

Effects of Volitional Preemptive Abdominal Contraction on Shoulder Proprioception Following Shoulder Muscle Fatigue

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ABSTRACT

The abdominal bracing maneuver, a volitional preemptive abdominal contraction (VPAC) strategy, is potentially beneficial to shoulder exercise performance. It is unclear how VPAC use affects shoulder function, including proprioception and shoulder muscle function following shoulder muscle fatigue caused by upper extremity dominant sports movements. Discovering methods that reduce its effects on shoulder proprioception and shoulder muscle function is important for clinical practice in orthopedic rehabilitation. **PURPOSE:** To identify VPAC effects on shoulder proprioception abilities and to identify VPAC effects on shoulder muscle electromyographic amplitudes, during seated proprioception trials, both with and without muscle fatigue present. **METHODS:** Thirty-nine participants (26 women, 13 men) participated in this study. Shoulder proprioception was measured by shoulder flexion reproduction angles. Kinematic data were collected during the shoulder flexion trials to determine the accuracy in the subjects' ability to reproduce a reference angle. All data were collected before and after a shoulder muscle fatigue protocol. Electromyographic data from the anterior deltoid (AD), posterior deltoid (PD), upper trapezius (UT), lower trapezius (LT), serratus anterior (SA), and infraspinatus (IF) muscles were used to observe muscle contraction amplitudes during the angle reproduction trials. **RESULTS:** Shoulder reproduction angles were not significantly affected by VPAC or muscle fatigue. Individually, shoulder muscle fatigue significantly increased UT muscle amplitudes (Mdn = 0.059(0.135), $p < .008$) and LT muscle amplitudes (Mdn = 0.023(0.059), $p < .008$). VPAC significantly increased shoulder IF muscle amplitudes (Mdn = 0.019(0.038), $p < .008$). **CONCLUSION:** The VPAC did not affect shoulder proprioception in this study, showing that the strategy may not be beneficial to improving proprioception in the shoulder joint. The affects of muscle fatigue on the selected shoulder muscles supported the observations in previous literature concerning muscle fatigue effects on selected shoulder muscle. Clinicians can use this information to assist with the creation of therapeutic exercise for the shoulder joint.