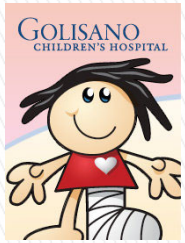
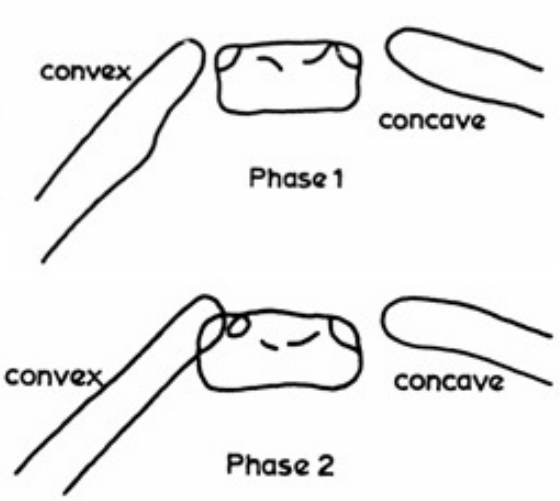
The RVAD in Infantile Scoliosis – What does it really represent?





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What is the RVAD anyway?

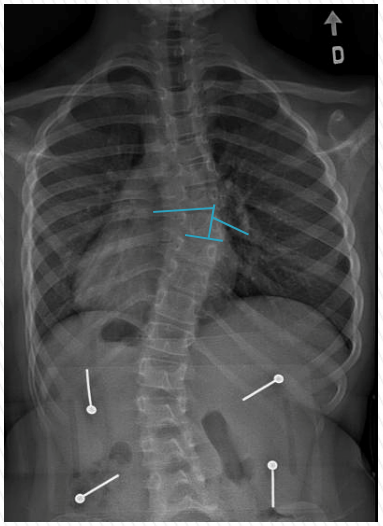
- The angle between the actual vertebral body and the ribs?
- A reflection of the spine's rotation?

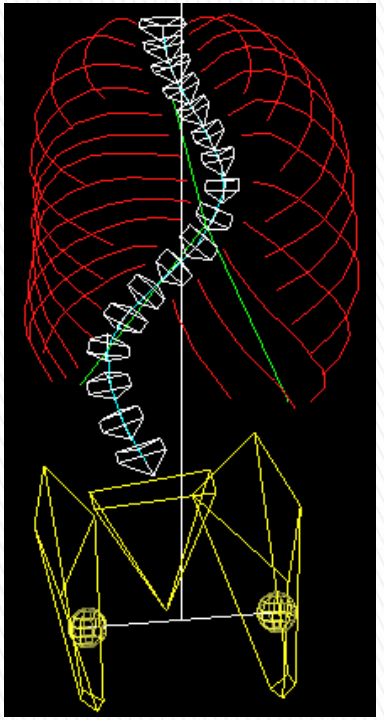
- We know that in severe curves, the ribs really do slope.
- But, phase II ribs probably represent rotation.

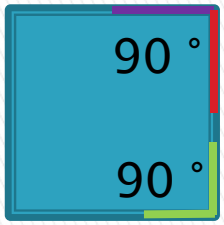
- We really don't know what to make of the RVAD as a physical entity or why it is related to prognosis.

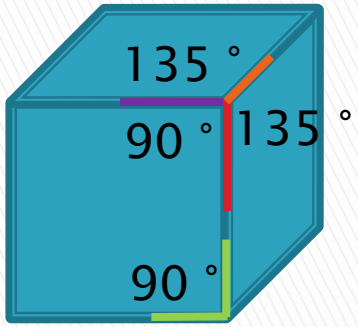
Purpose

Evaluate RVAD in 3D to determine its physical significance because 2D angles vary according to position of observer

