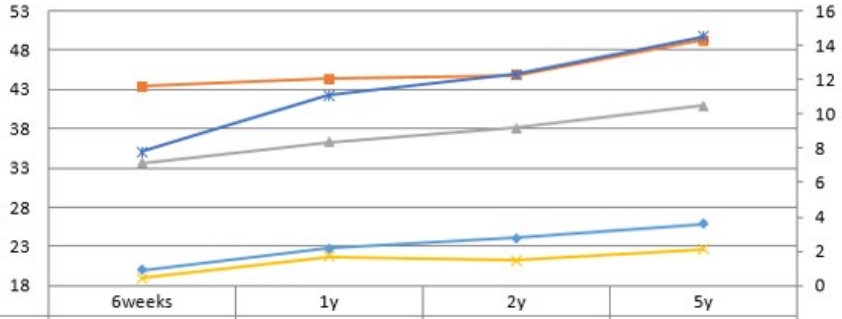
Introduction “Aging is kyphosing”. Adult Spinal Deformity (ASD) patients with significant sagittal deformity and/or functional impairment are frequently treated with posterior instrumented fusion (PSFI). Optimal postoperative spinal alignment has been associated to better surgical outcomes. No previous study has analyzed the spontaneous long-term postoperative alignment changes occurring at the non-instrumented spine, its risk factors or impact on surgical outcomes. Materials and Methods We identified all patients operated before 2015 from a prospective multicentric international ASD database. Patients with long fusion to pelvis and no alignment changes in the instrumented area (including PJK) during follow-up were retained. We analyzed baseline characteristics, surgical treatment, postoperative alignment and the 5YFU surgical outcomes: alignment (coronal and sagittal), adverse events and Quality of Life (QoL; ODI, SRS22, SF36). Alignment changes at the non-instrumented levels and its impact on 5YFU QoL were analyzed using t-tests. Risk factors associated to alignment changes were identified using longitudinal mixed-effects models adjusted for confounding variables. Results 79 patients met inclusion criteria: 83.5% women; age 61.9 years (SD±10.5), 10.7 fused levels (range 5-18, SD±3.7), 29.1% 3-Column Osteotomies, 88.6% posterior-only approach (Table). Despite having 65% of the sample well aligned at 6 weeks, a progressive worsening of global sagittal alignment (Global Tilt/RSA), thoracic kyphosis (T2-T12 and T5-T12), associated to increased pelvic compensation (Pelvic Tilt and Sacral Slope/RPV) was observed between 6 weeks and 5YFU ($p<0.05$). These changes however were not associated with worsening QoL outcomes ($p>0.05$) at any postoperative time point. Trends towards greater T2-T12 kyphosis progression linked to age, and an increased Sagittal Balance (SVA) and RPV linked to the presence of osteoporosis were observed. Optimal immediate postoperative sagittal alignment didn´t seem to protect against this “aging effect”. Conclusions Neither ASD surgery or optimal postoperative alignment prevent ongoing “aging” of the non-instrumented spine. Thoracic and global sagittal alignments continue to worsen over time. While no functional deterioration has been documented, the implication of these changes on surgical planning is still to be determined.

		Preop Mean (Standard Deviation)	6wk	1y	2y	5y	pvalue preop-6wk	pvalue 6wk-5y
Radiographic parameters	Major Cobb	40.7 (SD 22.3)	23.9	19.6	18.2	24.8	**p<0.05***	p>0.05
	Global Tilt (GT)	34.6 (SD 16.1)	20.0	22.7	24.1	25.9	**p<0.05***	**p<0.05***
	T1 Sagittal Tilt (T1ST)	0.3 (SD 6.4)	-3.7	-4.3	-3.4	-2.2	**p<0.05***	p>0.05
	Sagittal Balance (SVA)	71.9 (SD 57.9)	23.8	23.5	31.5	34.9	**p<0.05***	p>0.05
	Kyphosis T2-T12	34.5 (SD 18.7)	43.4	44.3	44.8	49.3	**p<0.05***	**p<0.05***
	Kyphosis T2-T5	9.6 (SD 7.7)	14.2	11.8	11.8	14.0	**p<0.05***	p>0.05
	Kyphosis T5-T12	28.8 (SD 18.8)	33.6	36.3	38.1	40.9	p>0.05	**p<0.05***
	Lordosis L1-S1	-34.3 (SD 17.7)	-52.9	-50.6	-51.0	-50.1	**p<0.05***	p>0.05
	Pelvic Tilt (PT)	26.3 (SD 9.6)	18.9	21.7	21.2	22.6	**p<0.05***	**p<0.05***
	Sacral Slope (SS)	29.8 (SD 10.1)	37.7	33.7	34.5	32.4	**p<0.05***	**p<0.05***
	Pelvic Incidence (PI)	56.2 (SD 13.1)	56.5	55.4	55.4	55.0	p>0.05	p>0.05
	RPV (Relative Pelvic Version)	-12.3 (SD 7.3)	-4.7	-8.0	-7.2	-9.1	**p<0.05***	**p<0.05***
	RSA (Relative Spinopelvic Alignment)	22.6 (SD 13.8)	7.8	11.1	12.3	14.5	**p<0.05***	**p<0.05***
	RLL (Relative Lumbar Lordosis)	-29.5 (SD 16.3)	-11.1	-12.7	-12.1	-13.0	**p<0.05***	p>0.05
Quality of Life		Preop	6m	1y	2y	5y	pvalue preop-6m	pvalue 6m-5y
	Oswestry Disability Index	44.7 (SD 17.2)	29.04	28.2	30.1	34.2	**p<0.05***	p>0.05
	SRS22- subtotal	2.5 (SD 0.6)	3.41	3.5	3.4	3.3	**p<0.05***	p>0.05
	SF36-PCS	33.5 (SD 7.4)	39.46	40.1	40.6	38.8	**p<0.05***	p>0.05
	SF36-MCS	41.5 (SD 12.7)	41.49	47.3	46.6	44.6	**p<0.05***	p>0.05

Ongoing Thoracic and Global Alignment Changes over Time



	6weeks	1y	2y	5y
Global Tilt (GT)	20	22,7	24,1	25,9
Kyphosis T2-T12	43,4	44,3	44,8	49,3
Kyphosis T5-T12	33,6	36,3	38,1	40,9
Pelvic Tilt (PT)	18,9	21,7	21,2	22,6
RSA* (Secondary Y Axis)	7,8	11,1	12,3	14,5

**RSA, Relative Spinopelvic Alignment.*