

COMPARING MUSCLE ACTIVITY DURING POST-SURGICAL ACTIVE ASSISTIVE RANGE OF MOTION EXERCISES.

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Purpose: Current knowledge is limited about the appropriate exercise progression following surgical repair of superior labral anteroposterior (SLAP) injuries. The purpose of this study was to evaluate the muscular demand and ROM during ten commonly prescribed post-operative exercises.

Subjects: Twenty participants were recruited, 10 Healthy (age= 28 ± 6 yrs) and 10 Post-SLAP repair (age 28 ± 9 yrs), 4-6 weeks following surgery. Only data from 9 Post-SLAP repair participants was analyzed; one data set was discarded due to poor EMG signal.

Methods: Ten rehabilitative exercises were performed: pendulum, forward bow, supported passive elevation with the upper extremity ranger (UER), supported active elevation, rope and pulley elevation, t-bar assisted elevation, UER assisted elevation, wall walks, UER active elevation, and active forward elevation (AFE). Electromyographical (EMG) electrodes were applied to the supraspinatus, infraspinatus, upper trapezius, anterior deltoid, biceps brachii, and serratus anterior to record muscular amplitudes. EMG amplitudes during concentric phase of each exercise were normalized to a percentage of sub-maximal reference voluntary contraction (%RVC). Maximal range of motion (MxROM) achieved during exercise performance was measured synchronously with video. A mixed model ANOVA considering group, exercise, and muscle was used for statistical analysis of each outcome measure with a $p < 0.05$ significance level set *a priori*.

Results: There was no significant muscle by group interaction for EMG, indicating that the two groups muscular demand were not different for any of the exercises. However an exercise order was apparent that gradually increased muscular demand for all muscles studied. MxROM amounts were less for SLAP patients compared to healthy during Rope and Pulley, T-bar, Wall Walk, and AFE exercises. ($p = .003$)

Conclusion: The EMG demand and MxROM attained follows a similar progression. Passive and active assistive exercises can be performed with lower muscular activation than AFE. Incorporation of the suggested exercise order into a post-operative SLAP rehabilitation clinical trial is necessary to evaluate their effectiveness of regaining motion without increasing pain.

Clinical Relevance: This is the first study in an early post-operative patient group to identify an exercise progression based on EMG and ROM evidence. The reported exercise progressions in the literature to date are based primarily on opinion and general principles of healing tissue. These results support active assistive exercises are of lower demand in a patient population prior to initiating active exercises.