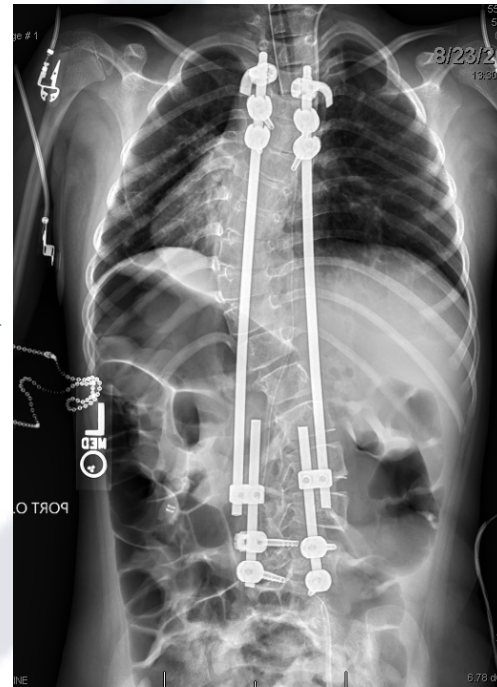
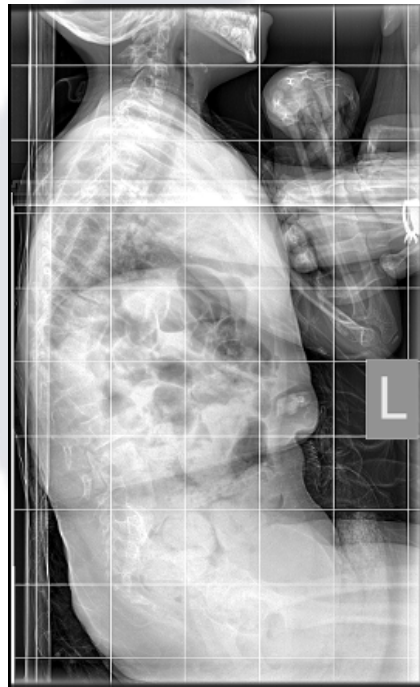
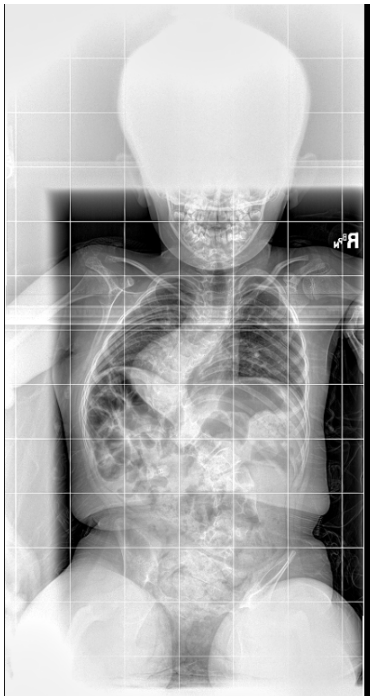

Unplanned Return to OR (UPROR) for EOS Children: A Comprehensive Evaluation of all Diagnoses and Instrumentation Strategies

