

Radiographic Comparison of Early Onset and Adolescent Idiopathic Scoliosis

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Growing Spine Study Group



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Sara K. Fuhrhop, BS	None
Colin J. Russell	None
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James O. Sanders, MD	Abbott (e); Hospira (e)
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Jeff B. Pawelek, BS	Growing Spine Foundation (a)
Behrooz A. Akbarnia, MD	DePuy Spine (a,b,e); Ellipse (a,b,c); K2M (a,b,c,d); Stryker (d); K Spine (a,b,c); Nuvasive (a,b,c); Nocimed (c)
Harms Study Group	Depuy Spine (a); Harms Study Group Foundation (a)
Growing Spine Study Group	Growing Spine Foundation (a)

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

Purpose

- Radiographic characteristics may differ between early onset idiopathic scoliosis (EOIS) and adolescent idiopathic scoliosis (AIS)
- This study aims to quantify differences, which could influence surgical decisions

Methods

Patient Populations

- EOIS – Growing Spine Study Group
 - 66 patients
 - 54% female and 46% male
 - Age 3.6 ± 1.4 years
 - Primary curves
 - 56 primary thoracic curves
 - 10 primary thoracolumbar/lumbar curves
- AIS – Harms Study Group
 - 1,537 patients
 - 79% female and 21% male
 - Age 12.3 ± 2.5 years
 - Primary curves
 - 1219 primary thoracic curves
 - 318 primary thoracolumbar/lumbar curves

Methods

Statistical Comparisons

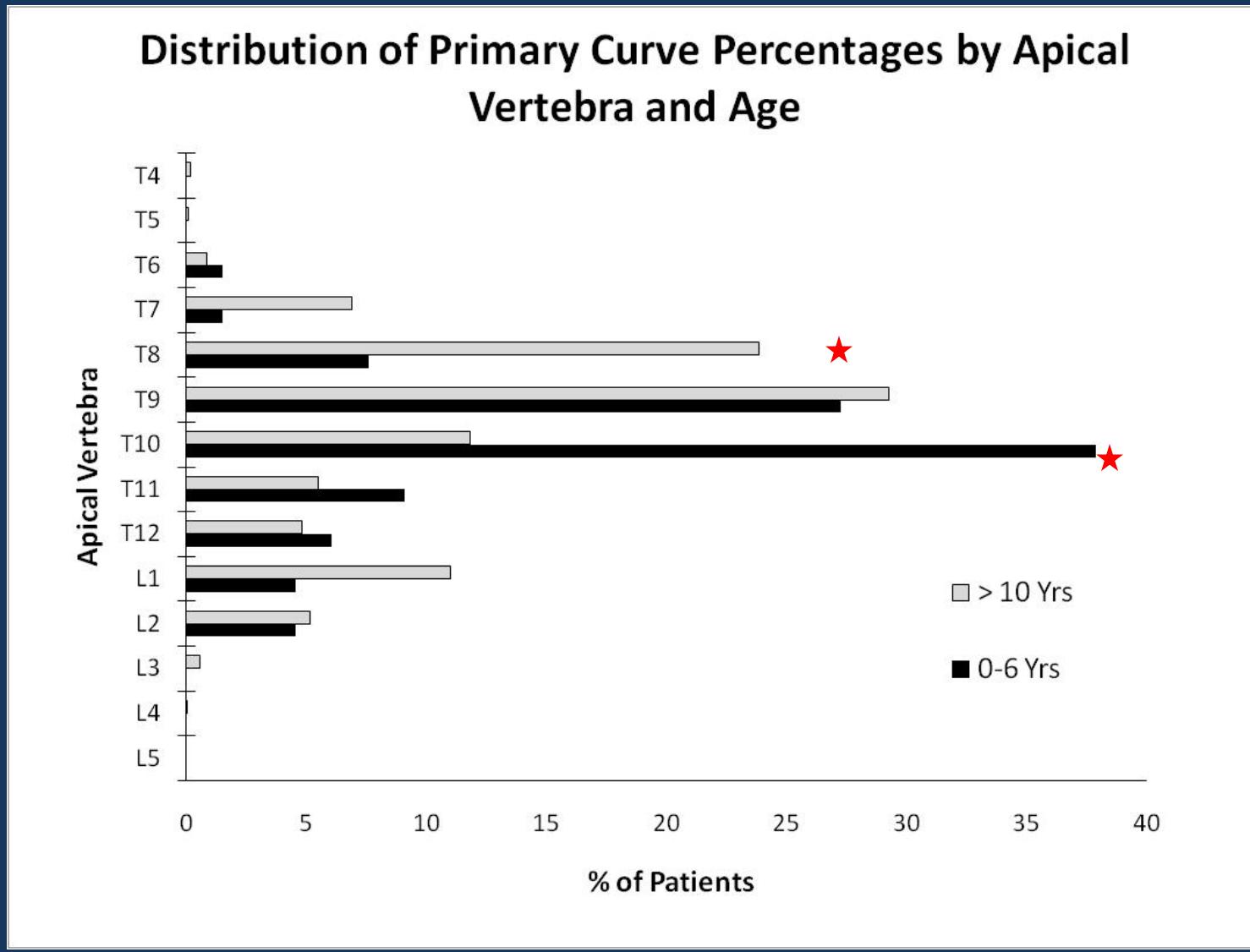
- Compared between entire EOIS and AIS groups:
 - Kyphosis
 - Lordosis
 - Stable vertebra
- Parameters compared in
 - primary thoracic curves
 - primary thoracolumbar/lumbar curves
- Level of significance set at $P = 0.05$

