Traumatic Anterior Shoulder Instability in Younger Adolescents Results in a Higher Incidence of Atypical Soft Tissue Injury

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INTRODUCTION: Traumatic anterior shoulder instability is not uncommon in the adolescent athlete, and untreated, recurrence rate is high. Atypical lesions beyond the classic anterior-inferior capsulolabral injury (Bankart), and posterior superior humeral head defect (Hill-Sachs) may occur and require close examination of appropriate imaging. Less common injuries such as anterior glenoid periosteal sleeve avulsions (ALPSA), humeral glenohumeral ligament avulsions (HAGL), and insertional tendon avulsions may occur within this population and accurate diagnosis and appropriate lesion management is key to treatment success.

The purpose of this study is to evaluate age, skeletal immaturity, and bone loss as correlates of posttraumatic anterior shoulder instability lesion patterns in an adolescent population.

Study Design: Retrospective Case cohort comparison, Level of evidence, III.
METHODS: Consecutive patients <18 years of age (n=160 shoulders) treated in the outpatient setting within a single academic sports medicine institution for a diagnosis of traumatic anterior shoulder instability between June 2013 and June 2021 were reviewed with IRB approval. Demographics, injury mechanism, radiographic and MRI lesion type (Bankart, Hill-Sachs, ALPSA, HAGL, or subscapularis avulsion), presence of any bone loss, operative findings when surgically managed, and shoulder physeal status were recorded. Exclusions of incomplete records, instability patterns other than isolated posttraumatic anterior, and prior injury or surgery to the index shoulder were applied resulting in 131 shoulders available for study. Instability lesion type was analyzed categorically by age <15 or > 15 years of age, and open physeal status; and individual age was assessed for correlation with any bone loss present. Atypical lesions (ALPSA, HAGL, Subscapularis avulsion) were defined as those less common in the general anterior shoulder instability population and assessed for correlations to age, open physeal status, and the presence of any bone loss. A chi-square test was used to compare categorical variables and a Fisher's exact text was utilized. Continuous variables were first examined for normality of data distribution and then a nonparametric Mann-Whitney was executed for the comparison of the two groups.
RESULTS: A total of 131 shoulders (avg age= 15.3 years,10.5-18.3), with 55 shoulders < 15 years of age and 76 shoulders > 15 years old were identified for study. Females [n=24, (43.6%) vs. n=10, (13.2%); p<0.0001] and subjects with open physes [n=48, (87.3%) vs. n=41, (55.4%); p<0.001] were both significantly greater in the age <15 cohort. BMI obesity status, injury relative to arm dominance, history of fixed dislocation, and number of recurrences were no different. (Table I) There were 109 shoulders with any degree of bone loss noted, and when comparing those with and without bone loss, younger age was significantly associated with no bone loss at presentation (no bone loss: age = 14.2, SD 1.9; bone loss: age = 15.5, SD 1.7; p< 0.005). (Figure I) Bony Bankart injuries [n=10, (18.2%) vs. n=26, (34.2%); p<0.05] and Hill-Sachs injuries [n=41, (74.6%) vs. n=68, (89.5%); p<0.05] were both significantly less common in the age < 15-year-old group. ALPSA lesions [n=13, (23.6%) vs. n=8, (10.5%); p<0.05] and all Atypical lesions combined [n=23, (41.8%) vs. n=13, (17.1%); p<0.005] were more common in the < 15-year-old group. (Table II).
DISCUSSION AND CONCLUSION: In this series of anterior shoulder instability in children and adolescents, instability lesions varied significantly by age. Bone loss was associated with older age at presentation, and atypical lesions of ALPSA, HAGL, and subscapularis avulsions were more common in those presenting less than 15 years of age. The treatment team should be aware of less common soft tissue injuries in this young age group and ensure imaging is adequate for proper diagnosis and treatment of traumatic anterior shoulder instability in these younger patients.

Figure I: The presence of bone loss in pediatric and adolescent anterior post-traumatic shoulder instability is associated with older age at presentation. P<0.01

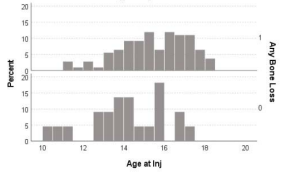

Table I: Age-Related Presentation Characteristics of Adolescent Traumatic Anterior Shoulder Instability

	< 15 years old N= 55	≥ 15 years old N= 76	p value
Sex (Female) N (%), n=131	24 (43.6%)	10 (13.2%)	<0.0001
Open Physes N (%), n=129	48 (87.3%)	41 (55.4%)	<0.001
BMI >30 N (%), n=126	4 (7.6%)	10 (13.7%)	0.278
Dominant Arm Injured N (%), n=122	34 (65.4%)	37 (52.7%)	0.165
Fixed Dislocation N (%), n=131	37 (67.3%)	57 (75%)	0.332
≥ 2 Events N (%), n=131	34 (61.8%)	35 (46.1%)	0.076
≥ 5 Events N (%), n=131	19 (34.6%)	23 (30.3%)	0.604

Table II: Age-Related adolescent post-traumatic anterior shoulder instability lesion patterns.

	< 15 years old N= 55	≥ 15 years old N= 76	p value
SOFT TISSUE INJURIES			
Any Atypical Lesion (ALPSA, HAGL, Tendon Avulsion) N (%)	23 (41.8%)	13 (17.1%)	<0.005
ALPSA N (%)	13 (23.6%)	8 (10.5%)	<0.05
HAGL N (%)	6 (11.1%)	3 (4.2%)	0.170
Subscapularis Avulsion N (%)	4 (7.4%)	2 (2.8%)	0.401
BONY INJURIES			
Bony Bankart N (%)	10 (18.2%)	26 (34.2%)	<0.05
Hill-Sachs Lesion N (%)	41 (74.6%)	68 (89.5%)	<0.05