Simultaneous 3D assessment of glenohumeral shape, humeral head centering, and scapular positioning in atraumatic shoulder instability: a magnetic resonance-based in vivo analysis.

Abstract:

BACKGROUND: Success rates in the treatment of atraumatic shoulder instability differ, and in vivo identification of the individual insufficient stabilizers is difficult. HYPOTHESIS: Atraumatic shoulder instability is an inhomogeneous entity with varying alterations of the active and passive stabilizers. This might be a reason for inferior treatment results. STUDY DESIGN: Case control study; Level of evidence, 3. METHODS: Shoulders of 28 healthy volunteers and both shoulders of 14 patients with atraumatic instability and multidirectional laxity were examined in different arm positions using open magnetic resonance imaging. Three-dimensional postprocessing techniques were applied to determine 3D glenoid size and retroversion, radius of the humeral head, and curvature of the glenoid. The results of static stabilizers were compared with those of glenohumeral and scapular positioning in the same patients for identification of the individual insufficient stabilizers. RESULTS: The atraumatic unstable shoulders showed an increased mean retroversion on both sides, the difference being significant on the affected side (9.4 degrees +/- 4.8 degrees vs healthy 3.9 degrees +/- 1.3 degrees; P< .05) with a range of 2.6 degrees to 16.6 degrees. The curvature analysis demonstrated a pronounced flatness of the glenoid with a significantly
increased mean radius (103.8 mm vs healthy 41.7 mm). The extent of these changes varied widely among patients. Comparison of the static stabilizers with glenohumeral and scapular positioning revealed that isolated changes of the active stabilizers exist in some patients, whereas no isolated changes of passive stabilizers were found. CONCLUSION: All active and passive stabilizers need to be analyzed in patients with atraumatic instability because the magnitude of alteration varied widely among individuals. Different combinations of alterations of the stabilizers were found. The presented technique allows for in vivo identification of the specific alterations. This is necessary for a better understanding of individual pathomechanics and for initiating a specific causal treatment.