Results

- Stable Vertebra
 - Lower in EOIS
 - EOIS $L3.0 \pm 1.4$
 - AIS $L2.1 \pm 2.2$
 - $P < 0.001$
- T2-T12 Kyphosis
 - Larger in EOIS
 - EOIS $41 \pm 16^\circ$
 - AIS $31 \pm 13^\circ$
 - $P < 0.001$
- Lordosis
 - Larger in AIS
 - EOIS $50 \pm 16^\circ$
 - AIS $58 \pm 13^\circ$
 - $P < 0.001$

Results

All Patients



Results

Thoracic Primary Curves

Measurement	EOIS (n = 56)	AIS (n = 1,219)	P Value
Apical vertebra	$T9.5 \pm 1.0$	$T8.8 \pm 1.1$	< 0.001
Proximal Cobb end vertebra	$T6.1 \pm 1.2$	$T5.6 \pm 1.1$	< 0.001
Distal Cobb end vertebra	$T12.8 \pm 1.2$	$T11.8 \pm 1.2$	< 0.001
Curve span (# of vertebrae)	6.7 ± 1.2	6.3 ± 1.0	0.01
Direction	34% R, 66% L	95% R, 5% L	< 0.001
Magnitude (°)	73 ± 23	55 ± 13	< 0.001

