Case-Matched Comparison of Spinal Fusion Versus Growing Rods for the Surgical Treatment of Progressive Idiopathic Scoliosis in Skeletally Immature Patients

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International Congress on Early Onset Scoliosis
San Diego, CA – November 21-22, 2013

SAN DIEGO CENTER FOR SPINAL DISORDERS

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GSSG Growing Spine Study Group

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DISCLOSURES

a. Grants/Research Support
b. Consultant
c. Stock/Shareholder
d. Speakers' Bureau
e. Other Financial Support

Jeff Pawelek, BS	None
Burt Yaszay, MD	(a) DePuy synthes; Children's Spine Study Group Foundation; (b) Depuy-Synthes, K2M, Nuvasive; (d) DePuy-Synthes, K2M; (e) K2M, OrthoPediatrics
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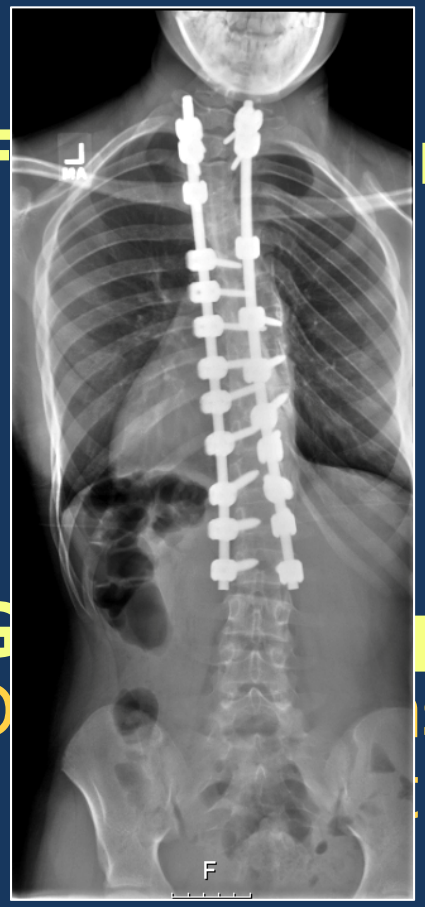
Gregory M. Mundis, Jr., MD	(a,b,d) Nuvasive; (a,b) K2M; (a,e) DePuy Synthes
Behrooz A. Akbarnia, MD	DePuy Spine (a,), Ellipse (b,c), K2M (b), KSpine (b,c), Nuvasive (a,b,c)
Harms Study Group	(a) DePuy-Synthes, OREF
Growing Spine Study Group	(a) Growing Spine Foundation

INTRODUCTION

Patients with progressive juvenile idiopathic scoliosis face various treatment options



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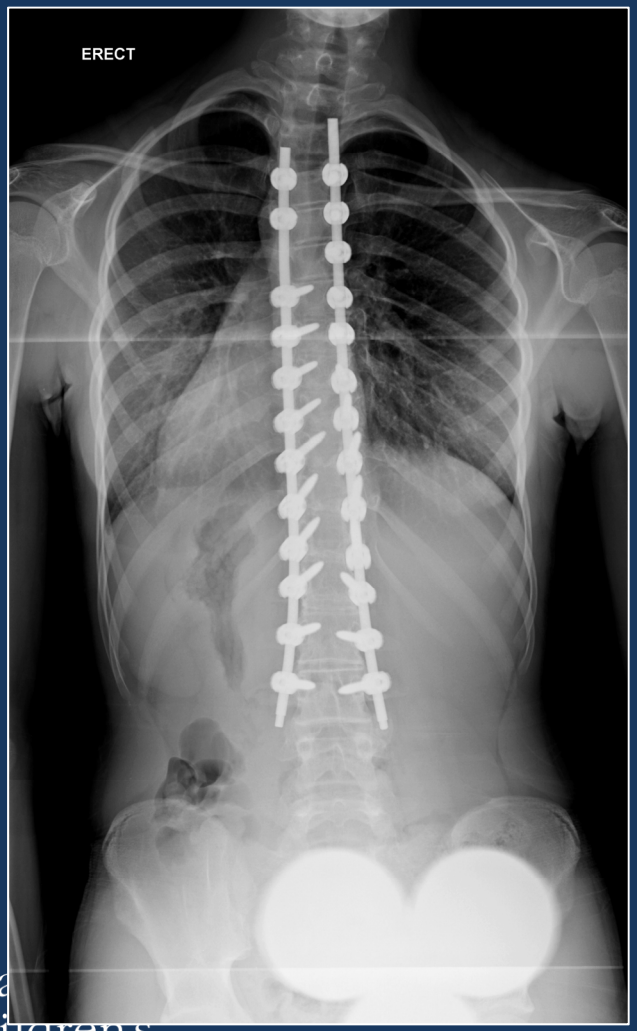
INTRODUCTION

