The Effect of Rib-Based Distraction Surgery on Spine Growth

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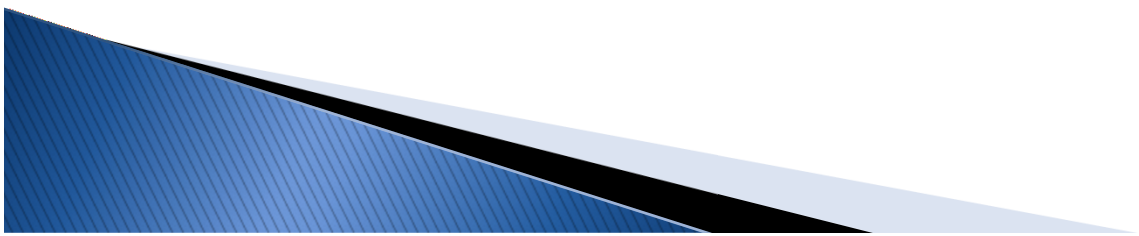
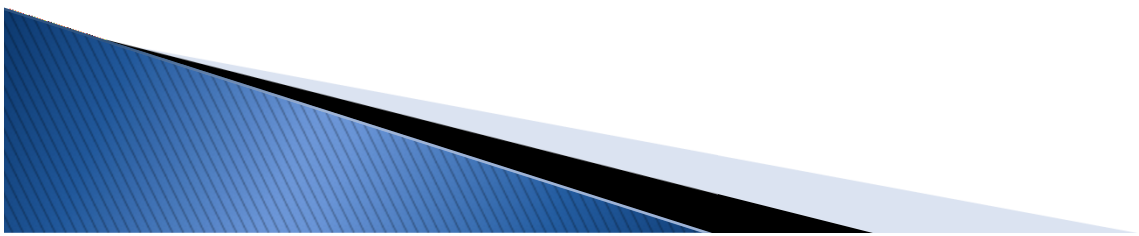
Disclosures

- Research / Educational Support
  - Depuy-Synthes Spine Canada
  - Medtronic Canada
- Consultant
  - Halifax Biomedical Inc.



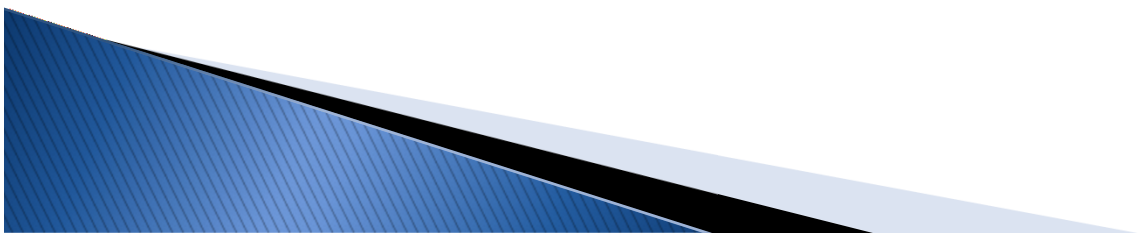
Purpose

- To evaluate the effect of rib-based distraction surgeries on spine growth in children with Early Onset Scoliosis.



Hypothesis

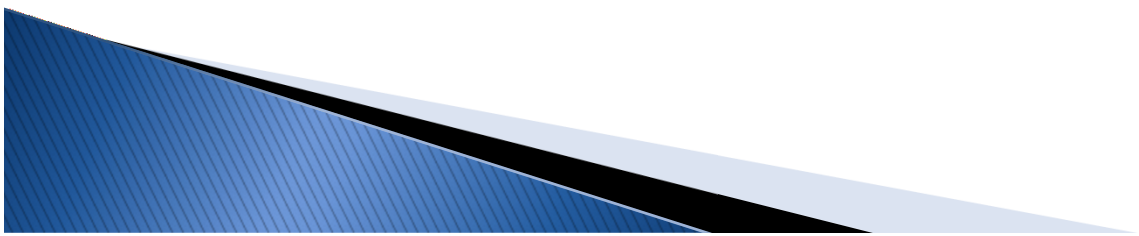
- Rib-based distraction will improve spine growth.
- These gains in spine growth may decrease over time.
- This decrease may be related to the normal slowing of T1-S1 growth between the ages of 5 and 10 years.



