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Early Cessation of Muscle Activity during a Motor Control Test of the Scapula in People with Shoulder Impingement Mottram

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INTRODUCTION: People with shoulder impingement can have altered scapulothoracic muscle recruitment during arm movement. These scapulothoracic muscles are crucial in providing control of scapular position relative to the thorax and humerus. A motor control test has been devised to clinically assess the dynamic control of the scapula during arm movement. It is not yet known whether impingement patients differ from healthy individuals in their control of the scapula and if retraining scapulothoracic muscles restores normal muscle activity during the novel test.

AIM: To assess muscle activation during a motor control test in healthy individuals and people with shoulder impingement pre- to post-intervention.

METHODS: Sixteen healthy and 16 participants with shoulder pain and impingement signs were recruited from the local community. Participants were assessed using a motor control test, which involved maintaining control of scapular orientation/alignment during arm elevation to 90° and lowering back to rest. Healthy participants were assessed once and pain participants before and after a 10 week intervention aimed at retraining scapulothoracic muscles and improving the alignment/orientation of the scapula. Activation of the scapulothoracic muscles (Upper Trapezius, Middle trapezius, Lower trapezius, Serratus anterior) in relation to glenohumeral angle were determined using surface electromyography. Duration of activation was compared between healthy, pre- and post-intervention results using independent samples and paired samples t-tests.

RESULTS: Premature termination of lower trapezius (LT) ($p < 0.05$) and serratus anterior (SA) ($p > 0.05$) activity were shown pre-intervention during the arm lowering phase of the test, at an arm angle of $27^\circ \pm 15$ and $28^\circ \pm 15$ compared to healthy individuals (mean arm angle $17^\circ \pm 8$ and $22^\circ \pm 10$). Duration of activity in LT and SA muscles was increased significantly ($p < 0.05$) post-intervention, with muscle activity terminating at an arm angle of $19^\circ \pm 7$ and $17^\circ \pm 8$ respectively, to match that of the healthy participants.

CONCLUSION: The findings demonstrated that shoulder impingement patients have reduced duration of important scapulothoracic muscles compared to healthy subjects during the motor control test. After a 10 week tailored motor control intervention, duration of scapulothoracic muscle activation was significantly improved to match the healthy subjects. The demonstrated motor control change in scapular impingement patients suggests a tailored intervention may improve function in shoulder impingement patients.