

The Value of Flexibility Radiographs in Predicting Coronal Curve Correction Following Growing Rod Surgery

Burt Yaszay, Jeff Pawelek, Nima Kabirian,
Tracey Bastrom, John Emans, George Thompson,
Richard McCarthy, Greg Mundis, Behrooz Akbarnia,
Growing Spine Study Group

*5th Annual International Congress on Early Onset Scoliosis
November 18-19, 2011 – Orlando, FL*



SAN DIEGO CENTER
FOR SPINAL DISORDERS



UNIVERSITY of CALIFORNIA
SAN DIEGO

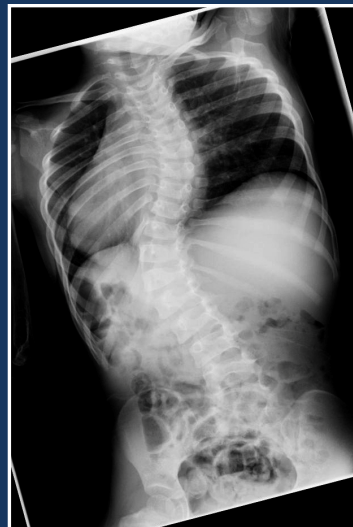
DISCLOSURES

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

<u>Author</u>	<u>Disclosure</u>
Burt Yaszay, MD	(a) DePuy, KCI; (b) KCI, Synthes, K2M; (d) DePuy; (e) DePuy
Jeff Pawelek, BS	None
Nima Kabirian, MD	None
Tracey Bastrom, MA	None
John Emans, MD	(b) Medtronic, Synthes; (e) Synthes
George Thompson, MD	OrthoPediatrics (b); SpineForm (b); Journal of Pediatric Orthopedics (e)
Richard McCarthy, MD	Medtronic Sofamor Danek (b)
Gregory M. Mundis, Jr., MD	Nuvasive (a,b,d); K2M (a,b); DePuy Spine (a,e)
Behrooz A. Akbarnia, MD	(a) K2M, DePuy, Nuvasive, Ellipse; (b) Nuvasive, K2M, Ellipse, Kspine, DePuy; (c) Nuvasive, Ellipse, K Spine, Nocimed
Growing Spine Study Group	Growing Spine Foundation (a)

INTRODUCTION

- Assessment of coronal curve flexibility is utilized for:
 - Scoliosis surgery planning
 - Predicting post-operative curve correction
- The value of flexibility films using different methods has not been previously reviewed in growing rod (GR) surgery for early onset scoliosis (EOS).



METHODS

- Retrospective review of a multi-center EOS database
- Patient inclusion criteria:
 - Underwent GR surgery
 - Flexibility x-rays taken prior to index surgery
 - Minimum 2-year follow-up from time of index surgery
- The following parameters were collected and analyzed:
 - Type of pre-op flexibility x-ray
 - Primary curve magnitude and pre-op flexibility
 - Curve correction immediately post-op and latest follow-up (and post final fusion if applicable)

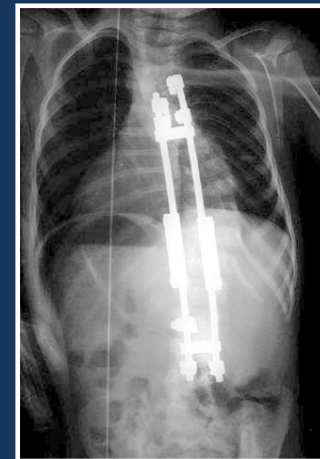
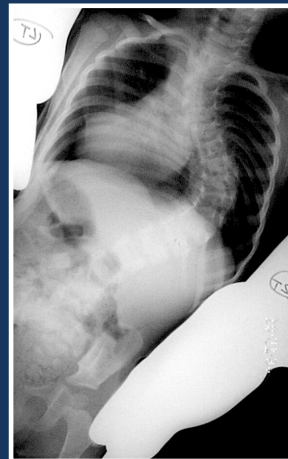


METHODS

- Correction Rate (CR), Flexibility Rate (FR) and Correction Index (CI) were calculated per Klepps et al.:

$$\frac{\text{CORRECTION RATE}}{\text{FLEXIBILITY RATE}} = \text{CORRECTION INDEX (CI)}$$

- A CI >1.0 indicated greater correction than predicted by flexibility films; <1.0 indicated less correction.



RESULTS

- 103 patients met inclusion criteria
- Mean age = 6.4 years
- Mean follow-up = 4.2 years
- 30 of 103 patients underwent “final” spinal fusion
- Distribution of diagnoses:
 - 31 idiopathic
 - 35 neuromuscular
 - 17 syndromic
 - 16 congenital
 - 4 “other”



RESULTS

- Distribution of type of curve flexibility films:
 - Supine bending films = 78%
 - Traction films 20%
 - Standing bend = 1%
 - Push prone = 1%
- All patients had a CI greater than predicted at post-index (1.9) which slightly declined at latest follow-up (1.6).
- For patients who underwent final fusion, curve correction equaled post-index correction (CI = 1.9).