Methods

- Multi-center review

- EOS (<10 y.o. at diagnosis)
  - Treated with rib-based system
  - > 5 yr f/u
  - > 3 lengthening procedures
  - Radiographs available between each lengthening



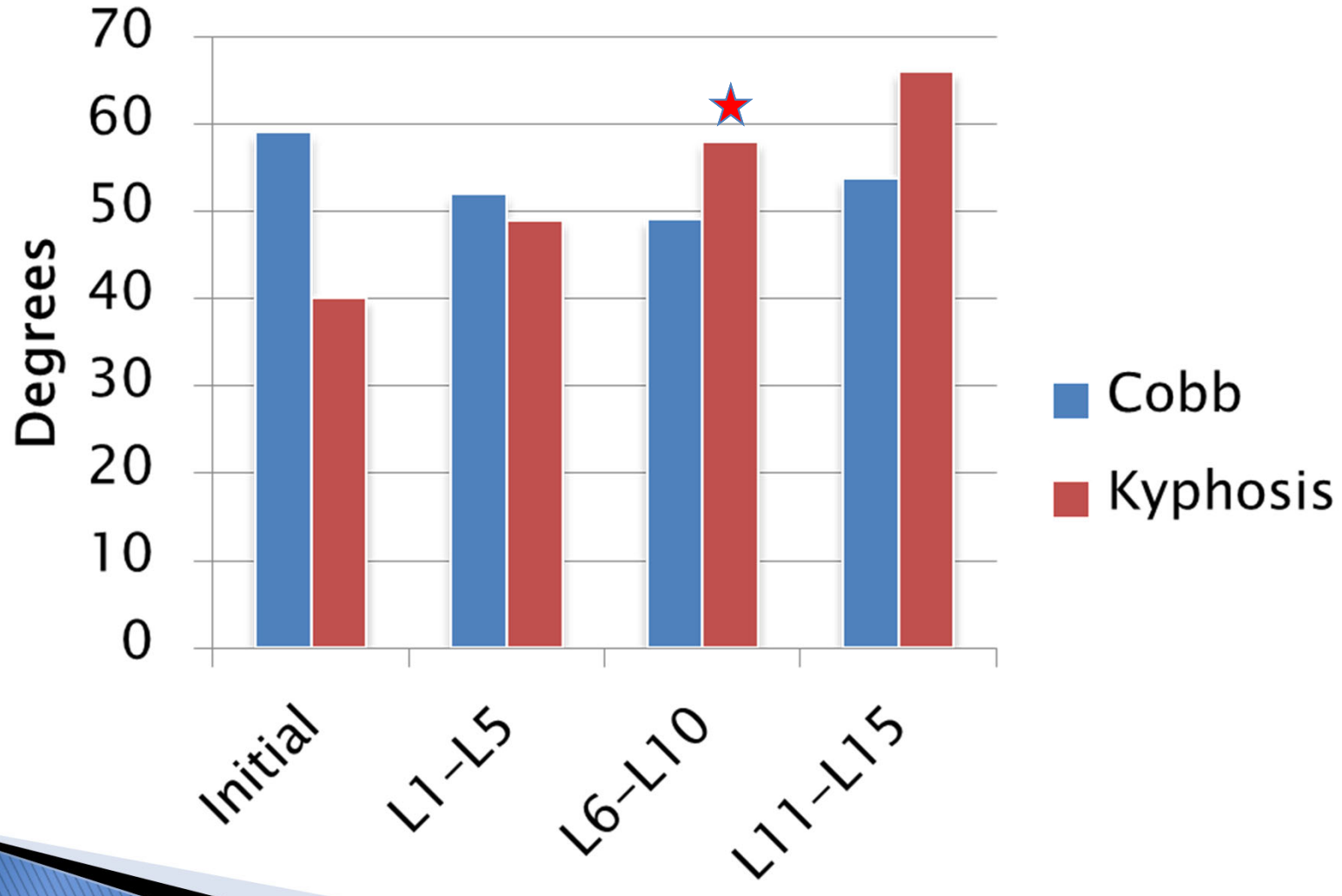
Methods

- Primary Outcomes:
  - T1-S1 height
  - Change in T1-S1 height / lengthening procedure
  - Normalized to the expected age-based T1-S1 growth