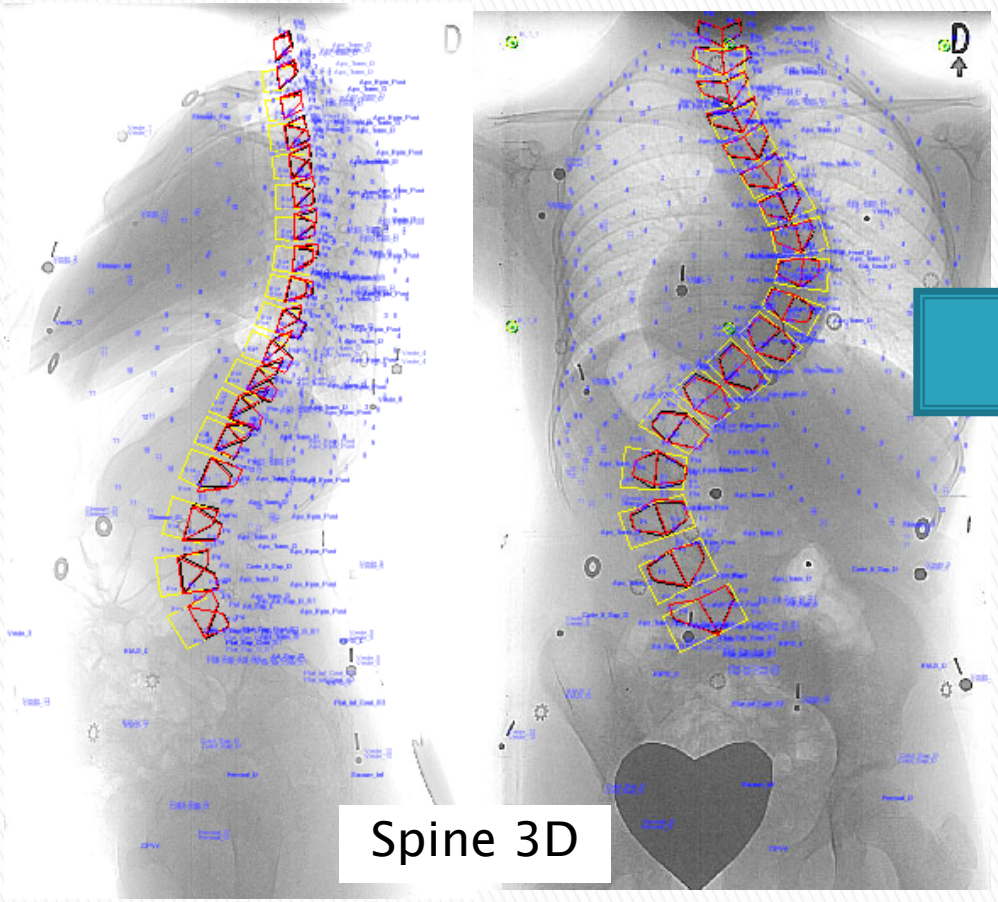




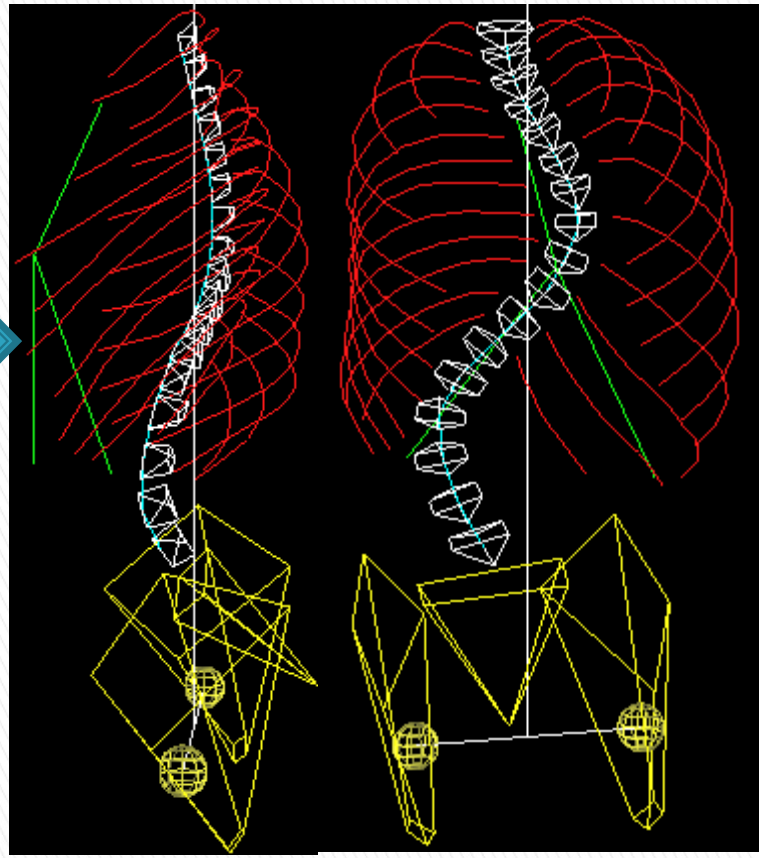




3D Reconstructions

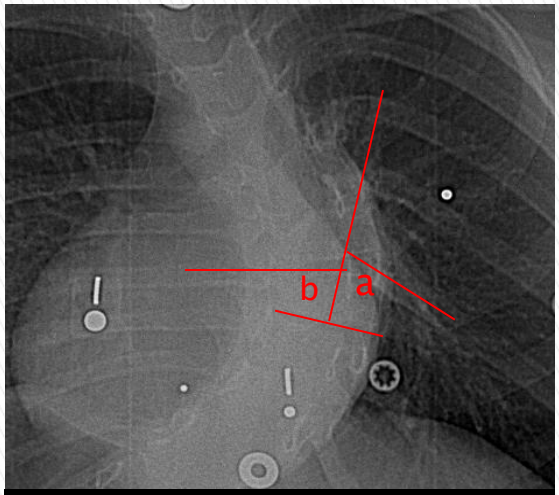


Spine 3D



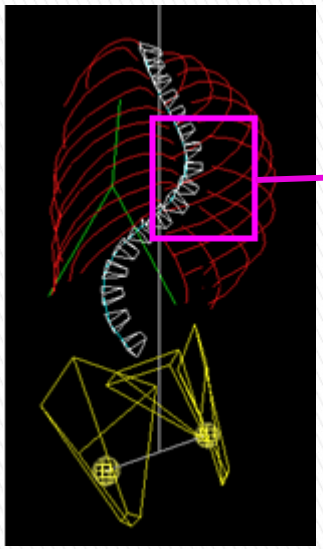
Rib Vertebra Angle Difference (RVAD)

