

# Sagittal Spinopelvic Parameters of Children with Early Onset Scoliosis

**Ron El-Hawary, Peter Sturm, Jason Howard, Krystyna Cowan  
Patrick Cahill, Amer Samdani, Michael Vitale, Peter Gabos,  
Nathan Bodin, Charles d'Amato, Colin Harris, John Smith**



# Sagittal Spinopelvic Parameters of Children...

**Presenter: Ron El-Hawary**

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

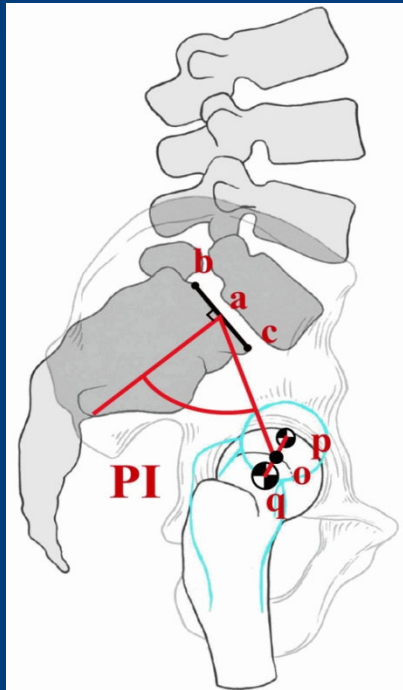
- co-authors: Peter Sturm  
Patrick Cahill  
  
Amer Samdani  
Michael Vitale  
Peter Gabos  
Nathan Bodin  
Charles d'Amato  
  
Jason Howard  
  
Krystyna Cowan

(a,b) Depuy Spine, (a) Synthes, (c) Pioneer Surgical  
(a,b) Depuy Spine, (b) SpineGuard, (b) Osteotech,  
(d) Synthes  
(b) Depuy Spine, (b) Spinevision, (b) Synthes  
(b) Biomet, (b) Stryker, (a) Medtronic, (e) CWSDSG  
(b) Depuy Spine  
no relationships  
no relationships  
no relationships  
no relationships

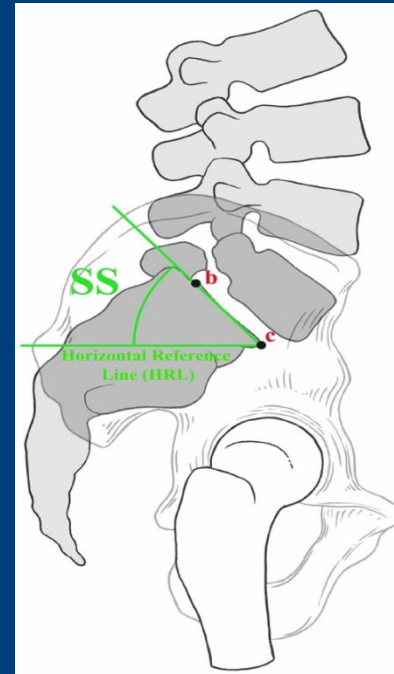
- a. Grants/Research Support**
- b. consultant**
- c. Stock/shareholder**
- d. Speakers' Bureau**
- e. Other financial support**

