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Five or more Proximal Anchors and including the Upper End Vertebrae (UEV) Protects Against Reoperation in Growth Friendly Constructs

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Background

- Implant failure in Growing Spine constructs can approach 80%[3]
- Common reasons for proximal revision:
  - Proximal Junctional Kyphosis[4]
  - Proximal Anchor Pullout[5]
- Biomechanical studies suggest proximal anchor type, number and location may influence implant failure rates [6]

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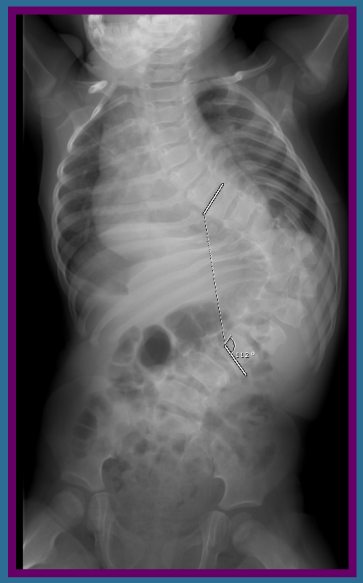
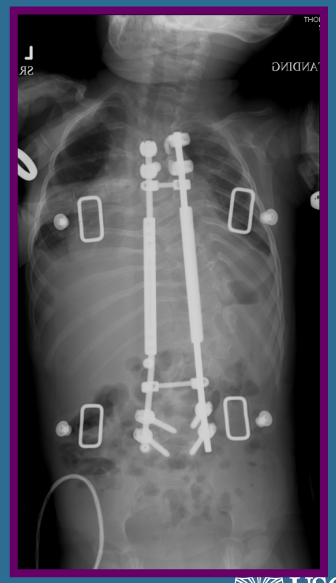
Purpose

To assess the impact of number, type and placement of proximal anchors on complication and revision rates following surgery with growth friendly constructs





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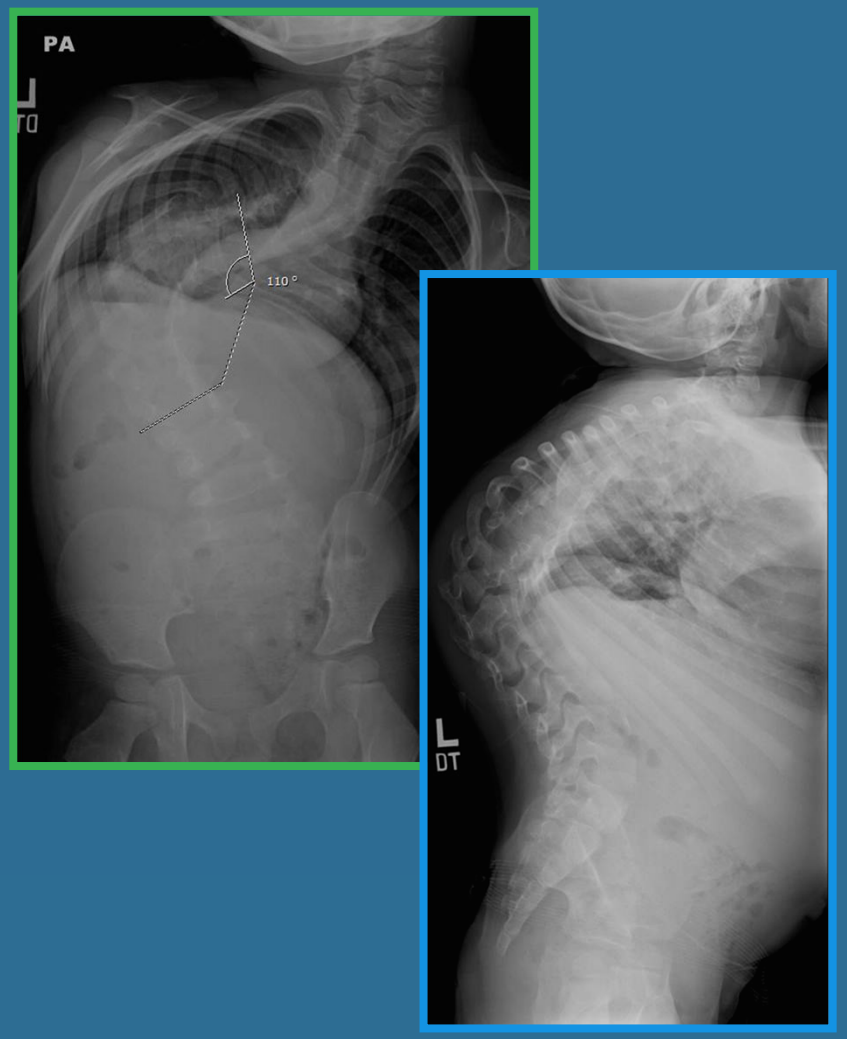
Methods

- Retrospective review, multicenter database
- Index instrumentation at < 10 years of age with ≥ 2 year follow up
- Upper end vertebrae of kyphosis (UEV) recorded on lateral radiographs
- Statistical significance analyzed via t-test and multilinear regression analysis



