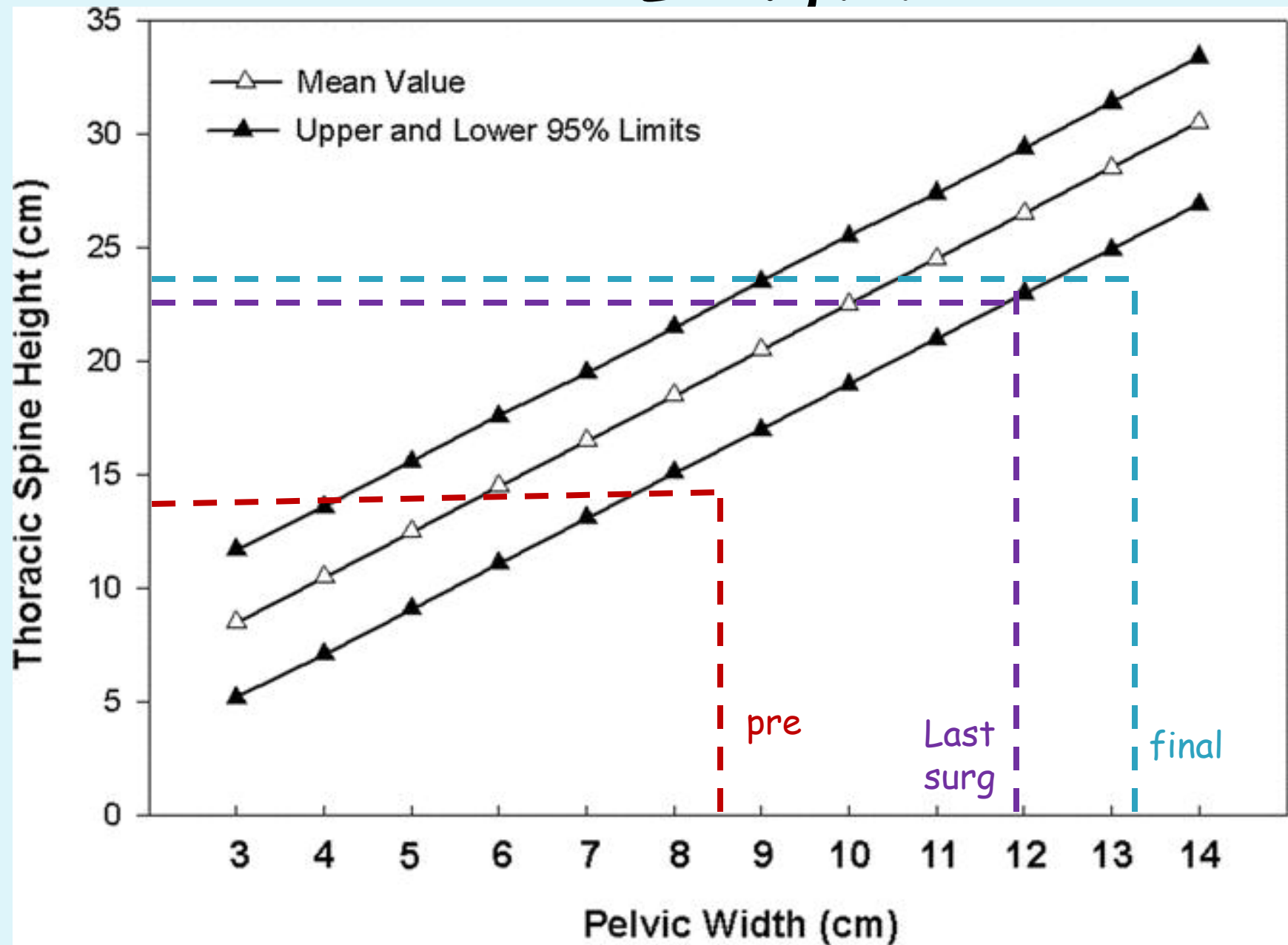
"Graduates" -> Bigger, Curves Better

	<u>T1-12</u> cm	<u>MT</u> deg	<u>Th width</u> cm
Preop	14.2 (9.9-17.7)	94 (73-123)	16.2 (14.7-18.9)
Last surg	22.6 (18.6-29.5)	50 (36-63)	19.8 (16.3-23.6)
Last f/u	23.6 (20.3-29.6)	46 (26-69)	20.3 (17.1-23)
	preop	last surg	last f/u
Kyphosis	67(35-99)	49(34-71)	44(26-57)
BMI	13.5 (11.6-18)		17 (11.9-26)
Pelv width	8.5 (6.7-9.8)	11.9 (10.1-14.3)	13.3 (10.6-15.2)

