Growing Rods as a Salvage Procedure After Convex Staple Epiphyseodesis to Control Curve Progression in Young Patients

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Disclosure

- **Purnendu Gupta, M.D.**
  - **Associate Professor of Surgery**
    - **Depuy (Consultant)**
- **University of Chicago, Section of Orthopaedic Surgery and Rehabilitation Medicine**
  - **Institutional support**
    - **Biomet, JBJS, Synthes, Stryker**

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Introduction

- Severe early onset scoliosis
  - Challenging problem
- Non-operative treatment options
  - Bracing
  - Casting
  - Traction

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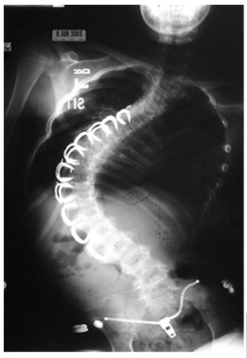
Introduction

- Surgical options
  - Fusion
  - Fusionless
    - Convex Stapling
    - Growing Rods
    - VEPTR
    - Shilla



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Convex Hemiepiphysiodesis: The Limits of Vertebral Stapling

Patrick T. O'Leary, MD, Peter F. Sturm, MD, Kim W. Hammerberg, MD, John P. Lubicky, MD, Steven M. Mardjetko, MD, Jean Herman, RN, MSN

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Spinal Deformity

There is great interest in growth modulation for the treatment of scoliosis

Growth modulation exploits the concept of the Hueter-Volkman principle:

Growth depends upon amount of compression on the endplate – it is slowed by compression and accelerated with less compression

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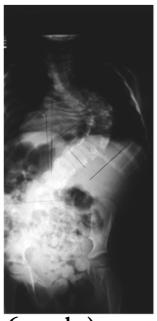
Purpose

- The purpose of this study is to assess the success of growing rods and vertical expandable titanium rib (VEPTR) as a salvage procedure in patients who had previously undergone convex staple epiphyseodesis for severe scoliosis

Methods

- This is a retrospective study of patients with severe early onset scoliosis with cobb angle over 50 degrees
- All patients underwent
  - Anterior convex stapling for scoliosis from 1999-2000
  - Due to continued curve progression, they subsequently underwent placement of growing rods or VEPTRs from 2005-2006

Methods

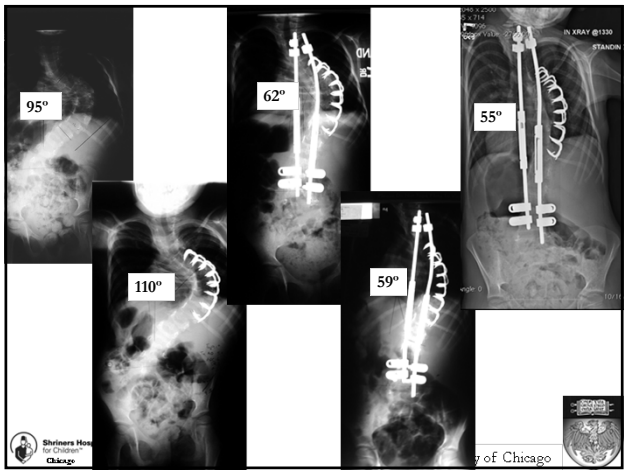


- 5 patients (2 F, 3M)
  - 4 patients with growing rods
  - 1 patient with VEPTR
- Evaluated over 5 visits:
  - Visit 1:Pre-stapling
  - Visit 2:Post-stapling (4-6 weeks)
  - Visit 3:Pre-growing rod/VEPTR
  - Visit 4:Post-growing rod/VEPTR (4-6 weeks)
  - Visit 5:Post-growing rod/VEPTR (approx. 2 years following growing rod/VEPTR insertion)

Demographics

	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5
Mean age years ± standard deviation	5.2 ± 2.2	5.8 ± 2.1	7.2 ± 1.6	7.6 ± 2.0	9.4 ± 1.3

RESULTS



Results

	Pre-Stapling mean (stdv)	Post-Stapling mean (stdv)
AP Radiograph	77.0º ± 19.2	61.0º ± 19.4
Thoracic lateral radiograph	11.6º ± 25.8	14.8º ± 27.1
Lumbar lateral radiograph	-29.8º ± 15.1	-15.8º ± 22.7
Apical Deviation (AD) cm	4.6 ± 2.9	3.0 ± 1.9
AD (corrected) cm	1.5 ± 2.2	2.1 ± 2.6
Spinous process rotation	2.2 ± 0.8	2.2±0.8
Pedicle rotations	2.0 ± 0.7	2.0 ± 0.7
Concave Length (CL) cm	11.4 ± 3.4	12.5 ± 4.3
Convex Length (VL) cm	14.1 ± 3.9	14.8 ± 3.8