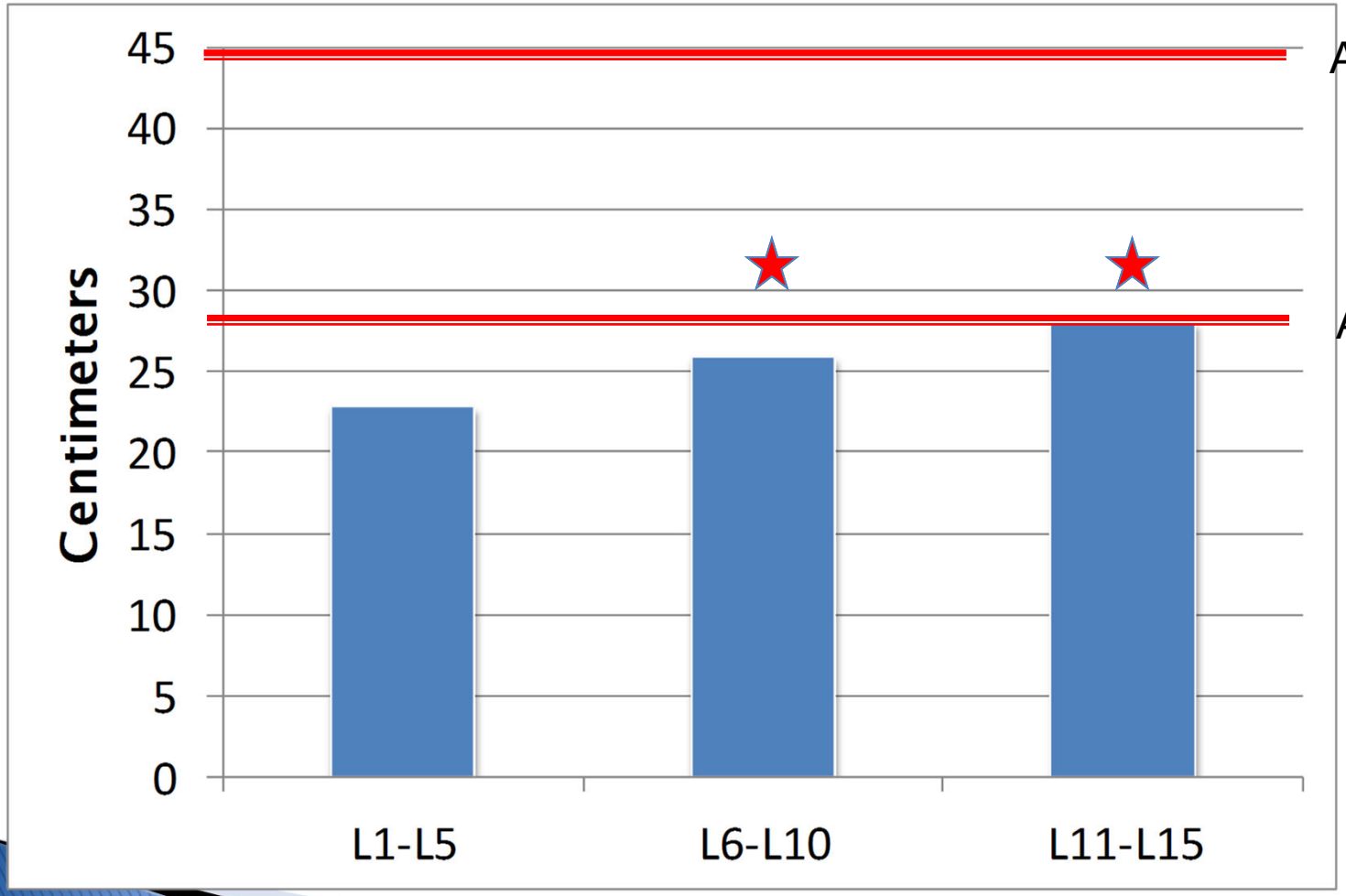
Results: Initial Surgery

- 37 subjects
- Mean Age = 2.7 years
- Cobb = 59°
- Kyphosis = 40°
- 9.1 Lengthening surgeries

