Does the Type of Proximal Anchor Used During Distraction-Based Surgeries for Patients With Non-Idiopathic EOS Affect Spine Length?

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# Author's financial disclosure

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#### Background

#### Lengthening of Dual Growing Rods and the Law of Diminishing Returns

Wudbhav N. Sankar, MD, David L. Skaggs, MD, Muharrem Yazici, MD, Charles E. Johnston II, MD, Suken A. Shah, MD, Pooya Javidan, MD, Rishi V. Kadakia, BS, Thomas F. Day, MD, and Behrooz A. Akbarnia, MD



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- Auto fusion?
- Supports delay tactic with casting

# Sagittal Spine Length (SSL)





Spurway et al., Spine Deformity 2016

#### Introduction

- It has been shown that Spine length continued to increase during distraction phase of treatment for EOS.
- It is unclear whether the choice of proximal anchor affects the spine length achieved with distraction-based surgeries.



### Purpose

To determine if the choice of proximal anchor in distraction-based surgeries will affect final spine length in non-idiopathic EOS.

# Hypothesis

 Distraction-based surgeries will increase spine length in patients with non-idiopathic EOS; however, there may be differences in the outcome based on the proximal anchor choice (Spine-based & Rib-based).

# **Design & Methods**

- Retrospective, comparative multi-center, review of patients with non-idiopathic EOS treated with distraction-based systems
- Minimum 5 yr f/u and 5 lengthenings

- Primary outcome was T1-S1 SSL
  - Pre-op
  - Post-implant (L1)
  - Lengthening Intervals (L2-5, L6-10, L11-15).

# Patients

#### 126 patients

Etiology/Anchor point	Rib based	Spine based
Congenital	52	12
Syndromic	8	30
Neuromuscular	9	15
Total	69	57

- Average pre-op age 4.6 yrs
- Average pre-op Scoliosis 75°

Average pre-op Kyphosis 48°.

#### Results





#### Results



Pre-Op SSL was higher is SB group\*, this difference was maintained throughout the distraction phase to the final lengthening \*.

# Results



# Conclusion

- Distraction-based surgeries increased spine length for patients with non-idiopathic EOS; regardless of proximal anchor choice.
- SSL was greater for SB implants pre-op and this difference was maintained to the 15<sup>th</sup> lengthening.
- RB implants achieved more relative growth with time.

# References

- Sankar WN, Skaggs DL, Yazici M, et al. Lengthening of dual growing rods and the law of diminishing returns. Spine (Phila Pa 1976). 2011 May 1;36(10):806-9
- Spurway AJ, Chukwunyerenwa CK, Kishta WE, Hurry JK, El-Hawary R. Sagittal Spine Length Measurement: A Novel Technique to Assess Growth of the Spine. Spine Deformity. 2016 Sep;4(5):331-337
- El-Hawary R, Vitale M, Samdani A, Wade J, Heflin J, Smith M, Klatt J, Smith J. Rib-Based Distraction Surgery Maintains Total Spine Growth. J Pediatr Orthop. 2016 Dec;36(8):841-846



