

Introduction Lower Instrumented Vertebra (LIV) selection in Adult Spinal Deformity (ASD) surgery remains controversial. The aim of this study was to analyze, in ASD patients undergoing long fusion, the baseline patient characteristics associated to LIV selection (L4, L5 and pelvis) and to compare 5-year follow-up outcomes and reintervention (UPROR) rates. **Materials and Methods** Patients reaching 5YFU, with 2YFU data, long fusion (>3 segments, Upper Instrumented Vertebra [UIV] T2-L1) and LIV -L4, LIV-L5 or LIV-pelvis were selected from a prospective international ASD database. We analyzed baseline data (demographic, radiographic, Quality of Life (QoL)), surgical parameters, 2YFU and 5YFU outcomes, including adverse events (major complications [MC] and UPRORs), deformity correction and QoL gain. A Propensity Score (PS) using 16 confounding variables was built to compare similar LIV-L5 and LIV-pelvis patients. Differences were assessed with average treatment effects (ATEs) based on PS. **Results** 198 patients met inclusion criteria (38 L4, 34 L5, 126 pelvis), 77.8% had 5YFU. Patients with LIV-L4 were younger and had greater baseline thoracolumbar kyphosis with less pain and disability (ODI, SF36-PCS, SRS22-Function, SRS22-Pain). LIV-L5 and LIV-pelvis had similar baseline QoL, but LIV-pelvis patients were older, had worse baseline sagittal alignment (pelvis>L5>L4; Table) more previous surgeries, and the highest rate of 3-column osteotomies (3CO). Presence of MRI L5-S1 disc degeneration was similar in LIV-L5 and LIV-pelvis (20.5% vs 32.8%, $p=0.10$). At 5YFU, QoL gain was equivalent in all groups. LIV-L5 and LIV-pelvis had comparable rates of UPROR and major complications, while LIV-L4 had the lowest rate of adverse events. At 5YFU, extension to pelvis was rare (<5%) in LIV-L4 and happened in one-fourth of LIV-L5 ($p=0.01$). Comparison of PS adjusted LIV-L5 and LIV-pelvis patients showed that LIV-pelvis was only associated with greater 5YFU sagittal radiographic correction ($p<0.05$), with no differences in 5YFU QoL or adverse events (Table). **Conclusions** LIV-L4, LIV-L5 and LIV-Pelvis identify 3 distinct ASD populations with increasing disease severity. 25% of patients with LIV-L5 ended up needing extension to pelvis, but both groups had similar UPROR rates. After PS-adjusted comparison, LIV-L5 did not show any clear advantage over LIV-pelvis in 5YFU QoL gain or adverse events rates.

	L4 (38)	L5 (34)	Pelvis (126)	P<0.05	
Baseline & Surgical Characteristics	Age	44.3 (SD 15.7)	52.8 (SD 16.5)	63.9 (SD 10.4)	L4 vs L5 vs Pelvis
	Bleeding (mL)	1174.8 (SD 786.2)	1502.7 (SD 1020)	2018.9 (SD 1488.5)	L4/L5 vs Pelvis
	Prior Spine Surgery	13.2%	29.4%	40.5%	L4 vs Pelvis
	3CO	11.9%	15.4%	25.4%	L4/L5 vs Pelvis
Radiographic Parameters	Major Cobb	Preop: 50.9 6w: 24.5 5y: 30.2	Preop: 47.5 6w: 25.4 5y: 31.5	Preop: 38.6 6w: 21.3 5y: 21.2	5Y L4/L5 vs Pelvis
	Kyphosis T10-L2	Preop: 26.0 6w: 1.5 5y: 4.6	Preop: 13.0 6w: 3.2 5y: 9.7	Preop: 10.2 6w: 7.6 5y: 8.2	Preop L4 vs L5/Pelvis
	Sagittal Vertical Axis (SVA)	Preop: 11.6 6w: 8.6 5y: -0.12	Preop: 25.5 6w: 32.4 5y: 39.3	Preop: 81.4 6w: 26.0 5y: 49.4	Preop L4/L5 vs Pelvis 6wk L4 vs L5/Pelvis 5Y L4 vs L5/Pelvis
	Global Tilt	Preop: 16.9 6w: 13.7 5y: 14.3	Preop: 24.4 6w: 23.6 5y: 28.5	Preop: 37.8 6w: 21.6 5y: 29.8	Preop L4 vs L5 vs Pelvis 6wk L4 vs L5/Pelvis 5Y L4 vs L5/Pelvis
	Pelvic Tilt	Preop: 16.4 6w: 14.1 5y: 15.6	Preop: 22.2 6w: 21.2 5y: 24.6	Preop: 28.5 6w: 20.4 5y: 24.8	Preop L4 vs L5 vs Pelvis 6wk L4 vs L5/Pelvis 5Y L4 vs L5/Pelvis
	Lordosis L1-S1	Preop: -48.7 6w: -50.3 5y: -47.3	Preop: -41.9 6w: -45.5 5y: -45.8	Preop: -32.5 6w: -53.0 5y: -51.0	Preop L5/L4 vs Pelvis 6wk L5 vs L4/Pelvis
Quality of Life	ODI	Preop: 28.5 6m: 27.6 5y: 24.1	Preop: 41.8 6m: 29.2 5y: 30.4	Preop: 45.0 6m: 32.5 5y: 37.2	Preop L4 vs L5/Pelvis 5Y L4 vs L5/Pelvis
	SRS22-Subtotal	Preop: 3.0 6m: 3.4 5y: 3.6	Preop: 2.7 6m: 3.3 5y: 3.3	Preop: 2.5 6m: 3.3 5y: 3.2	Preop L4 vs L5/Pelvis 5Y L4 vs L5/Pelvis
	SF36 PCS	Preop: 40.2 6m: 42.5 5y: 43.7	Preop: 34.5 6m: 38.2 5y: 40.2	Preop: 33.3 6m: 38.1 5y: 37.6	Preop L4 vs L5/Pelvis 6m L4 vs L5/Pelvis 5Y L4 vs Pelvis
	SF36 MCS	Preop: 41.4 6m: 47.4 5y: 50.0	Preop: 44.7 6m: 46.6 5y: 47.9	Preop: 40.7 6m: 45.8 5y: 44.7	5Y L4/L5 vs Pelvis
Adverse Events until 5YFU	Patients with Major Complications	6 (15.8%)	13 (38.2%)	54 (42.9%)	L4 vs L5/Pelvis
	Patients with UPROR	6 (15.8%)	11 (32.4%)	48 (38.1%)	L4 vs L5/Pelvis
	Patients revised and fused to pelvis	1/38 (2.6%)	8/34 (23.5%)		L4 vs L5
Average Treatment Effects (Δ preop-5YFU) - L5 vs Pelvis					
ODI	2.9 (p=0.13)	SF36 PCS	-0.7 (p=0.68)		
SRS-Subtotal	-0.1 (p=0.21)	SF36 MCS	-1.2 (p=0.56)		
Major Cobb	-14.3 (p<0.05)	Global Tilt	-5.7 (p<0.05)		
Lordosis L1-S1	-7.5 (p<0.05)	SVA	-26.4 (p<0.05)		
Major Complications	0.2 (p=0.55)	UPROR	0.2 (p=0.08)		

SD, standard deviation; UPROR, unplanned reintervention; 3CO, 3-column osteotomies.