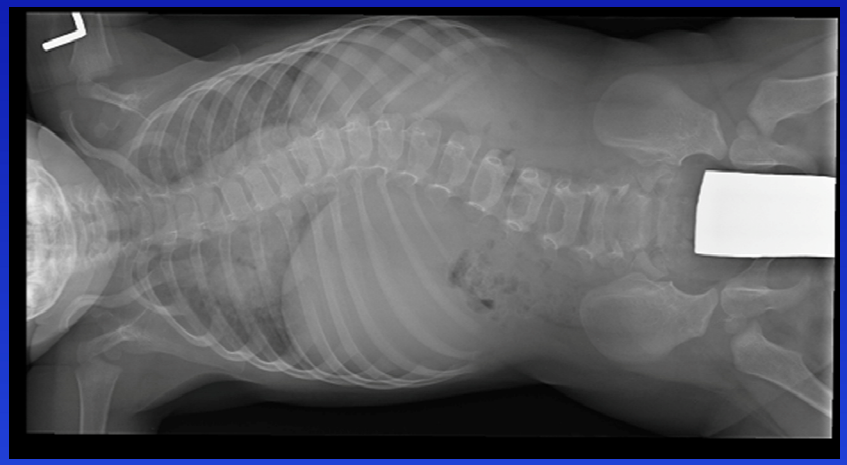
The Effect of Positioning on Radiographic Measurements for Early-Onset Scoliosis.



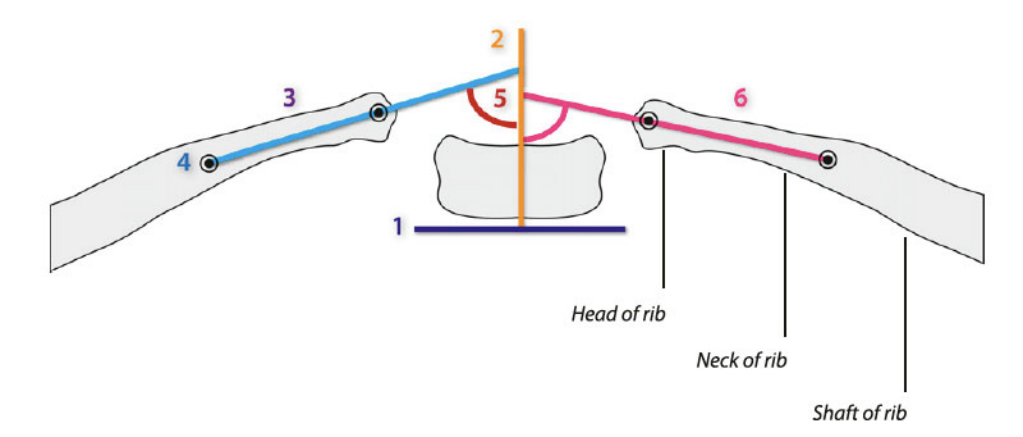
Caleb Behrend, MD
John Faust, MD
Suzanne Hilt, PNP
James Sanders, MD

Why does it Matter?

- Standard Scoliosis Films are Standing
- Infantile Scoliosis Occurs in Infants
- Infants Cannot Stand
- Mehta's Criteria Did Not State Supine, Sitting or Standing but were likely supine in babies
- Patients come to you at various developmental stages, yet you follow them as they develop – how do you interpret the measurements?

Questions Asked:

- Is The Curve Progressive or Resolving?
  - How Do the Parameters Change?
    - RVAD
    - Cobb
    - Phase



- How Do I Compare Radiographs Once The Child Can Stand With Those Before?