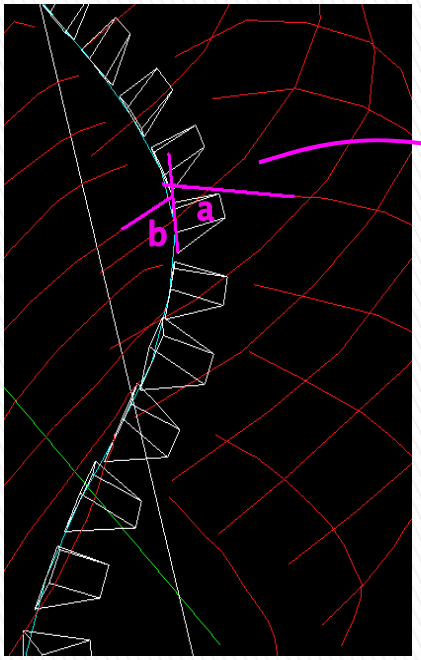
- **RVAD** (measured on coronal plane, Mehta's method)
- **RVAD3D**: Computed in 3D

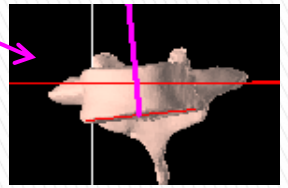


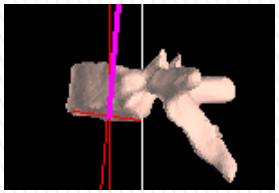
RVAD=b-a
(concave – convex side)

