Proximal segmental hyperkyphosis after VEPTR insertion

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Study performed at Children's Hospital Boston

- We have no financial disclosures

Proximal junctional kyphosis (PJK)

- Kyphosis between UEIV & one vertebra cephalad ≥ 10°
- Incidence of PJK after PSF: 30%
  - Not thought to be a clinical problem
- PJK also occurs with growing rods
  - Not clear if a clinical problem

Does PJK occur with VEPTR?

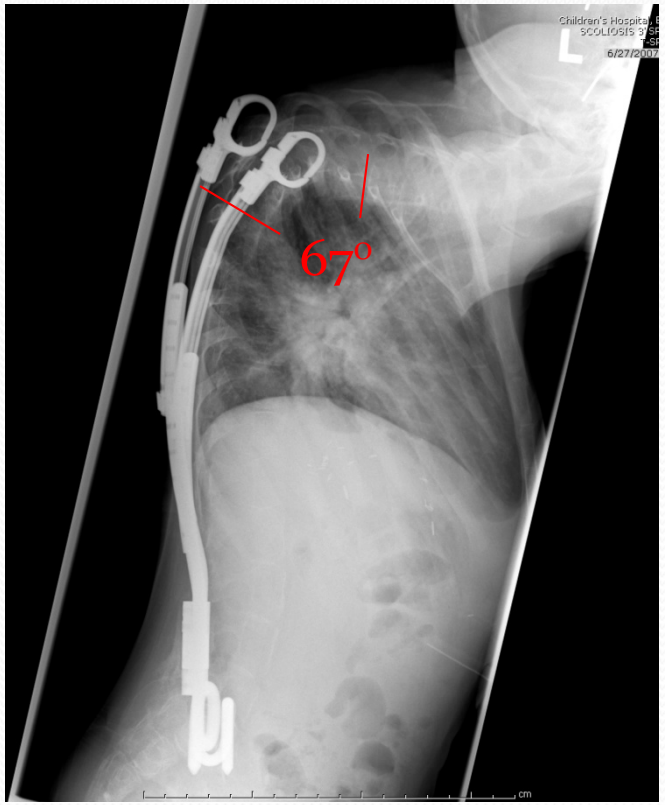
- Kyphosis above VEPTR construct has been observed but has not been clearly defined as a problem
- VEPTR may prevent ribs from deforming into kyphosis
- Spine may collapse independently into an acute upper thoracic kyphosis
- Similar in appearance to PJK

Purpose

- Does a PJK-like deformity occur with VEPTR?
- Severity, consequences, need for treatment

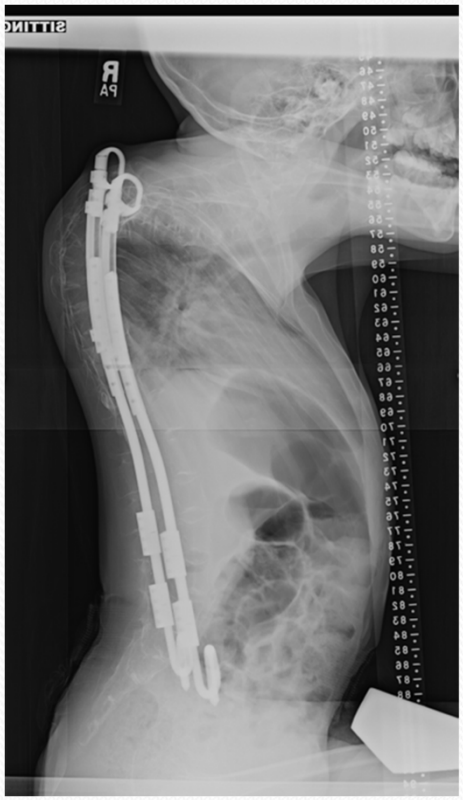
Methods

- 68 pts s/p VEPTR treatment (1999-2009)
- Proximal segmental hyperkyphosis (PSK):
  - No clear proximal junction with VEPTR
  - Kyphosis between IEP of vertebra 1 level caudad to instrumented rib & SEP of vertebra 2 levels cephalad to instrumented rib ≥ 20°



