

Trunk Muscle Cocontraction: The Effects of Moment Direction and Moment Magnitude

S. A. Lavender, *Y. H. Tsuang, G. B. J. Andersson, A. Hafezi, and C. C. Shin

*Department of Orthopedic Surgery, Rush-Presbyterian-St. Lukes Medical Center, Chicago, Illinois, U.S.A.; and
Department of Orthopaedic Surgery, National Taiwan University Hospital, Taipei, Taiwan

Summary: This study investigated the cocontraction of eight trunk muscles during the application of asymmetric loads to the torso. External moments of 10, 20, 30, 40, and 50 Nm were applied to the torso via a harness system. The direction of the applied moment was varied by 30° increments to the subjects' right side between the sagittally symmetric orientations front and rear. Electromyographic (EMG) data from the left and right latissimus dorsi, erector spinae, external oblique, and rectus abdominus were collected from 10 subjects. The normalized EMG data were tested using multivariate and univariate analyses of variance procedures. These analyses showed significant interactions between the moment magnitude and the moment direction for seven of the eight muscles. Most of the interactions could be characterized as due to changes in muscle recruitment with changes in the direction of the external moment. Analysis of the relative activation levels, which were computed for each combination of moment magnitude and direction, indicated large changes in muscle recruitment due to asymmetry, but only small adjustments in the relative activation levels due to increased moment magnitude. **Key Words:** Coactivation—Asymmetric loading—Low back pain—Ergonomics—Electromyography—Trunk muscles.
