

Sagittal Spinopelvic Parameters Help Predict the Risk of Proximal Junctional Kyphosis for Children Treated with Posterior Distraction Based Implants

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Disclosures

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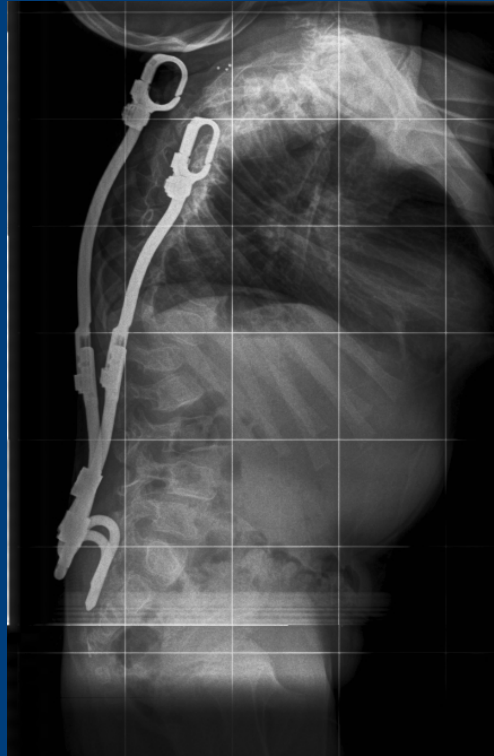
(a) Dupuy Spine, (a) Synthes, (a) Medtronic

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(b) Biomet, (b) Stryker, (a) Medtronic, (e) CWSDSG
(b) Depuy Spine
no relationships
no relationships
no relationships
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- a. Grants/Research Support**
- b. consultant**
- c. Stock/shareholder**
- d. Speakers' Bureau**
- e. Other financial support**

Proximal Junctional Kyphosis



Proximal Junctional Kyphosis

- Related to pre-operative sagittal-plane alignment?
- Related to surgical factors?



Purpose

- To determine if pre-operative sagittal-plane parameters can predict the risk of post-operative proximal junctional kyphosis (PJK) in a group of children treated with posterior distraction implants.

Methods

- Pre-operative and minimum 2-year follow-up
- N= 40 children with EOS:
 - 24 subjects - Rib-based.
 - 16 subjects - Spine-based.
- PJK was defined as proximal junction sagittal angle (PJA) $\geq 10^\circ$ and PJA at least 10° greater than pre-operative.

Results

- **PJK – 27.5% of patients (11 of 40)**
 - 6 treated with Rib-Based
 - 5 treated with Spine-Based
- **Rib-Based 25% with PJK (6 of 24)**
- **Spine-Based 31% with PJK (5 of 16)**
- **Not significantly different between treatment groups**

Results – Pre-op

Pre-op			
	PJK	No PJK	p value
Age (Years)	7.1	5.0	<0.05
Follow Up (Years)	2.4	2.9	0.36
Thoracic Cobb	69.9	76	0.16
Lumbar Cobb	38.8	29.1	0.48
Thoracic Kyphosis	45.1	28.7	<0.05
Lumbar Lordosis	53.1	44	0.079
PJA	2.2	2.8	0.41
Sagittal Balance (cm)	1.5	2.6	0.15
Pelvic Incidence	52.8	47.4	0.21
Pelvic Tilt	14.3	8.7	0.086
Sacral Slope	37.7	35.9	0.35
Pelvic Radius	72.7	67	0.19

Results – Follow up

2 Year post-op			
	PJK	No PJK	p value
Age (Years)	9.63	7.88	
Thoracic Cobb	50	52.8	0.35
Lumbar Cobb	23.89	25.9	0.37
Cerv. Lordosis	30.0	16.6	<0.05
Thor. Kyphosis	34.6	28.6	0.19
Lumbar Lordosis	47.4	47.8	0.48
PJA	21.9	3.1	<0.05
Sag.Balance(cm)	3.7	0.2	<0.05
Pelvic Incidence	56.4	51.2	0.23
Pelvic Tilt	18.4	13.6	0.24
Sacral Slope	40	39.2	0.43
Pelvic Radius	79.1	62.2	<0.05

PJK = 11/40

PJK = 27.5%

Results

- **Subjects with PJK**
 - Older age at initial surgery
 - Higher pre-op thoracic kyphosis
- **No difference rib-based vs spine-based**
- **Positive sagittal balance post-op**
- **Increased cervical lordosis post-op**
- **Increased pelvic radius angle post-op**

Conclusions

- There was a **27.5% rate of PJK** in this group of children with Early Onset Scoliosis that were treated with Posterior Distraction Based Techniques.
- Higher rates of PJK were found for **older** children who were **hyperkyphotic** pre-operatively and in those who had **positive sagittal balance** post-operative.

References

- Jean-Marc Mac-Thiong, MD,*† Hubert Labelle, MD,*† Manon Charlebois, MD,* . "Sagittal Plane Analysis of the Spine and Pelvis in." SPINE (2003): 1404-1409.
- Tanguay, F., Mac-Thiong, J.M., de Guise, J., Labelle, H. "Relation between the sagittal pelvic and lumbar spine geometries." Eur. Spine J (2007): 531-536.
- Yongjung J. Kim, MD, Keith H. Bridwell, MD, Lawrence G. Lenke, MD, Chris R. Glattes, MD,. "Proximal Junctional Kyphosis in Adult Spinal Deformity After Segmental Posterior Spinal." SPINE (2008): 2179-2184.
- Yongjung J. Kim, MD, Keith H. Bridwell, MD, Lawrence G. Lenke, MD, Junghoon Kim, MD,. "Proximal Junctional Kyphosis in Adolescent Idiopathic Scoliosis Following Segmental Posterior Spinal Instrumentation and Fusion." SPINE (2005): 2045–2050.

Thank You

