Plate Fixation of Metatarsal Shaft and Neck fractures has high union rates and low rates of hardware removal: A retrospective cohort study

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Introduction/Purpose: Despite large numbers of traumatic 1st, 2nd, 3rd, and 4th (1-4 MT) metatarsal shaft and neck fractures, there have been very few outcome studies related to their treatment. K-wire fixation of metatarsal fractures has been shown to lead to poor outcomes when residual displacement and angulation occurs. In order to maintain anatomic alignment, some surgeons use plates for fixation of metatarsal fractures. To the best of our knowledge, this is the first study to report the healing rates, fracture angulation and need for hardware removal of operatively treated 1-4 MT shaft and neck fractures with plate fixation.

Methods: In this retrospective cohort study, we reviewed the medical records of all metatarsal fractures at our institution from October 1, 2006 – December 31, 2014 to identify all 1-4 MT shaft and neck fractures. All tarsometatarsal joint fractures, isolated 5th metatarsal fractures, fractures treated at outside facilities, skeletally immature patients and fractures treated non operatively were excluded. Final available x-rays with a minimum of one year follow-up from the date of surgery were reviewed. Medical records and x-rays were reviewed for evidence of union, sagittal and coronal fracture angulation (degrees), time to full weight bearing, plate size, fracture location (neck vs shaft) and number of screws on each side of the fracture. Patients were also called to see if the plates were bothersome, if the plates had been removed, or if they desired to have the plate removed. Multiple linear regression analysis was used to make calculations of statistical significance.

Results: 45 patients with 75 metatarsal fractures treated with plate fixation were included. All fractures went to union and full weight bearing. Average time to union and full weight bearing was 10.9 and 7.5 weeks respectively. The average coronal and sagittal plane angulation was 3.9 degrees and 2.2 degrees. No demographic variable showed statistical significance with regards to sagittal and coronal angulation. Fractures located in the neck were found to have higher coronal plane angulation malunion compared to fractures in the shaft (P=0.019). No variable was related to final sagittal plane angulation. 28/45 patients responded to our telephone interview with an average follow-up of 4.4 years. 10 stated the plate bothered them. No plates had been removed and 27/28 patients did not want the plate removed.

Conclusion: Metatarsal fractures fixed with plates show high rates of union and low final fracture angulation. Patients did not report symptomatic hardware and did not desire to have plates removed. No patient included in this study underwent hardware removal.

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