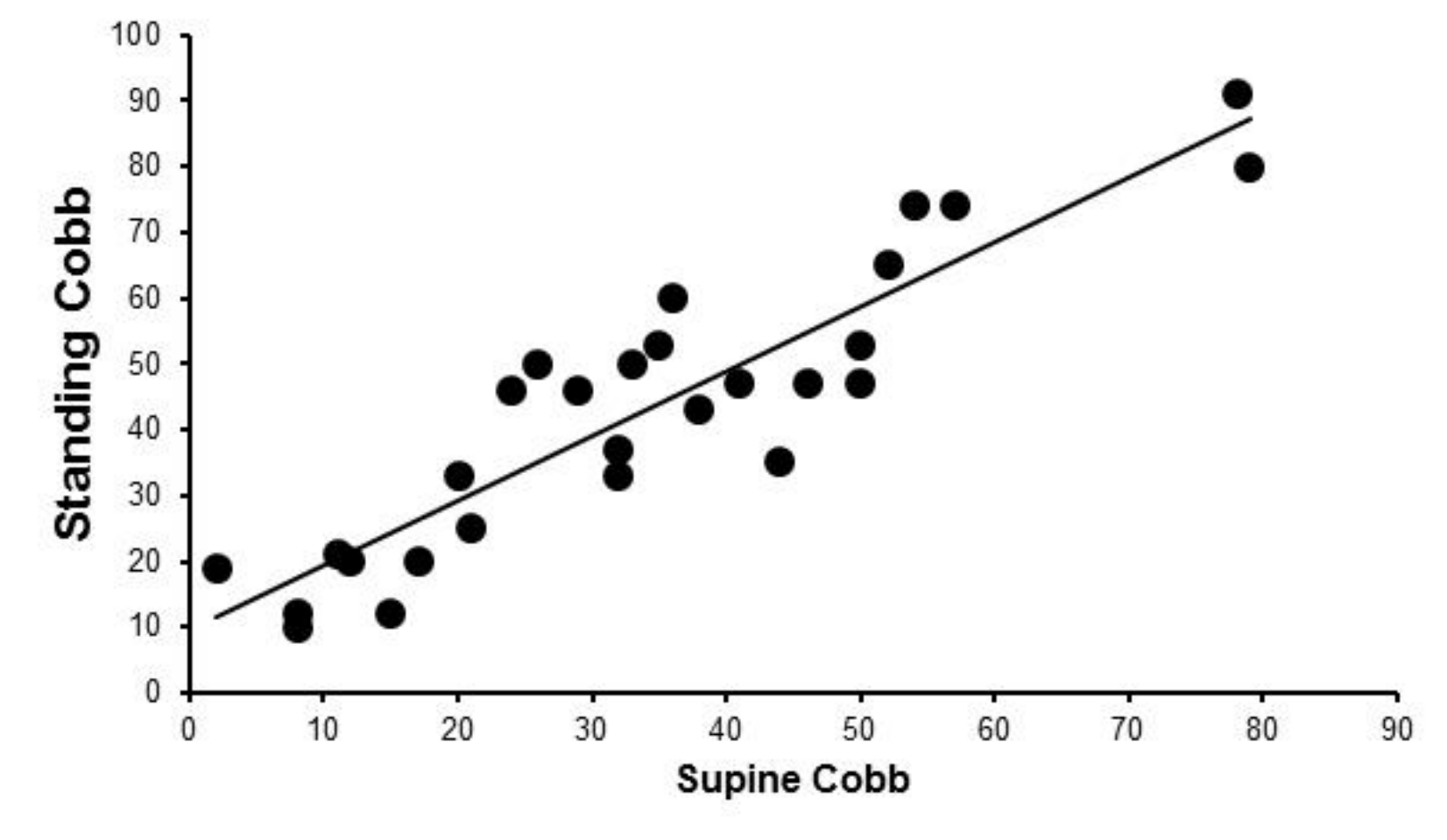
Methods

- Prospective Evaluation of Patients at University of Rochester with Early Onset Scoliosis Being Treated with EDF Casting
- Films were Routinely Evaluated with Supine and Either Sitting or Standing Films Based on Patient's Standing Ability until children could reliably stand.
- Radiographs were compared for Cobb Angle, RVAD, and Rib Phase were at one episode for each subject.

