

Effectiveness of Serial Derotational Casting for Treatment of Children with Early Onset Scoliosis

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-Disclosures-

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Other: CSSG - BOD

POSNA – BOD

IPOS- Chairman

None relevant

Growth as a corrective force in the early treatment of progressive infantile scoliosis

*Mehta -JBJS(B)
Sep 2005)*

- 136 patients with infantile scoliosis treated with casting (Cotrel and Morel technique)
- “Full correction” in 94 patients
- “Partial correction” in 42 patients
- RVAD, “asthenic” body risk factors



Infantile Idiopathic Scoliosis

Natural History

- L thoracic most common
- Boys 3:2
- 90% resolve by age 2
- Treatment for other 10% variable

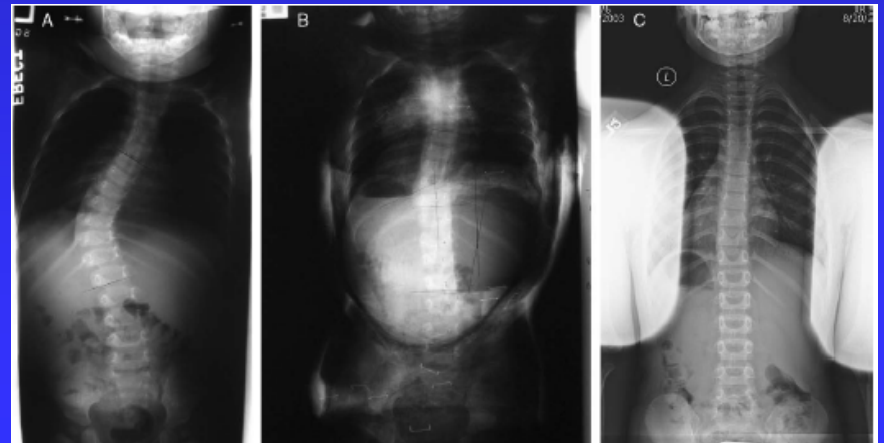


Derotational Casting for Progressive Infantile Scoliosis

James O. Sanders, MD, Jacques D'Astous, MD,† Marcie Fitzgerald, PA-C,‡
Joseph G. Khoury, MD,§ Shyam Kishan, MD,|| and Peter F. Sturm, MD¶*

JPO 2009

- 55 pts progressive EOS > 1yr f/u
- Best response if <20 mo, idiopathic, <60 deg
- Curve resolved in 17 (with avg initial RVAD 26 deg) and worsened in 6
- 9 went on to surgery



Serial casting as a delay tactic in the treatment of moderate-to-severe early-onset scoliosis. JPO 2012

[Fletcher ND](#), [McClung A](#), [Rathjen KE](#), [Denning JR](#), [Browne R](#), [Johnston CE](#)

- Single center's experience with casting 29 patients older than 2.5 years with curves measuring >50 degrees
- 15 patients (51.7%) required surgical “growing” treatment for at most recent follow-up
- Additional 7 patients (24.1%) underwent AP fusion
- Casting larger curves, <2.5 years of age and with varied etiology may stall but not prevent surgery

The role of serial casting in early-onset scoliosis (EOS).

[Baulesh DM¹](#), [Huh J](#), [Judkins T](#), [Garg S](#), [Miller NH](#), [Erickson MA](#).

- 36 patients
 - 17% resolution
 - 31% surgery
 - 52% in brace with modest correction at f/u

