Long-Term Functional Outcomes Following Major Lower Limb Trauma Sustained in the Military

Jessica Rivera, MD, PhD*; METRC METALS Investigators Group; Elizabeth Wysocki; Anthony R. Carlini, MS; Katherine Frey, PhD; Mary Jo Pugh; Megan Amuan; Jared Hansen; Benjamin S. Brooke, MD, PhD; Anthony Johnson, MD; B. Kyle Potter, MD; Roman Hayda, MD; Ellen MacKenzie, PhD, ScM*

Purpose: Prior studies of service members sustaining severe lower extremity trauma between 2003 and 2007 found that approximately 3 years post-injury, individuals treated with early amputation had better functional outcomes than those treated with limb salvage. The present study follows this cohort nearly 10 years later to determine if outcomes improved and if there were differences over time and across treatment and age subgroups.

Methods: Study participants (n = 307) were contacted approximately 10 years after their first interview (T1) and completed an additional (T2) assessment, which included the Short Musculoskeletal Function Assessment (SMFA). Comparisons were made across treatment groups at T1 (unilateral or bilateral injury; salvage or amputation) and stratified by age at injury (<25 and ≥25). Linear and logistic mixed-effect models were used to measure the overall effects of time, age at injury, treatment at T1 and participant characteristics on the SMFA.

Results: Overall, few differences are observed in SMFA outcomes at T2 (average 13.0 years post-injury) compared to T1 for the 212/307 (69%) T2 respondents. Results indicate persistent moderate-to-high levels of disability. Stratifying by treatment group, differences in SMFA outcomes among salvages did not change, but worsened for amputees (SMFA mobility difference: 6.1 for amputees, –0.5 for salvages). Stratifying treatment groups by age, these differences were driven by age. After adjusting for covariates, participants <25 years undergoing amputation experienced significantly superior SMFA results (lower scores) to those whose limbs were salvaged (coefficients and P values: Dysfunction: –13.2, P<0.0001; Mobility: –17.5, P = 0.001; Daily Activities: –10.8, P = 0.0137; Emotional Support: –15.0, P = 0.0022). Among younger patients, a statistically significant interaction between time to interview and amputation status indicates that SMFA scores worsened over time for amputees, and early differences were not sustained. For participants ≥25 years at T1, there were no significant differences over time by amputation status.

Conclusion: 13 years post-injury, study participants reported moderate to high dysfunction following major lower limb trauma. Results differed by age and treatment. Younger participants undergoing amputation at T1 initially fared better than salvage patients, but had significantly worse SMFA outcomes at T2, while outcomes for salvage patients did not change. Our hypothesis that the initial treatment differential would persist long term was not supported at T2.