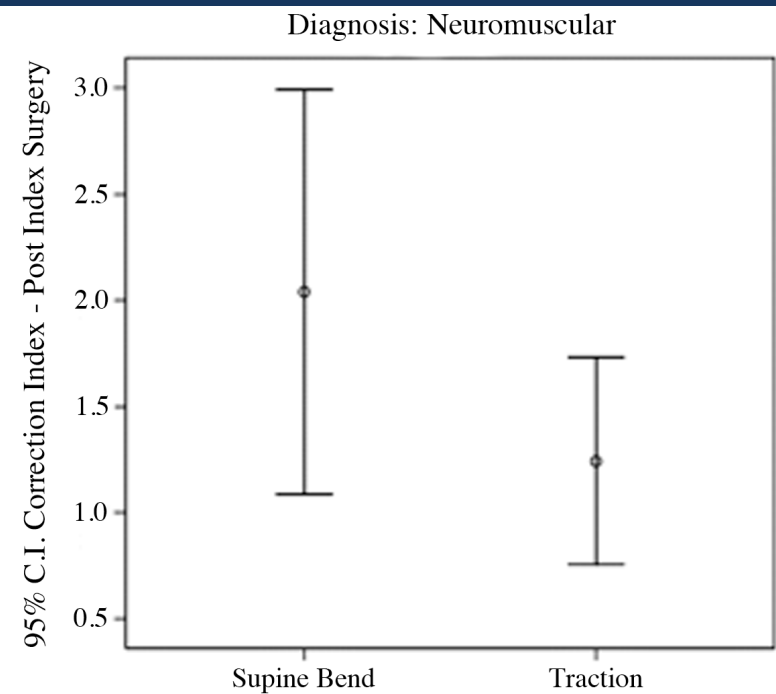
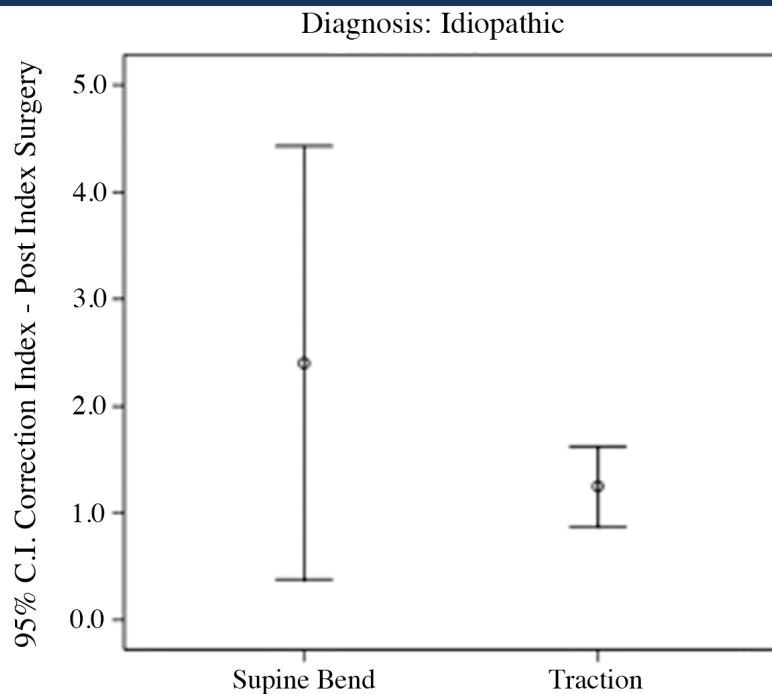
RESULTS

- CONGENITAL curves were stiffer (FR = 25%) compared to IDIOPATHIC (FR = 45%) and NEUROMUSCULAR curves (FR = 41%) ($p > 0.05$).
- At final fusion, CONGENITAL curves had a correction nearly predicted by the flexibility films (CI = 0.96) while IDIOPATHIC and NEUROMUSCULAR curves maintained greater correction (CI = 2.1 and 2.4, respectively).



RESULTS

- No statistical difference between SUPINE BEND and TRACTION in predicting correction at any post-op time point.
- There was greater consistency in measuring curve flexibility with TRACTION films.



CONCLUSION

- SUPINE BEND followed by TRACTION was the most commonly used flexibility film used in this series of growing rod patients.
- No flexibility method was better in predicting post-op curve correction.
- One can anticipate greater curve correction than predicted by flexibility films in IDIOPATHIC and NEUROMUSCULAR patients -- even at final fusion.

Thank You

The Growing Spine Foundation is supported primarily by donations from its surgeon members and unrestricted grants received either directly, or through OREF, by industry and other organizations.

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



SAN DIEGO CENTER
FOR SPINAL DISORDERS



UNIVERSITY of CALIFORNIA
SAN DIEGO