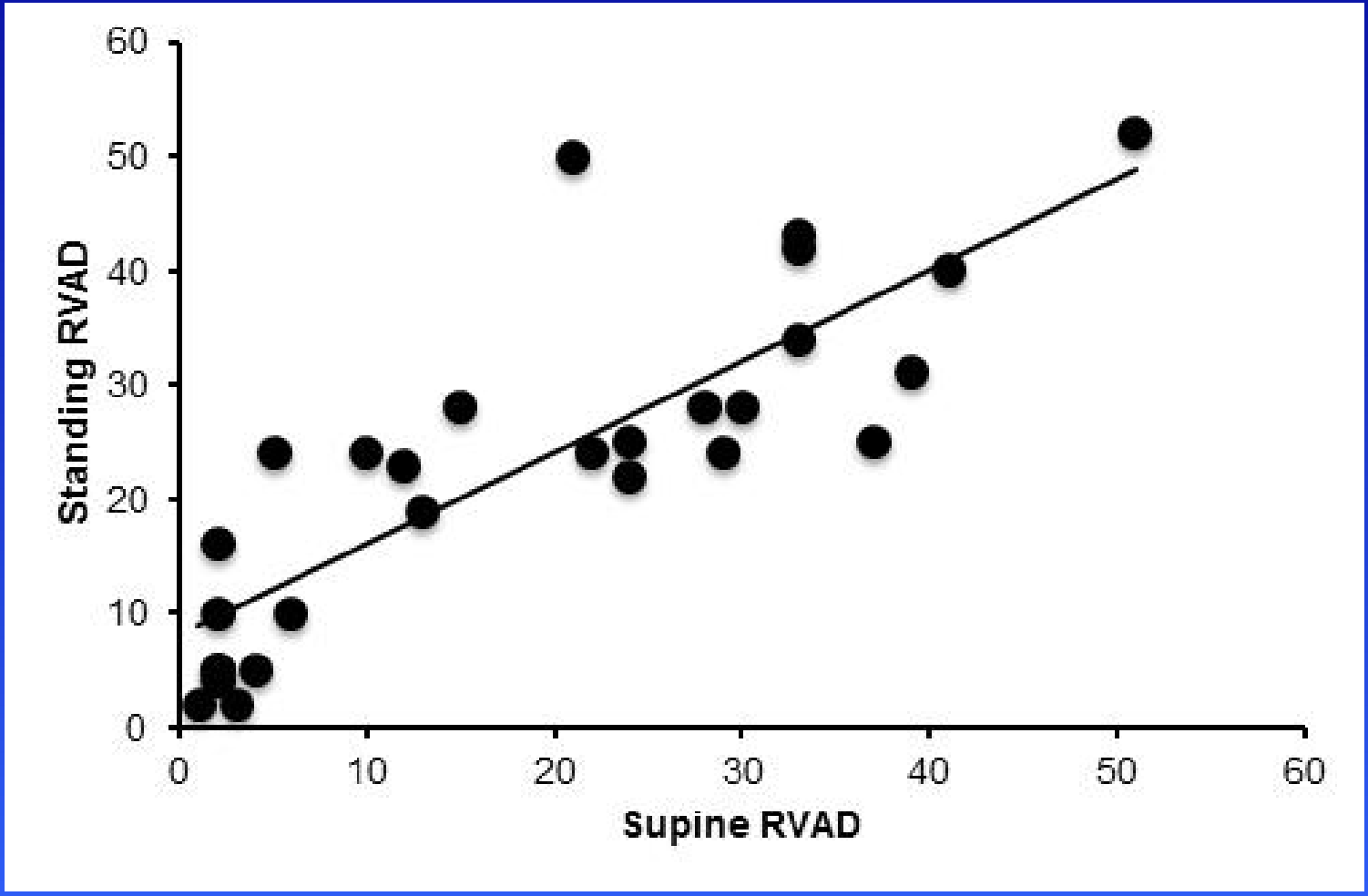
Results

- 26 Subjects
- mean age at first standing film was 2.7 yrs – std dev 1.3 yrs
- Cobb
  - Mean supine 32 degrees
  - Mean standing 43 degrees
  - mean change of 9 degrees $p<.001$
- RVAD
  - Mean supine 19 degrees
  - Mean standing 23 degrees
  - mean change of 4 degrees, $p=.01$
- 1 Patient went from Phase 1 to 2 with Standing

