

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

ABSTRACTS FROM PUBLISHED MANUSCRIPTS (2004 – 2005)

A comparison of shoulder joint forces during ambulation with crutches and a walker in persons with incomplete spinal cord injury. Lighthall Haubert L, Gutierrez DD, Newsam CJ, Gronley JK, Mulroy SJ, Perry J. *Arch Phys Med Rehabil* (In Press)

Objective: To compare three-dimensional (3D) shoulder joint reaction forces and stride characteristics during bilateral forearm crutches and front-wheeled walker ambulation in persons with incomplete spinal cord injury (SCI).

Design: Cross-sectional cohort study.

Setting: Biomechanics laboratory.

Participants: Fourteen adult volunteers with incomplete SCI recruited from outpatient rehabilitation hospital services.

Main Outcome Measure: Peak force, rate of loading and force-time integral (FTI) were compared for each component of the net 3D shoulder joint reaction force during ambulation with crutches and a walker. Stride characteristics were also compared between assistive device conditions.

Results: The largest weight bearing force was superiorly directed, followed by the posterior force. The superior joint force demonstrated a significantly higher peak and rate of loading during crutch walking (48.9 Newtons [N] and 311.6 Newtons/second [N/sec], respectively, vs. 45.3 N and 199.8 N/sec, respectively). The largest non-weight bearing force was inferiorly directed with a significantly greater peak occurring during crutch ambulation (43.2 N, vs. 23.6 N during walker gait). Walking velocity and cadence were similar, however, stride length was significantly greater during crutch walking (62% vs. 58% of normal).

Conclusions: Shoulder joint forces during assisted ambulation were large. Crutch use increased the superior force but did not increase walking velocity.

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