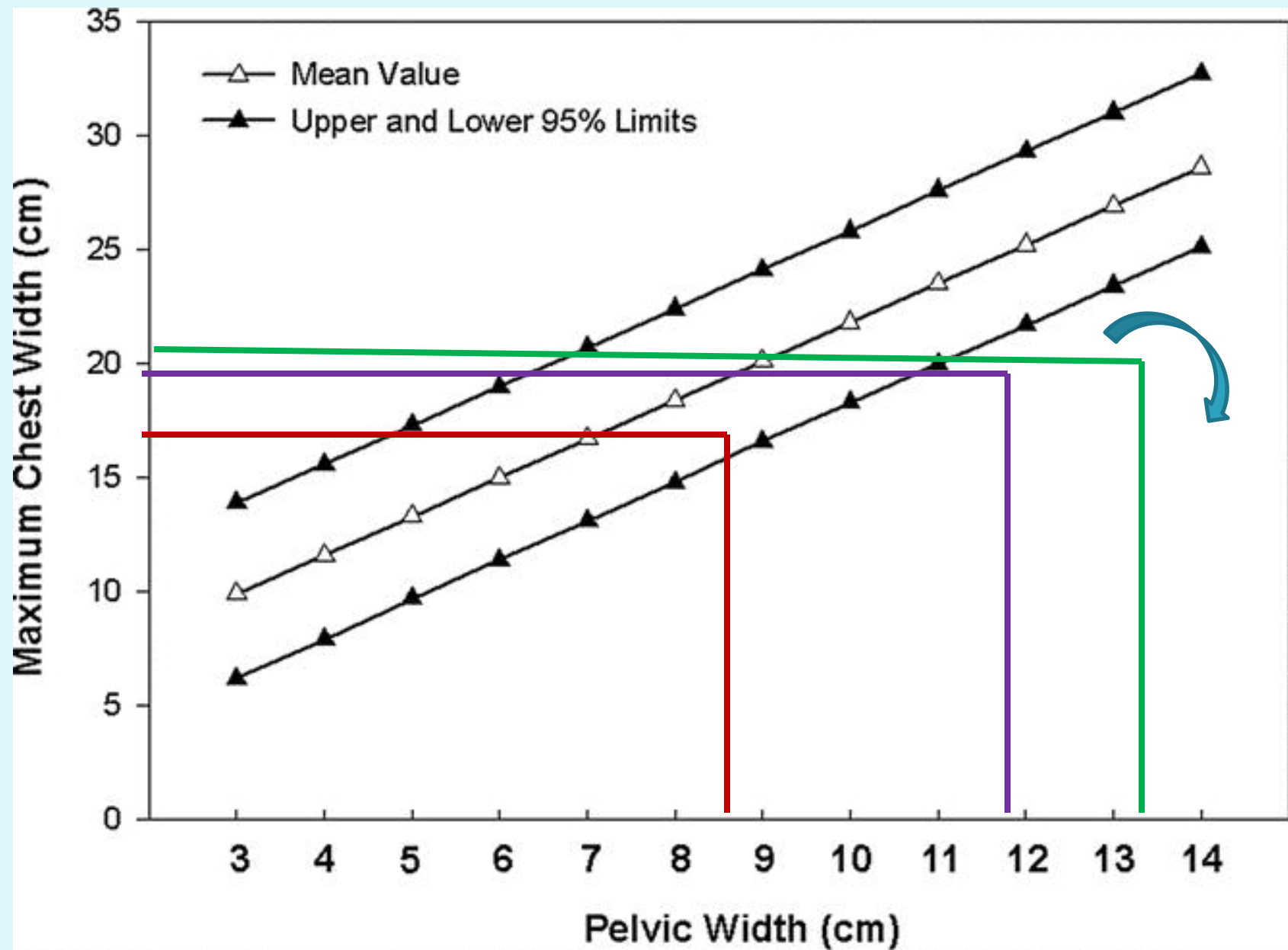
Complication (rod/anchor): 7 in 4 patients

No re-operations to date

T1-12 Length



Th width



Pulmonary/Volume

PFT

1st (6+5)