Results

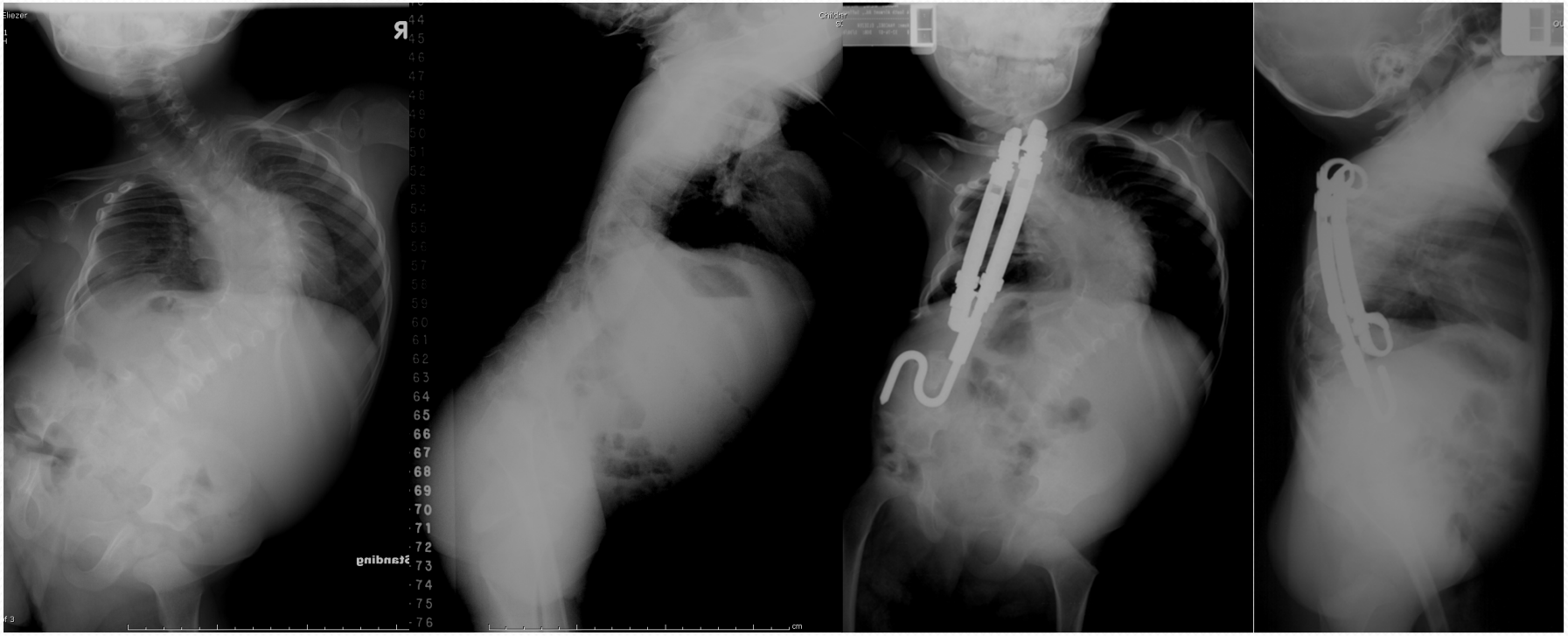
- 5 (7%) pts developed PSK
- Avg follow-up: 5.3 years
- 4 had preop thoracic hyperkyphosis
- All pts developed PSK within 1st year
- Avg PSK prior to subsequent intervention: 66°



