

# E-Poster Abstracts

\*Luis A. Goldstein Best Clinical Research Poster †John H. Moe Best Basic Research Poster

curves. The mean Cobb angle was  $71.2^{\circ} \pm 16.8^{\circ}$  and the range was  $51^{\circ}$  to  $119^{\circ}$ . The AVD ranged from 2.1mm to 5.1mm, with the shortest at L1 and the longest at T8. The aorta was found to be very near the vertebra (2-3mm) at T5, T12, L1, L2 and L3. The aorta was found to be further away (more than 4mm) at the apical region (T7 to T10). There were significant positive correlations between the magnitude of the main thoracic Cobb angle and the AVD from T8 to T12 ( $p < 0.05$ ). The correlations were weak ( $r < 0.5$ ) at T8, T9 and T11, and were moderate ( $r < 0.7$ ) at T10 and T12.

## Conclusion

We found that the aorta was generally very near the vertebra with the distance ranging from 2.1-5.1mm. The aorta was very near the vertebra (2-3mm) at the proximal thoracic and the thoracolumbar region. The aorta was further away (more than 4mm) at the apical region. From T8 to T12 region, the aorta was further away from the vertebra in curves with larger main thoracic Cobb angles.

The mean aorta-vertebra distance (AVD) and its correlation with the curve Cobb angle for the thoracic and lumbar vertebral levels.

Level	AVD (mm)	r	p
T4	3.4 ± 2.8	-0.102	0.598
T5	2.6 ± 2.1	-0.110	0.507
T6	3.2 ± 2.2	-0.300	0.857
T7	4.6 ± 2.5	0.186	0.258
T8	5.1 ± 2.6	0.360	0.024*
T9	4.9 ± 2.6	0.453	0.004*
T10	4.2 ± 2.4	0.666	<0.001*
T11	3.2 ± 1.9	0.498	0.001*
T12	2.5 ± 1.9	0.558	<0.001*
L1	2.1 ± 1.3	0.251	0.134
L2	2.5 ± 0.9	-0.109	0.513
L3	2.6 ± 0.9	-0.111	0.507

\*significant  
AVD = Aorta to vertebra distance

## 231. Durability of the Sagittal Plane in AIS Surgery. Durability of the Sagittal Plane in AIS Surgery: A 10-Year Followup Study

Michael P. Kelly, MD, MS; Munish C. Gupta, MD; Stefan Parent, MD, PhD; Baron Lonner, MD; Burt Yaszay, MD; Lawrence G. Lenke, MD; Amer F. Samdani, MD; Suken Shah, MD; Michelle Claire Marks, MS, PT; Peter Newton, MD

### Summary

The sagittal plane in AIS is well-preserved at 10 year followup after surgery. There was a small, 4 degree, increase in LL over 10 years after surgery for AIS and a commensurate decrease in PI-LL. No differences were found when evaluating the effect of the lowest instrumented vertebrae on change in lordosis and no associations were found between postoperative TK and lumbopelvic parameters. At 10 years, SRS-Pain and SRS-Self Image scores were high.

### Hypothesis

Low thoracic kyphosis (TK) after adolescent idiopathic scoliosis (AIS) surgery will lead to sagittal plane malalignment at 10 years postoperation.

### Design

Longitudinal cohort study

### Introduction

Restoration of TK after AIS surgery may allow for maximal lum-

bar lordosis (LL). Data suggest that inadequate restoration of TK may lead to loss of LL, though at 2 year followup overall sagittal plane alignment is good. There are no longer term followup studies examining the sagittal plane after surgery for AIS.

### Methods

A prospective, multi-center cohort of surgically treated AIS patients was queried for patients with baseline, one-year, and minimum 10yr followup radiographic and outcomes data (Scoliosis Reseach Society-22). Standard radiographic parameters were measured including TK, LL, pelvic incidence (PI, when available), and C7 sagittal vertical axis(C7SVA). Changes in TK, LL, C7SVA, and change per distal motion segment were calculated between 1yr and 10yrs. Associations between 10yr TK and 10yr LL, PI-LL match, C7SVA, and SRS-Pain/Self Image were investigated with Spearman correlations.

### Results

150 Patients were identified; 117 had 1yr and 10yr data (Female: 96 [82%], Lenke 1: 61 [52%], Lenke 5: 26 [22%], Lenke 2: 18 [15%], Posterior-only 65 [56%]). At 1yr median TK was 33 degrees (Interquartile range, 15), LL -58 (14), and C7SVA -1.8cm (4.8). Only 10 (8.5%) of patients had TK < 20 degrees(hypokyphosis). At 10yrs median TK 32 (14.5), LL -60 (17.5), and C7SVA -0.7cm (2.7). LL increased by a mean 4 degrees(95% CI 2 to 5.5), decreasing PI-LL to -8.4 (11) at 10yrs. Lumbopelvic parameters were not different when grouped by number of distal motion segments. Median 10yr SRS-Pain was 4.4 (0.8) and SRS-Self Image 4.6 (1.1). TK at 1yr did not correlate with change in lordosis at 10yrs nor change in LL-PI difference. TK did not correlate with any SRS-domain scores.

### Conclusion

At 10yr followup, the sagittal plane is well preserved in AIS patients with a small increase in LL over 10 years. The change in LL was not different according to the number of preserved distal motion segments. SRS-Pain and Self-Image scores are high at 10 year followup and are not correlated to postoperative TK.