FEV₁ (L.) .66

FEV₁ (%) 57.4

FVC (L.) .70

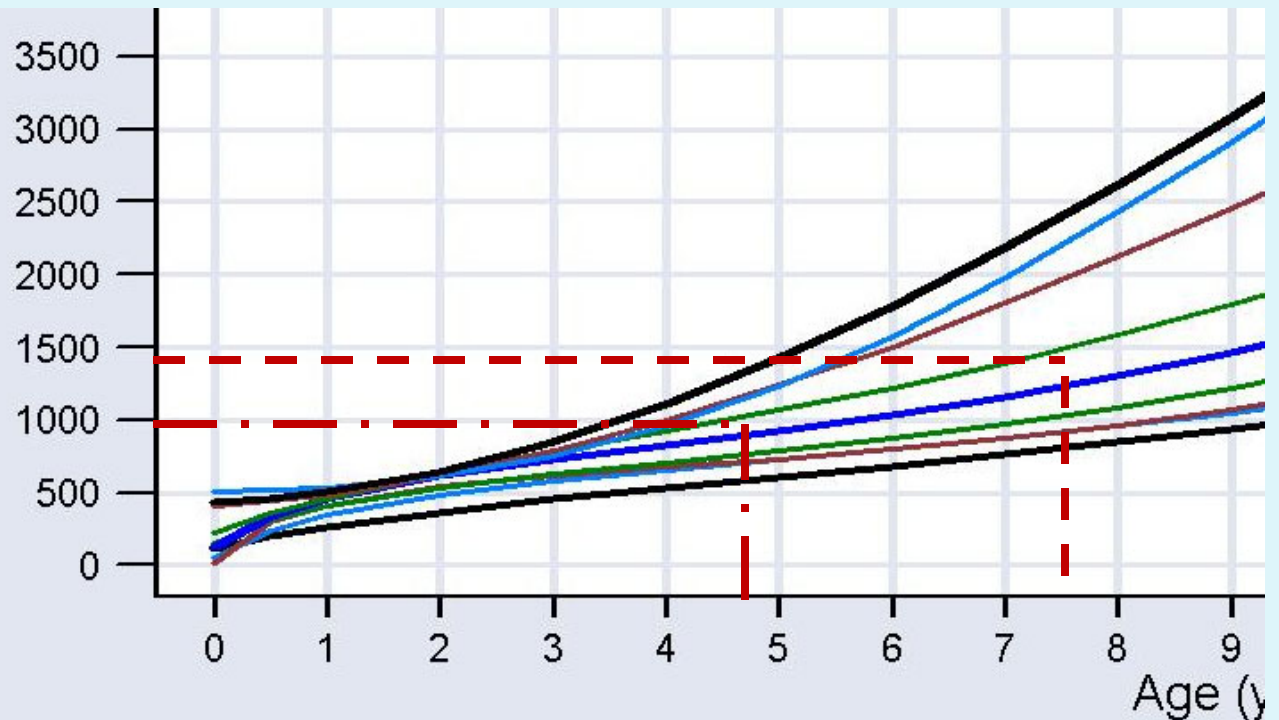
FVC (%) 58.4

CT vol 900 (670-1268)

@ age 56 m 4+8

1328 (915-2026)

88 m 7+4



Observations (n=only 7)

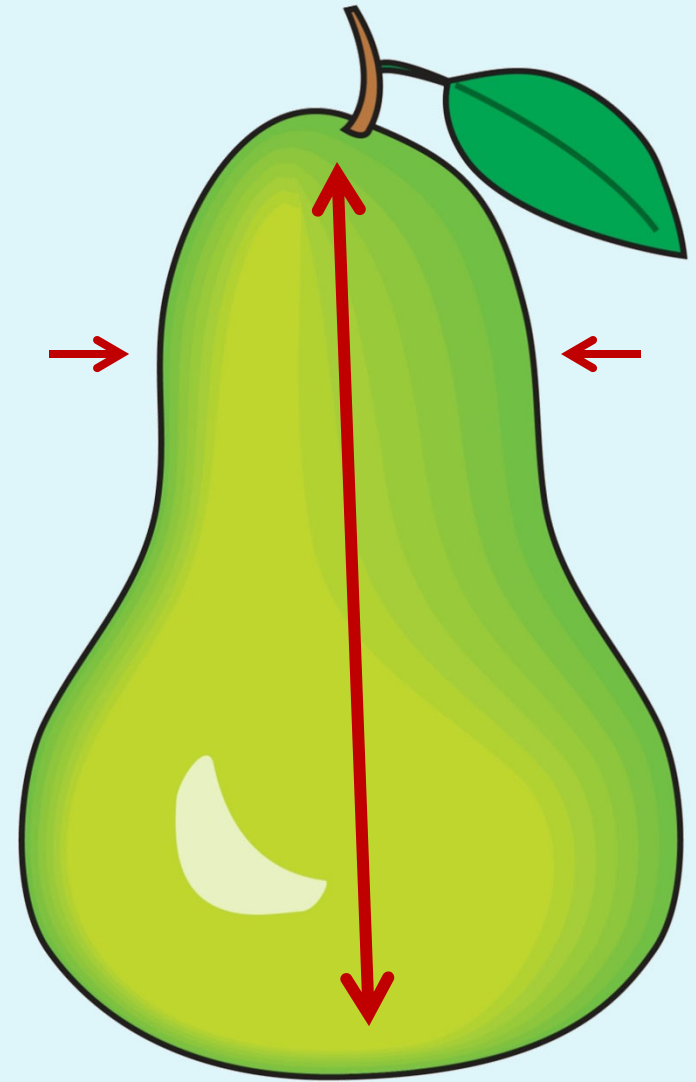
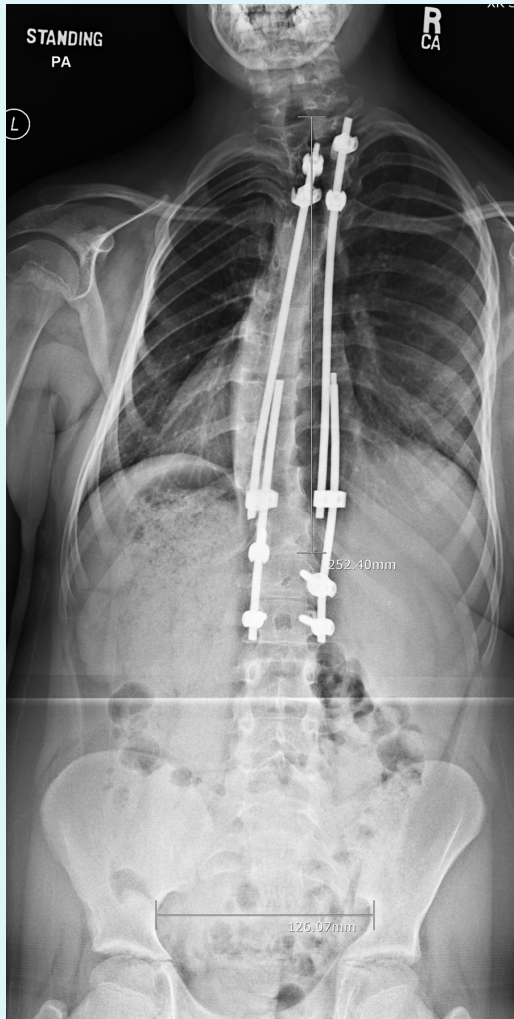
- Pulmonary outcome **diminished** (% pred criteria)