Casting

Light Traction



De-rotation



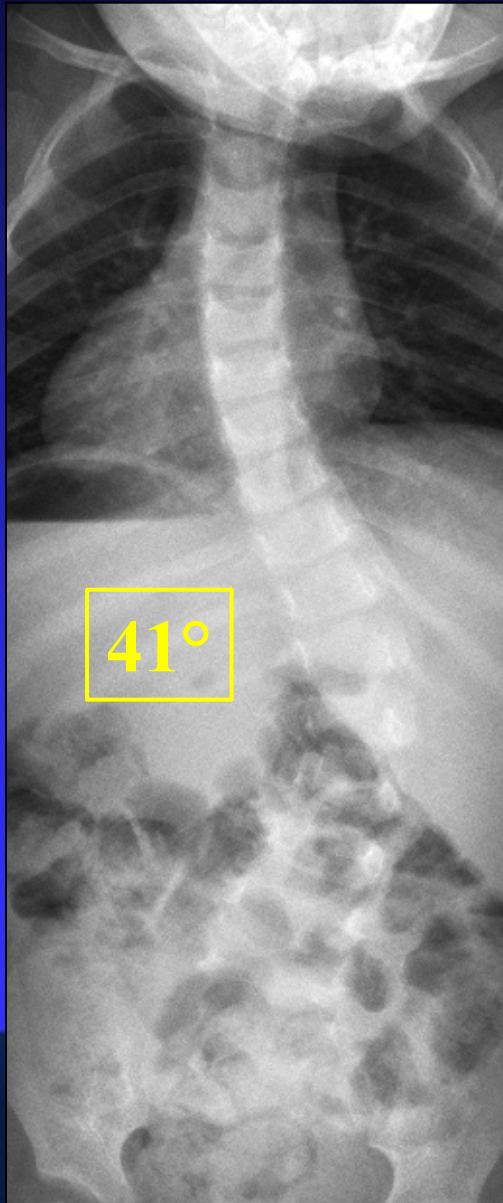
Windows
& Trimming

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CENTER

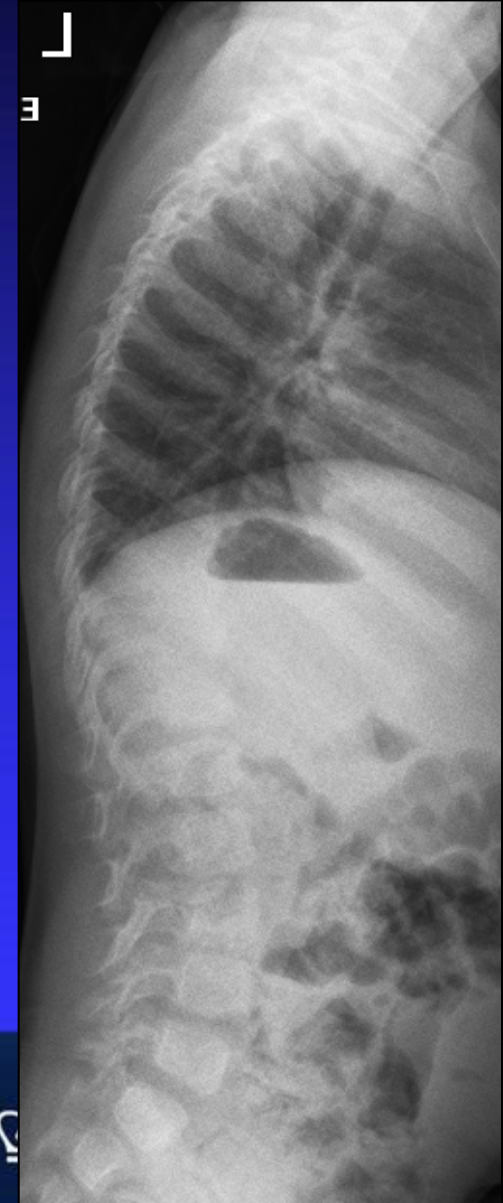
Decision Making in Casting

- Minimum 3 casts
- 3 days between casts with xray prior to reapplication
- Cast until response plateaus or curve less than 20 degrees or if no improvement after 3 casts