# Spinopelvic Parameters

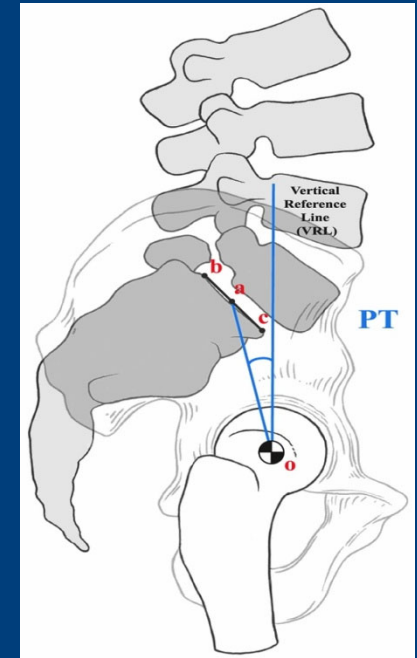
## Pelvic incidence



## Sacral slope



## Pelvic tilt



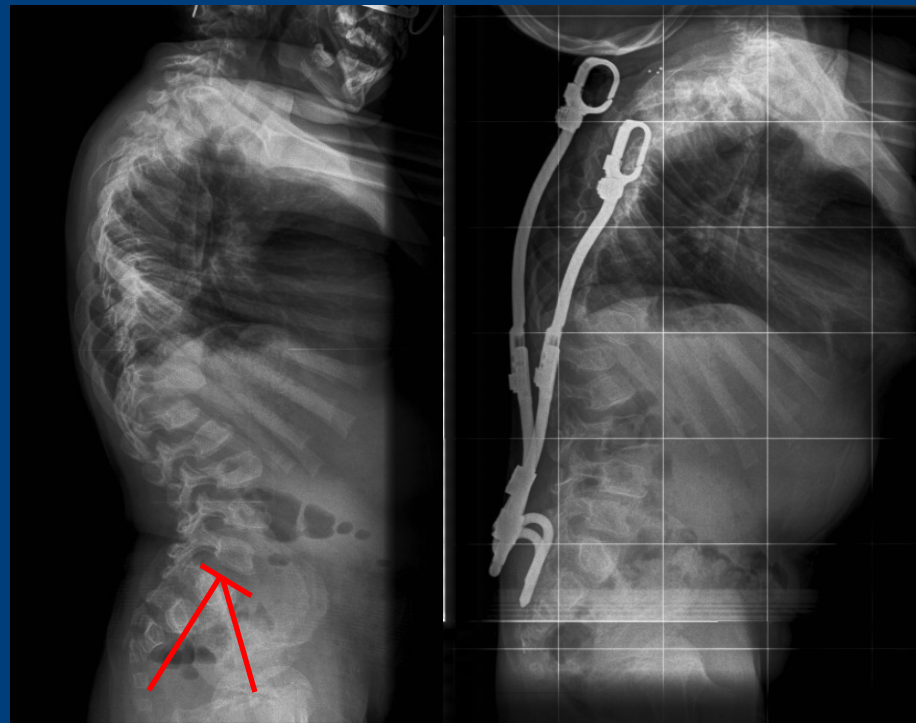
# Early Onset Scoliosis

- Spinopelvic parameters - not defined in children with early onset scoliosis
- Important to define because:
  - May affect natural history
  - May affect the outcome of surgical intervention



# Purpose

- To define sagittal plane spinopelvic parameters in a group of children with early onset scoliosis
- To define the variability associated with these measurements



# Methods

---

- **Inclusion**

- 6 months – 10 years of age (open triradiates)
- Scoliosis (ambulatory)
- >50 degrees

- **Exclusion**

- Previous spine surgery
- Non-Ambulatory

# Methods

---

- Standing lateral radiographs evaluated



- Parameters measured
  - Thoracic kyphosis, Lumbar lordosis
  - Pelvic incidence, pelvic tilt, sacral slope, pelvic radius angle



- Comparison to age-matched normals
  - Mac-Thiong et al, Spine 2004

# Results

- **N=82**
- **Mean age = 5.2 years**
- **Mean scoliosis =  $73.3 \pm 17.3^\circ$**

Parameters	EOS Patients < 10 years old N=82	Mac-Thiong et al., 2004 Patients < 10 years old (n=35)	P Value
Sagittal Balance (cm)	$2.4 \pm 4.03$	-	
Thoracic Kyphosis ( $^\circ$ )	$38.2 \pm 20.8$	$38.3 \pm 9.8$	0.97
Lumbar Lordosis ( $^\circ$ )	$47.8 \pm 17.7$	$45.6 \pm 12.1$	0.51
Pelvic Incidence ( $^\circ$ )	$47.1 \pm 15.6$	$44.6 \pm 10.6$	0.48
<b>Pelvic Tilt (<math>^\circ</math>)</b>	<b><math>10.3 \pm 10.7</math></b>	<b><math>4.3 \pm 8.1</math></b>	<b>0.004</b>
Sacral Slope ( $^\circ$ )	$35.5 \pm 12.2$	$40.3 \pm 8.7$	0.06
Modified Pelvic Radius Angle ( $^\circ$ )	$57.1 \pm 21.2$	-	



# Results

- **Mean Sagittal Spine Parameters**

- Thoracic Kyphosis
- Lumbar Lordosis



Similar to age-matched normals

- **Mean Sagittal Pelvic Parameters**

- Pelvic Incidence
- Sacral Slope



Similar to age-matched normals

- Pelvic Tilt



Significantly higher in EOS patients ( $p < 0.05$ )

# Results

---

- **Intraobserver Variability**

- Pelvic Incidence  0.564

- Sacral Slope  0.947

- Pelvic Tilt  0.816

- Pelvic Radius Angle  0.789

# Results

- **Interobserver Variability**

- Pelvic Incidence



**NS**

- Sacral Slope



**P=0.003**

- Pelvic Tilt



**NS**

- Pelvic Radius Angle



**NS**

# Conclusions

---

- Sagittal plane spinopelvic parameters have been defined for a group of children with early onset scoliosis
- With the **exception of increased pelvic tilt**, these parameters were found to be similar to those published for children without spinal deformity

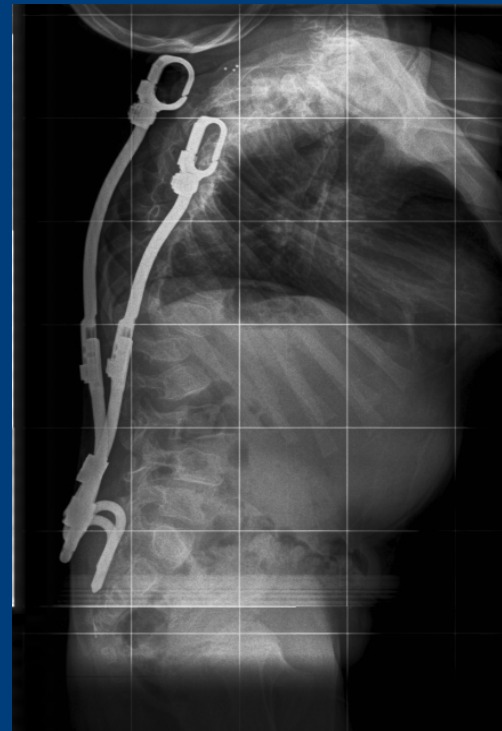
# Conclusions

---

- **Intraobserver and interobserver variability measurements for pelvic tilt and pelvic radius were superior to measurements of pelvic incidence and sacral slope**
- **Measurements of spinopelvic balance may be less variable for pelvic tilt and pelvic radius as they do not rely on orientation of the immature sacral endplate**

# Conclusions

- This data may be useful as a baseline in determining prognosis for children with Early Onset Scoliosis who are treated with growing systems.



# Thank You