Spinal Fusion



+ Single surgery treatment
+ Low complication rate
+ Proven improvement in quality of life
! Stops growth of fused levels prior to skeletal maturity
? Effect on spinal/thoracic height

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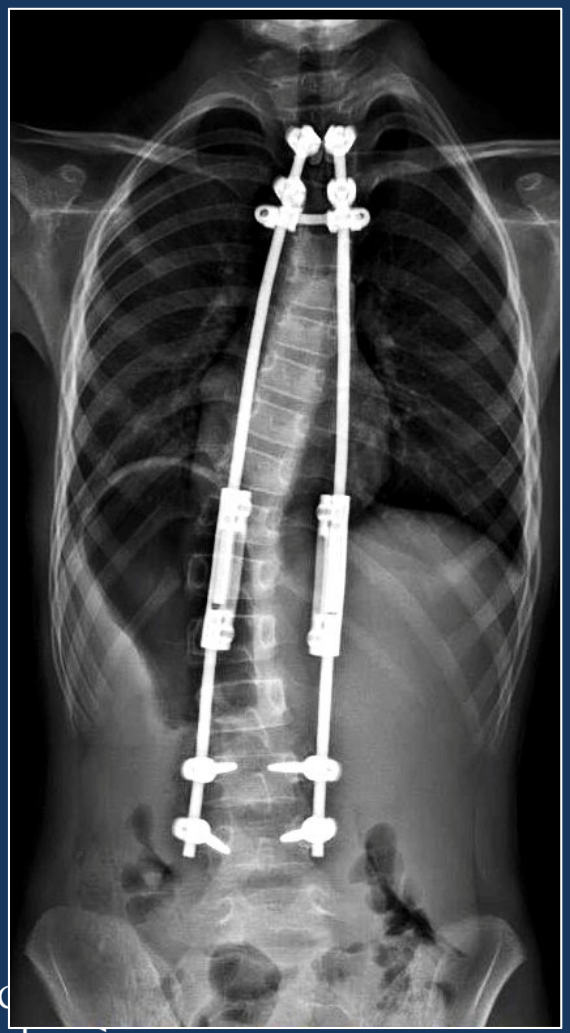
INTRODUCTION

Growing Rods



+ Maintains spinal/thoracic growth
+ May help prevent short stature and pulmonary disease
+ May minimize risk of crankshaft
! High rate of complications
! Burden of repeated surgeries
! Impact on quality of life not well-understood