.....in spite of apparent satisfactory thoracic length gain and curve correction over 7 year of surgical management with acceptable complication rate

[Consistent with Dede et al Veptr pulmonary outcomes]

- Th width increase **not keeping up** with normal growth (significance ?)

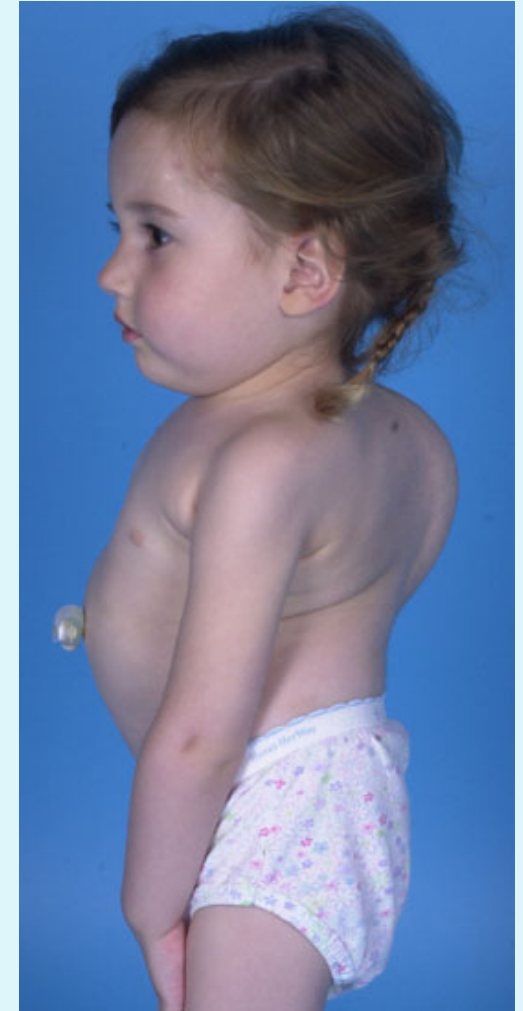
Observations - Th width ? significance



Good News, Bad News

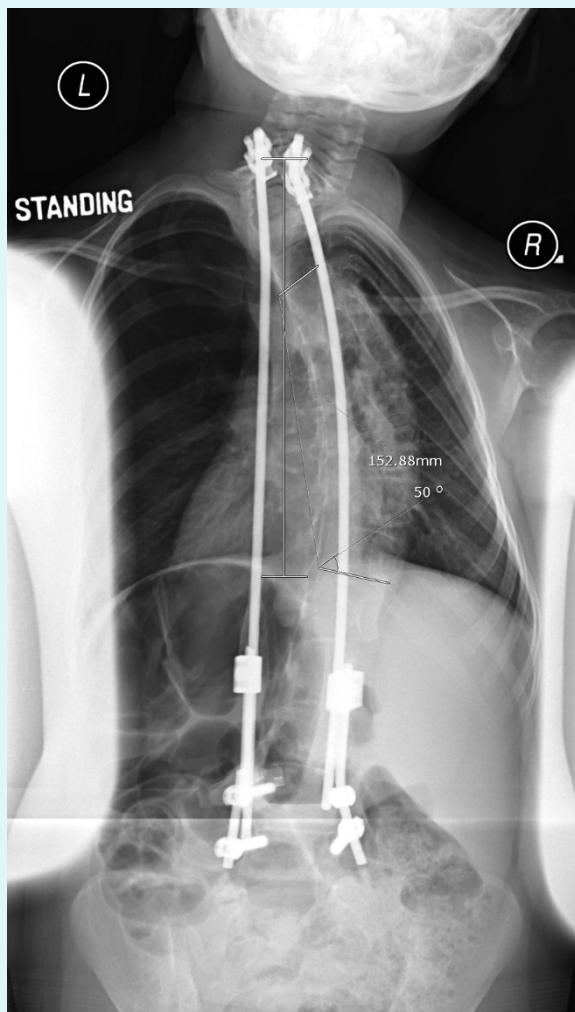
- T1-12 length effectively increases
(Glotzbecker et al Spine Deformity '14)
- Th width - increased but not keeping up with growth - ? Significance
- PFT data worrisome (consistent with Dede et al JBJS Veptr outcomes) - the increase in absolute volume not keeping up with growth

