

Age at Initiation, Deformity Magnitude and ASA Classification Influence Complication Rates of Surgical Treatment with Dual Growing Rods in Early Onset Scoliosis

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Disclosures

- No relevant disclosures
- Disclosures in the program book



Background

The timing of VEPTR/GR implantation is debated and must be individualized

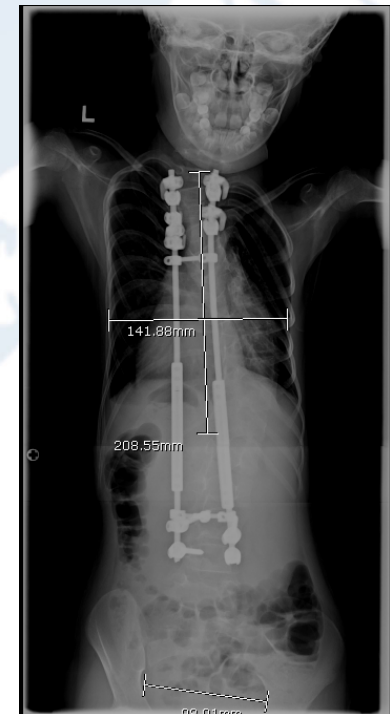


WAIT.....

Or INTERVENE?

Background

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Background

Early intervention:

- Milder deformity
 - Device implantation easier
- Facilitates symmetric chest growth?
 - Improve pulmonary function
 - Greater spine growth and pulmonary function values when VEPTR was initiated earlier
 - Most favorable when less than 2
 - Vital capacity (58% vs 36%)

[J Bone Joint Surg Am. 2004 Aug;86-A\(8\):1659-74.](#)

The effect of opening wedge thoracostomy on thoracic insufficiency syndrome associated with fused ribs and congenital scoliosis.

[Campbell RM Jr¹](#), [Smith MD](#), [Mayes TC](#), [Mangos JA](#), [Willey-Courand DB](#), [Kose N](#), [Pinero RE](#), [Alder ME](#), [Duong HL](#), [Surber JL](#).

Background

Later intervention:

- Fewer surgical lengthenings
- Better implant anchor points and bone quality
 - Fewer complications?
- Casting a good option
- Avoid:
 - Auto-fusion
 - Law of Diminishing returns

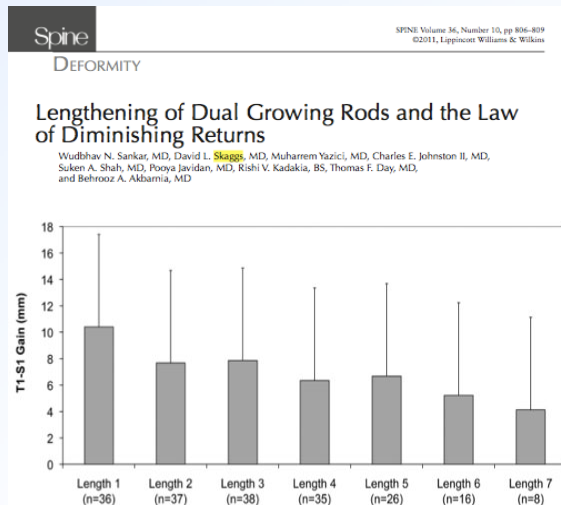
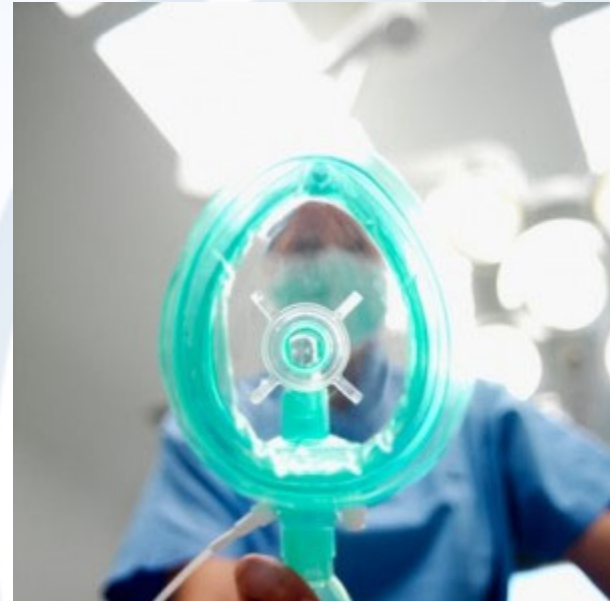


Figure 2. T1-S1 gain versus number of lengthenings



Growth as a corrective force in the early treatment of progressive infantile scoliosis

Background

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Complications of Growing-Rod Treatment for Early-Onset Scoliosis

Analysis of One Hundred and Forty Patients

By Shay Bess, MD, Behrooz A. Akbarnia, MD, George H. Thompson, MD, Paul D. Sponseller, MD, Suken A. Shah, MD, Hazem El Sebaie, FRCS, MD, Oheneba Boachie-Adjei, MD, Lawrence I. Karlin, MD, Sarah Canale, BS, Connie Poe-Kochert, RN, CNP, and David L. Skaggs, MD



