Asymmetric Resting Shoulder Position in Healthy Overhead Athletes

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Context: Scapular malposition, Inferior medial border prominence, Coracoid pain and malposition, and dysKinesis of scapular movement (SICK) are associated with shoulder injury in overhead athletes. Those with SICK scapula are believed to have asymmetric resting scapular position as a result of increased scapular protraction, anterior tipping and internal rotation of the dominant shoulder, yet the asymmetry of the resting scapular position and the contributors to the asymmetry have not been investigated. Additionally, symmetry of the resting scapular position in healthy overhead athletes needs to be evaluated for comparison with injured individuals. If similar degrees of asymmetry in the resting scapular position is present in healthy overhead athletes, asymmetry alone may not suggest the presence of SICK scapula in injured overhead athletes. The objective of this study was to assess symmetry of the resting scapular position and contributing scapular kinematics in healthy overhead athletes. Design: A cross-sectional design was used for this study. Setting: University medical center-based biomechanics laboratory. Patients or Other Participants: Forty-three, healthy, college-aged male overhead athletes (15 baseball pitchers, 15 volleyball players, and 13 tennis players) participated in the study. Interventions: Bilateral three-dimensional scapular position and orientation with the arm at rest was measured using an electromagnetic tracking device. Main Outcome Measures: Bilateral scapular position (protraction/retraction, elevation/depression) and orientation (upward/downward rotation, internal/external rotation, anterior/posterior tipping) were compared using paired t-tests. Statistical significance was set a priori at $\alpha = 0.05$. **Results:** The dominant side scapula was less retracted (dominant: 16.3±5.59°, non-dominant: 18.78±5.53°, p=0.01), more internally rotated (dominant: 30.3±7.57°, non-dominant: 26.5±7.35°, p=0.002) and anteriorly tipped (dominant: 15.9±4.82°, non-dominant: 14.0±5.30°, p=0.001) compared to the non-dominant side. There were no bilateral differences in scapular upward/downward rotation or elevation/depression. **Conclusions:** Asymmetry in the resting scapular position and orientation was found in healthy overhead athletes. The pattern of bilateral difference in scapular position and orientation found in this study supports the theory that asymmetry in the resting scapular position is the result of decreased scapular retraction (increased protraction), increased anterior tipping, and internal rotation of the dominant shoulder. The presence of resting scapular position asymmetry in healthy overhead shoulders suggests that this may be a normal adaptation in overhead athletes. Although the asymmetry was present in the healthy overhead athletes, the differences between dominant and non-dominant shoulders found in this study were relatively small (bilateral difference: 1.9° - 3.9°). It remains unknown how resting shoulder position asymmetry in injured overhead athletes compares to healthy overhead athletes. Further investigation of bilateral resting scapular position in injured overhead athletes and nonoverhead athletes is needed to further understand the implication of this resting scapular position asymmetry on shoulder pathologies. Word Count: 436