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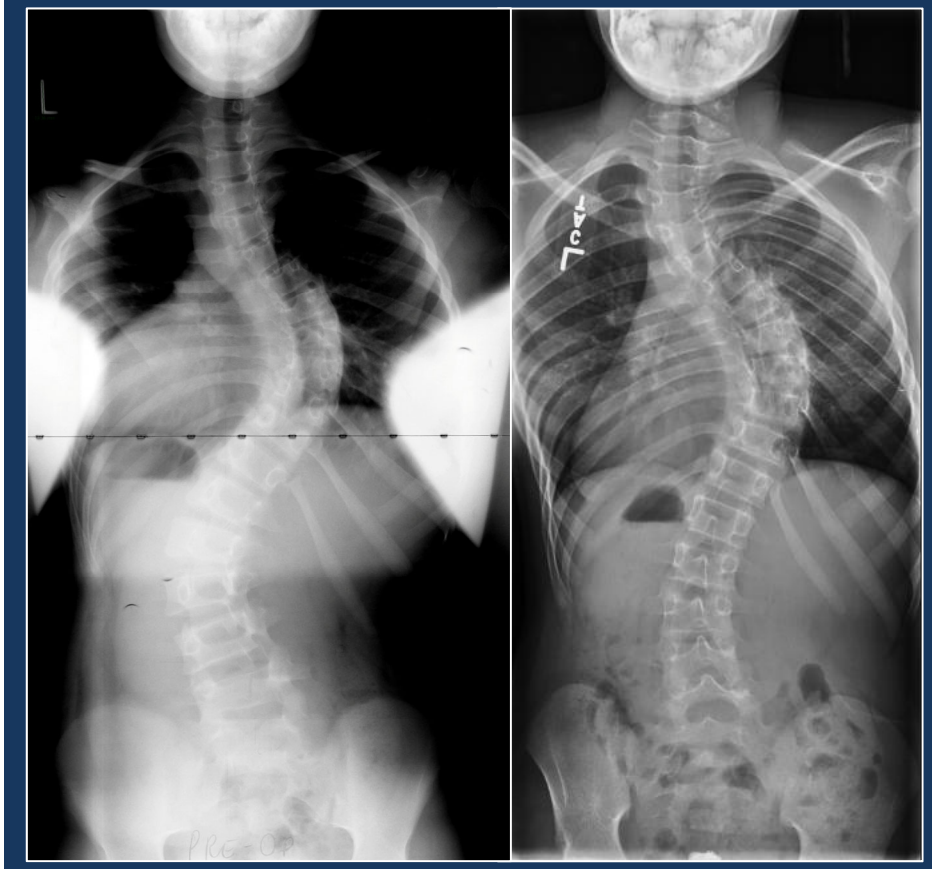
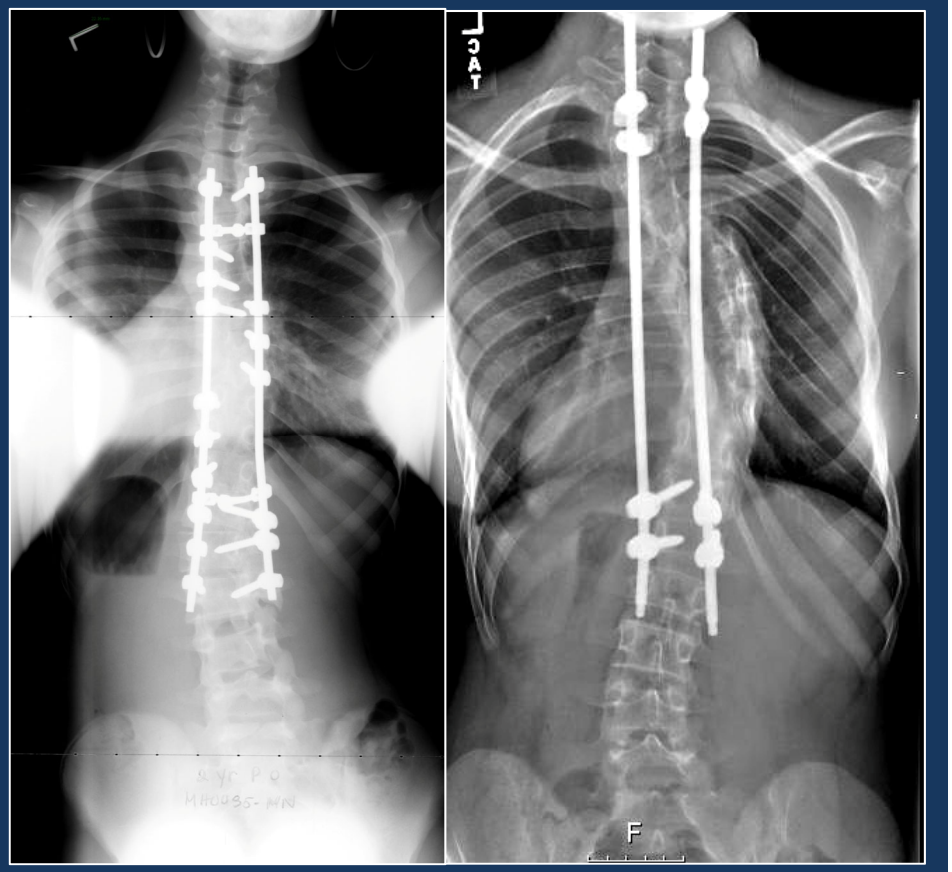
PURPOSE