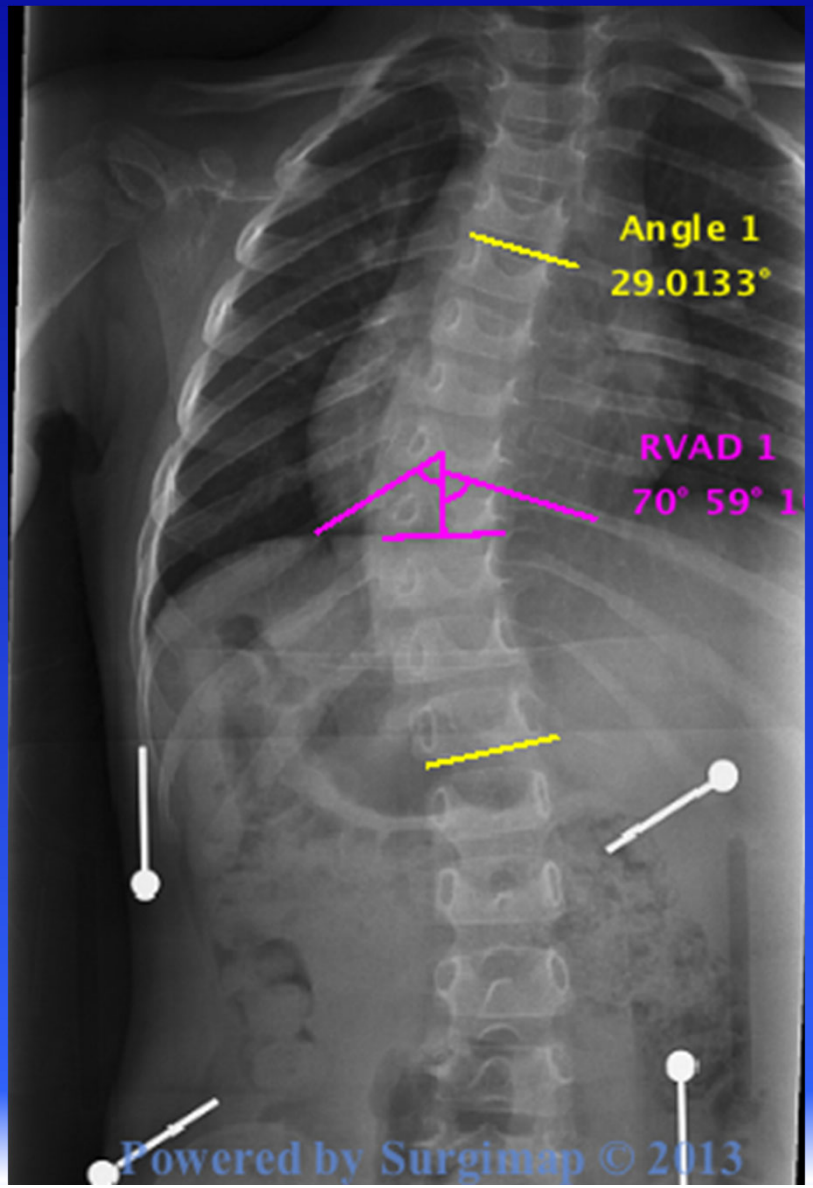
Cobb Standing vs. Supine

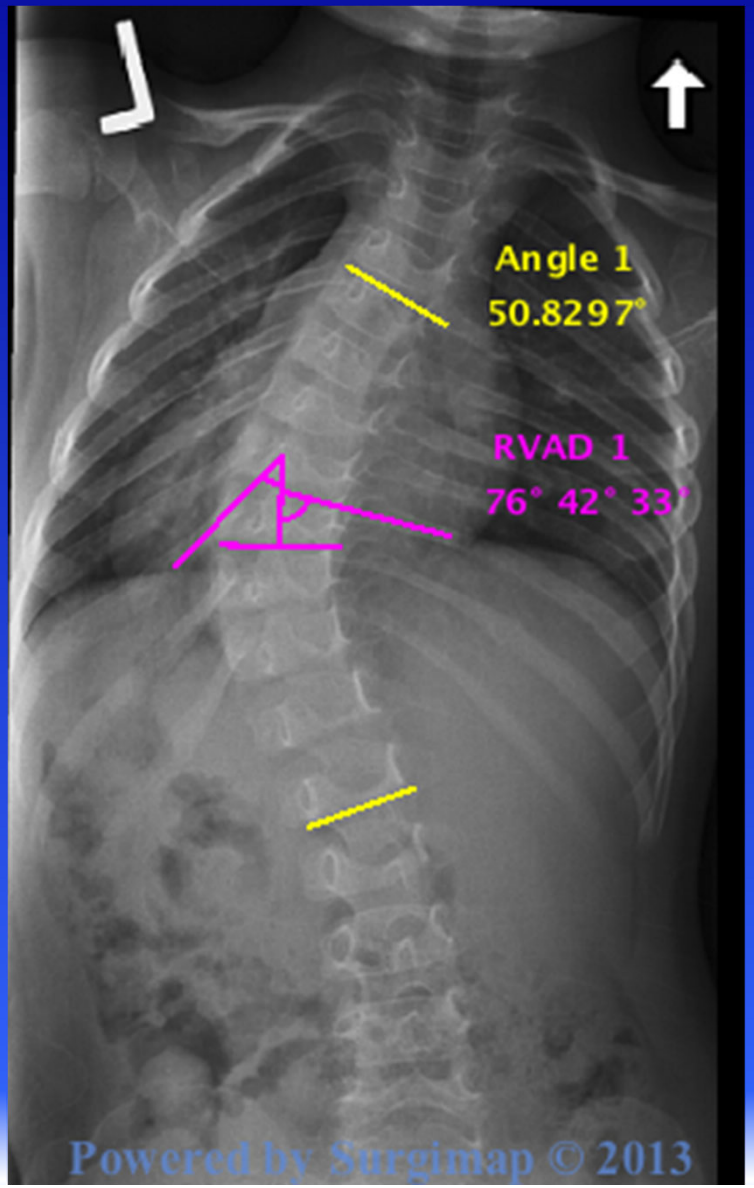


RVAD Standing vs. Supine

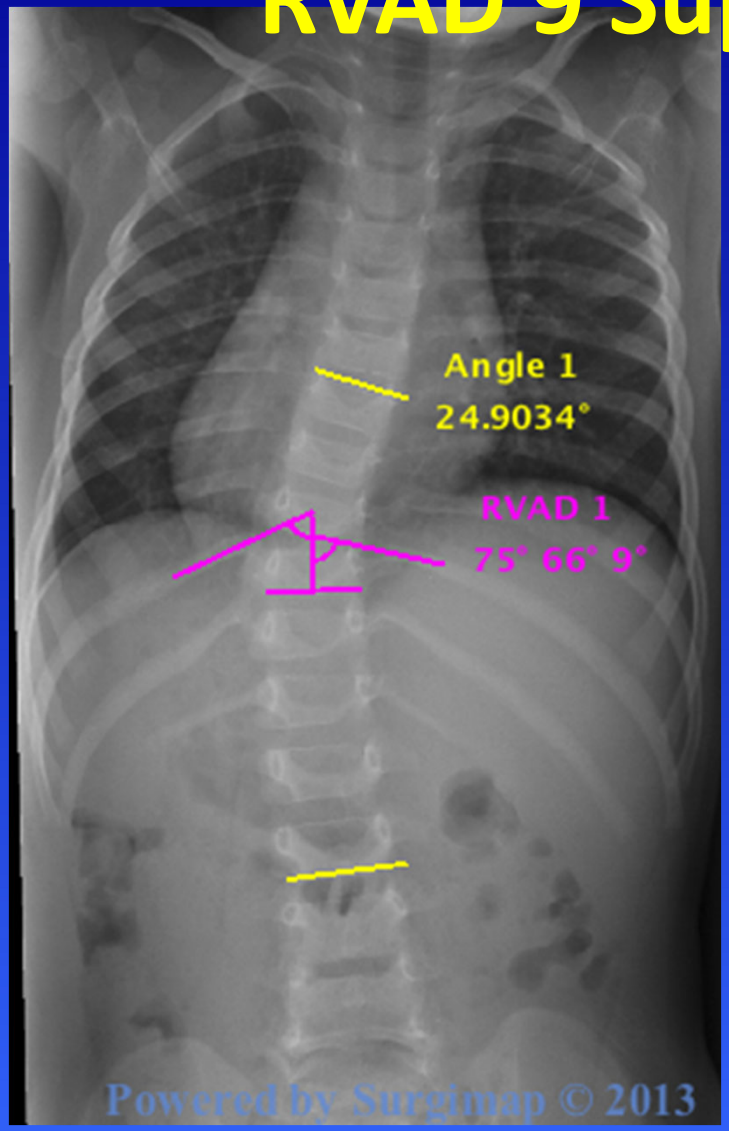


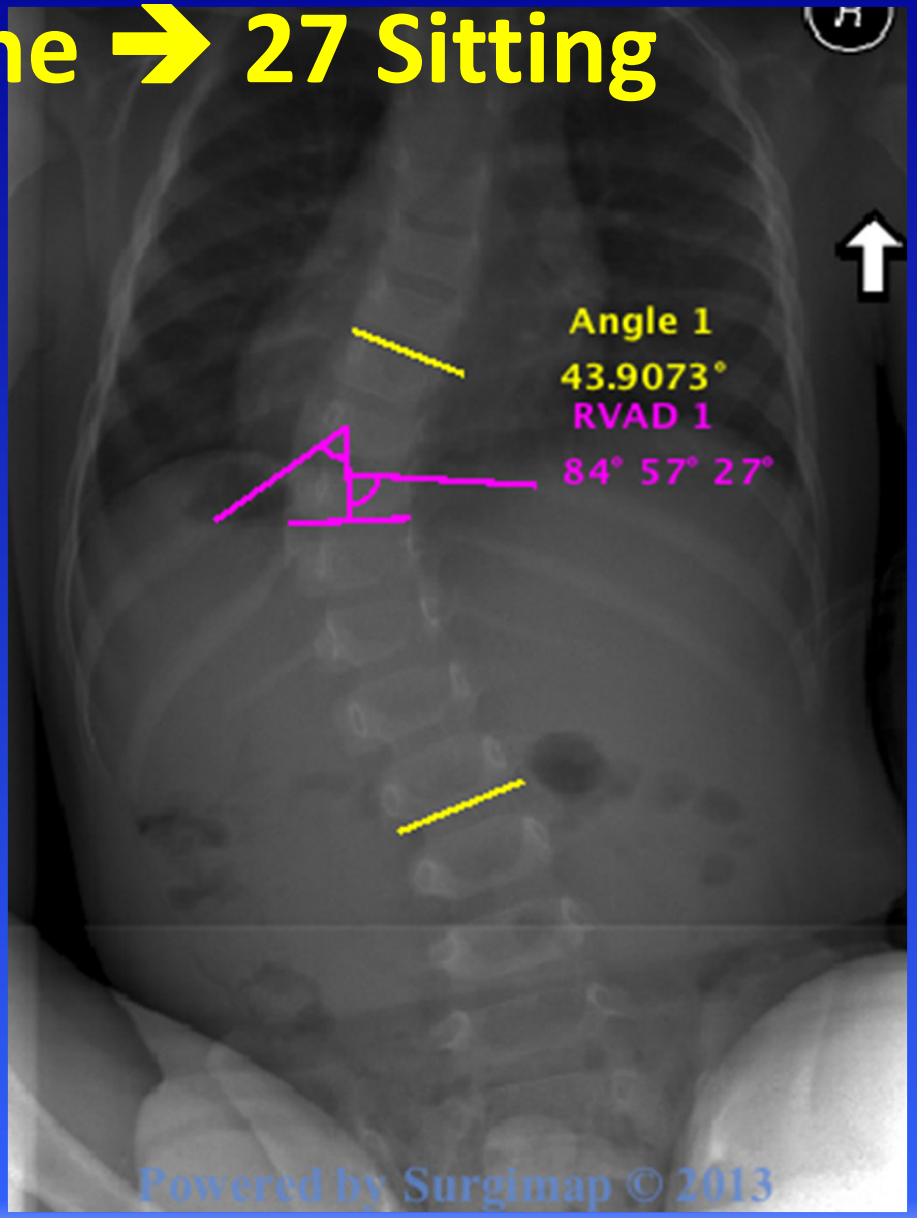
♀2+0 Supine Cobb 29 → 51 Standing
RVAD 1 Supine → 33 Standing





♂1+6 Supine Cobb 25 → 44 Sitting
RVAD 9 Supine → 27 Sitting





Limitations

- All the patients *a priori* had progressive infantile scoliosis
- All patients were starting or undergoing active treatment – serial EDF casting as described by Mehta

What are the take homes?

- There is a mean Cobb angle increase of nearly 10 degrees when children begin to stand
- The RVAD increases nearly 5 degrees but more stable than Cobb
- Need to add this to the inter and intra-rater variability (Corona, et al, JBJS 2012)
  - 5 degree RVAD <20 and 6 degree RVAD >20
  - 3 degree Cobb
- Less clear that we really understand how these measurements relate to prognosis

Thoughts

- The distinction between progressive and resolving may not be as clear as we were taught.
- Most of us are so busy dealing with the next child having a terrible curve that we don’t yet understand the nuances of this disorder.
- Can we understand this disorder by just focusing on the larger curves?