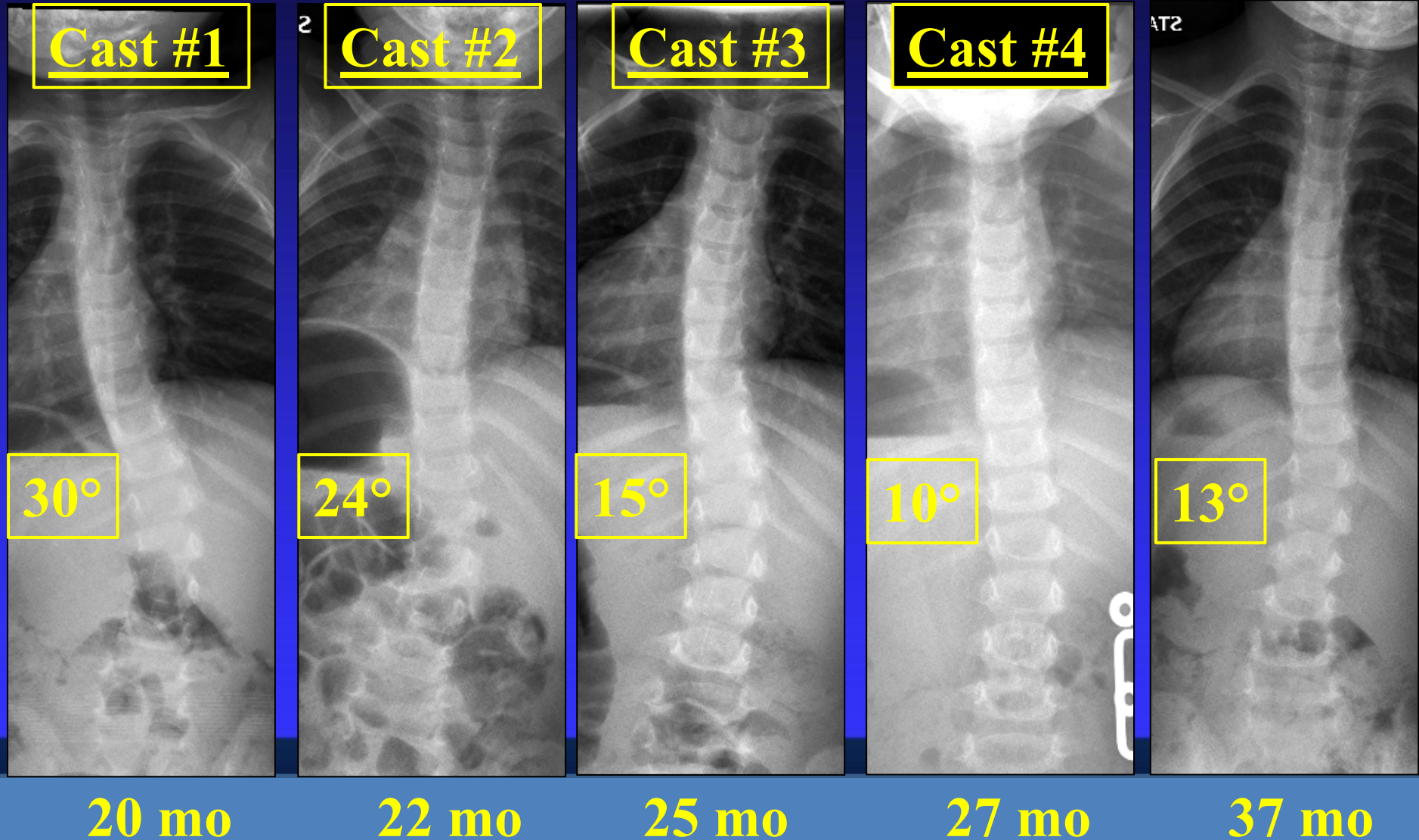
Patient LL: 1/2012



- 15 months old
- IIS
- 41° R Thoracic Curve
- C-EOS: I2N



Is this Natural History or Cast Success?



Purpose: to examine the effectiveness of scoliosis casting and identify factors that will affect the efficacy of casting treatment for children with EOS.

Design:

Retrospective, single-center study that reviewed EOS patients who underwent serial Mehta Derotational Casting

Methods

Participants:

- **Inclusion:**

- Diagnosis of EOS
- 1-5 years of age
- Radiographic evaluation between casting treatments

Outcomes:

- Cobb angle correction

Patient Characteristics

16 patients who underwent serial derotational casting treatment at CUMC met inclusion criteria

Characteristic Variable	Mean	Range
Age (yo)	2.4	1 -5
Pre-Cast Cobb Angle (degrees)	50.3	32 - 81
Number of Casts	4.4	3 - 8

Etiology

16 patients who underwent serial derotational casting treatment at CUMC met inclusion criteria

Etiology	Number
Idiopathic	13 (81%)
Syndromic	2 (13%)
Congenital	1 (6%)