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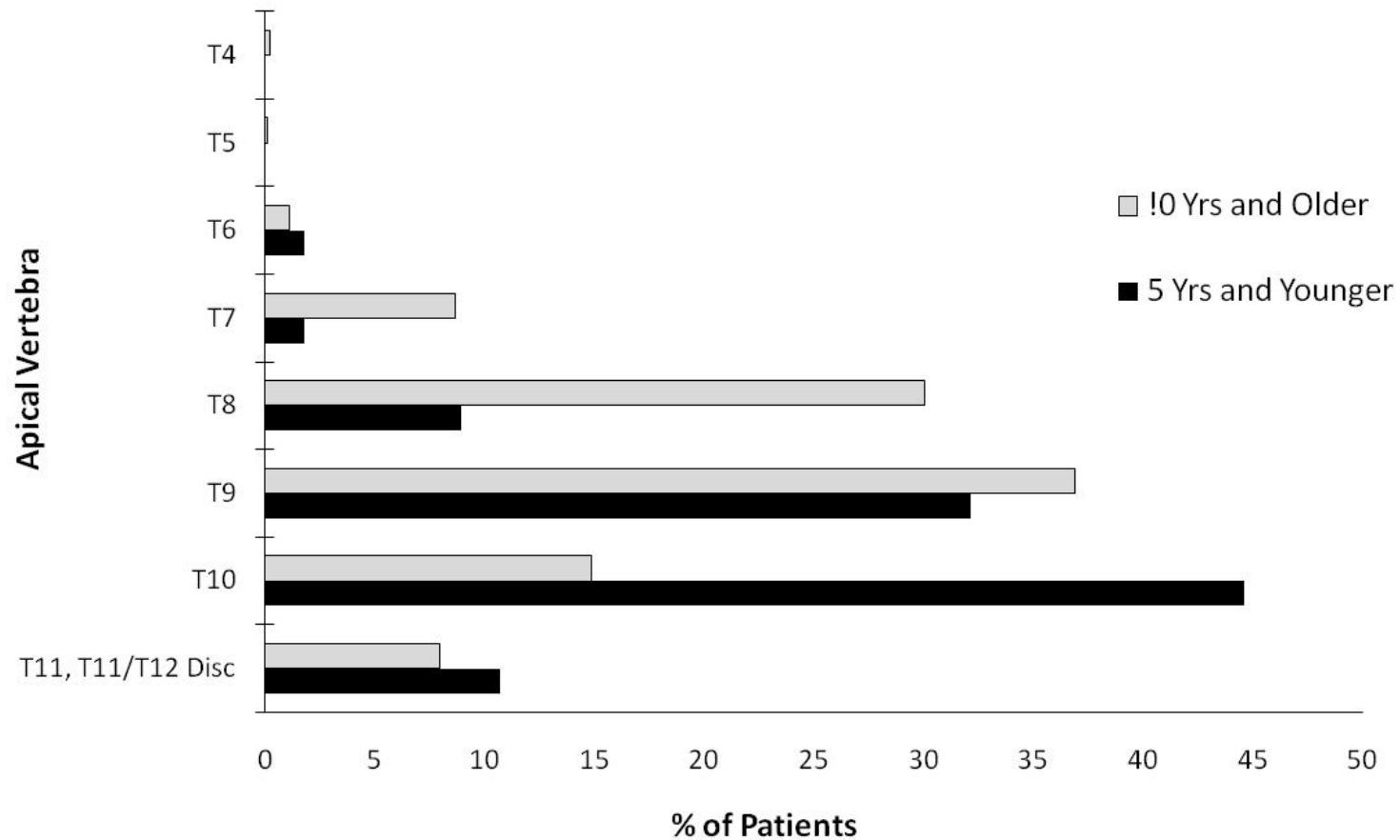
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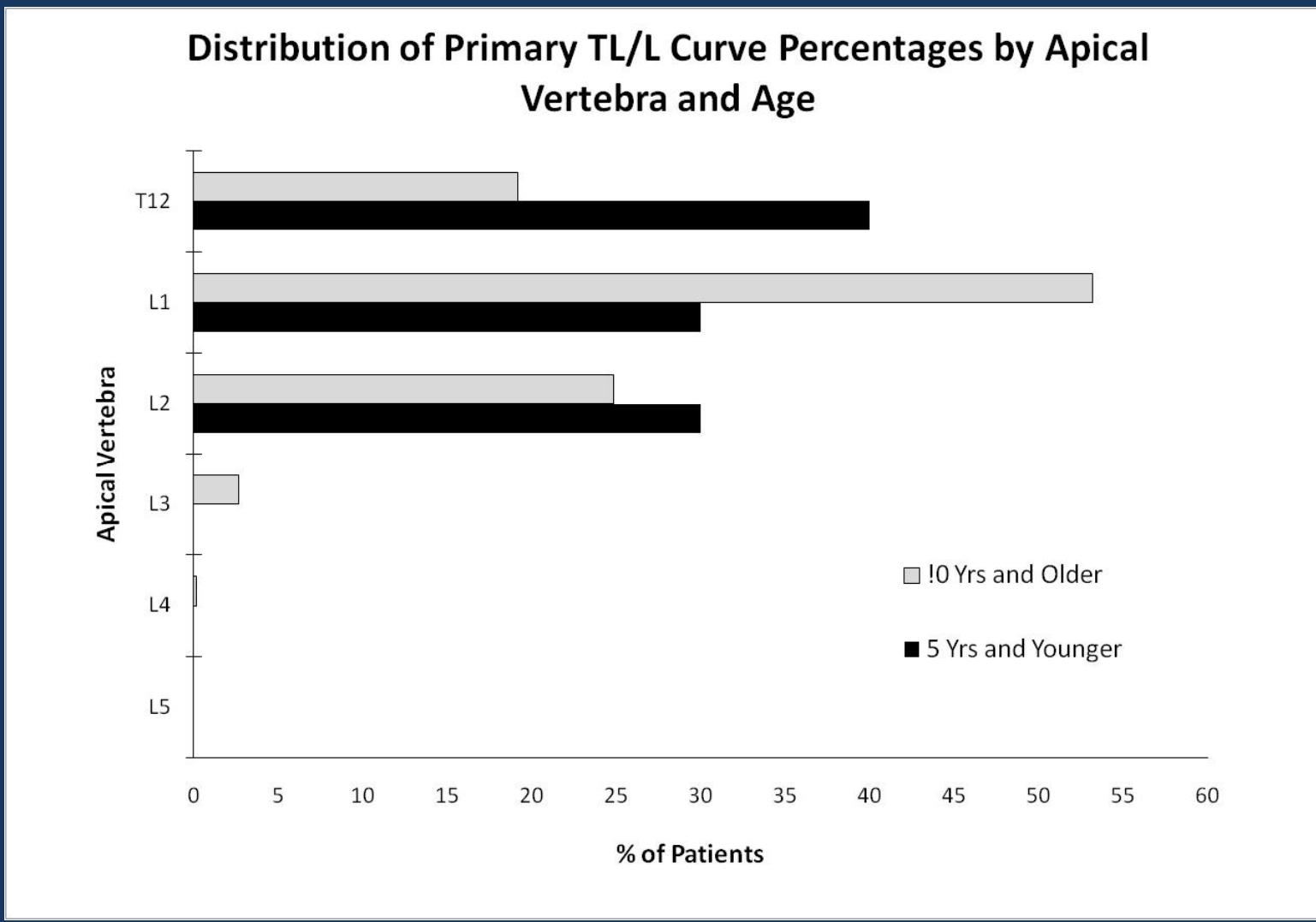
Thoracic Primary Curves

