Contribution of selected scapulothoracic muscle forces to the control of accessory scapular motions

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CONTRIBUTION OF SELECTED SCAPULO THORACIC MUSCLES TO THE CONTROL OF ACCESSORY SCAPULAR MOTIONS. Ludwig PM, Cook TM; Physical Therapy Graduate Program, The University of Iowa, Iowa City, IA 52242

Purpose: Increased emphasis is being directed to selective control of accessory scapular motions to address problems in older rehabilitation programs. However, the majority of previous biomechanical descriptions of scapulothoracic muscle actions have been limited to two-dimensional models describing scapular upward and downward rotation. The purpose of this project was to model and describe the potential three-dimensional components for a high volume of patients.

Methods: Subjects: Twenty-seven subjects participated (15 STs and 12 PTs). M aterials and Methods: The electromechanical spinal model of Simmonds et al. (1995) was used for this experiment. The model incorporates a vertebral column extended to the shape of a person's trunk. The output from the load cell and LVDT is fed through a data acquisition board into an IBM computer. The motion is resisted by a series of springs that can be altered to provide different conditions of "spinal" stiffness. Three stiffness levels were used in this experiment: 616N, 1212N, and 244N/cm. All subjects applied three repetitions of Grades I-IV Maitland type oscillatory mobilizations and three replications of a test grade of mobilization (grade V) to the spinal model. This procedure was repeated for each of the three levels of stiffness. Within each stiffness condition the order of testing was randomized. Data Analysis: Descriptive statistics were computed for peak mean forces applied during each grade of mobilization, for each level of stiffness and each repetition for PTs and STs. A 2x3x3x3 ANOVA (group x stiffness x grade x repetition) was used to test main effects and interactions. Results: The ANOVA revealed significant main effects for experience, stiffness, and mobilization grade (p < .05). Repetition was not significantly different. There were significant two-way interactions, experience by grade; experience by stiffness and grade by stiffness. One three way interaction was significant (experience by grade by stiffness). Mean peak forces were generally lower in the ST group compared to the PTs. The range was 28.11 - 179.27 Newtons across grades and stiffness levels in the ST group compared with 75.64 - 239.86 Newtons in the PT group. Inter-rater variability was high. Within each group, mean peak forces increased with stiffness and for each mobilization grade. Discussion: The results confirm the clinical belief that experience influences the application of spinal mobilization techniques.