Balance Maintenance in Seated Reaches for People with Thoracic Spinal Cord Injury

Matthew Parkinson, Matthew Reed, Don Chaffin

Balance maintenance is an important consideration for people with spinal cord injury. In previous work, the center of pressure (COP) excursion capability, a measure of balance maintenance ability, was established for a population of people with spinal cord injuries performing forward reaches in the sagittal plane. The motions and movement strategies associated with this change in capability were not previously investigated. Twelve participants with spinal cord injury moved weights from a position directly in front of them to a range of shelf locations. Control participants without spinal cord injury or low-back pain performed similar tasks. Optical and electromagnetic motion capture was used to record the movements of both groups. COP location throughout the motions was calculated using three-dimensional inverse dynamics. The motion strategies and resulting external joint torques of the two groups were compared from the point of view of balance maintenance. Design strategies for seated environments that incorporate this understanding of seated balance are discussed.