Distribution of Primary Thoracic Curve Percentages by Apical Vertebra and Age

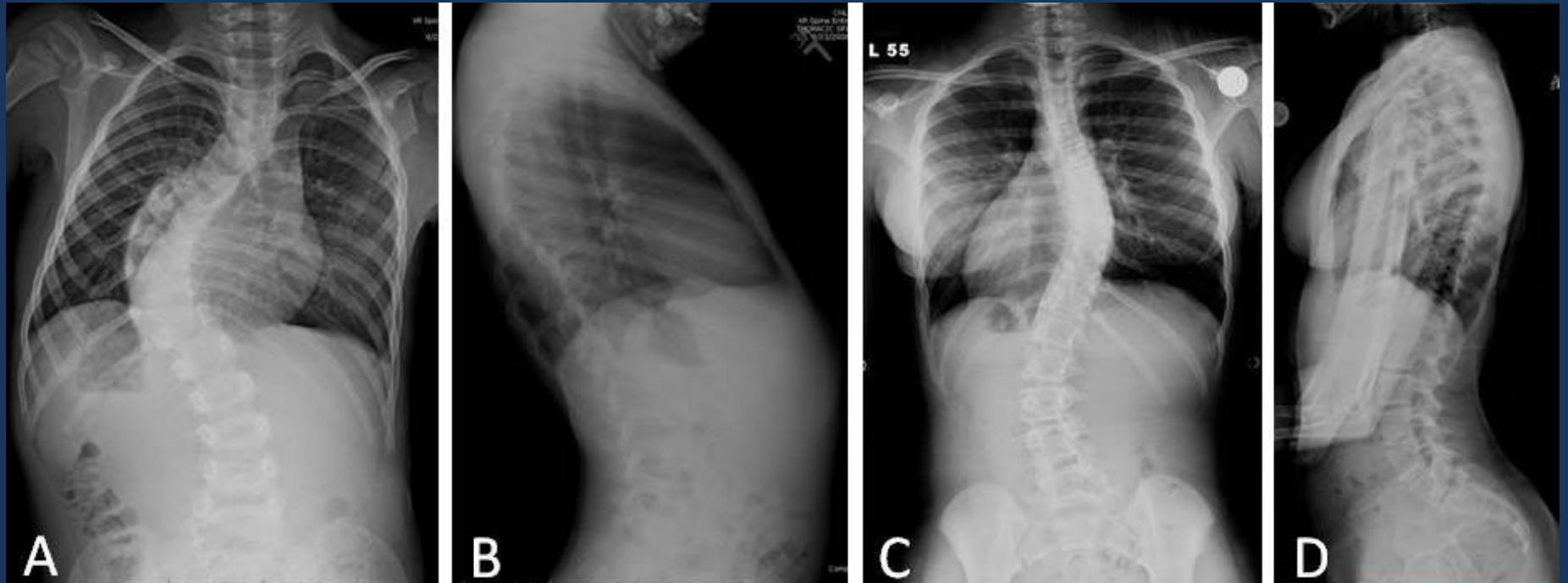


Results

Thoracolumbar/Lumbar Primary Curves



“Modal” EOIS and AIS Characteristics



(A,B)