Results: Deformity

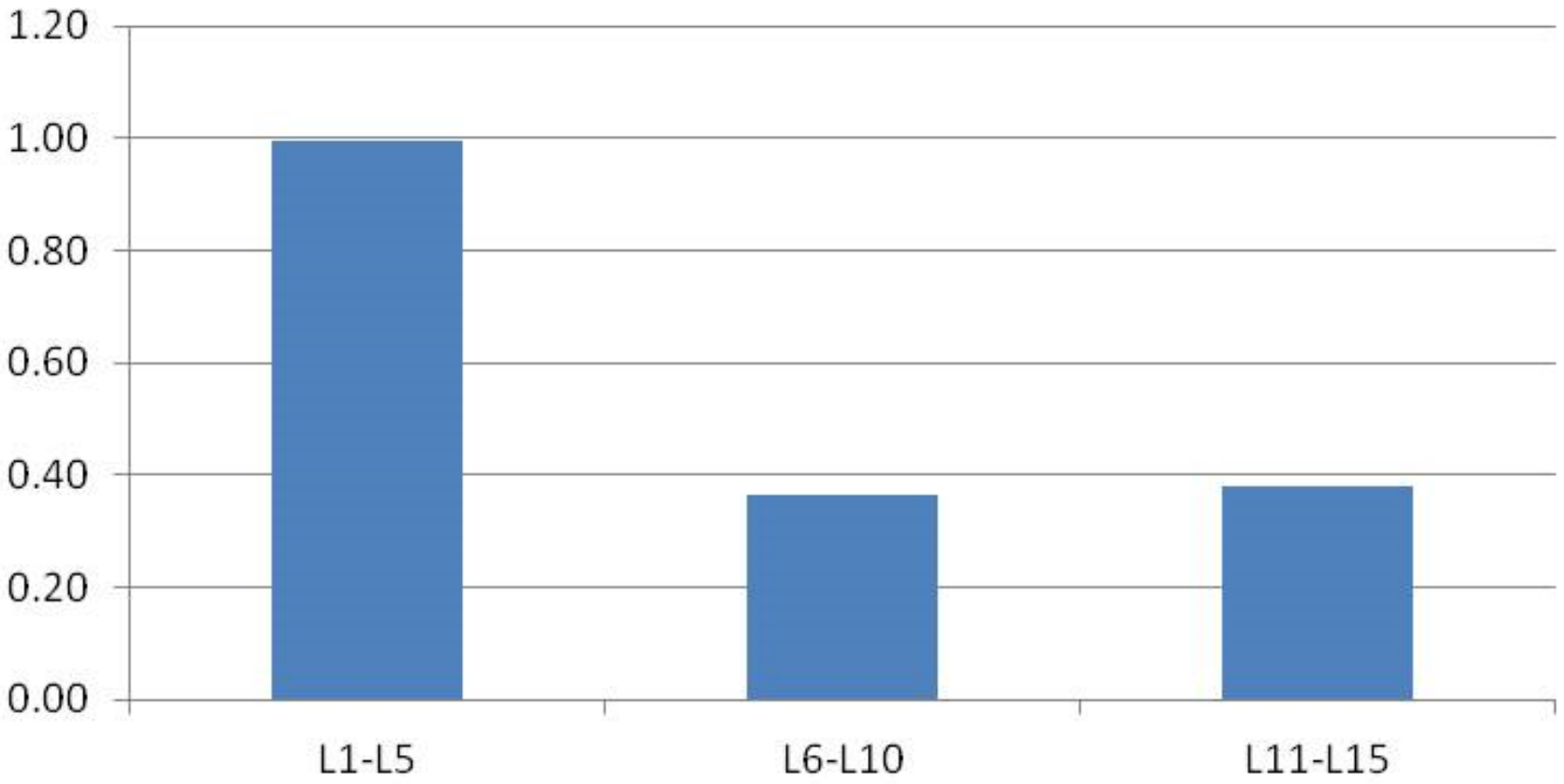


Results: T1-S1 Height

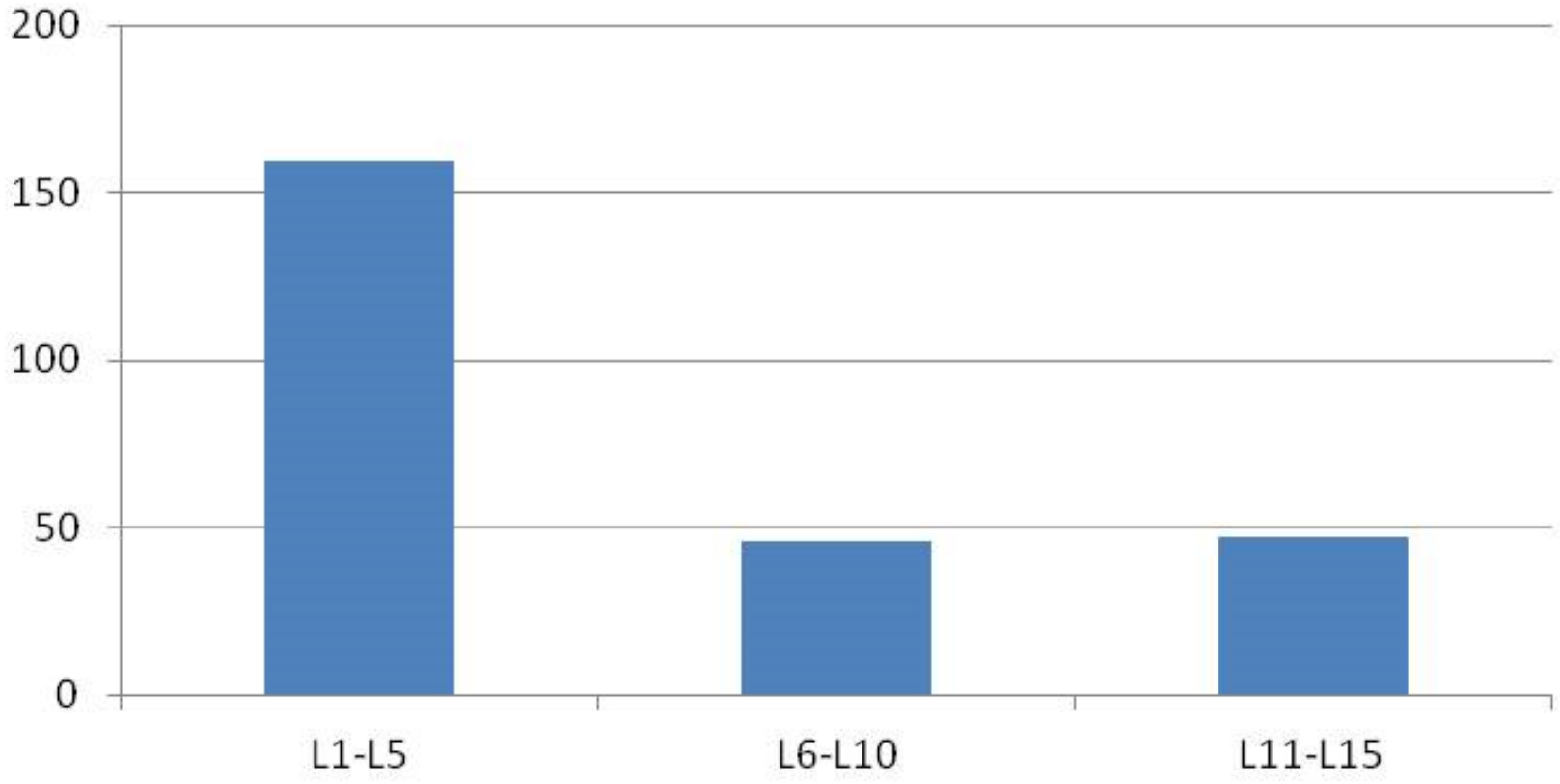