5/13 “idiopathic patients” had developmental delays

Results: Cobb Correction

50% (8/16) had improvement in Cobb at final follow up

31% (5/16) Maintained ($< 10\%$ Curve Progression, $< 10\%$ Correction)

19% (3/16) Progressed ($\geq 10\%$ Curve Progression)

Results: Cobb Correction

Cobb Correction for the 8 patients who had > 10% Cobb Improvement after the final cast (Casting Responders)

Pre-Cast Cobb (degrees)	Post-Cast Final Cobb (degrees)	Final Cobb Correction (%)
47.0 \pm 15.0	29.0 \pm 19.8	42.7 \pm 25.4

Results: Cobb Correction

Average Curvature Improvement among all 16 subjects:

After Initial Cast = 17.2% Cobb angle Correction

After 3rd Cast = 22.4% Cobb angle correction

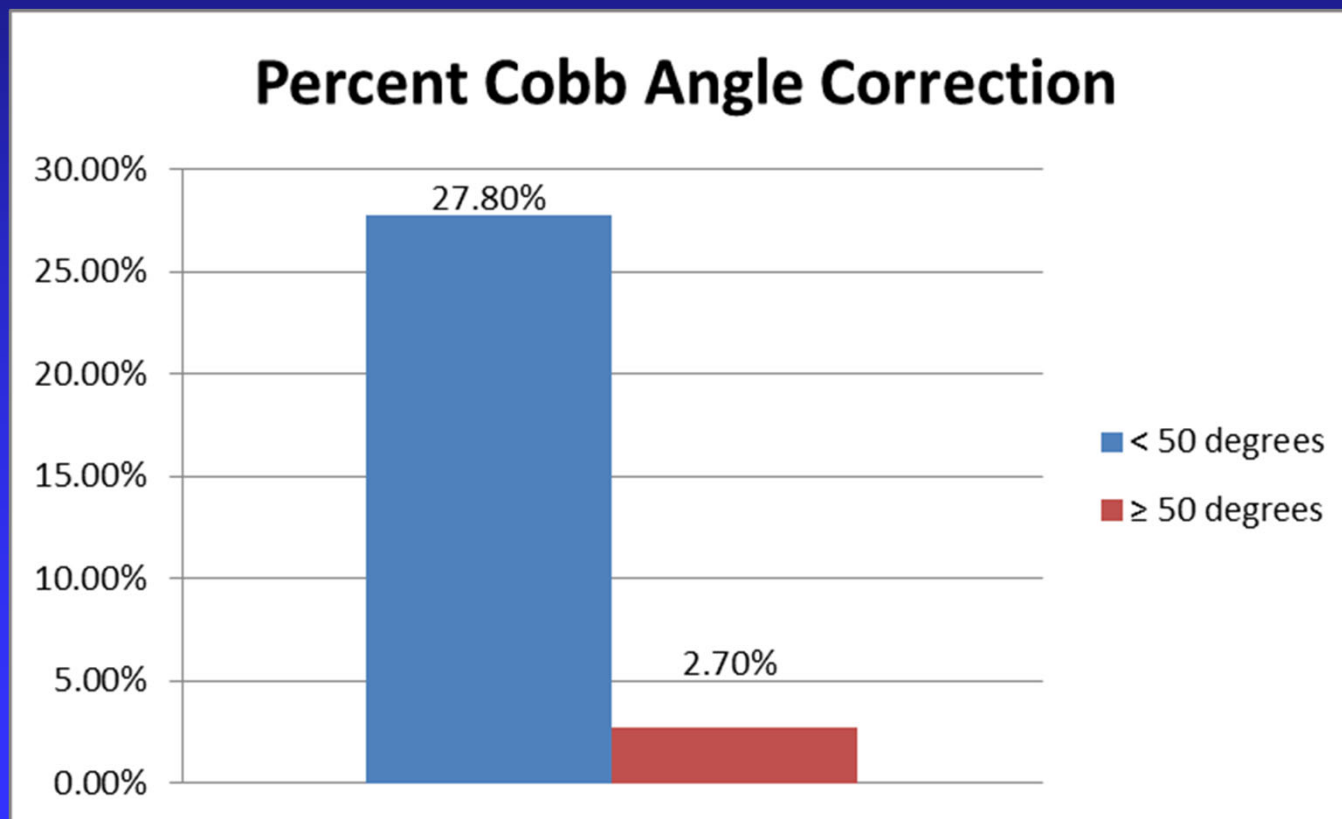
Results: Cobb Correction

10 of the 16 Patients required ≥ 4 casts:

Among the 10 patients there was an average of 8.3% Cobb Angle Correction after the Final cast

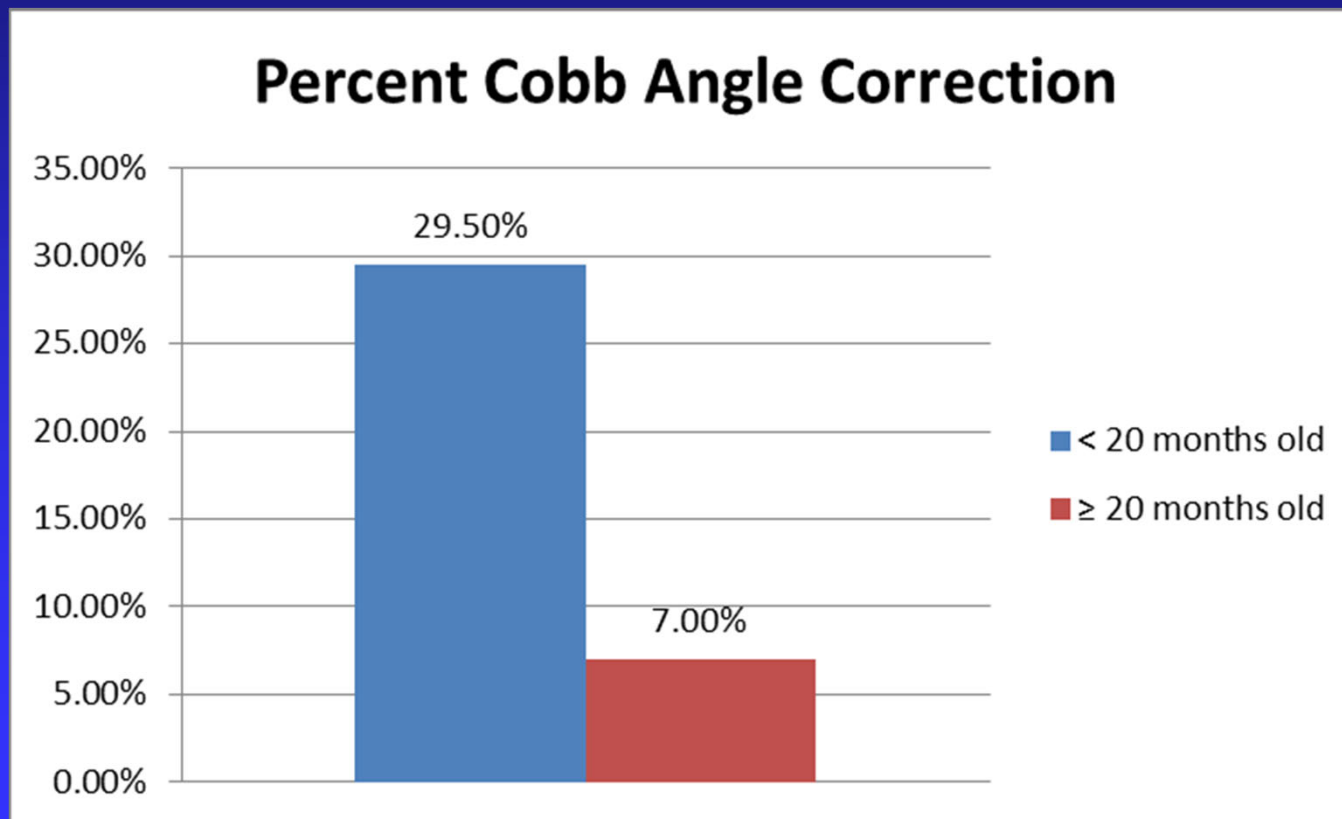
Effects of Pre-Cast Cobb

9 of the 16 Patients had **initial Cobb < 50°** and were **5x more likely** to have at least **10% curvature improvement** after the final cast compared to the 7 patients with initial curve $\geq 50^\circ$