-5.6 year old patient
-T10 curve apex
- 44° T2-T12 kyphosis

(C,D)

-12.4 year old patient
-T9 curve apex
- 34° T2-T12 kyphosis



Lower curve apex and greater kyphosis in EOIS

Conclusions

- Statistically significant differences found in
 - T2-T12 kyphosis
 - Highest stable vertebra
 - Primary curve parameters
 - apex, magnitude, direction, span, proximal Cobb vertebra, and distal Cobb vertebra
- Significance
 - Greater kyphosis in EOIS may increase anchor stress
 - Lower stable vertebra require more distal fusion in EOIS

Thank You





Thank You

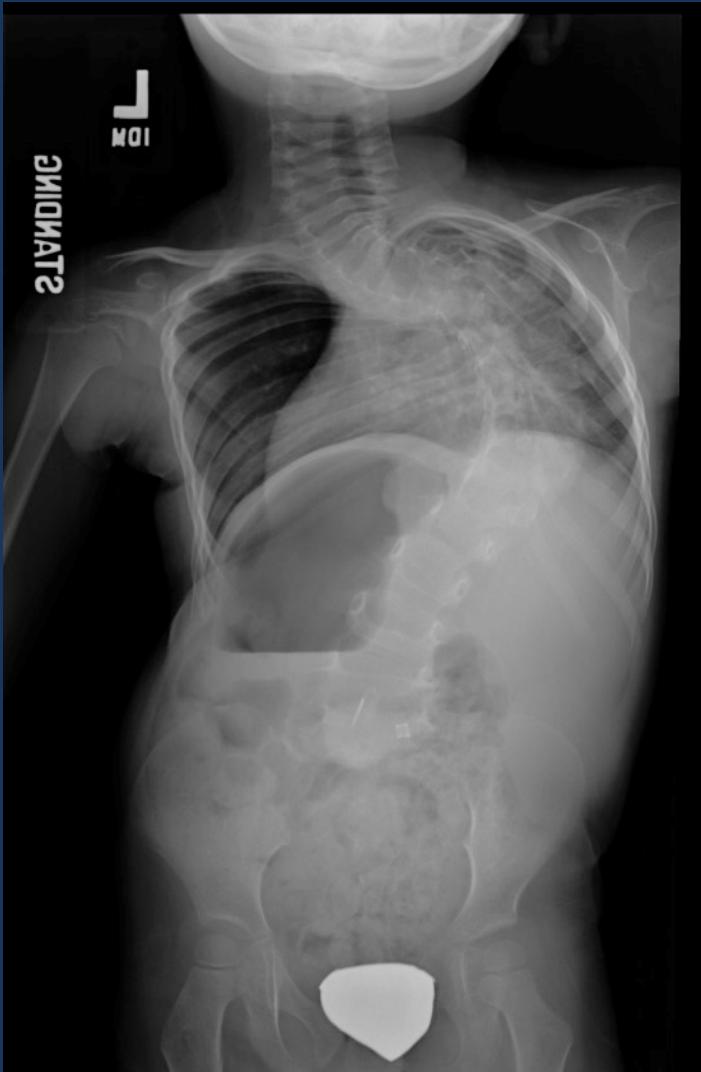
Results

Thoracolumbar/Lumbar Primary Curves

Measurement	EOIS (n = 10)	AIS (n = 318)	P Value
Apical vertebra	T12.9 ± 0.9	L1.1 ± 0.7	< 0.001
Proximal Cobb end vertebra	T9.8 ± 1.9	T10.4 ± 1.1	.34
Distal Cobb end vertebra	L3.2 ± 1.3	L3.3 ± 0.7	.89
Curve span (# of vertebrae)	5.4 ± 1.4	5.5 ± 1.2	.91
Direction	10% R, 90% L	19% R, 81% L	.51
Magnitude (°)	63 ± 14°	51 ± 12°	0.03

Radiographs

Severe Kyphoscoliosis in EOIS



4.5 Year
Old
Female