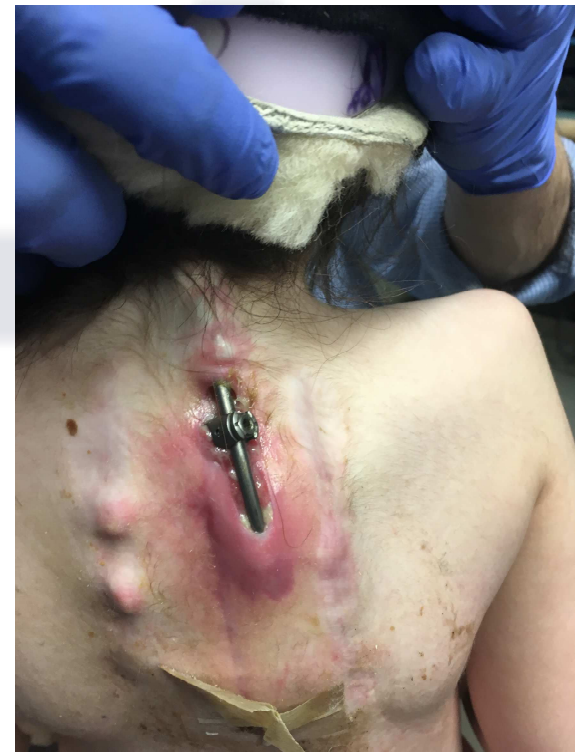
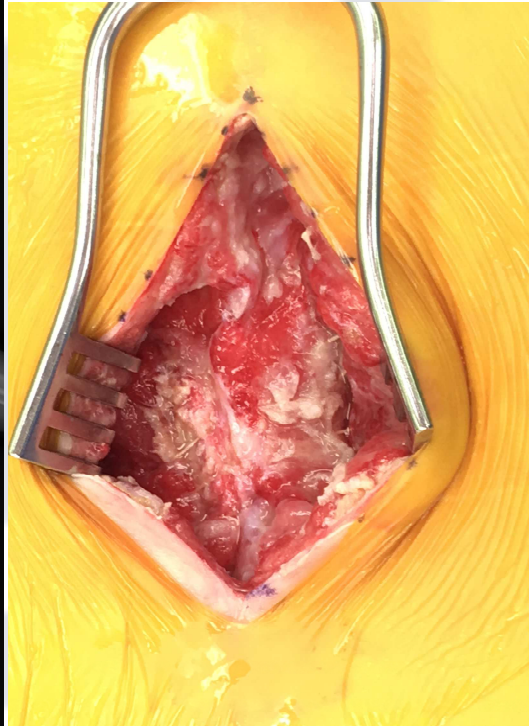
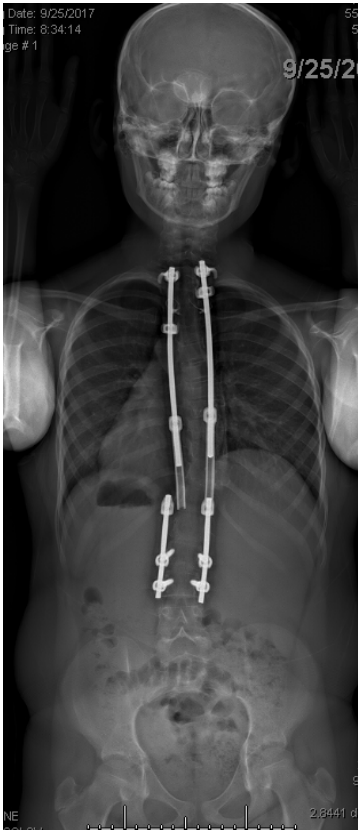
**Jason B. Anari MD, John M. Flynn MD, Michael A. Vitale MD, John
T. Smith MD, Jamie A. Gomez MD, Children's Spine Study Group
Department of Orthopaedic Surgery
Children's Hospital of Philadelphia**



Background



Background



Why now with C-EOS

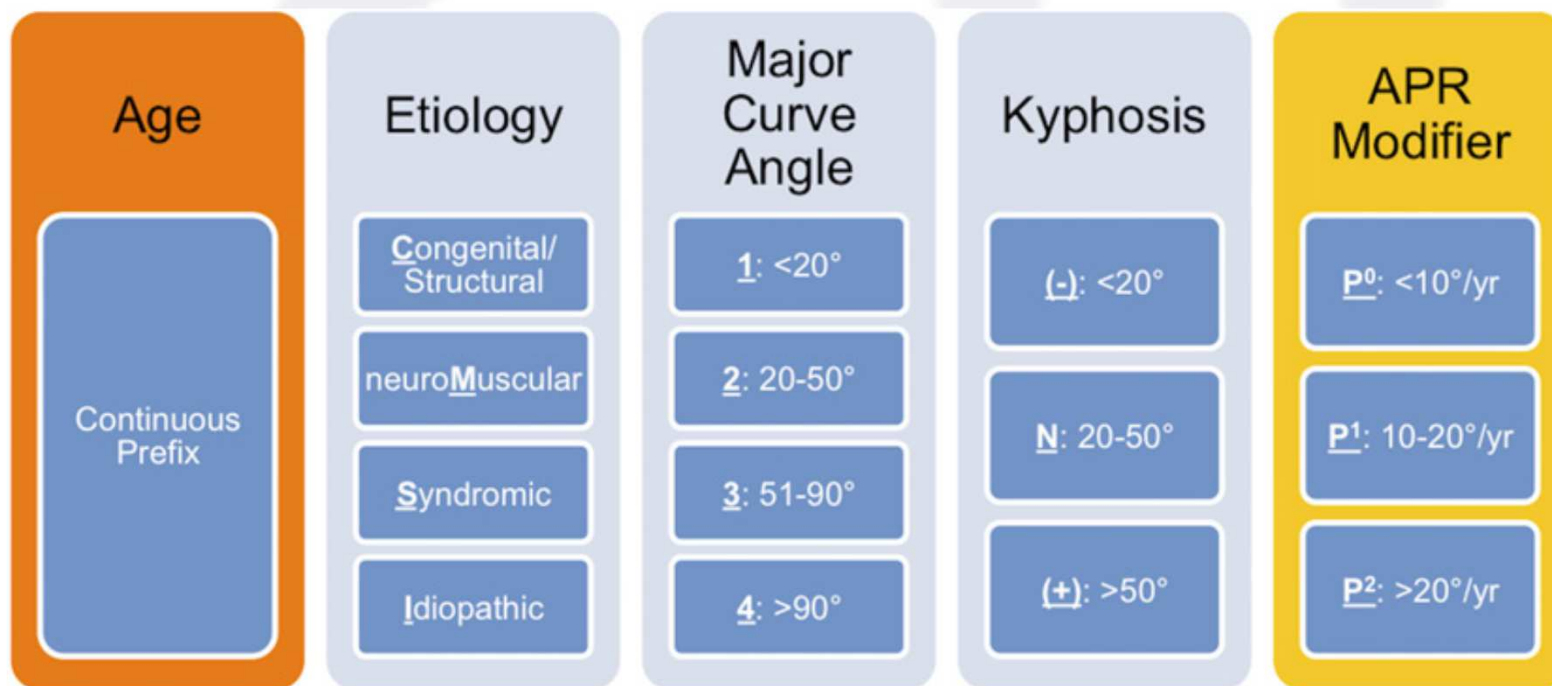
- **Early onset scoliosis is a heterogeneous population that lacked a classification system until 2014**

