



Grant Information Summary:

Reliability and Validity of a Scapular Motion Classification System for Screening and Clinical Practice

Practical Significance Statement

Few qualitative methods exist to reliably identify abnormal scapular motion (scapular dyskinesia) during an orthopaedic clinical exam. This study introduces a reliable method of identifying scapular dyskinesia based on visual examination and also validates the method by showing differences in 3-dimensional motion between subjects with and without scapular dyskinesia. However, our data does not support a direct relationship between scapular dyskinesia and the presence of symptoms in athletes engaged in overhead sports.

Study Background

Scapular dyskinesia is believed to be a significant source of shoulder pain and dysfunction, particularly in athletes involved with overhead sports; yet, clinical measures that are available to document motion abnormalities have questionable reliability or are impractical for routine use.

Objective

The objectives of this study were to 1) Develop a reliable test for identifying scapular movement abnormalities (dyskinesia)

suitable for routine screening and clinical use, 2) Validate the test for scapular dyskinesia using a previously validated motion analysis system to compare 3-dimensional motion between subjects judged as either having or not having scapular dyskinesia. 3) Determine the association between abnormal scapular movement and shoulder symptoms in athletes engaged in overhead sports.

Design And Setting

All measurements were performed in a laboratory setting or at a protected area

adjacent to the pool. For objective 1 (reliability) all athletes were video-taped during testing to allow subsequent evaluation by multiple raters. For objective 2 (validity), 66 subjects initially rated as either clearly normal or obvious dyskinesia underwent instrumented 3-dimensional motion analysis. For objective 3, self-report data related to symptoms was collected from all subjects.

Subjects

A total of 142 athletes were tested, 111 male and 31 females. The mean age was

20.8 +/-2.8 years. Of these, 49 athletes represented baseball, swimming or volleyball at the NCAA Division III level. The remaining 93 athletes were NCAA Division I water polo players. Subjects had to be actively competing in an overhead sport, and could not be obese (BMI > 30), or have a recent history of rotator cuff tear, dislocation or direct contact shoulder injury .

Measurements

Raters were trained to detect scapular dyskinesia using written operational definitions and video examples of normal and abnormal motion. Scapular dyskinesia was defined as the presence of either "winging" (medial or inferior border of the scapula protrudes ≥ 1 " with a sulcus/gap present between thorax and scapula) or "dysrhythmia" (premature or excessive elevation or protraction; or non-smooth or stuttering motion during arm elevation or lowering). Right and left sides were rated independently for each test motion as either "normal", "subtle", or "obvious" dyskinesia. Two raters independently observed and rated scapular motion in all athletes performing the prescribed tasks at the time of testing. Subsequently, six raters (three pairs) each rated 30 subjects chosen randomly (total 90) by viewing videos. A quantitative 3-dimensional analysis was accomplished using electromagnetic based sensors applied to the humerus and scapula bilaterally and to the thorax based on previously described protocols. Symptoms were assessed using the University of Pennsylvania Shoulder Score which is a composite based on pain at rest, moderate activity, and strenuous activity. Reliability was assessed using percent agreement and weighted kappa, and

the relationship between symptoms and scapular dyskinesia was evaluated by odds ratios.

Results

Percent agreement ranged from 75-86% and Kappa values (95% CI) ranged from 0.46(0.27-0.65) to 0.67 (0.52-0.79) for dyskinesia ratings of each shoulder and test movement. Significant differences in 3-dimensional scapular motion were found between subjects visually rated as normal compared to those rated as having dyskinesia. Subjects with dyskinesia had significantly less upward rotation (Figure 1), less clavicle elevation and greater clavicle protraction during flexion. The presence of shoulder symptoms was not significantly different between the "normal" and "obvious" subjects (Odds Ratio=0.79, 95%CI: 0.33 -1.89).

Conclusions

The test for scapular dyskinesia shows satisfactory reliability for clinical use. Subjects visually judged as having dyskinesia generally have less upward rotation and clavicle elevation and greater clavicle protraction during flexion. The presence of scapular dyskinesia was not related to shoulder symptoms in athletes engaged in overhead sports.

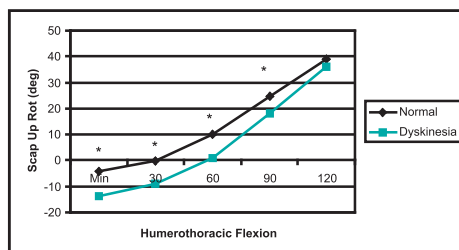


Figure 1. Subjects visually rated as having dyskinesia demonstrated significantly less scapular upward rotation compared to those judged as normal.

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Publication & Presentation List

McClure PW, Kareha SM, Tate AR, Irwin D, Stuckey E. Reliability of a clinical test to detect scapular dyskinesia and its relationship to shoulder symptoms in athletes. NATA Annual Meeting and Clinical Symposium, Atlanta, GA, June 2006

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