Lower Extremity Orthopaedic Injuries Exhibit Prolonged Time to Brake and Increased Dysfunction

Andrew Alejo, BA*; Alexander Rascoe, MD; Chang-Yeon Kim, MD; Bryan Oyong Ren, BS; Joanne Fraifogl, BS; Isabella Heimke, BA; Anna Vergon, BA; Heather A. Vallier, MD*
Case Western Reserve University, Cleveland, Ohio, UNITED STATES

Purpose: Being able to return to driving safely after a lower extremity trauma is a frequent question among recovering patients. Creating guidelines for this would have substantial merit. A computer simulator that measures TTB (Total Time to Brake) computes time required for a patient to react to a visual stimulus. The present study sought to compare recovery following various lower extremity injuries, as measured by TTB and patient-reported functional outcome scores. establish a relationship between TTB and Musculoskeletal Function Assessment (MFA) for lower extremity trauma patients at our urban Level I trauma center in comparison to normal controls.

Methods: Orthopaedic trauma patients (n = 232) with operatively managed injuries of the lower extremity at a Level I trauma center who presented for routine outpatient follow-up were prospectively enrolled. Demographic, injury, and treatment information was collected. The driving simulator consisted of a steering wheel mounted on a console with foot pedals for acceleration and braking. A computer screen simulated a driving environment, and patients were asked to brake when unexpected objects entered onto the road. Participants repeated the driving simulator trial 5 times and the mean TTB was calculated. A healthy control group consisting of uninjured adults was also enrolled (n = 25). The MFA questionnaire was administered. Patients were excluded from enrollment if they were unable to consent, non-weightbearing, or otherwise unable to follow the necessary directions.

Results: Trauma patients had mean age of 46 years, and 135 were male (58%). There were 109 (47%) right-sided injuries. 56 (24%) were treated for injuries to the pelvis or hip, 53 (23%) for knee injuries, 43 (18%) for tibia/fibula injuries, and 81 (35%) for ankle or foot injuries. After mean follow-up of 17 weeks following surgery, all patients had begun weightbearing as tolerated. Patients under age 65 years (n = 196) and patients or with hip injuries had better (closer to normal) TTB and MFA scores, both $P<0.05$. Those with ankle and foot injuries demonstrated more impairment compared to other injuries and to control patients. A multiple-variable linear regression analysis was undertaken to further evaluate TTB and MFA, considering age, sex, injury laterality, energy mechanism, and location.

Conclusion: An important aspect in the recovery from lower extremity trauma is a safe return to driving. Our preliminary results suggest that dysfunction measured by TTB and MFA exhibit trends for certain injury locations. These results urge caution when permitting patients to return to driving.

Δ OTA Grant