- Age 15 mo
- MRI: Negative
- Weight: 5.2 kg (<5th%)



Early intervention ??
Try delay ?

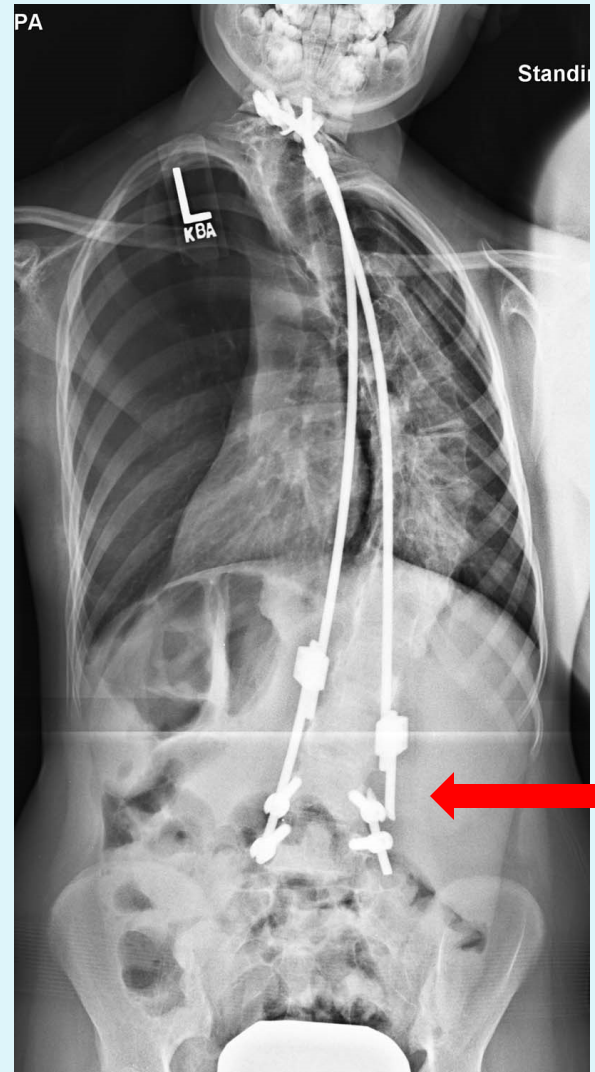
ES - HGT x 3+ yr



Age 4+10

Cobb: 50°

T1-12: 153.8 mm

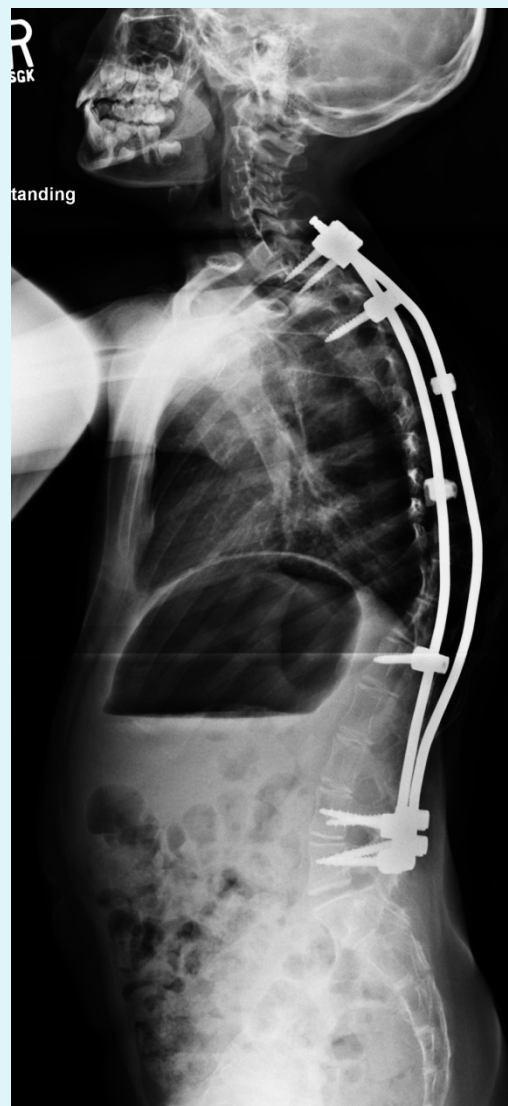
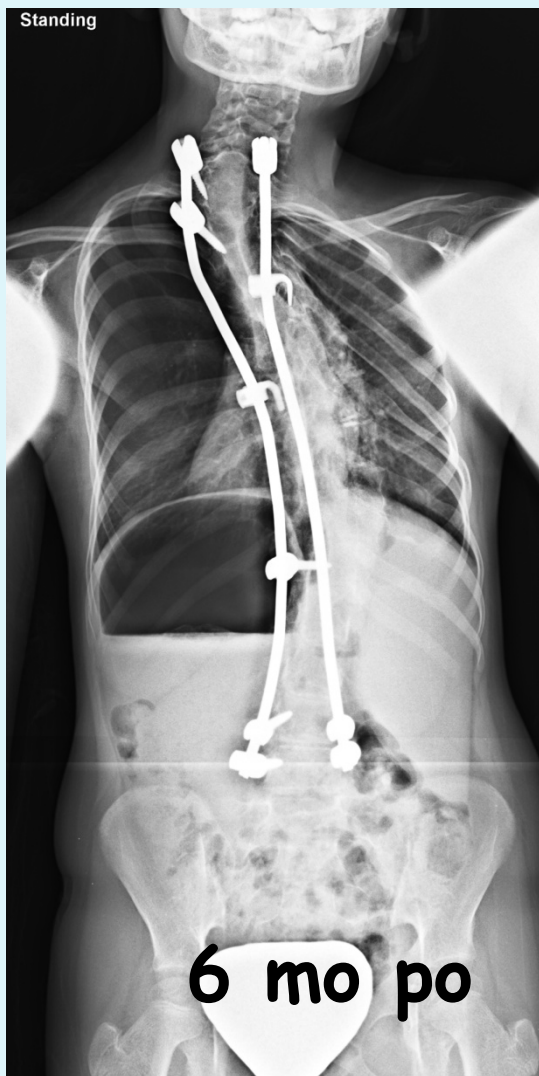


age 11

broken rod #3 + 9

scheduled lengthen

ASF (vats)/PSF with extensive posterior facet ankylosis



T1-12 = 21.0 cm
T1-S1 = 32.3 cm
T4-L1 48°
3 $\frac{3}{4}$ yr delay
5 yr surgical rx
PFT's : FVC 46%
FEV1 50%