Background

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Growth as a corrective force in the early treatment of progressive infantile scoliosis



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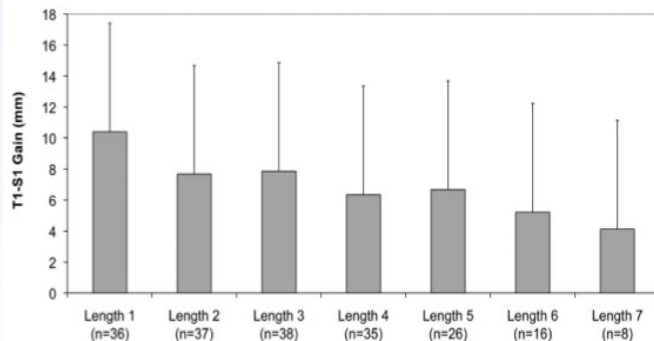
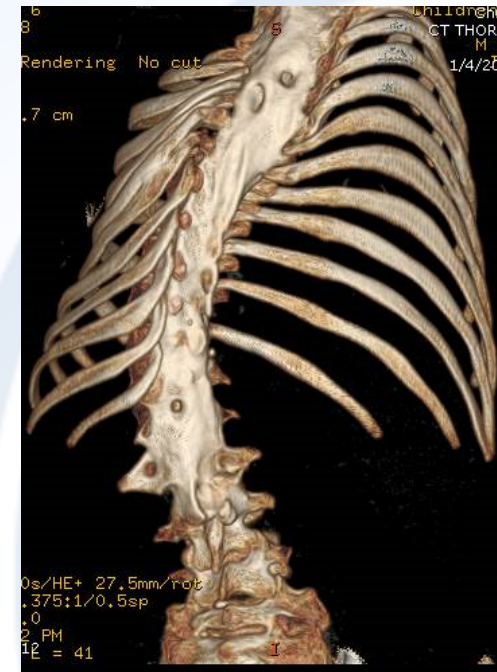


Figure 2. T1-S1 gain versus number of lengthenings



Spine
DEFORMITY

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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

DELAYED VEPTR IMPLANTATION RESULTS IN SIMILAR RADIOGRAPHIC OUTCOMES WITH FEWER COMPLICATIONS

*Vidyadhar V. Upasani, MD; John B. Emans, MD; John T. Smith, MD;
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POSNA 2014

- **Early intervention:**
 - No better deformity control or greater thoracic growth
- **Delayed intervention:**
 - Fewer medical complications and clinically significant device complications

Background

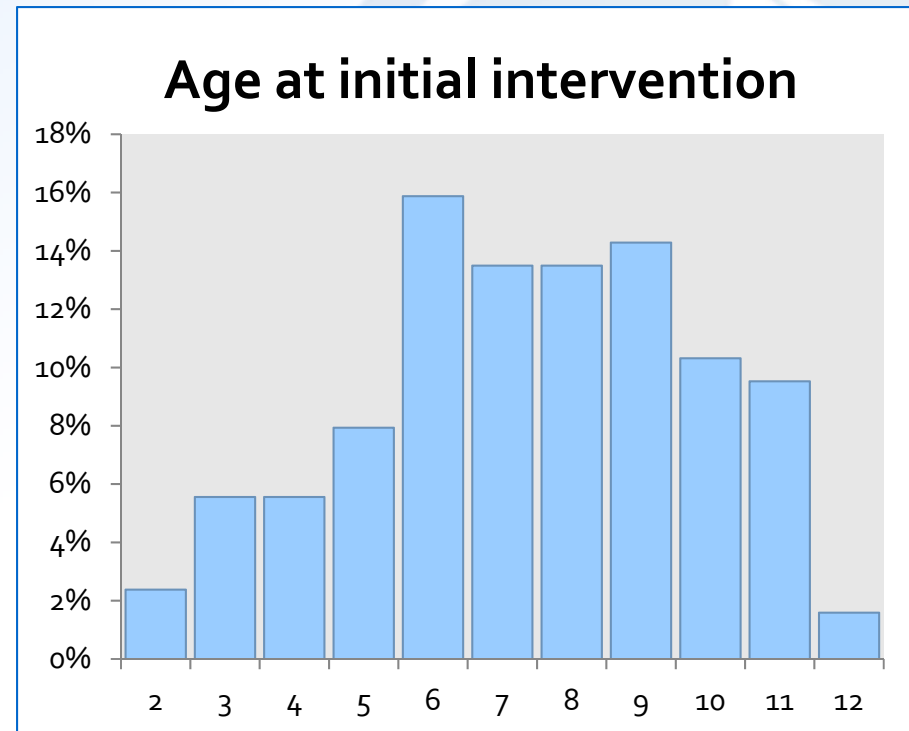
- Timing of intervention remains controversial

| | Early Intervention | Delayed Intervention |
|---------------|--|---|
| Advantages | <ul style="list-style-type: none">• Milder deformity• Greater potential for chest / pulmonary development | <ul style="list-style-type: none">• Fewer procedures• Improved bone quality• Improved anchor points |
| Disadvantages | <ul style="list-style-type: none">• More interventions• Law of diminishing returns | <ul style="list-style-type: none">• Irreversible deformity• Smaller effect on pulmonary development |