Mehta, 1972



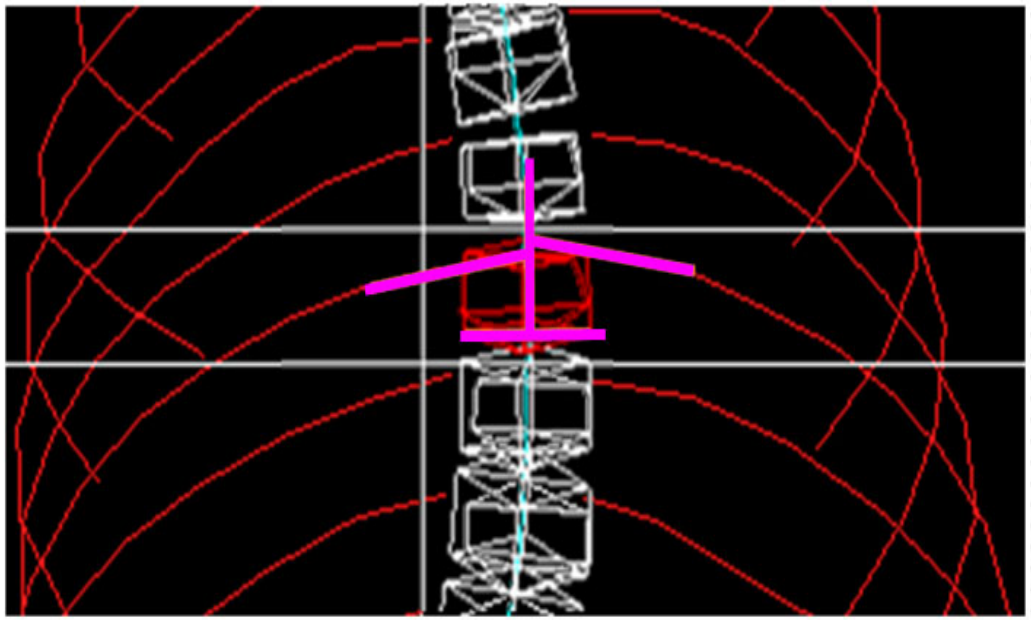






Rib Vertebra Angle Difference (RVAD)

- Local RVAD
  - 2D measurement from reconstruction
  - Measured in the local plane of the vertebra (Stagnara's plan d'election, 1965)



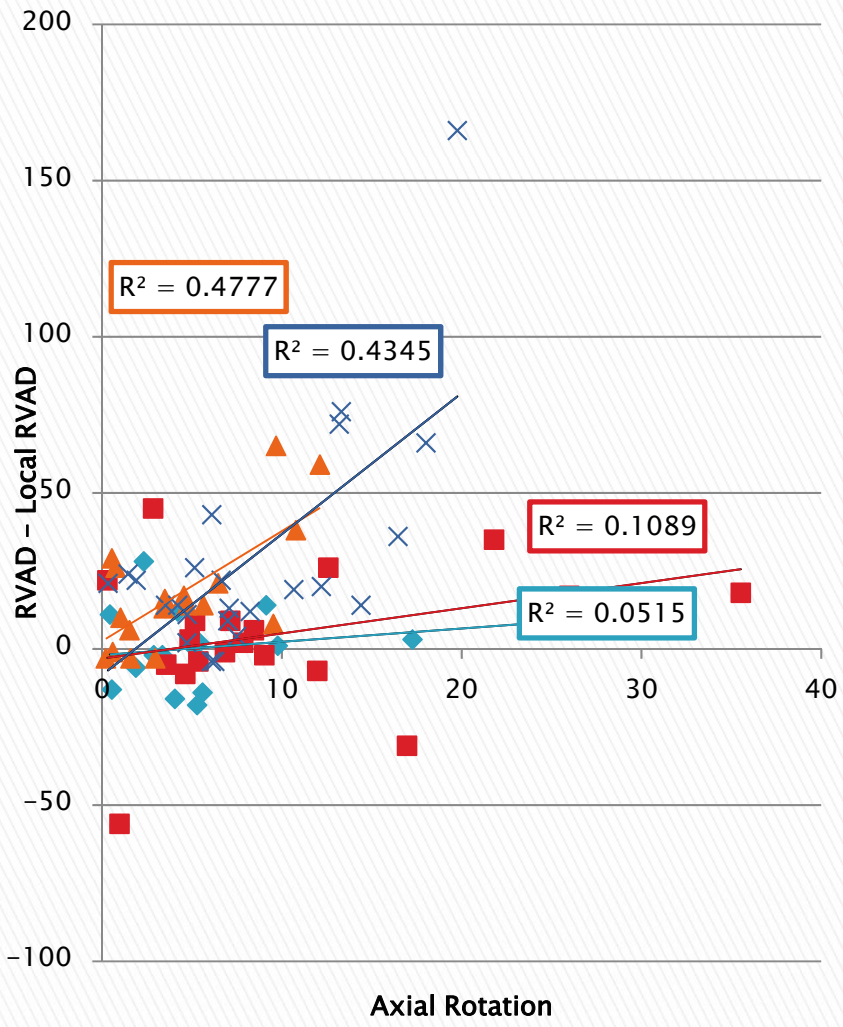
Patient data

- Age : 5.4 ± 2.3 years
- 26 females, 16 males
- Cobb : 43.3 ± 19.9 °
- 18 Phase I, 24 Phase II patients

