

**Quantitative Functional Recovery After Closed Tibia Fracture***Alexandra Goodwin, BA<sup>1</sup>; Brittany E. Haws; Ziyad O. Knio; Anna N. Miller, MD**<sup>1</sup>Wake Forest University School of Medicine, Winston Salem, North Carolina, USA*

**Purpose:** We sought to evaluate functional recovery after surgical repair of isolated, closed tibial shaft fractures using an objective measure over several visits. We also compared our results to functional deficits seen in a prior study that observed a similar cohort who had undergone fasciotomies. We hypothesize that the majority of recovery occurs soon after injury and that fasciotomy delays functional recovery.

**Methods:** Study participants had isolated, unilateral, closed tibial shaft fractures. Isokinetic assessment was performed at 3, 6, and 12-month follow-up visits. We calculated peak torque/body weight (T) as a percent and total work (W) in ft-lbs bilaterally for each patient, measuring ankle dorsiflexion (D) and plantar extension (P) at both 60° and 120° per second. We compared functional outcomes in the injured legs to the function of the healthy legs at each time point and longitudinally. We also compared functional recovery in our sample to a similar study with patients who had undergone fasciotomies.

**Results:** There was a significant difference between healthy and injured leg at 3 months for all metrics except D120W. At 6 months, all metrics were significant except D120T and P120W. At 12 months no metric showed a significant difference. Analysis of longitudinal recovery showed significance between follow-up time and functional recovery between 3 and 6 months for P60WD ( $P = 0.004$ ), P120TD ( $P < 0.001$ ), and P120WD ( $P < 0.001$ ), between 6 and 12 months for D120TD ( $P = 0.035$ ) and P60WD ( $P < 0.001$ ), and between 3 and 12 months for all variables except D60WD ( $P = 0.069$ ) and D120WD ( $P = 0.656$ ). A significant effect throughout the study period was found for all metrics except D60WD ( $P = 0.075$ ) and D120WD ( $P = 0.469$ ). Functional recovery at 12 months was greater for our cohort than for patients who underwent fasciotomies in addition to tibia fracture repair in a separate study. All metrics other than P60T ( $P = 0.175$ ), P120T ( $P = 0.054$ ), and P120W ( $P = 0.055$ ) were significantly different between groups.

**Conclusion:** The difference in function between healthy and injured legs decreased over time according to a paired t test, with equivalent function by 12 months. Longitudinal analysis came to a similar conclusion. Plantar flexion improved more rapidly than dorsal extension. At 12 months, our non-fasciotomy patients had significantly greater improvement in strength compared to a study with similar patients who underwent fasciotomies. This confirms that fasciotomy itself may independently delay functional recovery following tibial fracture.