Development and Initial Validation of the Classification of Early-Onset Scoliosis (C-EOS)

Brendan A. Williams, MD, Hiroko Matsumoto, MA, Daren J. McCalla, BS, Behrooz A. Akbarnia, MD, Laurel C. Blakemore, MD, Randal R. Betz, MD, John M. Flynn, MD, Charles E. Johnston, MD, Richard E. McCarthy, MD, David P. Roye Jr., MD, David L. Skaggs, MD, John T. Smith, MD, Brian D. Snyder, MD, PhD, Paul D. Sponseller, MD, MBA, Peter F. Sturm, MD, George H. Thompson, MD, Muharrem Yazici, MD, and Michael G. Vitale, MD, MPH

- **Research questions could not be extrapolated to specific patient populations**

C-EOS



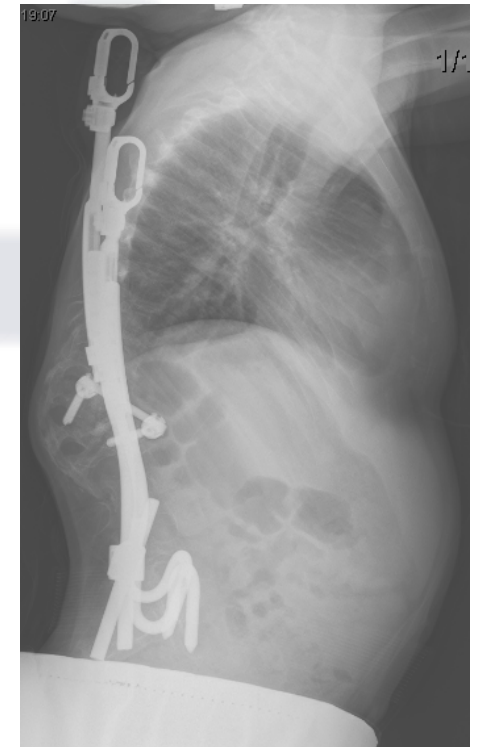
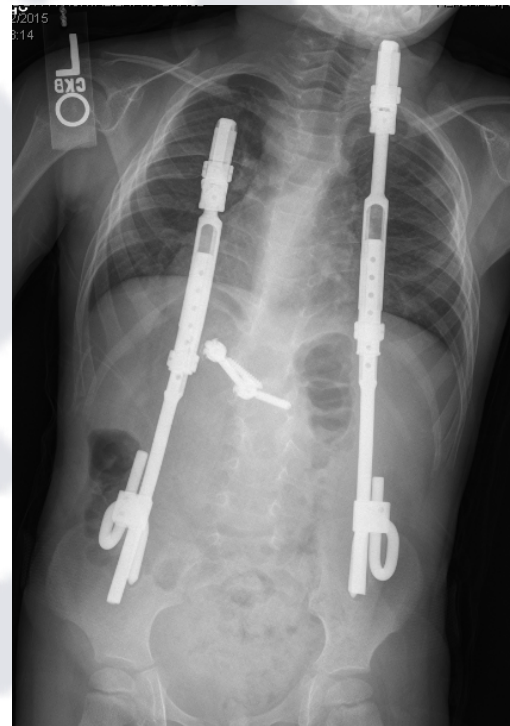
Question

