PATHOKINESIOLOGY LABORATORY
RANCHO LOS AMIGOS NATIONAL REHABILITATION CENTER

ABSTRACTS FROM PUBLISHED MANUSCRIPTS (2004 – 2005)

Upper extremity kinetics during lofstrand crutch-assisted gait. Requejo PS, Wahl DP, Bontrager EL, Newsam CJ, Gronley JK, Mulroy SJ, Perry J. *Med Eng Physics* 2005;27:19-29.

A three-dimensional (3D) biomechanical model was developed to determine upper extremity kinematics and kinetics of persons walking with forearm crutches. Six component load cells and strain gauges were installed in the crutches to determine crutch forces. A six-camera VICON motion system was used to acquire coordinate data from 24 reflective markers attached to the upper extremities and crutches. Joint axes for the wrist, elbow and glenohumeral joints were defined and joint forces and moments were determined using inverse dynamics. Accuracy of the crutch instrumentation was established by simultaneously collecting force data from a Kistler forceplate and each crutch during crutch-assisted gait with the respective crutch tip contacting the forceplate. In order to demonstrate the application of this biomechanical model, upper extremity weight bearing forces, joint motion and stride characteristics were recorded from a subject with T-12 incomplete spinal cord injury (SCI), using a crutch-assisted reciprocal four-point gait pattern. The peak net joint forces and moments were greater for the right arm opposite the weaker left lower extremity. The largest joint forces were directed superiorly (F_Z) and the asymmetrical pattern of crutch use was consistent with lower extremity strength differences. During left leg weight acceptance, increased right wrist extension motion and moment were recorded, which may contribute to wrist pathology.

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