★ P<0.05

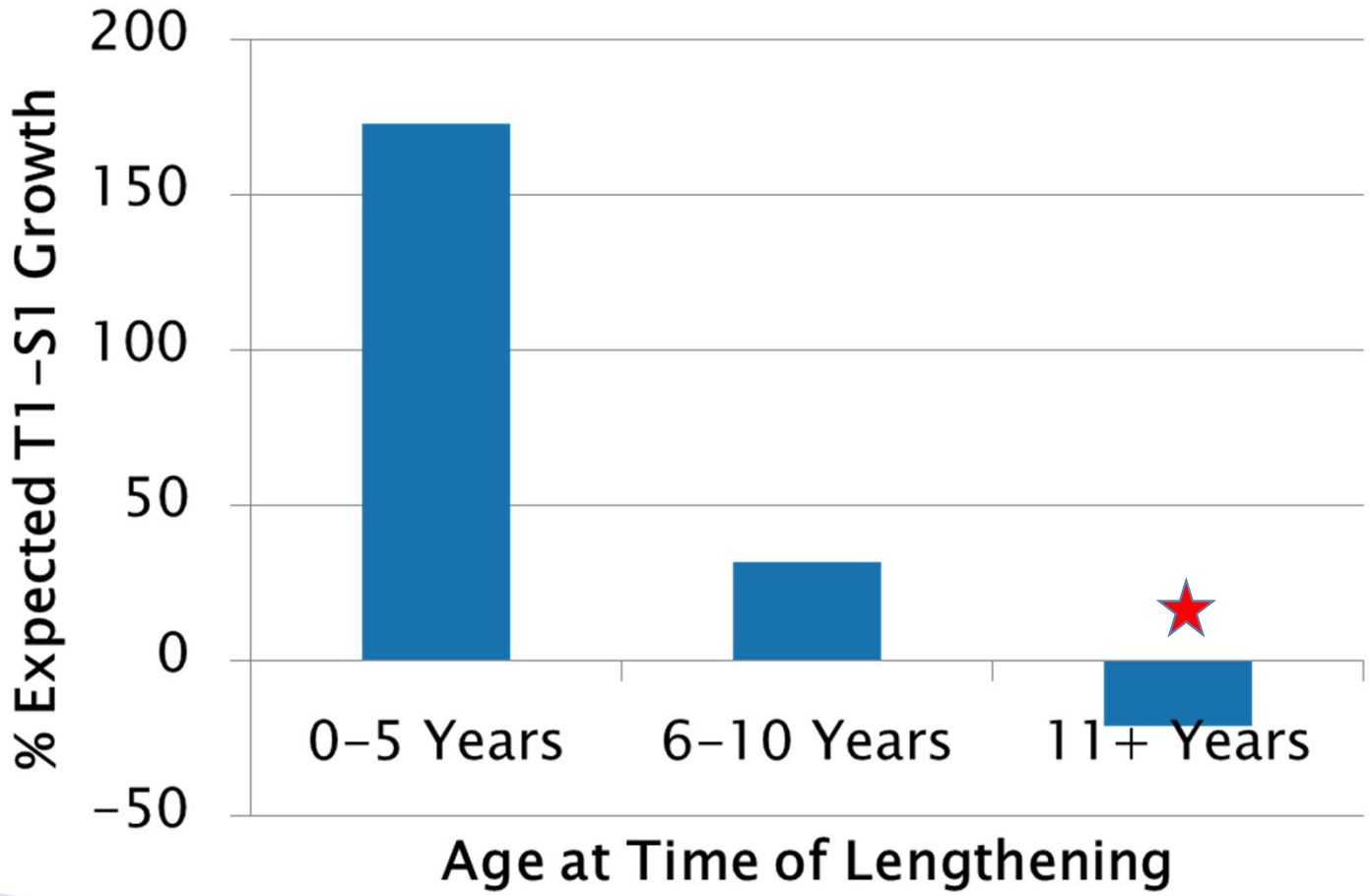
Results: T1-S1/Lengthening (cm)



