

Comparison of Post-operative Complications and Reoperations of Humeral Shaft Fractures treated with Intramedullary Nail Versus Plate Fixation

Bhargavi Maheshwer, Andrew Jacob Moyal, Jeremy Michael Adelstein, Robert John Burkhart, Alexander N Berk, Joshua Kyle Napora

INTRODUCTION: Surgical management of humeral shaft fracture is complex with growing use of intramedullary nail (IMN) fixation compared to the traditional plate fixation. The purpose of this study was to compare post-operative complications and reoperation rates between humeral shaft fractures treated with plate fixation vs IMN. We hypothesized that plate fixation would be associated with increased risk of re-operation and wound complications compared to IMN.

METHODS: Patients undergoing fixation of humeral shaft fractures were identified across 113 million patients within the United States, utilizing the TriNetX database using Current Procedural Terminology (CPT) and International Classification of Disease (ICD-10) codes. Two cohorts were created based on fixation via plate or IMN. Cohorts were matched to 10 demographic and comorbidity variables. Outcomes included emergency department (ED) utilization, intensive care unit (ICU) admissions, readmissions, transfusions, surgical site infections (SSI), reoperations, radial nerve palsy and venous thromboembolism (VTE) within 30-days, 90-days, 1-year, and 2-years postoperatively. Significance was set at $p < 0.05$.

RESULTS: Following propensity matching, 2,961 patients met criteria for IMN and ORIF cohorts. Acutely, ORIF had lower rates of ED visits ($p < .01$, within 90-days) and VTE ($p = .048$ within 30-days, and $p = .04$ within 90-days), but higher rates of radial nerve palsy ($p < .01$, day of surgery) and wound dehiscence ($p = .048$ within 30-days, $p = .04$ within 90-days). ORIF had lower rates of non-infectious hardware complications between 90-days and 1-year post-op ($p = .02$), but higher rates of radial-nerve palsy ($p < .01$ 90-days through 1-year, $p = .048$ 1-year through 2-years). The total number of reoperations did not differ at 2-year follow up.

DISCUSSION AND CONCLUSION: This large, matched cohort analysis demonstrates higher rates of radial nerve palsy and wound dehiscence, but lower rates of ED visits and VTE in the IMN cohort in the acute postoperative period. Total rates of reoperation did not differ long-term, although plate fixation continued to exhibit higher rates of RNP, likely due to future reoperations. Counseling patients and educating them of the risk of radial nerve deficits and future reoperation with plate fixation are imperative for the operative surgeon during the preoperative setting. Future studies with comparative clinical outcomes are needed to further compare both fixation techniques and to further assess rates and impact of re-operations within 2-years follow-up. In this specific patient population, risks for long-term complications need to be clearly conveyed to patients.

