

Resistance to Correction - Prognostic Value of Correctability ? Classification ?

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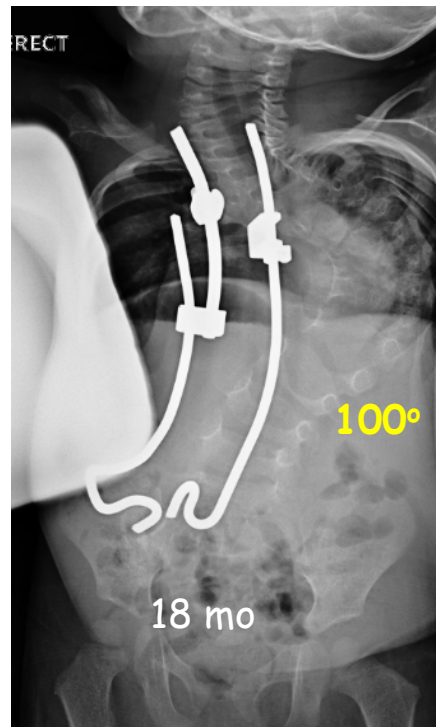
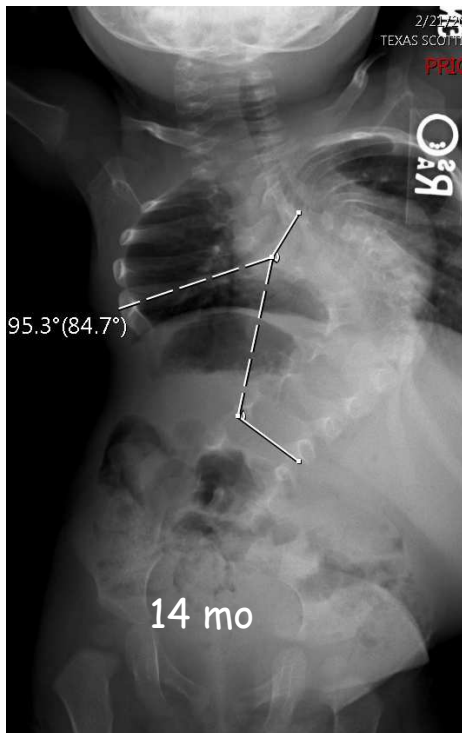
* disclosures in program

** nothing to disclose



Some EOS cases fail to gain correction or lengthening ... is this a bad sign ?

- Ineffective correction by distraction instrumentation?



Related to etiology ?

Curve magnitude ?

Pre-op classification (C-EOS) helpful?

Methods



- Combined databases of GSSG + CSSG =
- Curve correction (Cobb) / elongation (T1-12, T1-S1) between index and 1st postop xrays (post index)
- Distraction-based constructs
- Etiology / age
- "Resistant" = < 20% Cobb correction = "STIFF"
- 2^o resistance = < 20% increase T1-12 or T1-S1 length

188 patients with complete data : 46 C , 68 I, 74 S

N-M cases excluded (hypo- and hypertonic mix)



Results / each etiology C,I,S

- Index age, curve magnitude - no diff
- Index Th height, T1-S1 length - **C < I,S**
- Post index Th height, T1-S1 - **C < I,S**
- Post index curve magnitude, % correction, % length gain Th height + T1-S1 - no diff

RESULTS

	Congenital [46]	Idiopathic [68]	Syndromic [74]	P Value
Sex (F/M)	21 F – 25 M	46 F – 22 M	40 F – 34 M	-
Age at Index Surgery	6.0 years ± 3.6 (1.0 – 14.9)	6.9 years ± 2.9 (1.6 – 12.3)	6.7 years ± 2.9 (1.3 – 13.8)	0.276
Index Major Cobb (Degrees)	76 degrees ± 25 (25 – 138)	75 degrees ± 17 (33 – 117)	79 degrees ± 21 (42 – 139)	0.545
Index Thoracic Height (cm)	14.0 cm ± 3.8 (6.0 – 24.3)	16.9 cm ± 3.7 (7.5 – 25.1)	16.0 cm ± 3.6 (8.0 – 27.4)	0.000
Index Spine Length (cm)	23.6 cm ± 5.5 (13 – 38.3)	27.5 cm ± 5.7 (13.8 – 39.0)	26.0 cm ± 5.3 (16.1 – 41.6)	0.001
Post Index Major Cobb (cm)	47 degrees ± 18 (11 – 97)	44 degrees ± 16 (18 – 95)	46 degrees ± 15 (11 – 89)	0.561
Post Index Thoracic Height (cm)	16.4 cm ± 4.1 (8 – 25.4)	19.4 cm ± 3.4 (11.2 – 25.7)	18.6 cm ± 3.3 (12.6 – 28.1)	0.000
Post Index Spine Length (cm)	27.3 cm ± 5.7 (17 – 41.1)	31.6 cm ± 5.4 (19.4 – 43.0)	30.6 cm ± 5.0 (21.9 – 44.8)	0.000
Delta Major Cobb (cm)	-28 degrees ± 16 (-61 – 0)	-31 degrees ± 15 (-72 – 0)	-33 degrees ± 17 (-88 – (-2))	0.258
Delta Thoracic Height (cm)	2.4 cm ± 1.4 (0 -8.3)	2.5 cm ± 1.5 (0.2 – 6.8)	2.6 cm ± 1.7 (0 – 7.9)	0.793
Delta Spine Length (cm)	3.7 cm ± 1.8 (0 -8.3)	4.2 cm ± (1.2 – 10.3)	4.6 cm ± 2.4 (0.9 – 13.3)	0.084
Percent Major Cobb Correction (%)	36% ± 16 (0 -74)	41% ± 17 (0 -80)	41% ± 17 (5 – 81)	0.243
Percent Thoracic Height Lengthening (%)	19% ± 13 (0 – 62)	17% ± 13 (1 – 61)	18% ± 16 (0 – 99)	0.704
Percent Spine Length Lengthening (%)	17% ± 9 (2 – 28)	17% ± 10 (3 – 56)	19% ± 12 (3 – 63)	0.294