4/11 - final fusion
5 yr surgical rx

Clinical - final fusion



F/u QOL
data
missing....
Challenge
for the
next
"graduate"
reports



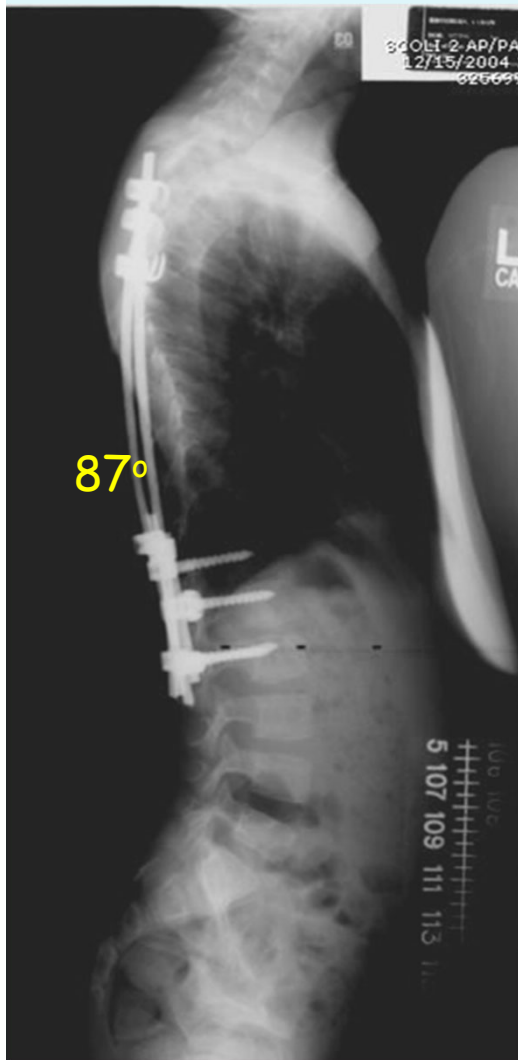


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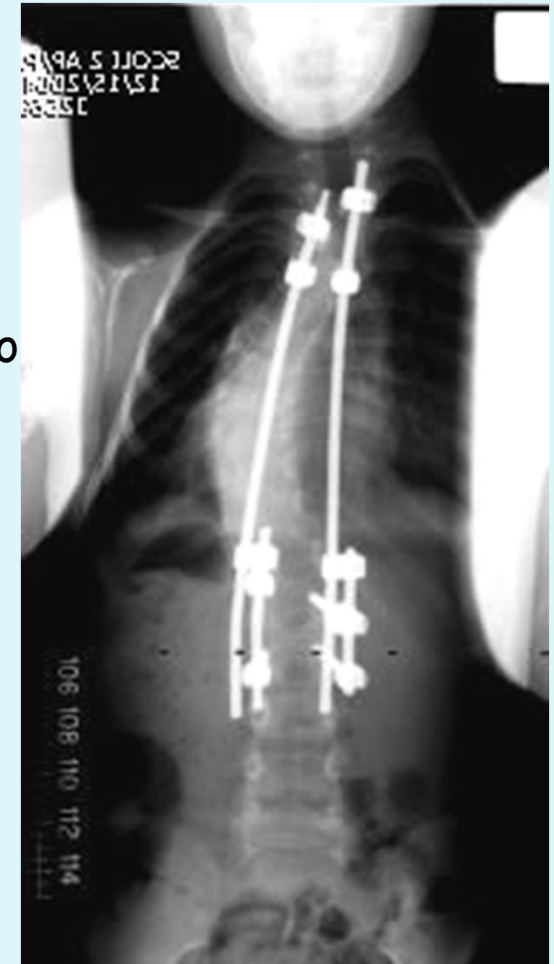
Thanks