Results: % Expected Growth



Results: Function of Age



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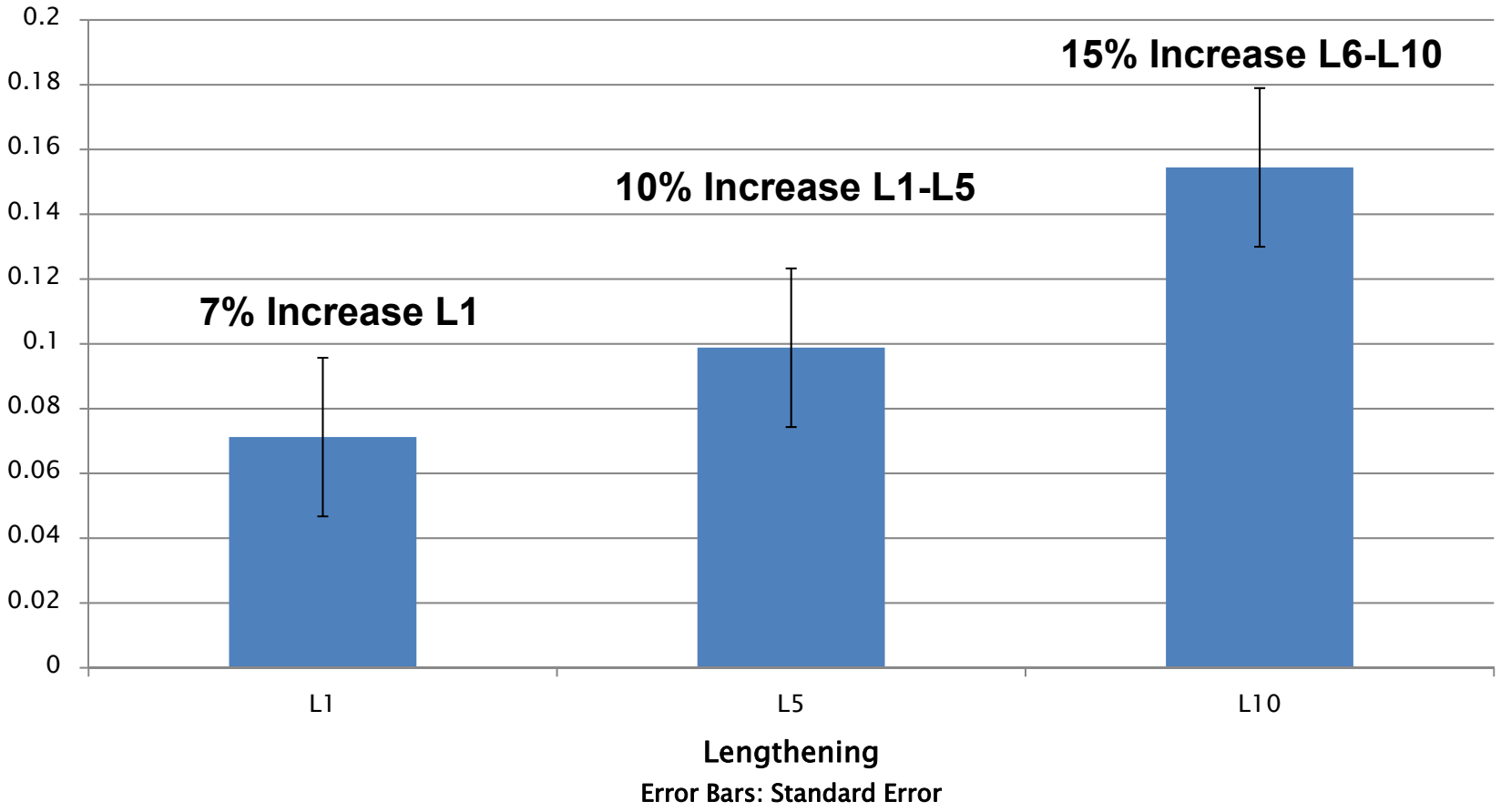
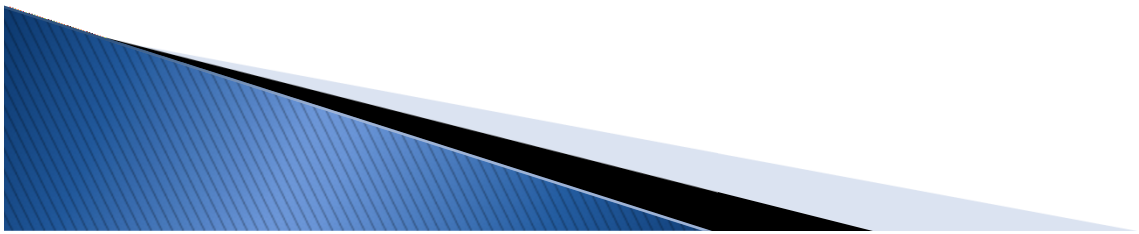
Results: T1-S1 / Initial T1-S1