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	Final Post-Stapling, mean ±stdv	GR/VEPTR Initial mean±stdv	GR/VEPTR Final mean ±stdv
STAPLE LEVEL (degrees)	84.2º ± 19.7	55.6º ± 16.7	44.1º ± 32.1
GROWING ROD LEVEL (degrees)	30.8º ± 19.9	23.6º ± 21.5	23.9º ± 4.8
Thoracic lateral radiograph	28.4º ± 34.5	-5.0º ± 30.0	22.0º ± 18.2
Lumbar lateral radiograph	-31.5º ± 25.3	-13.0º ± 34.1	3.7º ± 31.1
Apical Deviation (AD) cm	5.0 ± 2.7	2.8 ± 2.5	3.3 ± 1.2
AD (corrected) cm	4.1 ± 3.0	1.0 ± 1.1	2.3 ± 1.5
Spinous process rotation	2.8 ± 0.4	2.8 ± 0.8	1.7 ± 1.3
Pedicle rotation	2.4 ± 0.5	3.0 ± 0.7	1.7 ± 1.2
Concave Length (CL) cm	11.4 ± 3.9	13.9 ± 4.7	16.2 ± 4.3
Convex Length (VL) cm	15.2 ± 4.7	16.1 ± 4.4	17

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Convex Length (VL) cm	15.2 ± 4.7	16.1 ± 4.4	17.9 ± 4.4

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Curve Progression

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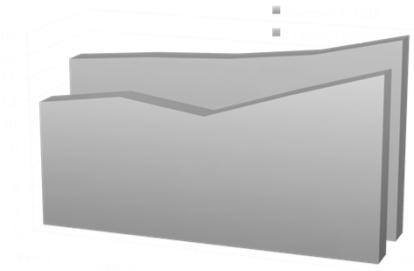
Concave vs. Convex Growth



Growing Rod/VEPTR

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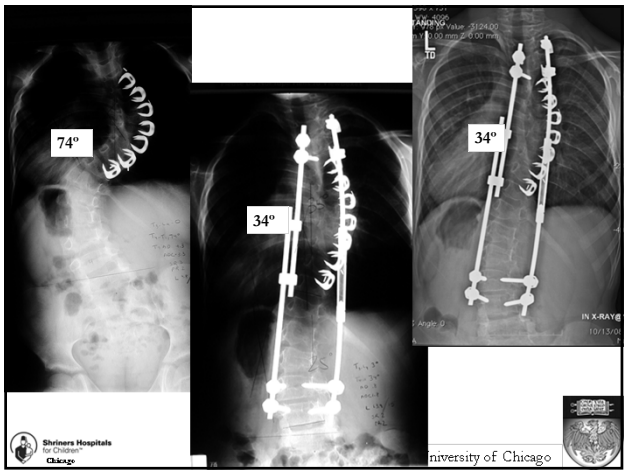

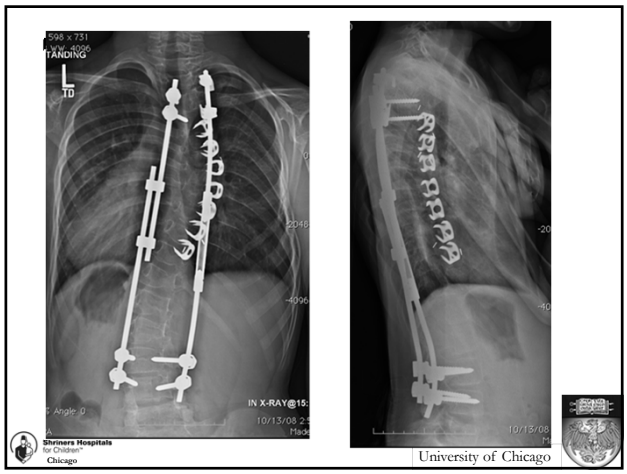

Conclusion

- Stapling alone did not prevent curve progression in early onset scoliosis
- After growing rods or VEPTRs, all patients showed marked improvement
  - Cobb Angle of the stapled levels
  - Apical deviation
  - Increase in the concave length of the spine

Conclusion

- The addition of a growing device may unload forces across the concavity of the curve resulting in modulation
- Convex curve stapling in combination with a growing device may be a treatment option for severe curves in early onset scoliosis

Thank You