Does Spinopelvic Alignment Affect Health-related Quality of Life in EOS

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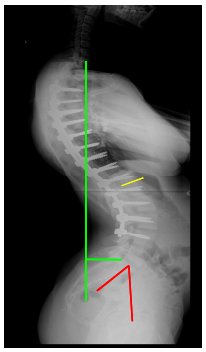
Sagittal Balance in Adults, AIS and EOS

LL= PI +/- 9

#1 most important parameter in ASD SRS, ODI, SF12
Schwab et al. 2010

PI-LL can be altered when a fusion is carried distal or equal to L3

< -10 PI-LL increases PJK



Burton DA; Karkenny A; Schulz J; Hanstein R; **Gomez JA**; How are we Affecting Spinopelvic Parameters in Patients with Adolescent Idiopathic Scoliosis. JPO 2017

20-28 % risk of PJK with distraction

Rib vs Spine no difference in PJK

Pre-op **hyperkyphosis** increased the risk for **post-op PJK**

PI-LL>20^{o} and PT>30^{o} increased risk for clinical PJK

El-Hawary et al. What is the Risk of Developing Proximal Junctional Kyphosis During Growth Friendly Treatments for Early-onset Scoliosis? JPO 2015

Gomez, El-Hawary, CSSG, GSSG et.al. The Effect of Spinopelvic Parameters on the Development of Proximal Junctional Kyphosis in Early Onset Scoliosis SRS 2016

Purpose

To determine if changes in spinopelvic alignment and/or PJK affect quality of life (QOL) parameters in EOS patients

Study Design

Retrospective cohort study of children treated with distraction based implants from two Early Onset Scoliosis registries

CHILDREN'S SPINE STUDY GROUP

GSF Growing Spine Foundation

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Methods

X-Ray measurements:

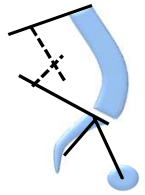
Spinopelvic parameters: TK, LL, PI, PT, PI-LL

PJA & PJK (*Glattes et al, 2005*)

EOS-Q24 to assess HRQoL:

Domains; 1-100: Higher = better

PI minus LL



Pelvic Tilt

Analysis

QOL-scores compared using t-test and Wilcoxon rank sum test

Sag parameters and QOL were analyzed using Spearman correlation; chi square testing

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Demographics

N: 83 EOS pts

Age @ Surgery: 5.3 years ± 3.1

Radiographic F/u: 4.4 years ± 2.5

EOS-Q F/u: 6.6 years ± 2.8

Anchors: 62 Rib and 21 Spine-Based Distraction

Etiology: 34 congenital, 25 idiopathic, 18 syndromic, 5 neuromuscular, 1N/A

	Pre-op Mean ± SD	Most recent FU Mean ± SD	*P-value*
Major Curve	70.8° ± 18.1	58.2° ± 18.1	***<0.005***
Thoracic Kyphosis	38.2° ± 23.4	44.8° ± 24.0	***<0.005***
Lumbar Lordosis	52.0° ± 16.1	54.2° ± 15.9	*0.231*
PI-LL	-3.4° ± 17.8	-3.3° ± 18.0	*0.737*

Etiology & HRQoL

	congenital	idiopathic	syndromic	neuromuscular	*P-value*
Patient QoL	84.4 ± 10.6	82.5 ± 12.0	78.8 ± 15.8	70.4 ± 12.4	*0.087*
Transfer	88.5 ± 16.6	92.0 ± 14.1	77.8 ± 26.5	68.0 ± 17.9	***0.014***
Physical Function	89.9 ± 14.3	89.6 ± 13.0	83.6 ± 21.5	64.2 ± 26.0	***0.012***
Daily Living	87.9 ± 15.6	87.1 ± 16.8	76.7 ± 27.9	66.0 ± 19.5	***0.041***
Fatigue	83.9 ± 15.8	83.2 ± 16.3	70.6 ± 18.9	79.8 ± 17.9	***0.019***

Syndromic and neuromuscular EOS have worse HRQoL scores than congenital and idiopathic

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Pre-operative Thoracic Kyphosis & HRQoL

Pre TK correlated negatively with 8 HRQoL domains:

HRQoL Domain	Spearman correlation coefficient (*P-value*)
Patient QoL	-.258 (*<0.05*)
Family Burden	-.222*(*<0.05*)
Transfer	-.280* (*<0.05*)
Physical Function	-.315** (*<0.01*)
Daily Living	-.285* (*<0.05*)
Fatigue	-.221* (*<0.05*)
Parental Impact	-.262* (*<0.05*)
Satisfaction	-.392** (*<0.01*)

Pre TK >50˚ lowered HRQoL scores:

HRQoL Domain	Pre TK ≤50°	Pre TK >50°	*P-value*
Satisfaction	**81 ± 16**	**71 ± 16**	***0.014***
Individual Questions	**Pre-op TK ≤50°**	**Pre-op TK >50°**	***P-value***
Sitting Difficulty	4.6 ± 0.9	4.3 ± 1.0	*0.044*
Dressing Difficulty	4.6 ± 0.9	4.2 ± 1.1	*0.016*

Relationship between Pre TK >50˚ and low HRQoL scores:

Spinopelvic Parameter	QOL Category	Risk Ratio	95% CI	*P-value*
Pre TK >50°	Satisfaction <80	1.983	0.920-4.278	*0.043*
Pre TK >50°	Physical Function <80	2.011	0.941-4.297	*0.030*
Pre TK >50°	Transfer <80	2.75	1.354-5.585	*0.004*

Post-operative TK, PJK & HRQoL

No difference in HRQoL scores between patients with low vs high TK at last f/u

HRQoL Domain	Post-op TK ≤50°	Post-op TK >50°	*P-value*
General Health	**79.5 ± 13.4**	**82.4 ± 15.4**	***0.281***

Similarly, radiographic PJK did not affect HRQoL scores

HRQoL Domain	Rx PJK (35%)	No PJK	*P-value*
Patient QOL	**83.3 ± 10.3**	**79.2 ± 13.9**	***0.194***

Clinical PJK (extension of UIV) affected Pain scores

HRQoL Domain	PJK (14%)	No PJK	*P-value*
Pain/Discomfort	**65.0 ± 12.4**	**75.4 ± 18.5**	***0.036***
Pain Frequency	2.9 ± 0.8	3.7 ± 1.0	***0.010***
Pain Severity	3.6 ± 0.7	3.8 ± 0.9	*0.380*
Relationship PJK & Pain	**Risk Ratio**	**95% CI**	**p-value**
Clinical PJK yes/no Pain <80 vs ≥ 80	12.49	1.692-92.15	***<0.005***

Pelvic Parameters & HRQoL

No consistent effect of Pelvic tilt (PT) and Lumbar Lordosis (LL) on HRQoL domains at most recent F/U

Continuous QOL score **Categorical chosen values**

Pelvic Tilt	**HRQoL Domain**	**Spearman correlation coefficient (*P-value*)**	**PT >30º vs ≤ 30º**
Pre Pelvic tilt	Pain/Discomfort	**.254 *(<0.05)***	*No difference*
F/U Pelvic tilt	*No significant correlation with HRQoL domains*		*No difference*
Lumbar Lordosis	**HRQoL Domain**	**Spearman correlation coefficient (*P-value*)**	**LL <60º vs ≥ 60°**
Pre LL	*No significant correlation with HRQoL domains*		Family Burden: 82 vs 76, *P=0.04* Parent Impact: 83 vs 75, ***P=0.04***
F/U LL	Fatigue	.219 (*<0.05*)	*No difference*

PREOP PI-LL & HRQoL

Pre-operative PI-LL affects Family Burden:

HRQoL Domain	Spearman correlation coefficient (*P-value*)
Family Burden	**-.221 (*<0.05*)**

HRQoL Domain	PI-LL ≤ ±10°	PI-LL > ±10°	P-value
Family Burden	**85 ± 12**	**75 ± 17**	***0.007***
Fatigue	84 ± 15	76 ± 19	*0.059*
Parental Impact	85 ± 12	77 ± 18	*0.070*

POSTOP PI-LL

Similar HRQoL scores between patients with PI-LL ≤ ±10º vs > ±10º were not sig different.

HRQoL Domain	PI-LL ≤ ±10°	PI-LL > ±10°	*P-value*
Patient QOL	**80.5 ± 11.9**	**82.4 ± 13.1**	***0.303***

Risk associated with pelvic parameters to have low HRQoL

Spinopelvic Parameter	QOL Category	Risk Ratio	95% CI	p-value
PT ≥ 30° post-op	Fatigue <80	5.032	1.082-23.41	0.028
LL ≥ 70° pre-op	Physical Function <80	4.545	1.184-17.45	0.029
LL ≥ 70° post-op	Pain <80	2.554	0.857-7.609	0.038
PI-LL > ±10° pre-op	Transfer <80	1.597	1.09-2.339	0.04
	Finance <80	2.015	1.355-2.996	0.001
	Physical Function <80	*1.461*	*0.986-2.165*	*0.08*
	Fatigue <80	*1.459*	*0.976-2.179*	*0.074*
	Parental Impact <80	*1.474*	*0.990-2.195*	*0.067*

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Conclusions

- Syndromic and neuromuscular EOS patients have lower HRQoL scores
- Pre-operative TK has the greatest effect on HRQoL
  Clinical PJK and Preop TK > 50° lead to lower HRQoL at F/U
- Pre-operative PI-LL outside 10 degrees weakly affects HRQoL
- Other pelvic parameters didn’t show consistent effects on HRQoL at most recent FU

Thank You

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