5+6 yoM s/p neuroblastoma

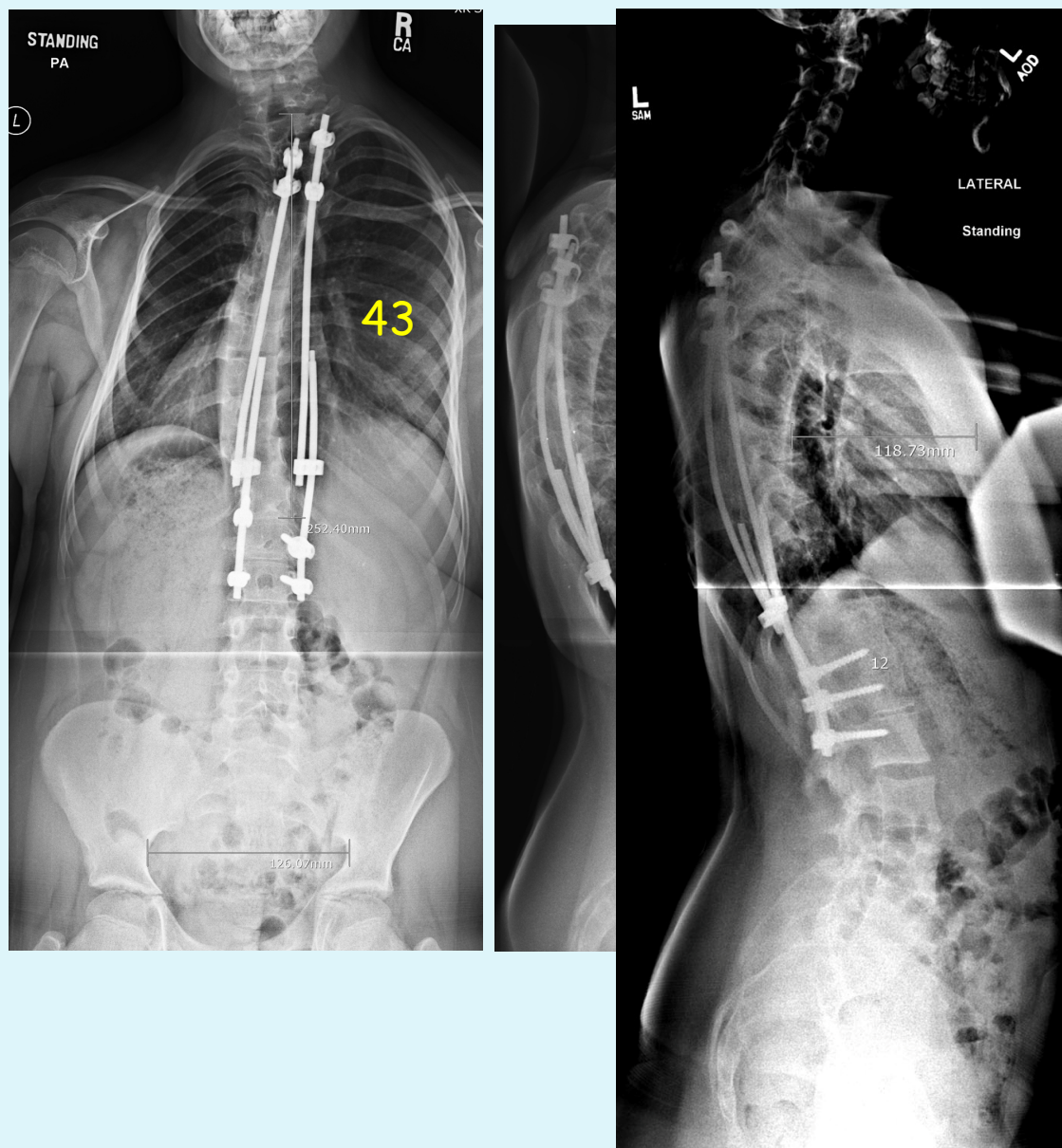


HGT x 3mo
then GRI

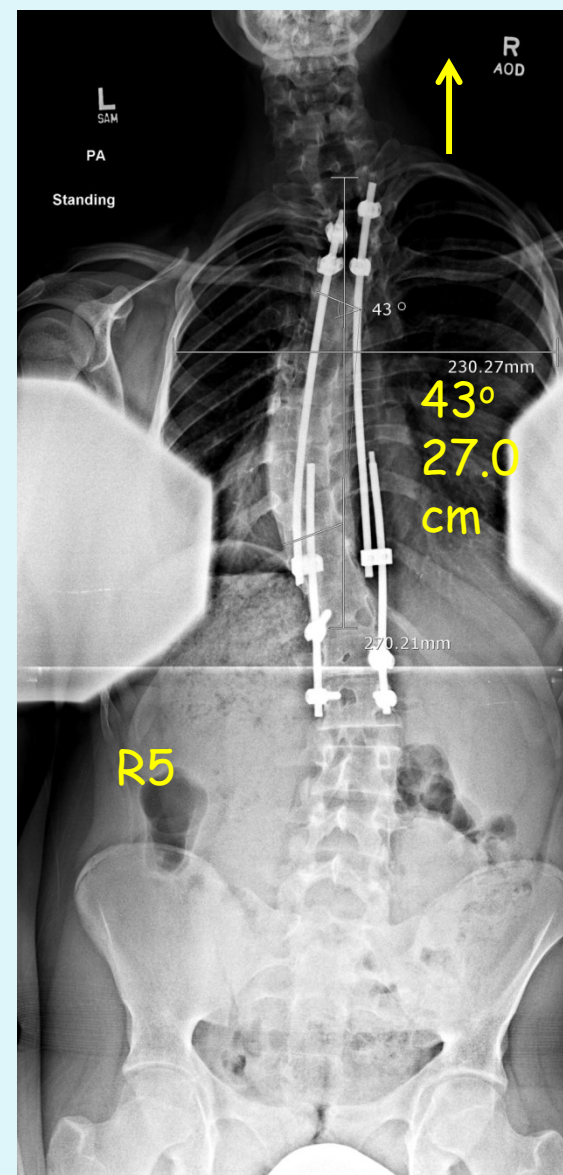


Too much kyphosis ?

Last lengthening 10/10 age 12



Last f/u 10/13 age 15

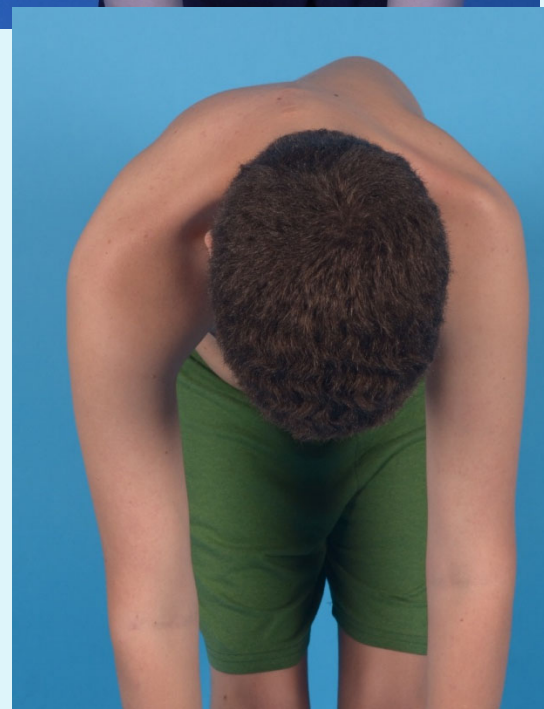




5+6



14



Final Outcome - what do we know?

Flynn JBJS 2013 - GSSG database

- Most patients get fused formally between 11-13
- Indication for fusion obscure (often 2° to recent complication)
- Final fusion extended proximally for pjk or pullout ; distally for coronal balance
- 81% with operative info reported to have stiff or autofused spine
- Final "correction" minimal or actually worse in 37% [correction could not be determined in 30% of cohort]
- Final fusion may not be final 2° more complications (Poe-Kochert/Thompson SRS '14)