Results

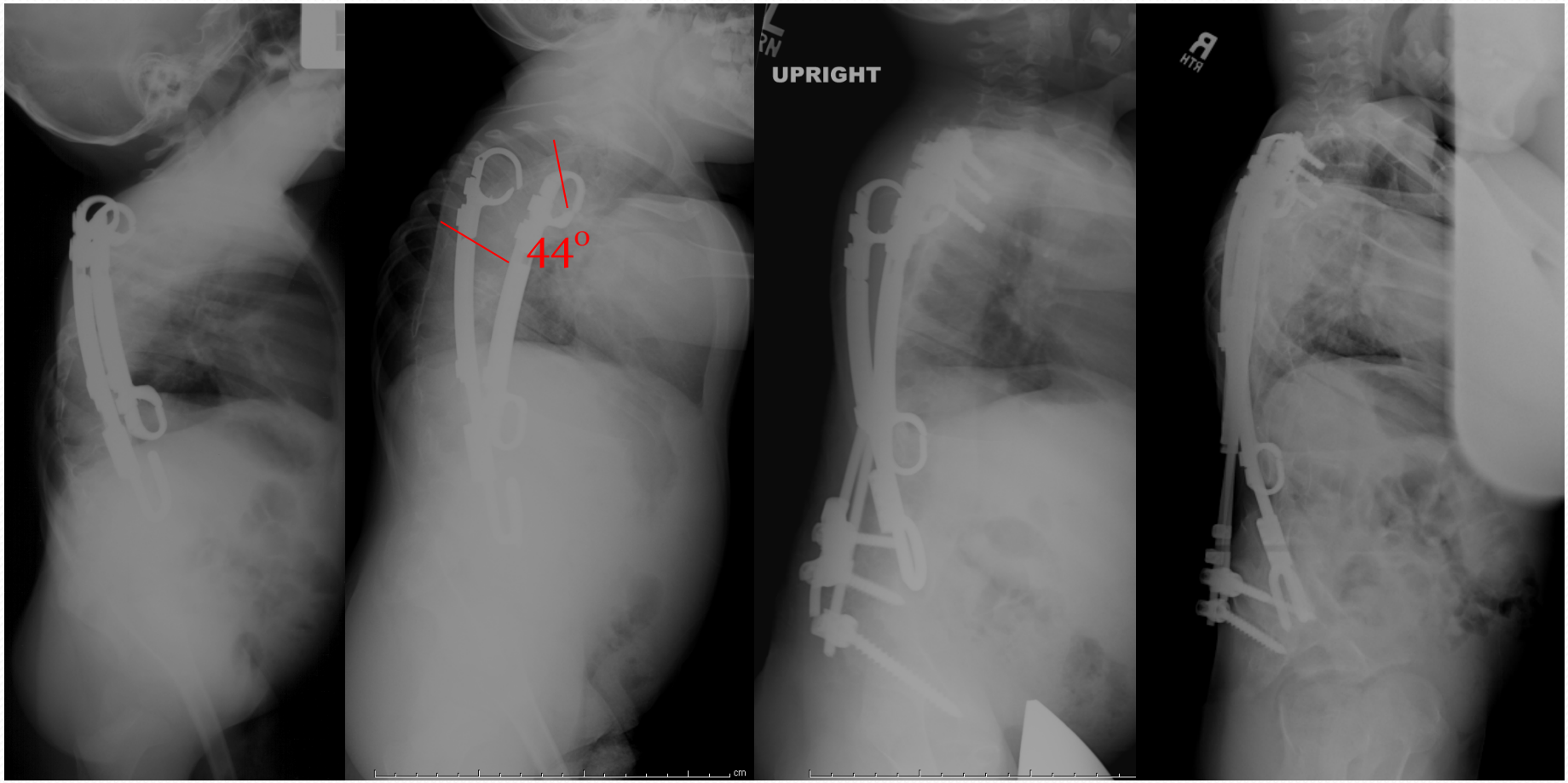
Patient	Intervention	PSK prior to intervention (degs)	PSK after intervention (degs)	PSK at most recent f/u (degs)	F/u after intervention (years)
1	Family chose to cont VEPTR	-	-	73	-
2	Died after halo placement	67	-	-	-
3	Growing rods	75	48	45	1.8
4	Halo traction + growing rods	44	10	-19	7.0
5	Halo traction + growing rods	73	9	6	0.8
Avg		**64**	**22**	**11**	**3.2**

