

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

ABSTRACTS FROM CONFERENCE PRESENTATIONS (2003 – 2005)

Effect of seat position on shoulder muscle activity during manual wheelchair propulsion: A preliminary report. Gutierrez DD, Newsam CJ, Gronley JK, Mulroy SJ, Perry J. *J Spinal Cord Med* 2003;26(1):S43.

Objective: To determine if moving the seat posteriorly in relation to the wheel axle alters shoulder muscle function during wheelchair propulsion.

Design: Repeated measures.

Participants: Eight men with complete spinal cord injury (SCI) participated. Subjects were >1 year post injury and asymptomatic for shoulder pain.

Methods: Fine-wire electromyographic (EMG) activity was recorded from 4 push phase muscles, anterior deltoid (AD), sternal pectoralis major (SPM), infraspinatus (INF) and lower serratus anterior (LSA). Subjects propelled a wheelchair placed on a stationary ergometer at a pre-determined, self-selected velocity in 2 seat positions: 1) wheel axle aligned with the shoulder joint center and 2) with the seat moved 8cm posterior to the initial position.

Results: Mean propulsion velocity for the 2 seat positions was similar (72.7 +/- 15.1 m/min; 71.8 +/- 15.0 m/min). In both positions, each muscle had similar onset in late recovery (82%-97% cycle) and similar cessation in late push (19%-24% cycle). Median intensity for AD was significantly reduced in the posterior seat position (24% vs. 18%MMT; $p<.05$). Median EMG intensity was reduced for all other muscles in the posterior seat position, although not statistically significant (SPM 29% vs. 22%MMT; INF 21% vs. 18%MMT; LSA 20% vs. 15%MMT).

Conclusions: Longevity of shoulder muscle function in persons with SCI is of crucial importance for mobility. Moving the seat posteriorly reduced muscle intensity for 3 of 4 push phase muscles by >25%, although only AD reached statistical significance in this pilot investigation. This finding offers a valuable intervention for wheelchair modification to preserve shoulder function.

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