Do Thoracolumbar/Lumbar Curves Respond Differently to Growing Rod Surgery Compared to Thoracic Curves?

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The Growing Spine Study Group	None

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Introduction

- The effectiveness of growing rod (GR) constructs in the treatment of EOS has been demonstrated in previous literature[1,2].
- However, the effect of GR treatment on different curve locations has not yet been examined.
- The aim of this study was to elucidate the radiographic effect of GR surgery on the behavior of thoracic vs. lumbar curves in EOS.

1. Akbarnia BA et al. Dual growing rod treatment of progressive early onset scoliosis: A multicenter study. *Spine* 2005;46-S57.
2. Thompson GH et al. Comparison of single and dual growing rod followed through definitive surgery: A preliminary study. *Spine* 2005;2039-2044.

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Methods

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Demographic

- Total # of Patients: 175
  - Thoracic Curves (Group 1) = 139 Patients
  - Thoracolumbar/Lumbar Curves (Group 2) = 36 Patients

	Group 1	Group 2
Mean Pre-Op Age (Years)	5.8	6.3
Gender	Male = 44.6%, Female = 55.4%	Male = 44.4% Female = 55.5%
Mean Clinical F/U (Years)	5.0	5.8
Mean # of Lengthenings	5.9	5.8
Mean # of Levels Instrumented	13.6	**14.9***

*$p<0.05$

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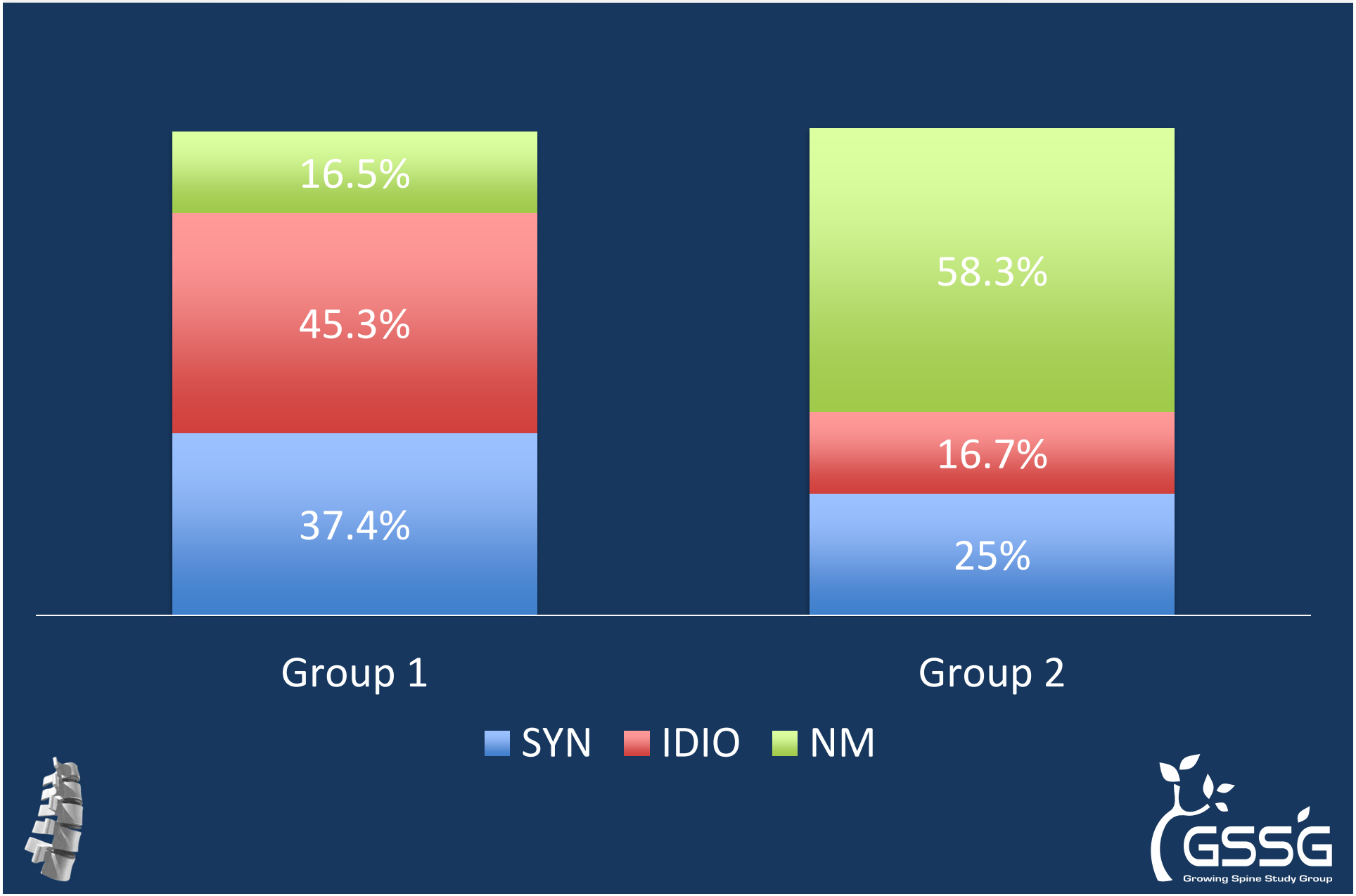
Curve Location by Etiology



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Results

- Changes **After** Index GR surgery:

	Group 1	Group 2
Major Curve (°)	77 → 43 (44% correction)	82 → 40 **(51% Correction*)**
Max Thoracic Kyphosis (°)	55 → 40	54 → 32
Lumbar Lordosis (°)	-50 → -43 (7° mean decrease*)	-44 → -42
T1 – S1 Length (mm)	252 → 291	255 → 298
Sagittal Balance (mm)	+26 → +20	+35 → +22
Coronal Balance (mm)	19 → 23	**68*** → 36 **(32mm correction*)**

***p<0.05**

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Results

- Changes **During** Lengthening period:

	Group 1	Group 2
Major Curve (°)	43 → 47	40 → 44
Max Thoracic Kyphosis (°)	40 → **54***	32 → 40
Lumbar Lordosis (°)	-43 → -50	-42 → -38
T1 – S1 Length (mm)	291 → 333	298 → 335
Sagittal Balance (mm)	+20 → +22	+22 → +16
Coronal Balance (mm)	23 → 23	36 → 50

***Max thoracic kyphosis was significantly greater at the latest visit for Group 2 patients ($p<0.05$)**

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Results

- Overall changes: **Pre-Index to Latest Follow up visit**.

	Group 1	Group 2
Major Curve (°)	77 → 47 **39% Overall correction**	82 → 44 **46% Overall correction**
Max Thoracic Kyphosis (°)	55 → 54*	54 → 40
Lumbar Lordosis (°)	-50 → -50*	-44 → -38
T1 – S1 Length (mm)	252 → 333	255 → 335
Sagittal Balance (mm)	+26 → +22	+35 → +16
Coronal Balance (mm)	19 → 23	68 → 50

*p<0.05

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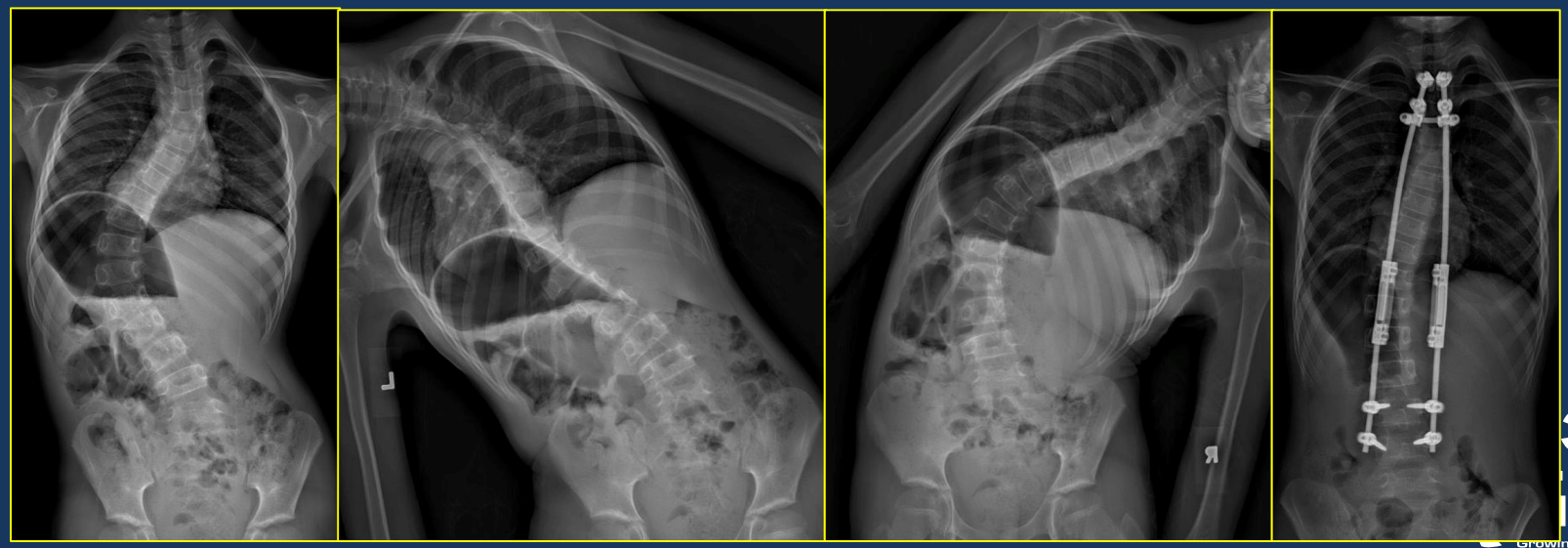
Flexibility

- A total of 80 patients (Group 1 = 58, Group 2 = 22) had pre-operative flexibility films available:

	Pre-operative Major curve Flexibility	Post-Index Major curve Correction	Final Visit Major curve correction
Group 1	40%	44%	39%
Group 2	45%	53%*	44%

*$p<0.05$



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Implant Complications & Revisions

	Complications	Revisions
Group 1	46%	70%
Group 2	50%	**89%***

- *Group 2 had significantly greater number of implant revisions (*p*=0.02).

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Conclusions

- Following GR surgery, thoracolumbar/lumbar curves achieved greater mean curve correction than thoracic curves, however, after an average of 6 lengthenings, both groups showed similar major curve correction.

- T1-S1 spinal growth achieved throughout treatment period was also similar between thoracic and thoracolumbar/lumbar group.

- Although complication rates were similar in both groups, thoracolumbar/lumbar patients required significantly more implant related revisions.

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