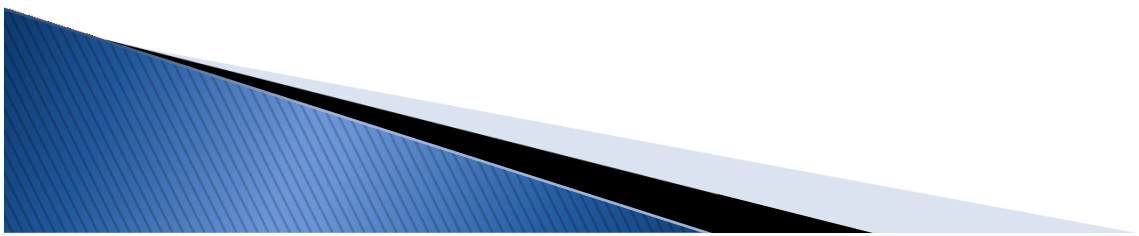
Strengths

- 5 year follow-up
- > 3 lengthening surgeries



Limitations

- Variability in data
  - Heterogeneous population of EOS
- Low numbers with greater than 10 lengthening procedures

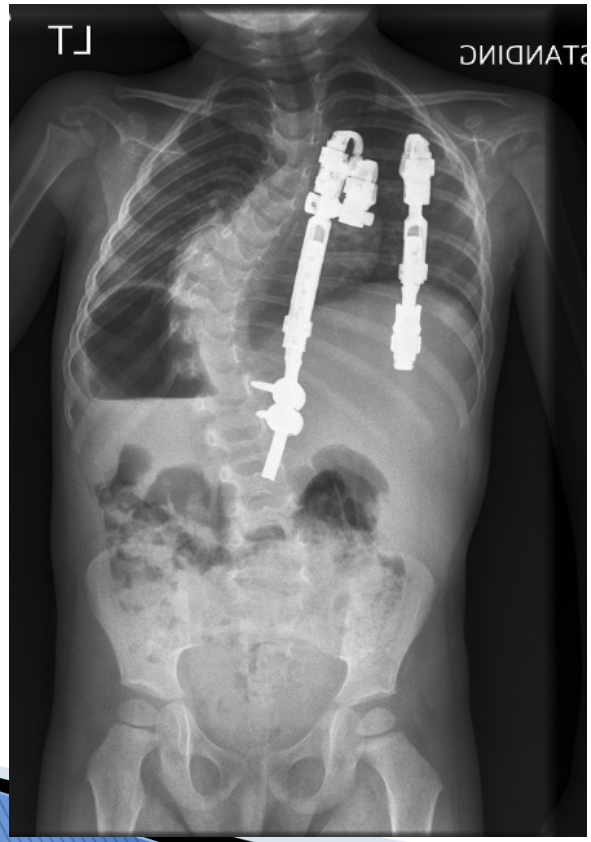


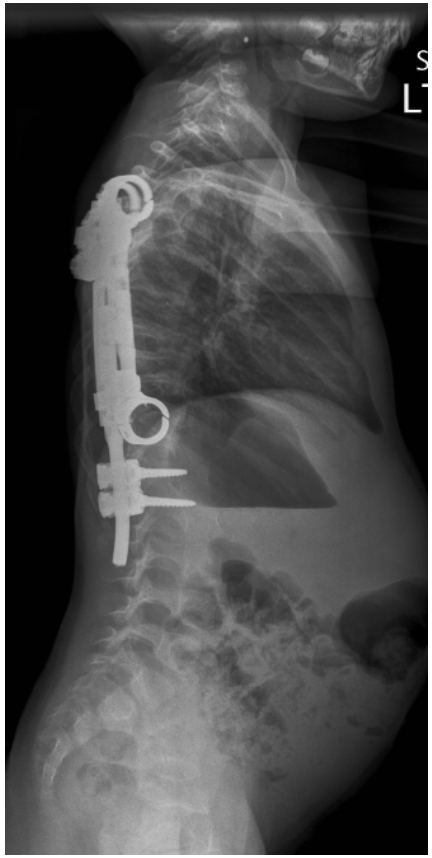
Discussion

- Pre-mature fusion?
- Sagittal Plane
- Implant Design
- Biomechanics

Discussion

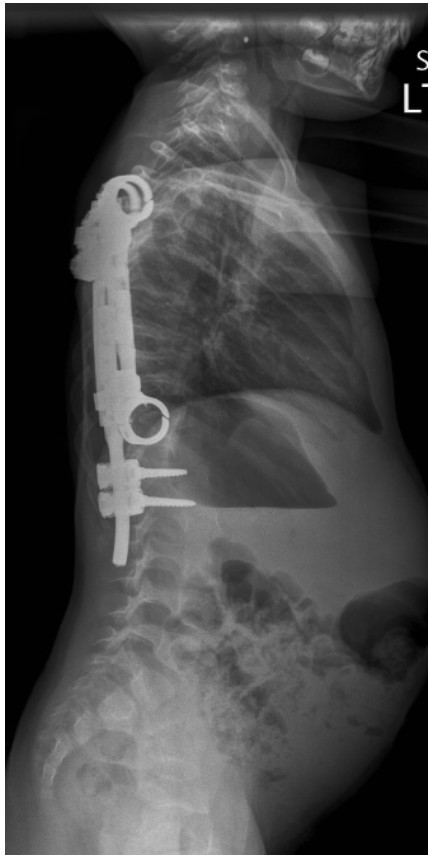
- Growth only measured on PA radiograph





Discussion

- Growth only measured on PA radiograph
  - Kyphosis
    - 40 degrees pre-op
    - 65 degrees at L15
  - T1 moves anterior
  - Relatively lower T1-S1

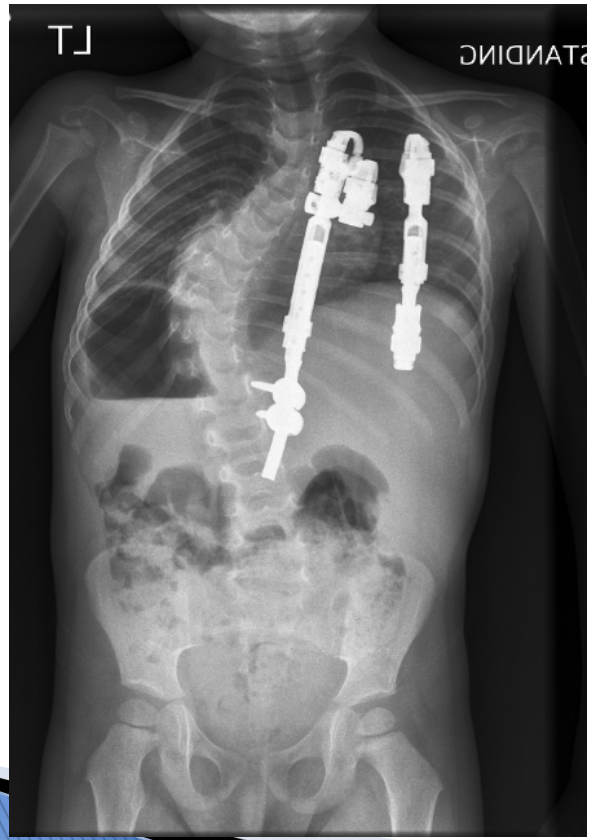


Discussion

- Implant Design – Radius of curvature
  - T1 moves anterior
  - Relatively lower T1-S1

Discussion