- **Early complications in EOS are common**
 - **Literature lacking on how often things do not go as planned**



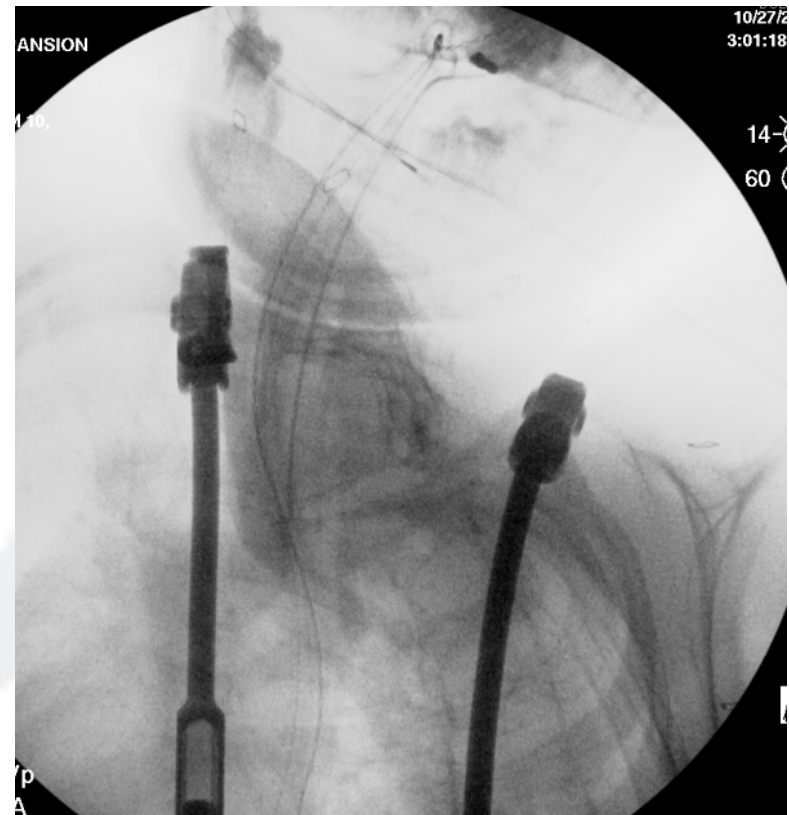
UPROR: Unplanned return to the operating room

- **What qualifies as UPROR**
 - Additional surgical event
 - Additional surgery dealt with at expansion
 - **Anchor failure**
 - Proximal (rib fracture)
 - Distal (pelvic hook migration)
 - **Infection**
 - Deep space collection
 - Wound dehiscence
 - **Implant fracture**



