

Delays to Care Significantly Impact Severity of MRI Findings in Young Patients with Anterior Shoulder Instability

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INTRODUCTION: Shoulder instability is common in adolescent and young adult patients due to higher levels of participation in contact sports and other high-risk activities, as well as anatomic factors unique to the young patient population. The timing of orthopaedic evaluation following a shoulder instability event can vary, and many patient demographic and socioeconomic factors may influence this timing. Magnetic resonance imaging (MRI) is a commonly used imaging modality to identify the presence of labral tear as well as bone defects such as Hill-Sachs or anterior rim glenoid bone deficiency. Presence of bony deficiency on both the humeral head and glenoid surfaces is a known risk factor for additional instability as well as potential failure of arthroscopic labral repair. The purpose of this study is to identify factors contributing to delay in obtaining orthopaedic care and determine if delay is correlated with more severe shoulder pathology.

METHODS: Retrospective chart review was conducted at a single tertiary pediatric institution to identify patients age 21 and younger with recurrent anterior shoulder instability from January 2008 to present. Patients were excluded if they did not have an MRI to evaluate their shoulder instability. Initial MRI following instability event(s) was included in analysis and MRI findings were determined as reported by the attending radiologist. Data extracted included date and patient age at first instability event, sport, race/ethnicity, insurance, Child Opportunity Index (COI), date of first orthopaedic visit, date of initial MRI, and findings on MRI. Statistical analyses, including multivariate regression, Pearson correlation, and bivariate logistic regression, were performed in Statistical Package for the Social Sciences (SPSS) to evaluate the impact of delays to care on MRI findings in pediatric shoulder instability, with significance set at $p < 0.05$.

RESULTS: 82 MRIs in 79 patients were included for analysis. Three patients had bilateral anterior shoulder instability. Average age at first instability event was 16.0 years (range 12.4 to 20.1 years). Median time to orthopaedic evaluation was 162.50 days (IQR 442.5) and median time to MRI was 302 days (IQR 624.25). The number of instability events prior to evaluation was significantly positively correlated with time to orthopaedic evaluation ($r=0.45$, $p < 0.001$) as well as time to MRI ($r=0.31$, $p = 0.004$). Linear regression bootstrapped with 1000 resamples suggested that public insurance category was associated with longer delay to MRI ($B = 221.46$, $p = 0.031$), with an average mean difference of 274.27 days ($p = 0.028$) between public and private insurance. Delays to orthopaedic evaluation and MRI were not found to be correlated with more severe soft tissue injuries such as glenolabral articular disruption (GLAD), humeral avulsion of the glenohumeral ligament (HAGL), or anterior labroligamentous periosteal sleeve avulsion (ALPSA). However, delay to orthopaedic evaluation was significantly associated with presence of glenoid deficiency ($p < 0.001$) and longer delay to MRI were also significantly associated with the presence of glenoid deficiency ($p < 0.001$). Logistic regression suggested that MRI delay beyond 400 days was associated with 9.5 times greater odds of glenoid deficiency ($p = 0.042$), and delay beyond 192 days were associated with 3.6 times greater odds of a Hill-Sachs lesion ($p = 0.008$).

DISCUSSION AND CONCLUSION: Delays in orthopaedic evaluation and MRI have a significant impact on injury severity following anterior shoulder instability. Specifically, longer delay was associated with number of recurrent instability events, increased risk of glenoid bone deficiency and greater odds of a Hill Sachs lesion. Findings of bone deficiency place these patients at higher risk of recurrent instability and failed surgical stabilization. Future directions should target patient and provider education on the risks of increased injury severity and potential poor outcomes associated with delays to care. Particular attention should be given to patients with public insurance as this was identified to be a significant risk factor contributing to a delay in care.

Table 1: Time to Orthopaedic Evaluation and Presence of Various Pathological Features on MRI

Pathology	Present (avg no. days)	Absent (avg no. days)	Mean Difference (days)	Sig.
Hills-Sachs	336.18	272.91	63.27	0.440
Glenoid Bone Deficiency	752.29	270.35	481.94	<0.001*
GLAD lesion	8.00	327.05	-319.05	0.083
HAGL	33.00	318.45	-285.45	0.269
ALPSA	252.83	326.12	-63.29	0.680

Table 2: Time to MRI and Presence of Various Pathological Features on MRI

Pathology	Present (avg no. days)	Absent (avg no. days)	Mean Difference (days)	Sig.
Hills-Sachs	582.70	361.63	221.08	0.057
Glenoid Bone Deficiency	1223.14	428.60	794.54	<0.001*
GLAD lesion	270.50	508.01	-237.51	0.370
HAGL	123.50	505.75	-382.25	0.301
ALPSA	410	503.25	-93.25	0.671