- 42 Early Onset Scoliosis patients

Results

- 42 Early Onset Scoliosis patients
- The RVAD weakly associated with spinal axial rotation ($R^2 = 0.02$)
- Strongly associated with the 3D RVAD ($R^2 = 0.65$)



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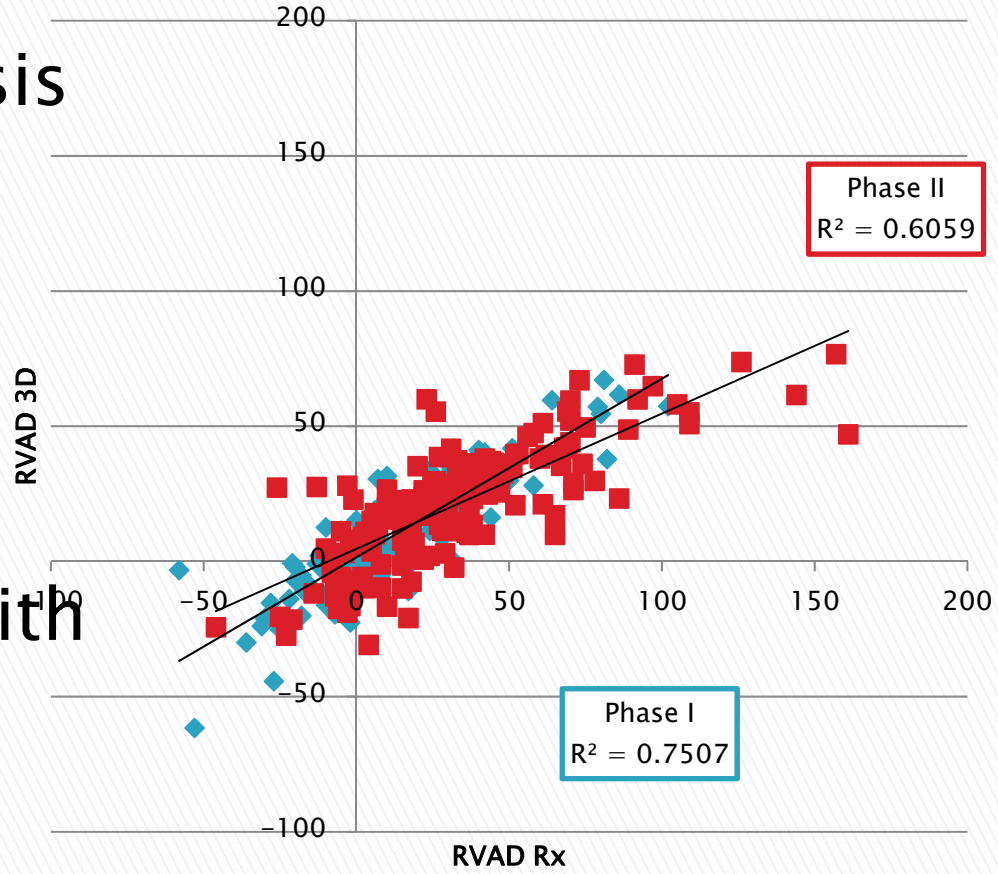

Conclusion:

- RVAD is a projection of 3D geometry of chest wall/spine
  - Not true representation of 3D nature of deformity
  - Compound of factors : projection, axial rotation, chest wall/spine asymmetry
- RVAD 3D
  - Deformation of rib cage in relation to spine

Discussion Thoughts:

- RVAD is really a spine to rib (chest wall) and not a rotation measure
- This still leaves us with the question of why is this chest wall to spine factor so important in curve prognosis.