## What Do Coronal Flexibility Films Really Tell Us About the Treatment of Idiopathic Early Onset Scoliosis Patients Using Growing Rods?

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# DISCLOSURES

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# INTRODUCTION

 The utility of pre-operative flexibility films has been wellstudied in Adolescent Idiopathic Scoliosis (AIS)



### Spine (Phila Pa 1976). 2007 Nov 15;32(24):2668-72.

The reliability of preoperative supine radiographs to predict the amount of curve flexibility in adolescent idiopathic scoliosis.

Cheh G, Lenke LG, Lehman RA Jr, Kim YJ, Nunley R, Bridwell KH. Wooridul Spine Hospital. Seoul. Korea.

#### Spine (Phila Pa 1976). 2000 Jan;25(1):76-81.

Comparison of push-prone and lateral-bending radiographs for predicting postoperative coronal alignment in thoracolumbar and lumbar scoliotic curves.

Vedantam R, Lenke LG, Bridwell KH, Linville DL. Midwest Orthopedic Institute, Richmond, Indiana, USA.

### Spine (Phila Pa 1976). 2012 Jul 1;37(15):E922-6.

The predictive value of the fulcrum bending radiograph in spontaneous apical vertebral derotation in adolescent idiopathic scoliosis.

Luk KD, Cheung WY, Wong Y, Cheung KM, Wong YW, Samartzis D.

Department of Orthopaedics & Traumatology, The University of Hong Kong, Pokfulam, Hong Kong SAR, China. hrmoldk@hku.hk

### Spine (Phila Pa 1976). 2010 Mar 1;35(5):557-61.

Prediction of scoliosis correction with thoracic segmental pedicle screw constructs using fulcrum bending radiographs.

Cheung WY, Lenke LG, Luk KD.

Department of Orthopaedics and Traumatology, The University of Hong Kong, Hong Kong, China. Icheung@hkucc.hku.hk

### Spine (Phila Pa 1976). 2001 Mar 1;26(5):E74-9.

### Prospective comparison of flexibility radiographs in adolescent idiopathic scoliosis.

Klepps SJ, Lenke LG, Bridwell KH, Bassett GS, Whorton J.

Department of Orthopaedics, Washington University School of Medicine; Mid-Central Orthopaedics, and Shriners Hospital, St. Louis, Missouri, USA.





# INTRODUCTION

- Flexibility films are considered routine for successful surgical treatment of AIS
  - Determine curve type and structurality
  - Guide selection of fusion levels, especially LIV
  - Provide clues about post-operative curve correction





## PURPOSE

- The role of flexibility films in growing rod surgery has yet to be studied and clearly defined.
- The purpose of this study was to assess the value of flexibility films for idiopathic curves surgically treated with growing rods.







# METHODS

Retrospective review of a multi-center database

### • Inclusion criteria:

- Growing rod surgery
- $\leq$  10 years of age at index surgery
- Idiopathic diagnosis
- Pre-operative flexibility x-rays

## Parameters collected and analyzed:

- Major Cobb angle (pre-index, post-index, latest follow-up)
- Type of flexibility film
- Flexibility rate
- Correction index







# CORRECTION RATEFLEXIBILITY RATEFLEXIBILITY RATEFLEXIBILITY RATE

- CI = 1.0 [curve correction <u>equals</u> curve flexibility]
- **CI** >1.0 [curve correction is <u>greater</u> than curve flexibility]
- **CI** <1.0 [curve correction is <u>less</u> than curve flexibility]







## • 30 patients met the inclusion criteria

Gender	22 females, 8 males		
Mean pre-op age	6.2 years (1.7 to 10 years)		
Mean pre-op Cobb	78° (45 to 108°)		
Mean length of follow-up	4.6 years (1.5 to 8.9 years)		

### • Flexibility film types:

- 81% (n=24) supine bend
- 14% (n=4) traction
- 5% (n=2) standing bend or push-prone







### Descriptive Data (mean values)

	Post Index	Latest Follow-up	
Flexibility Rate	<b>0.44</b> (0		
<b>Correction Rate</b>	<b>0.53</b> (0.20 to 0.76)	<b>0.41</b> (-0.42 to 0.98)	p value <0.05
<b>Correction Index</b>	<b>1.45</b> (0.65 to 4.31)	<b>1.04</b> (-1.00 to 3.80)	p value <0.05

Curve corfactioncorfaction flexibility







### Correlation Analysis: Age and Cobb (r values)

	Pre-op		Post Index		Latest Follow-up		
	Age	Cobb	Age	Cobb	Age	Cobb	
Flexibility Rate							
Correction Rate	NO CORRELATIONS						
Correction Index							





# DISCUSSION

## **Pre-operative flexibility films:**

- Under-predicted curve correction obtained from the index growing rod surgery
- Accurately predicted curve correction at later follow-up
  - Due to loss of curve correction during the lengthening period
- Did <u>not</u> correlate with patient age or curve magnitude
  - Due to low sample size







## **Case example**







## DISCUSSION

## Study limitations

- Larger cohort is needed
  - Appropriately powered correlation analysis
  - Compare types of flexibility films





## THANK YOU



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