Methods

Multicenter retrospective review GR patients

- All diagnosis
- Completed GR treatment
- Classification and regression tree (CART) analysis
- 126 patients
 - 53 boys, 73 girls
 - Mean age at initial surgical intervention of 6.9 ± 2.4 years (range: 1.3 to 12.0) years



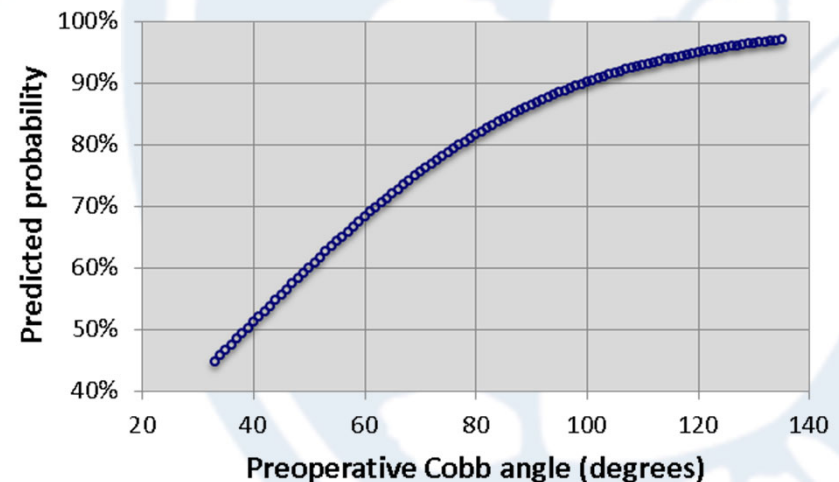
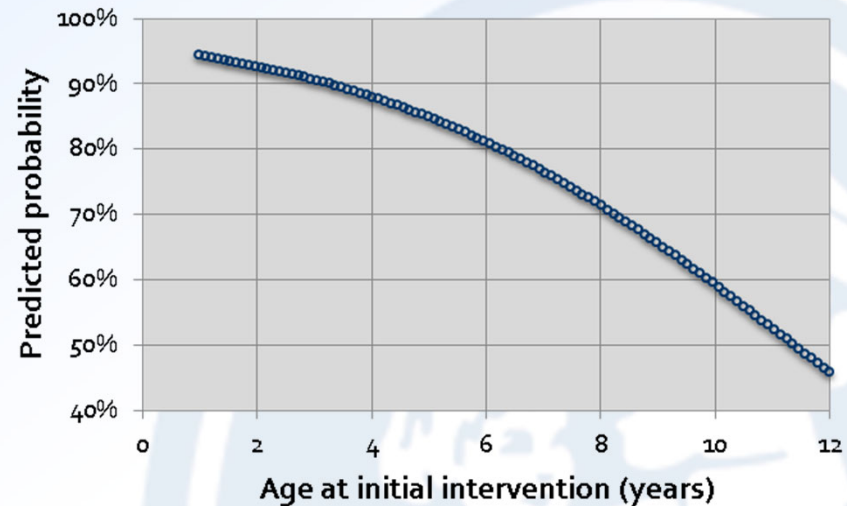
Results

- **75% (95/126) at least one medical or implant-related complication**
- **Multivariable analysis:**
 - Age at implantation and pre-op major curve size were significant independent predictors of complication



Results

- For each year increase in age at implantation, the cumulative odds of complication decrease by 21%
– (OR=0.79; $p=0.02$).
- For each one degree increase in major curve size, the odds of complication increased by 3%
– (OR=1.03; $p=0.02$).



Results

| | Early | Late |
|----------------------------|------------------------------|------------------------------|
| Total complications | More (86%) | Less (56%) |
| Complications/lengthening | Same (0.46) | Same (0.38) |
| Curve correction | Same (77→47) | Same (66→35) |
| Change thoracic dimensions | Same (change T1-T12=56cm) | Same (change T1-T12=46cm) |

Results

- Medical complications significantly correlated to ASA level only in univariate analysis ($p=0.02$)
- Incidence of implant complications was not associated with ASA ($p=0.33$)



Conclusions

- **Patients with GR surgery earlier accumulate more complications**
 - More surgical events
 - **NO cutoffs or treatment recommendations**
 - No difference in outcome measures
 - Ultimate change in Cobb, thoracic dimensions
 - More information on early vs late debate but does not provide treatment recommendation

Limitations

- **Are we using the right outcome measures?**
- **Selection bias (do sicker kids get operated on earlier?)**
- **No other outcome data**
 - Pulmonary function, quality of life, controls

Summary

- **Early intervention:**
 - More complications
- **Based on radiographic outcome measures:**
 - No difference in outcome early vs late
- **Worsening space for the lungs may demand earlier intervention**
 - We don't know what the right trigger is
- **Need to know how early vs late impacts pulmonary function and quality of life to complete picture**

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