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Results

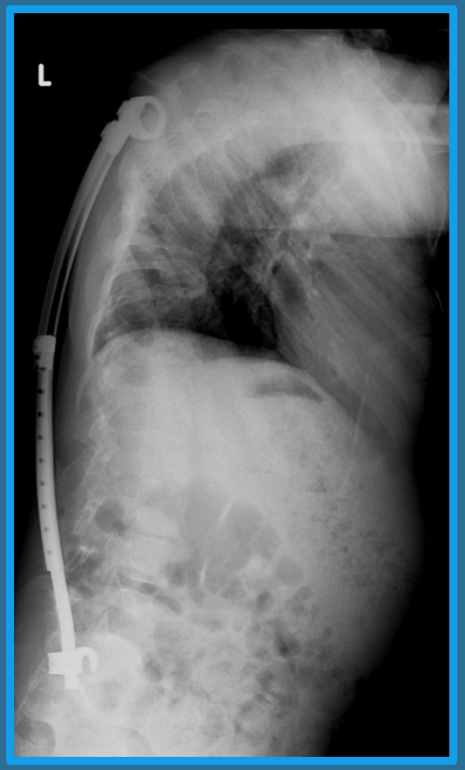
357 patients mean f/u of 6 years:

-306 growing rods with spine anchors

-16 growing rods with rib anchors

-35 VEPTRs

- Implant type (VEPTR vs. Growing Rod) was not associated with Anchor Pullout (p=0.150)



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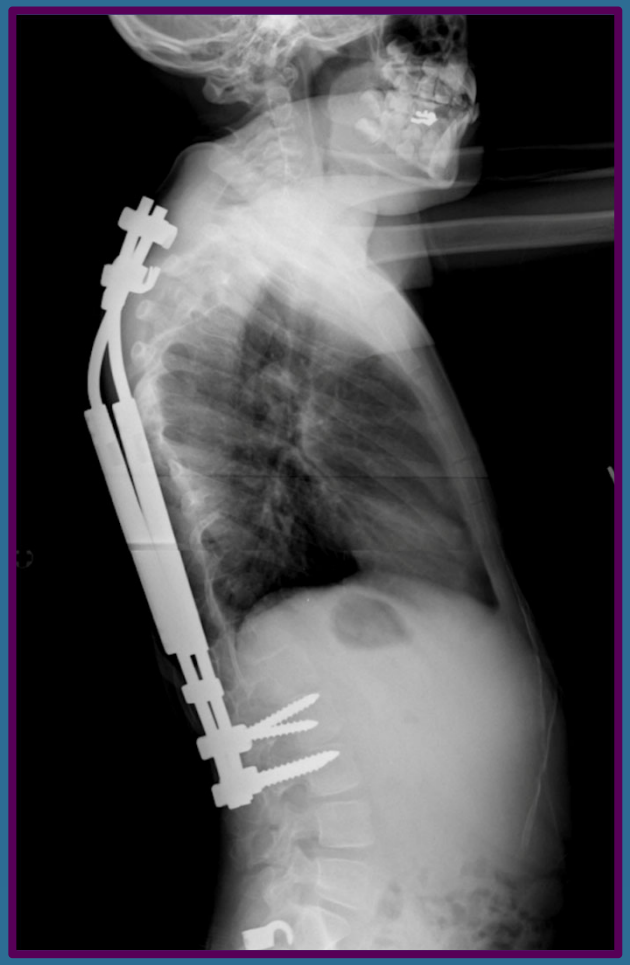
Results- Anchor Pullout

- 22% (77/357) patients anchor pullout
- Type of Anchor (screw vs spine hook vs rib hook) did not affect pullout rate (p=0.850)

Anchors	Pullout
≥2	22%
≥3	20%
≥4	20%
≥5	12%
≥6	10%



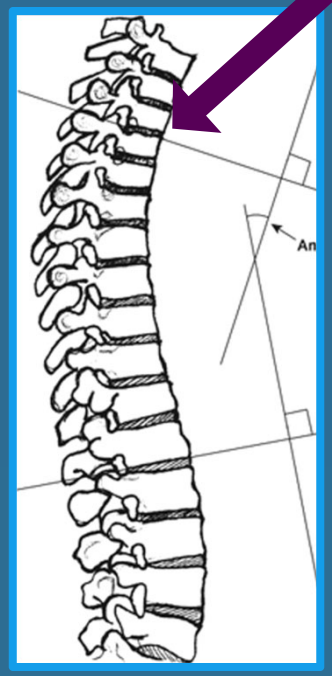
2,3,or 4 Vs. 5 or 6 anchors

p=0.01

Results - Proximal Revision

- Mean Index Proximal Instrumentation :
  T2 (range C7- T9)

- Instrumentation below UEV was associated with increased proximal revision (p=0.026)



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Results – Proximal Extension

- 24% (47/200) Proximal Extension of Implants (final fusion or revision growth friendly implants)
  - Index Instrumented at or above UEV: **20%** (26/130)
  - Index Instrumented below UEV: **30%**(21/70)
  - Index Instrumentation below UEV associated with higher rate of proximal revision (p=0.027)

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Results - Proximal Revision

- **Not** associated with Proximal Revision:
  - Cobb Angle
  - Total Anchors
  - Type of Anchor
  - Type of Implant
  - Number of vertebrae instrumented
  - Level of UEV of Kyphosis

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Conclusions

1. ≥5 anchors less pullout (p=0.010)

2. Anchors at or above UEV (Sagittal) less proximal extension (p=0.026)

3. Not Significant:

    1. Anchor Type (spine hook, rib hook, screw)
    2. Implant Type (VEPTR or GR)

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