INFLUENCE OF POSTURE ON SUBACROMIAL SPACE

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Purpose: The subacromial space (SA) contains the rotator cuff (RC) tendons, bursae, and long head of the biceps. Compression of the SA contents, known as outlet impingement, has been theorized to be caused by numerous factors. One cause is poor posture. Previous studies indicate that slouched posture or increased thoracic spine flexion alters scapular kinematics. These scapular abnormalities may adversely affect the SA space. A position of scapular protraction has demonstrated a decrease in SA space, and an increase in SA space was evident with scapular protraction (Solem-Bertoft, 1993). Using US-generated images, the SA has been assessed by measuring the acromio-humeral distance (AHD). This technique has demonstrated excellent reliability when measuring AHD with the arm at rest, 45°, and 60° of shoulder abduction. (Desmeules, 2004; Azzoni, 2004) The purpose of this study is to determine the influence of posture on SA space using US in subjects with RC disease and pain free subjects. **Subjects:** Twenty-nine adults (mean age=31.9 years, SD=10.7) free from shoulder pain (Group: HTHY) and 31 adults (mean age=53.5 years, SD=13.7) with painful RC disease (Group: RCD). **Methods:** An US unit (Pyramid 764, Pyramid Medical Inc, Los Alamitos, CA) with a 7.5MHz linear array transducer was used to obtain two images of each subject's painful shoulder (RCD) or a randomly selected shoulder (HTHY) in three postures: neutral, slumped, and upright and at 2 shoulder positions of rest and at 45° of abduction. The AHD was measured with an on-screen caliper as the distance (in mm) between the most inferior aspect of the acromion and the most superior aspect of the humeral head. Two AHD measurements taken at each posture and arm position were averaged for data analysis. Analysis at each arm position using a mixed model repeated measures ANOVA included effects for: group, posture, and group*posture interaction. **Results:** There were no significant interactions of group*posture with the arm at rest and 45° of abduction. The effect of posture is independent of group. Collapsing the groups, there were no significant differences in AHD among the three postures with the arm at rest ($F_{(2,116)}$=1.4, p=0.2557); however, there was a significant main effect of posture at 45° of abduction ($F_{(2,115)}$=9.1, p=0.0002). Specifically, with the arm abducted at 45°, AHD was greater in the upright posture (mean AHD= 9.76mm, SE=0.27) compared to the neutral posture (mean AHD=8.63, SE=0.26), with a mean difference = 1.13mm, SE=0.27. There were no significant differences between slumped (mean AHD=9.24, SE=0.26) and neutral or upright postures. **Conclusions:** Posture affects the SA space, however this influence is minimal. Upright posture had a greater AHD as compared to neutral posture, when the arm was actively elevated to 45° of abduction; however, the magnitude of the mean increase (1.13mm) is less than the standard error of the measurement for both resting (SEM=1.21mm)and upright AHD (SEM=1.22mm). The proportion of subjects whose individual change in AHD exceeded the SEM is 28/60 (36%). There was not effect of posture on AHD with the arm at rest. Disease state does not appear to mitigate the effects of posture, as SA space did not differ between RCD and healthy subjects. **Clinical Relevance:** Upright posture increases SA space at 45° of abduction , regardless of whether painful rotator cuff disease is present or not. Given the small magnitude of this increase relative to the SEM, clinical relevance is questionable.