- Biomechanics
  - 1st lengthening – Greatest Moment



Conclusions

- Rib-based distraction improves T1-S1 height.
  - 19 cm pre-op
  - 28 cm at L15

- These gains in spine growth demonstrated a trend to decrease over time
  - 1.0 cm / lengthening L1-5
  - 0.4 cm / lengthening beyond

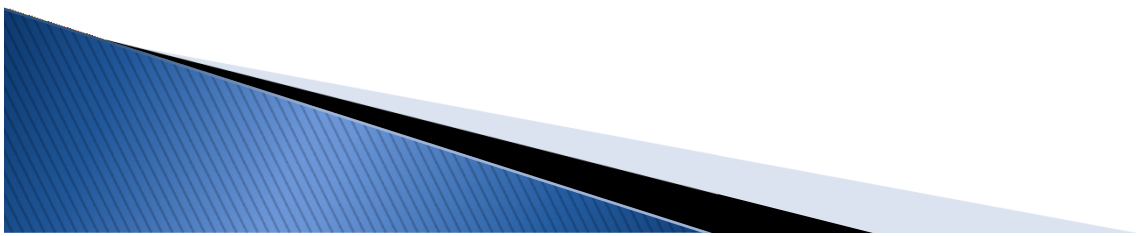
Conclusions

- These changes demonstrated a trend to not be related to the normal slowing of T1-S1 growth between the ages of 5 and 10 years.
  - 150% Expected Growth per lengthening L1-5
  - 50% Expected Growth per lengthening beyond

Conclusions

- Rib-based lengthening increases T1-S1 height until age 10 years, but not beyond.

- Further studies are necessary to examine the multiple factors that may contribute to these results (i.e. sagittal plane, biomechanics).



Thank You