- Compare spinal fusion vs. growing rods using a case-matched series





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METHODS

- Multicenter **EOS** database was used to identify patients:
  - Skeletally immature (open tri-radiates)
  - 9-11 years old at initial surgery
  - Major thoracic curve
  - Idiopathic etiology
  - Growing rod surgery
  - Underwent "final" spinal fusion

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METHODS

- Multicenter **AIS** database was used to identify patients:
  - Skeletally immature (open tri-radiates)
  - 9-11 years old at surgery
  - Major thoracic curve
  - Definitive fusion
  - Minimum 2-years follow-up

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METHODS

- A one-to-one patient match was performed using:
  - Pre-op age (+/- 12 months)
  - Major curve size (+/- 10°)
  - Location of curve apex (+/- 2 levels)

- All x-rays were reviewed to confirm similar curve patterns

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METHODS

- Study time points
  - Pre-op
  - 1st post-op
    - *After index surgery for growing rods*
  - Latest follow up
    - *After "final" fusion for growing rods*

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RESULTS

- Demographics

	Growing Rods	Spinal Fusion
# of patients	11	11
Mean age at pre-op	10.1 years	10.8 years
Mean age at latest follow up	15.7 years	13.2 year
Mean follow-up	5.6 years	2.5 years

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RESULTS

- Mean Major Curve Size

	Growing Rods	Spinal Fusion	*p* Value
Pre-op Cobb	58°	60°	*p*=0.145
Post-op Cobb	35°	17°	*p*=0.005*
Latest Cobb	31°	24°	*p*=0.131
Initial Cobb correction	38%	71%	*p*=0.004*
Overall Cobb correction	45%	58%	*p*=0.110

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RESULTS

- Mean T1-T12 Thoracic Height

	Growing Rods	Spinal Fusion	*p* Value
Pre-op T1-T12	228 mm (187-263 mm)	210 mm (175-236 mm)	*p*=0.041*
Post-op T1-T12	234 mm	228 mm	*p*=0.035*
Latest T1-T12	265 mm	237 mm	*p*=0.002*
Initial % increase	8%	9%	*p*>0.05
Overall % increase	18%	13%	*p*>0.05

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RESULTS

- Mean T1-S1 Spine Height

	Growing Rods	Spinal Fusion	*p* Value
Pre-op T1-S1	350 mm	341 mm	*p*=0.269
Post-op T1-S1	379 mm	369 mm	*p*=0.437
Latest T1-S1	429 mm	386 mm	*p*=0.001*
Initial % increase	9%	8%	*p*>0.05
Overall % increase	25%	13%	*p*=0.01*

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RESULTS

- # of Levels Instrumented

	Growing Rods	Spinal Fusion
Initial surgery	12.0 levels	10.5 levels
Latest follow up	13.1 levels	11.1 levels

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RESULTS

- Surgical Procedures

Growing Rods	Spinal Fusion
26 lengthenings Mean = 2.4 per patient	N/A
10 revision surgeries 5 of 11 patients **(45%)**	2 revisions 2 of 11 patients **(18%)**
47 total surgeries	**13 total surgeries**

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CONCLUSIONS

- Compared to spinal fusion, growing rod patients:
  - Similar overall curve correction
  - Similar increase in thoracic height
  - **47** surgeries vs. **13** surgeries
  - **2.5x** rate of revision surgery
  - Marginally greater spine height
    - *Does this remain true until skeletal maturity?*
    - *Is this clinically relevant?*

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CONCLUSIONS

- Not all patients reached skeletal maturity at latest follow up
- Next step
  - Analyze data when all patients are skeletally mature

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THANK YOU

The Growing Spine Foundation acknowledges and thanks all donors who support its cause.

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