

**PATHOKINESIOLOGY LABORATORY
RANCHO LOS AMIGOS NATIONAL REHABILITATION CENTER**

ABSTRACTS FROM PUBLISHED MANUSCRIPTS (2004 – 2005)

Effect of fore-aft seat position on shoulder demands during wheelchair propulsion: Part 2 – An electromyographic analysis. Gutierrez DD, Mulroy SJ, Newsam CJ, Gronley JK, Perry J. *J Spinal Cord Med* 2005;28:222-229.

Background & Objectives: Shoulder pain is common in persons with complete spinal cord injury. Adjustment of the wheelchair-user interface has been thought to reduce shoulder demands. The purpose of this preliminary study was to quantify the effect of seat fore-aft position on shoulder muscle activity during wheelchair propulsion.

Methods: Shoulder EMG was recorded while 13 men with paraplegia propelled a wheelchair in two seat positions: 1) shoulder joint center aligned with the wheel axle (anterior) and 2) shoulder joint center 8cm posterior to the wheel axle (posterior) in 3 test conditions (free, fast and graded). Duration of EMG activity, median and peak intensities was compared.

Results: During free propulsion the median EMG intensity of all muscles was similar between anterior and posterior seat positions. The major propulsive muscles (pectoralis major and anterior deltoid) demonstrated significant reductions in their median and peak intensities in the posterior seat position. Pectoralis major median intensity was significantly reduced in the posterior position during fast (41 v. 63 %MMT) and graded (41 v. 49%MMT) conditions and peak intensity was reduced across all conditions (free:29 v. 51%MMT, fast: 103 v. 150%MMT, graded:99 v. 125%MMT). Anterior deltoid intensity was significantly reduced in the posterior position during fast propulsion only (26 v. 31%MMT). For all muscles, EMG duration was similar between positions in all test conditions.

Conclusions: Reduction in the intensity of the primary push phase muscles (pectoralis major and anterior deltoid) during high demand activities of fast and graded propulsion may reduce the potential for shoulder muscle fatigue and injuries.

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