Patient 4

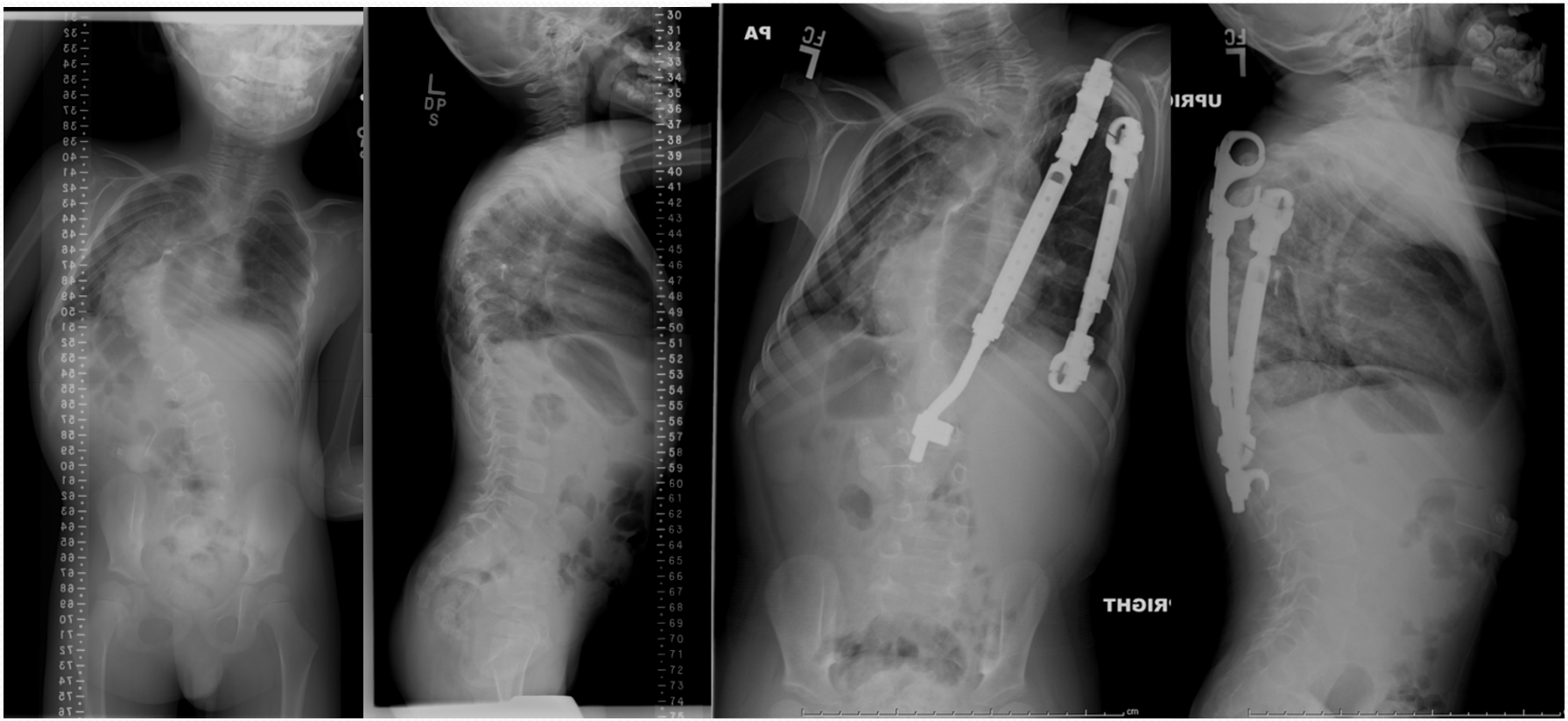


Patient 4

3 months | 10 months | s/p growing rods | 7 years postop

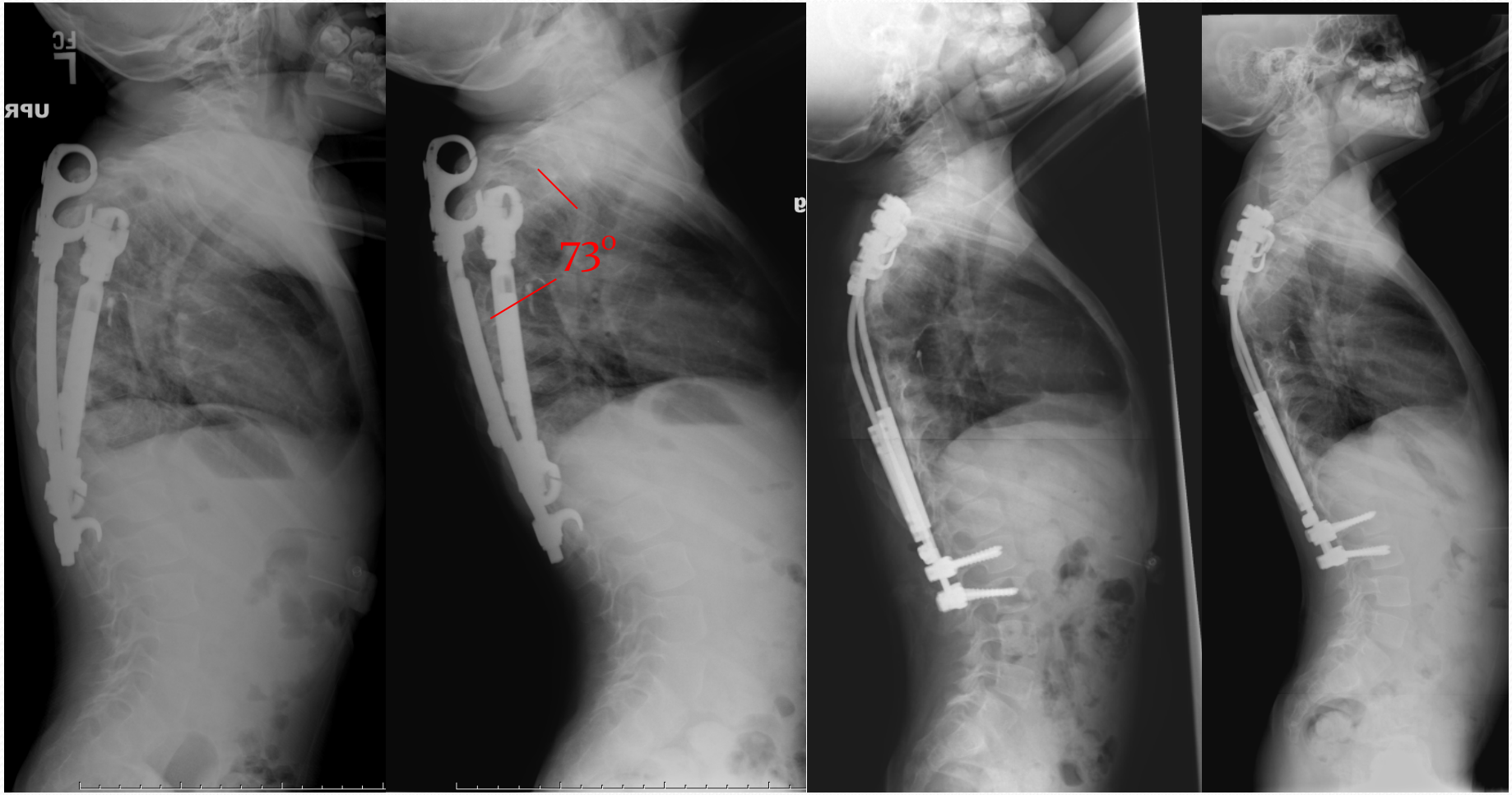


Patient 5



Patient 5

6 weeks | 6 months | s/p growing rods | 9 months postop

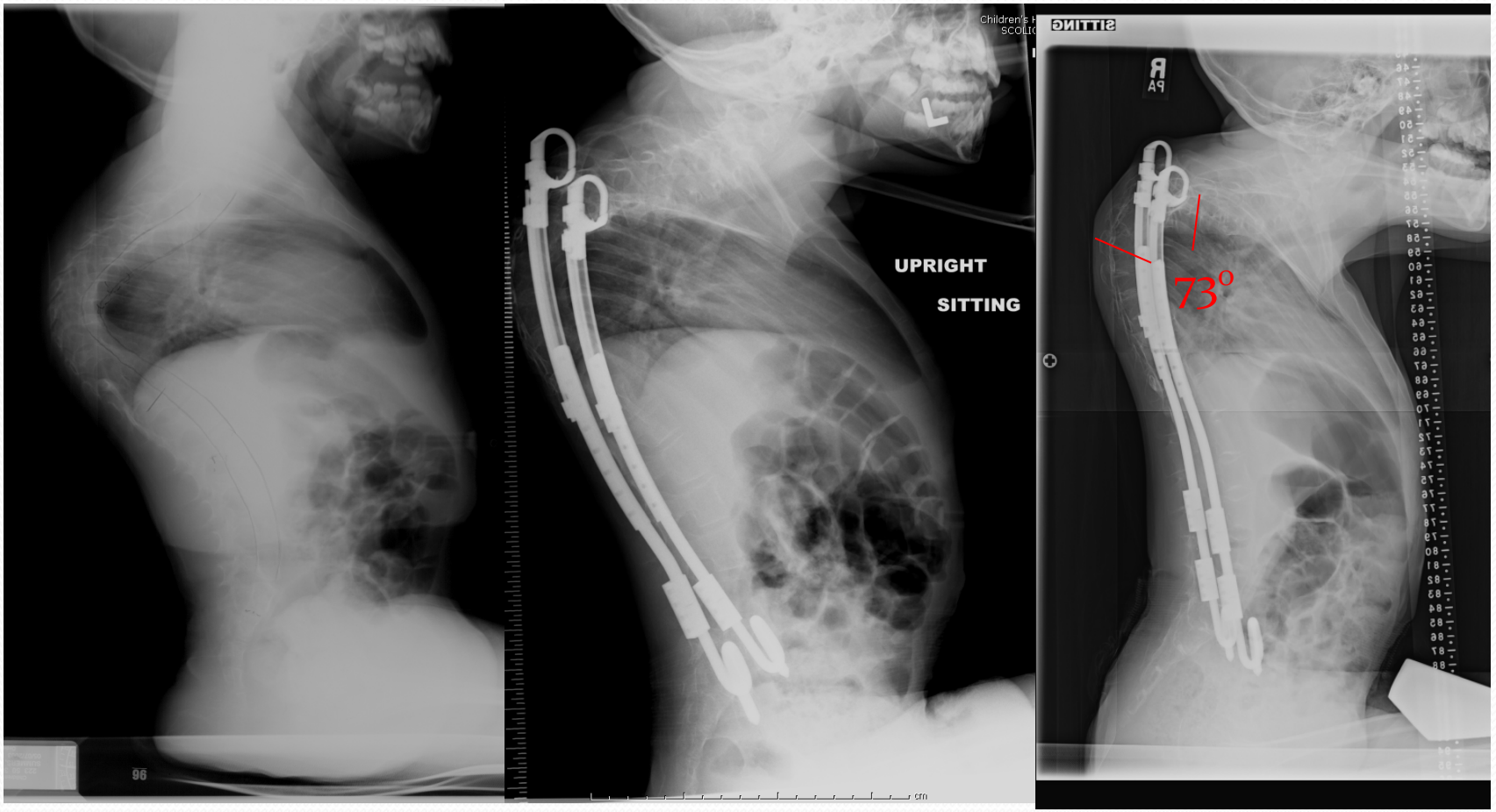


Patient 1

Preop

2 years

8 years



Discussion

- 1st detailed report describing PJK-like deformity with VEPTR & severity, consequences, need for treatment
- 7-38% risk of PSK
- Preop thoracic hyperkyphosis may be risk factor
- Rib-to-pelvis constructs do not necessarily decrease risk
- Consider revision to growing rods ± halo traction

Study limitations

- Retrospective study
- No comparison group
- Small number of pts
- Short follow-up
- Accurate measurement of kyphosis with co-existing scoliosis can be difficult

Conclusion

- Although the VEPTR does not contact the upper spine, an acute short-segment hyperkyphosis (PSK) equivalent to PJK can occur proximal to the construct
- Preexisting thoracic hyperkyphosis may be risk factor
- Can develop within 1st year of VEPTR treatment
- May be progressive & severe
- If left untreated, can require complex surgical interventions