Abstract

OBJECTIVE: The purpose of this manuscript is to review current knowledge of how muscle activation and force production contribute to shoulder kinematics in healthy subjects and persons with shoulder impingement. RESULTS: The middle and lower serratus anterior muscles produce scapular upward rotation, posterior tilting, and external rotation. Upper trapezius produces clavicular elevation and retraction. The middle trapezius is primarily a medial stabilizer of the scapula. The lower trapezius assists in medial stabilization and upward rotation of the scapula. The pectoralis minor is aligned to resist normal rotations of the scapula during arm elevation. The rotator cuff is critical to stabilization and prevention of excess superior translation of the humeral head, as well as production of glenohumeral external rotation during arm elevation. Alterations in activation amplitude or timing have been identified across various investigations of subjects with shoulder impingement as compared to healthy controls. These include decreased activation of the middle or lower serratus anterior and rotator cuff, delayed activation of middle and lower trapezius, and increased activation of the upper trapezius and middle deltoid in impingement subjects. In addition, subjects with a short resting length of the pectoralis minor exhibit altered scapular kinematic patterns similar to those found in persons with shoulder impingement. CONCLUSION: These normal muscle functional capabilities and alterations in patient populations should be considered when planning exercise approaches for the rehabilitation of these patients.

Keywords

electromyography, muscle activation, scapula, shoulder pain