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Prospective Evaluation of Glenoid Bone Loss After First-Time and Recurrent Anterior Glenohumeral Instability Events

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Summary:

Prospective MRI study of glenoid bone loss before and after glenohumeral instability events in young athletes, demonstrating an average of 6.8% bone loss after first time instability and 13.6% bone loss in subjects experiencing recurrent instability, with a total calculated bone loss of over 20% in all subjects with recurrent instability.

Abstract:

Introduction

Determining the amount of glenoid bone loss in patients following anterior glenohumeral instability events is critical to guiding appropriate treatment. One of the challenges in managing shoulder instability in young athletes is the absence of clear data showing the impact of each event. The purpose of this study was to prospectively determine the amount of bone loss associated with a single instability event, in the setting of both first-time and recurrent instability.

Methods

We conducted a prospective cohort study of 714 athletes surveilled for four years. Baseline assessment included a subjective history of shoulder instability. Bilateral noncontrast shoulder MRIs were obtained in all participants with and without a history of previous shoulder instability. The cohort was prospectively followed during the study period and those who sustained an anterior glenohumeral instability event were identified. A post-injury MRI with contrast was obtained and compared to the screening MRI. Glenoid width was measured for each patient's pre- and post-injury MRI. The projected total glenoid bone loss was calculated and compared for patients with a prior history of shoulder instability.

Results

Of the 714 athletes (1428 shoulders) that were prospectively followed during the four-year period, 23 shoulders in 22 subjects sustained a first-time anterior instability event (5 dislocations, 18 subluxations), and six subjects with a previous history of instability sustained a recurrent anterior instability event (1 dislocation, 5 subluxations). On average, there was statistically significant glenoid bone loss (1.84 +/- 1.47 mm) following a single instability event ($p < 0.001$), equivalent to 6.8% (95% CI: 4.46%, 9.04%, range 0.71%-17.6%) of the glenoid width. Twelve shoulders (52%) demonstrated glenoid bone loss > 5%, 4 shoulders demonstrated glenoid bone loss >13.5% and no shoulders had >20% glenoid bone loss after a first-time instability event. Pre-existing glenoid bone loss in subjects with a

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history of instability was 10.2% (95% CI: 1.96%, 18.35%, range 0.6% - 21.0%). This bone loss increased to 22.8% (95% CI: 20.53%, 25.15%, range 21.2% to 26.0%) following additional instability (P=0.0117). All six shoulders with recurrent instability had >20% glenoid bone loss.

Conclusion

Glenoid bone loss of 6.8% was observed after a first-time anterior instability event. In the setting of recurrent instability, the total calculated glenoid bone loss was 22.8%, with a high prevalence of bony Bankart lesions (5/6). The findings of this study support early stabilization of young, active subjects following a first-time anterior glenohumeral instability event.