Effects of Age at Initial Casting

7 of 16 Patients were **< 20 mo** at Initial Casting and were **5x more likely** to have at least **10% curvature improvement** after the final cast compared to 9 patients who were ≥ 20 mo



Current Disposition of Patients

- **Observation only: 2 (12.5%)**
- **Patients in Casts: 1 (6.3%)**
- **Patients in Braces: 12 (75%)**
- **Patients who progressed to surgery: 1 (6.3%)**

Conclusions

- **50% of patients undergoing serial derotational casting improvement at follow up**
- **81% of the patients either had significant Cobb correction ($> 10\%$) or Maintained their Curve**

Conclusions

- Children younger than **20 months old** or with **Cobb $< 50^\circ$** at time of initial casting were More Responsive to Casting Treatment

Previous Work has Demonstrated QOL Negatively Affected by Casting

Quality of Life and Burden of Care In Patients with EOS Undergoing Casting

Vitale et al, ICEOS 2013

- EOSQ Scores from patients treated in CSSG and GSSG

**At Pre-Casting Visits,
Only Daily Living and
Financial Burden
Were Significantly
Lower Among EOS
Patients**

Domain Name	Pre-Casting (N = 22)		
	Mean ± SD		P
	EOS	Norm	
General Health	72 ± 23	81 ± 3	0.830
Pain/Discomfort	91 ± 17	89 ± 4	0.591
Pulmonary Function	98 ± 6	97 ± 2	0.606
Transfer	98 ± 11	97 ± 2	0.854
Physical Function	86 ± 23	94 ± 3	0.104
Daily Living	70 ± 25	88 ± 4	0.004
Fatigue/Energy Level	90 ± 15	90 ± 3	0.993
Emotion	93 ± 14	96 ± 2	0.434
Parental Burden	78 ± 21	85 ± 6	0.173
Financial Burden	82 ± 25	95 ± 2	0.020

Domain Name	Post-Casting (N = 54)		
	Mean ± SD		P
	EOS	Norm	
General Health	70 ± 19	82 ± 5	< .001
Pain/Discomfort	80 ± 19	88 ± 5	0.003
Pulmonary Function	91 ± 16	98 ± 2	0.007
Transfer	86 ± 26	98 ± 2	0.001
Physical Function	71 ± 29	98 ± 3	< .001
Daily Living	62 ± 32	89 ± 6	< .001
Fatigue/Energy Level	80 ± 28	94 ± 4	< .001
Emotion	83 ± 23	96 ± 2	< .001
Parental Burden	63 ± 17	91 ± 5	< .001
Financial Burden	73 ± 24	98 ± 2	< .001

**All HRQoL Sub-Domain
Scores at Post-Casting
Visits Were Significantly
Lower Than Age-Matched
Norms**

**Caregivers also rated higher
Parental and Financial
Burdens**

Question

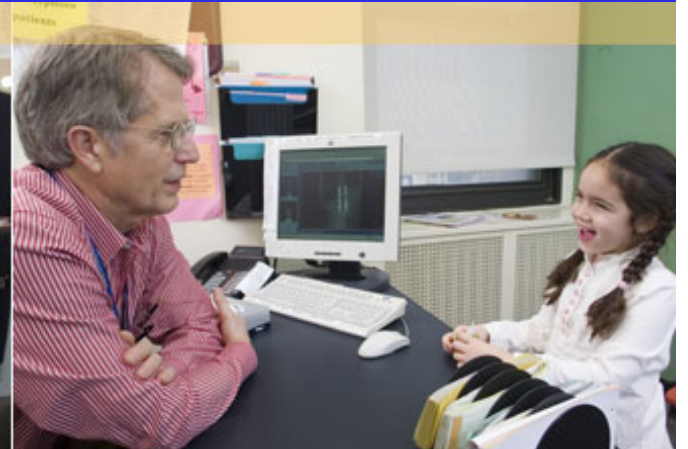
- If most curves resolve by 2 years of age and...
- If most patients treated > 2.5 years progress and...
- If casting/anesthesia is assd with negative effects on QOL....
- **What are ideal indicatons for casting?**



THANK YOU

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Patient MS