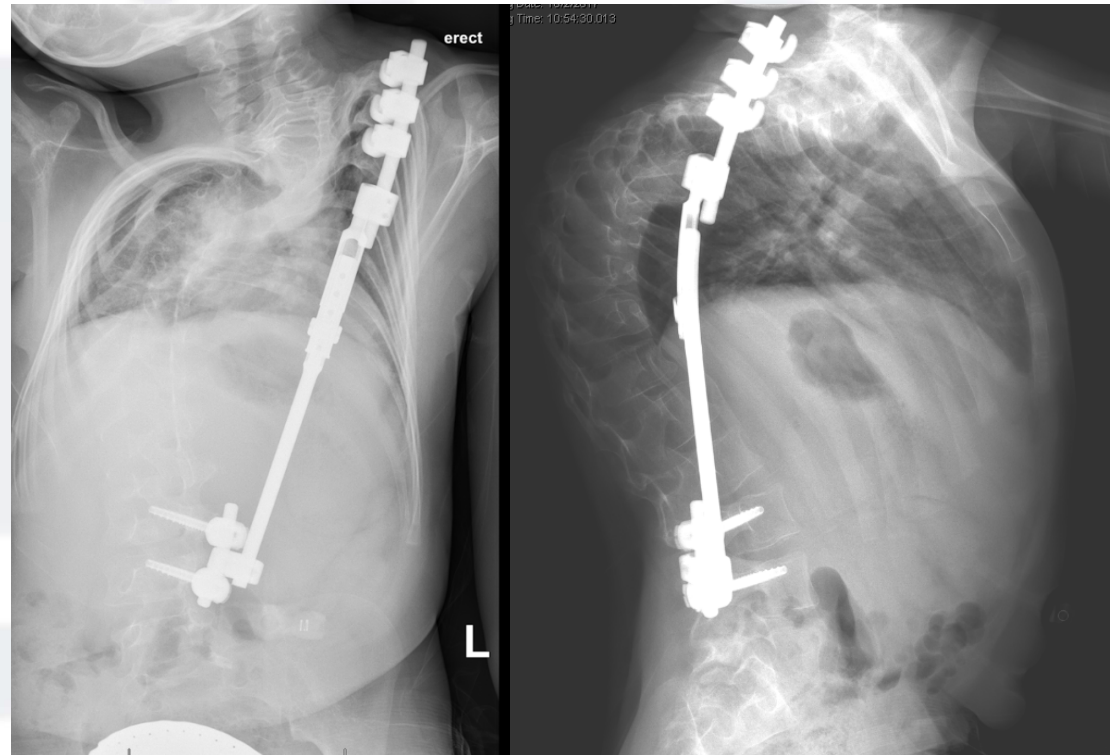
Methods

- 2 year prospectively collected and retrospectively analyzed from the CSSG
- Included all patients who had distraction based spinal growth implants without fusion



Results

- **371 patients**
- **130/371**
UPROR
— (35%)



C-EOS Specific UPROR Events

Neuromuscular	53
M1-	3
M2	1
M2+	1
M2N	3
M3	3
M3-	3
M3+	17
M3N	14
M4	1
M4+	3
M4N	4

Congenital	36
C2	1
C2-	1
C2+	2
C2N	1
C3	3
C3-	1
C3+	10
C3N	17

Idiopathic	21
I+	1
I2	1
I2N	2
I3	1
I3+	6
I3N	6
I4	1
I4+	3

Syndromic	20
S2	1
S3	2
S3+	8
S3N	4
S4+	4
S4N	1

Bad Actors

- 1a: **M3+** - Neuromuscular w/ a 50°- 90° coronal cobb angle & a > 50° sagittal cobb angle.
- 1b: **C3N** – Congenital w/ a 50° - 90° coronal cobb angle & a 20°- 50° sagittal cobb angle.
- 3: **M3N** – Neuromuscular w/ a 50°- 90° coronal cobb angle & a 20°- 50° sagittal cobb angle.



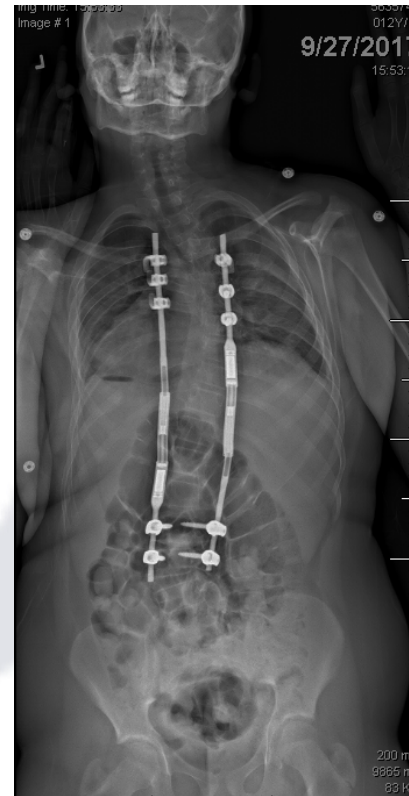
Implant Specific UPROR

- **2 year follow up data**
 - **No relationship between UPROR and implant design**

2 Year UPROR by Implant			
	n	Total	%
MCGR	19	58	33%
VEPTR	96	262	37%
SHILLA	2	5	40%
Growing Rod	12	44	27%
Combination	1	2	50%
Total	130	371	35%
			p=0.787

Take home message

- **Pre-operative information for patient's family**
 - Specific C-EOS diagnoses may predispose a patient to a higher complication rate once initiating distraction based spinal growth.
 - **1 in 3 children have an UPROR within 2 years**



Future Directions

- **Should C-EOS diagnosis drive the implant selection to limit UPROR?**
 - Proximal implant level
 - Pelvis or spine
 - Numbers of fixation points
- **Is a specific type of UPROR seen more frequently in one implant type?**



Thank You