## 232. End-Growth Results of a Personalised Conservative Approach According to the SRS e BRAIST Inclusion Criteria and Outcomes

Stefano Negrini, MD; Sabrina Donzelli, MD; Jorge Villafañe, PhD; Francesca Di Felice, MD; Fabio Zaina, MD

### Summary

Personalised conservative approach (PCA) is proposed by current Guidelines. We checked PCA according to two sets of criteria to define patients at higher risk and the relevant outcomes: SRS and BRAIST in a large prospective real-life study. Failures were 1.9% (BRAIST) and 3.1% (SRS). 38.1% of patients improved, increasing the rate of patients below 30° from 59.4% to 71.2% (BRAIST) and from 59% to 72.2% (SRS). PCA allows to obtain good results also using very strict inclusion and outcome criteria.

### Hypothesis

A personalised conservative approach (PCA) to Adolescents with Idiopathic Scoliosis (AIS) can achieve good individualised results while reducing invasivity of treatments adapting to patients' needs

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### Design

Retrospective observational study nested in a prospective database including all outpatients of an Institute with 26 Centres

### Introduction

Current Guidelines (Negrini 2012, 2018) propose PCA according to the step-by-step theory: treatment intensity increases with estimated risk factors, from observation to PSSE to soft, rigid and very rigid bracing. In the literature exists nowadays two sets of criteria to define patients at higher risk and the relevant outcomes: the SRS (Richards 2005) and BRAIST (Weinstein 2013). PCA has not yet been checked according with these criteria

### Methods

We considered two partially overlapping populations according to the SRS and BRAIST criteria. SRS inclusion criteria (in brackets BRAIST if different): age 10 or more (10-15), Risser 0-2, 25-40° (20-40°), no prior treatment, female premenarchal or less than 1 year postmenarchal. End of observation: Risser 3, medical prescription. Outcomes: SRS (BRAIST): % of patients >44° (>49°), or progressed (>4°). We added SRS-SOSORT Consensus (Negrini 2014) outcomes: % of patients <30°, improvement (>4°) Treatment: PCA including observation, PSSE (SEAS school), soft (SpineCor), hard (Sibilla) and very rigid (Sforzesco) braces. Statistics: descriptive; ROC curves to check the starting Cobb degrees able to predict with best sensitivity and specificity the final outcomes

### Results

42 and 81 patients dropped out, leaving 735 and 687 in SRS and BRAIST respectively. Failures were 1.9% (BRAIST) and 3.1% (SRS). 38.1% of patients improved, increasing the rate of patients below 30° from 59.4% to 71.2% (BRAIST) and from 59% to 72.2% (SRS). The ROC curves for failures had an area of 76.5 (SRS) and 81.0 (BRAIST) with a point of cohort of 25.5 giving a sensibility of 95.5% and 92.3% and specificity of 63% and 63.5% respectively for SRS and BRAIST

### Conclusion

PCA allows to obtain good results using the SRS and BRAIST inclusion criteria, also considering the SRS-SOSORT Consensus outcomes

		BRAIST	SRS
<b>Number</b>		687	735
<b>Treatment</b>	<i>Observation</i>	0,1%	0,3%
	<i>PSSE (SEAS School)</i>	6,2%	6,9%
	<i>Soft brace (SpineCor)</i>	9,4%	6,8%
	<i>Rigid brace (Sibilla)</i>	49,4%	44,1%
	<i>Very rigid brace (Sforzesco)</i>	41,2%	49,1%
<b>Above 50° (BRAIST)</b>	<i>Start</i>	0,0%	0,0%
	<i>End</i>	1,9%	1,8%
<b>Above 45° (SRS)</b>	<i>Start</i>	0,0%	0,0%
	<i>End</i>	3,3%	3,1%
<b>5° Cobb change (SRS-SOSORT)</b>	<i>Progressed</i>	18,5%	16,6%
	<i>Improved</i>	38,1%	38,2%
<b>Below 30° (SRS-SOSORT)</b>	<i>Start</i>	59,4%	59,0%
	<i>End</i>	71,2%	72,2%

### 233. Evaluation of Lateral Atlantodental Interval (LADI) Asymmetry in Pediatric Patients

*Andrew Hub, BS; Janit Pandya, BS; Andrew Jea, MD*

#### Summary

Asymmetry of the LADI has been reported in healthy adult and pediatric patient populations with or without a history of trauma, both on plain radiographs and CT. Asymmetry of LADI may also rarely indicate ligamentous injury or atlantoaxial rotatory subluxation, which if present could lead to catastrophic sequelae, a diagnostic dilemma (normal variant vs. ligamentous injury). Although low yield, this leads pediatric providers to investigate further with more intensive and costly imaging studies, such as dynamic CT or MRI.

#### Hypothesis

We hypothesize that there is no appreciable difference in LADI across gender and pediatric age ranges. In addition, we believe that asymmetry of the LADI is not unusual in asymptomatic children evaluated by cervical computed tomography.

#### Design

Retrospective cross-sectional study.

#### Introduction

The study of normative radiographic measurements for the developing pediatric spine is incomplete. The purpose of this analysis is to determine the normal range of asymmetry of the lateral atlantodental interval, and define age- and gender-related differences.

#### Methods

A total of 3072 children age 0 to 18 years who underwent CT of the cervical spine were identified at Riley Hospital for Children between 2005 and 2017. Patients were stratified by gender and age (in years) into 36 cohorts. Following this stratification, patients within each group were randomly selected for inclusion until 15 patients in each group had been measured (quota sampling). Only those patients with "normal" CT scans were included for analysis. A CT scan was considered "normal" if there was no evidence of congenital spine abnormality, prior