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Curve correct < 20%/stiff vs >20%/flex p^*

	Mean SD	N	Mean SD	N	
Age index yr	6.5 (3.1)	21	6.6 (3.1)	167	.99
Curve °	66.8 (18.6)	21	78.0 (20.3)	167	.025
T1-12 index cm	15.4 (4.3)	21	15.9 (3.8)	167	.61
T1-S1 index cm	25.8 (6.8)	21	25.9 (5.5)	167	.77
% correction	12.5 (6.5)	21	43.3 (14.0)	167	.000
% T1-12 incr	17.5 (13.0)	21	17.9 (14.2)	167	.94
% T1-S1 incr	16.1 (9.6)	21	17.7 (10.9)	167	.53

Flex group had larger curves at index (78 vs 66.8) + more % correction -> same post-index magnitude

* Mann-Whitney test

Post-index curve magnitude....

No diff $C = 47.3^\circ$

$p = .56$ $I = 44.0^\circ$

$S = 45.6^\circ$

Post index $C=16.4$ cm

T1-12 length $I=19.4$

$S=18.6$

$p = .000$

$C= 27.3$ cm

T1-S1 $I= 31.6$

$S= 30.6$

$p = .000$

Post-index correct +/- length increase

	C	I	S	total	P
Correct <20%	7	7	7	21	.59
>20%	39	61	67	167	
↑T1-12 <20%	31	47	45	123	.55
>20%	15	21	29	65	
↑T1-S1 <20%	33	52	44	129	.08
>20%	13	16	30	59	
Total	46	68	74	188	

Curve correction vs length gain - disconnect

Spine length more difficult to achieve

Curve correction <20 %
 T1-12 length gain < 20%
 T1-S1 length gain <20%

21/188
 123/188
 129/188

**NO
 CORRELATION**

Table 6. Pearson's Correlations

		percent_t_ height	percent_s_ length
Percent_major_cobb	N	188	188
	Pearson Correlation	-0.04	-0.08
	P-value	0.612	0.255

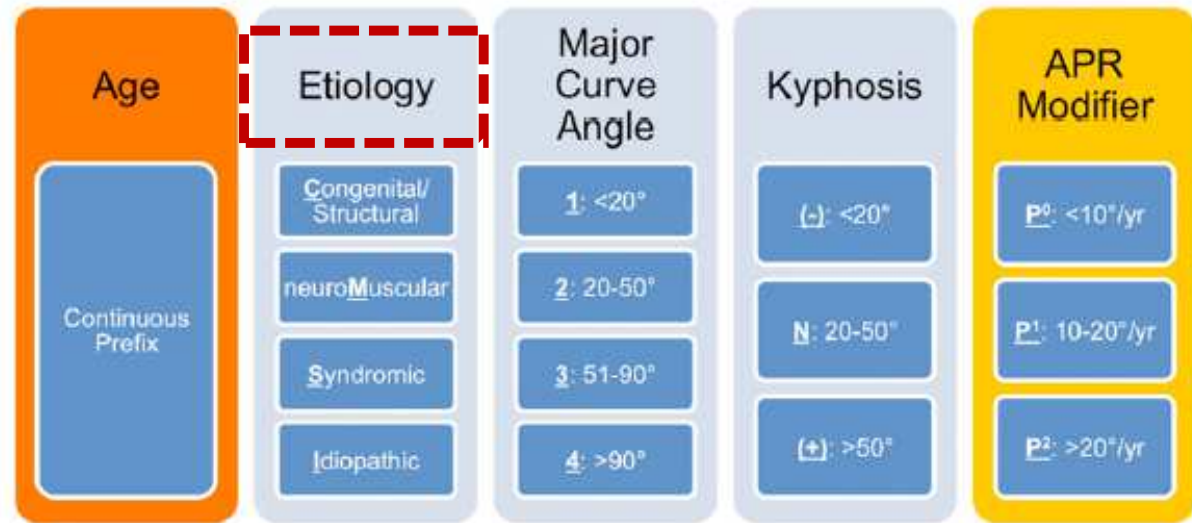
Limitations

- Data base - multicenter, partial # patients w/ complete data (<50%)
- 20% O/U definition of stiff vs. flex correction/elongation arbitrary
- Amount of intended initial correction unknown

Summary

- No diff based on etiology (C,I,S) in amount or % correction curve magnitude -> no diff in post index magnitude
- No diff between etiology (= same distribution) based on correctability (flex vs stiff)
- C etiology - less absolute Th and Spine length than I or S pre- and post-index
- No correlation between curve correction and length gain

Conclusion



- In spite of intuitive value of etiology in determining prognosis, based on this study....
- C,I,S etiology plays minor / no role in initial phase of EOS rx outcome by distraction growth-sparing methods
- Next up - analyze curve magnitude, kyphosis magnitude, progression data to identify resistance