Morbidity and Mortality Rates in Patients with Ankylosing Spinal Disorders Comparing Between Single-Level, Multi-Level, and Spinopelvic Injuries

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Purpose: Patients with ankylosing spine disorders (ASDs), such as ankylosing spondylitis (AS) and diffuse idiopathic skeletal hyperostosis (DISH), have a fourfold fracture risk during their lifetime as compared with the general population. Patients with spine fractures and ASDs are at high risk for complications and death. The goal of the study was to assess the morbidity and mortality rates associated with a single-level spine fracture, multi-level spine fractures, or the combination of spine and pelvis fractures.

Methods: We conducted a retrospective cohort review of a large consecutive series of adult patients with ASDs from 2005 to 2020 at a Level I trauma center. Demographic data, procedural data, hospital data, and 90-day postoperative data were obtained. Statistical analyses compared single-level, multi-level, and spinopelvic injuries groups using Fisher's exact test and analysis of variance to compare categorical and continuous variables, respectively.

Results: 383 cases of ASDs (155 AS and 228 DISH) with fractures were identified from 2005 to 2020. There were 323 patients with a single-level injury, 45 with multi-level injury, and 15 with spinopelvic injuries. There were 57 deaths within 90 -days (14.9%), but no difference in mortality between groups (P = 0.949). There were 96 patients (25.1%) with complications. The most common complications were wound infection 52 (13.6%), pulmonary complications 38 (9.9%), and hardware-related 7 (1.9%). Complication rates in these 3 groups were significantly different for infection (single-level 11.5%, multi-level 26.7%, and spinopelvic 20%, respectively, P = 0.015). Significant differences among the groups were identified for ASD type, surgical invasiveness index, energy of mechanism, injury location, instrumented levels, estimated blood loss, and discharge disposition (P<0.05).

Conclusion: The overall 90-day mortality rate was 14.9%, not significantly different between groups. The overall complication rate in the treatment of ASD patients is 25.1%. The complication rate is significantly higher in patients with multi-level injury and in patients with a combination of spine and pelvic fractures.

Table 1: Comparison of Patient Variables

		Single	Multi	Spinopelvic	p-value
	Total N	323	45	15	
Demographics	Age (years, mean ± SD)	70.61 ± 13.40	68.18 ± 12.89	63 ± 11.20	0.059
	BMI (kg/m^2, mean ± SD)	31.88 ± 7.65	31.56 ± 7.78	30.6 ± 6.87	0.799
	Sex (% Female)	45 (13.9%)	9 (20.0%)	1 (6.7%)	0.417
	ASD Type (% AS)	128 (39.6%)	25 (55.6%)	2 (13.3%)	0.011*
	Follow-up (days, mean ± SD)	147.52 ± 228.79	274.56 ± 527.93	117.13 ± 130.39	0.014*
Comorbidities	Diabetes	109 (33.7%)	14 (31.1%)	4 (26.7%)	0.889
	Hypertension	190 (58.8%)	29 (64.4%)	7 (46.7%)	0.468
	ASA Class				0.174
	I: No Disturbance	2 (0.6%)	0	0	
	II: Mild Disturbance	44 (13.6%)	4 (8.9%)	3 (20.0%)	
	III: Severe Disturbance	180 (55.7%)	32 (71.1%)	8 (53.3%)	
	IV: Life Threatening	97 (30.0%)	8 (17.8%)	4 (26.7%)	
	V: Moribund	0	1 (2.2%)	0	
	Surgical Invasiveness Index	12.61 ± 4.57	23.78 ± 7.71	12.73 ± 5.66	<0.001*
Injury	Energy of Mechanism (% Low Energy)	187 (57.9%)	19 (42.2%)	3 (20.0%)	0.003*
	Injury Location				<0.001*
	C/CT	124 (38.4%)	30 (66.7%)	0	
	T/TL	184 (57.0%)	8 (17.8%)	0	
	L/LP	15 (4.6%)	0	0	
	Multi	0	7 (15.6%)	15 (100%)	
Operative	Surgical Approach				0.498
	Posterior	312 (96.6%)	43 (95.6%)	14 (93.3%)	
	Anterior	3 (0.9%)	0	0	
	Both	8 (2.5%)	2 (4.4%)	1 (6.7%)	
	Instrumented Levels	5.93 ± 1.76	11.11 ± 3.65	6.27 ± 2.49	<0.001*
	Estimated Blood Loss	567.71 ± 541.11	1167.78 ± 1037.32	1006.67 ± 963.23	<0.001*
Hospital Variables	Length of ICU Stay (days, mean ± SD)	6.17 ± 14.29	8.04 ± 9.44	10.87 ± 8.24	0.319
	Length of Hospital Stay (days, mean ± SD)	14.49 ± 20.65	15.80 ± 11.00	21.40 ± 12.92	0.388

Data represented as N (%) or mean ± SD unless otherwise specified.
* denotes significance, p<0.05