

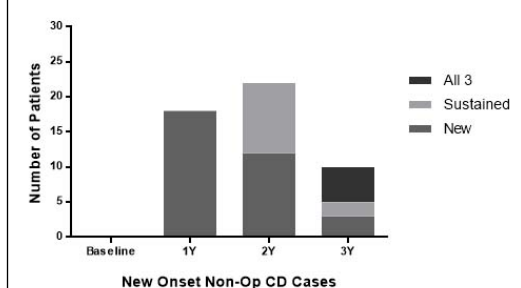
Introduction

- Development of new-onset cervical deformity (CD) has been noted in adult thoracolumbar deformity patients.[1, 2]
- This study identifies predictors of new CD and determines impact on patient-reported outcomes in non-op ASD patients.

Methods

- Inclusion criteria: complete radiographic, surgical, and HRQoL data at baseline, 1, 2, and 3yrs f/u for non-operative ASD patients.
- CD defined as =2 of the following: T1S-CL>20°, C2- C7 SVA>40mm, or C2-C7 kyphosis>10°.
- Cervical alignment (CA) defined as =2 of the following: T1S-CL<20°, C2- C7 SVA=40mm, or C2-C7 kyphosis=0°.
- Univariate and multivariate analyses determined new CD predictors at 3 time points and impact on HRQoLs (ODI, PCS, MCS, all SRS).

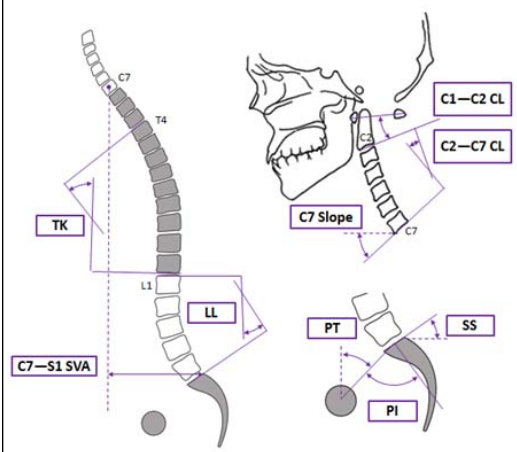
Figure 2: Distribution of new onset non-op cervical deformity (CD)



Results

- 89 non-op patients had complete follow-up (mean age: 52.3 yrs, 87.6% female).
- Pre-op CD rate was 38.2%, with 51.7% of them meeting cSVA threshold, 38.2% T1S-CL, and 59.6% for CL.
- New onset CD incidence was 38.8%, 46.8%, and 21.3% at 1, 2, and 3yrs (Figure 2).
- Sagittal profile comparison of patients who remained well aligned and those who developed new CD revealed no differences in global sagittal spino-pelvic parameters (TK, PT, GA) at any follow-up time point ($p>0.05$).
- Increased BL C2-slope (OR 1.17, $p=0.001$) and PT (OR 1.11, $p=0.008$) positively predicted new CD in patients at 2yrs; PT increased new onset CD risk at 3yrs (OR 1.19, $p=0.035$) (Table 2).
- Both patients with and without new onset CD improved in MCS BL-3yr scores, but new CD improved slightly less (newCD mean: 0.28, noCD mean: 0.41, $p=0.005$).

Figure 1: Spinopelvic Parameters



Conclusions

- Overall non-op new CD rate was 35.6%, similar to that of op patients (63%).
- BL C2 slope severity and PT increased new onset non-op CD likelihood, and no differences in sagittal spino-pelvic parameters were associated with new CD at any time points.
- Of the HRQoL score differences considered, only the mean baseline-3yr SF-36 Mental Component Score among non-op new CD patients was slightly decreased compared to aligned patients, indicating potential clinical impact associated with deformity onset.

Table 1

	Cervical Alignment (CA) (n=47)	Remaining Cohort (n=42)	P-value
Patient Demographics			
Age (years)	51.35 ± 16.67	53.33 ± 18.11	0.594
Weight (kg)	65.89 ± 13.51	75.02 ± 23.12	0.025*
BMI (kg/m ²)	24.62 ± 4.29	27.53 ± 7.43	0.026*
% Female	89.4%	85.7%	0.602
Co-Morbidities			
Prior Spine Surgery (%)	6.4%	26.2%	0.010*
Arthritis (%)	19.1%	21.4%	0.789
Depression (%)	6.4%	21.4%	0.038*
Diabetes (%)	0.0%	11.9%	0.015*
Hypertension (%)	12.8%	14.3%	0.834
Osteoporosis (%)	6.4%	14.3%	0.217
Smoking History (%)	15.9%	11.9%	0.592
Radiographic Parameters			
Baseline PT	19.19 (8.87)	20.99 (9.55)	0.359
Baseline PI	55.35 (13.24)	54.80 (13.20)	0.846
Baseline SS	36.17 (11.40)	33.83 (11.17)	0.333
Baseline T1S-CL	13.51 (5.37)	24.84 (6.93)	<0.001*
Baseline C2-C7 CL	11.54 (11.60)	-2.38 (9.27)	<0.001*
Baseline C2-T3	8.25 (11.94)	-4.07 (13.53)	0.002*
Baseline C2-SS	12.57 (5.46)	22.81 (7.30)	<0.001*

Univariate analysis of patient characteristics for cervically aligned (CA) patients at baseline to the remaining cohort

Table 2

	Odds Ratio	95% CI (Upper-Lower)	P-value
1 Year Follow-Up			
Gender	0.362	2.613-0.050	0.314
Weight	0.998	1.083-0.919	0.959
BMI	1.102	1.417-0.858	0.447
Baseline T1-SS	1.008	1.087-0.934	0.841
Baseline T1S-CL	0.958	1.166-0.787	0.669
Baseline C2-T3 SVA	0.974	1.044-0.909	0.459
Baseline C2-SS	1.139	1.412-0.919	0.234
Baseline PT	1.165	1.385-0.979	0.085
Baseline C2-S1 CL	0.969	1.013-0.927	0.167
2 Years Follow-Up			
Baseline T1S-CL	1.004	1.212-0.832	0.963
Baseline C2-T3 SVA	0.992	1.071-0.919	0.839
Baseline C2-SS	1.170	2.048-1.056	0.001*
Baseline PT	1.112	1.203-1.028	0.008*
3 Years Follow-Up			
Baseline T1S-CL	1.086	1.456-0.810	0.581
Baseline C2-T3 CL	0.902	1.003-0.811	0.057
Baseline C2-SS	0.942	1.367-0.650	0.754
Baseline PT	1.186	1.391-1.012	0.035*

Multivariate analysis for potential independent predictors of new onset non-op CD at 1, 2, 3yrs follow-up

References

- Passias PG, Soroceanu A, Smith J, et al. Postoperative cervical deformity in 215 thoracolumbar patients with adult spinal deformity: prevalence, risk factors, and impact on patient-reported outcome and satisfaction at 2-year follow-up. Spine (Phila Pa 1976). 2015;40(5):283-91.
- Smith JS, Lafage V, Schwab FJ, et al. Prevalence and Type of Cervical Deformity Among 470 Adults With Thoracolumbar Deformity. Spine (Phila Pa 1976). 2014;39(17):1001-1009.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) further understand new onset CD in nonoperative patients, 2) identify increased baseline C2 slope as a predictor of new onset CD, 3) understand the potential impact of HRQoL associated with new onset CD.