## Delayed Operative Intervention Greater Than 14 Days is Not Associated With Increased Complications or Reoperation in Proximal Humerus Fractures

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INTRODUCTION: Delayed intervention for proximal humerus fractures beyond five days has previously been associated with inferior surgical outcomes. Safety net hospitals are a critical component of the United States healthcare system however, these institutions have been linked with inferior surgical outcomes and increased costs. Given inherent differences in both patient level and system-wide factors, delays in presentation and definitive treatment are common in these settings. This study aimed to assess the difference in outcomes of proximal humerus fractures undergoing open reduction and internal fixation before or after 2-weeks from injury. METHODS:

We retrospectively reviewed 95 patients with proximal humerus fractures who underwent open reduction and internal fixation from November 2011 to April 2023 from our urban, tertiary, academic safety net hospital. Patient age <18 years old, isolated greater tuberosity fractures, follow up less than 3 months, and incomplete records were excluded. Cohorts were generated based on timing to operative intervention, including those operated on prior to 14 days and those operated  $\geq$ 14 days from injury. Demographics, comorbidities, Neer classification, radiographic outcomes, and reoperations were compared between the two cohorts via two-sample t-test and chi-squared analysis with statistical significance defined as p<0.05.

## RESULTS:

Of the 95 patients included, 56 underwent operative intervention at  $\geq$ 14 days (mean 21.79 days ± 8.20 days). Patients were similar in age (52.28 ± 16.01 years vs. 50.76 ± 12.61 years, p=0.608), body mass index(28.90 ± 8.70 vs. 28.04 ± 6.36 kg/m2, p=0.584), percentage of female patients (57.89% vs. 55.36%, p=0.808), race (33.33% Hispanic/Latino vs. 57.14% Hispanic/Latino, p=0.057), rates of diabetes, (12.82% vs. 16.07%, p=0.660) and history of smoking (17.95% vs. 17.86%, p=0.991). Preoperative Neer classification was similarly distributed between the cohorts (p=0.793). No significant differences in postoperative reduction quality, neck-shaft angle, or calcar ratio were observed between groups (all p>0.05). No differences were noted in non-union (p=0.351), malunion (p=0.629), osteonecrosis (p=0.406), hardware failure (p=0.516), and screw cutout (p=0.237) rates.VAS pain score (p=0.474), forward flexion (p=0.432), abduction (0.481) and external rotation (0.234) were similar between the cohorts at 3- and 12-months postoperatively; VAS pain score was significantly higher in the ≥14 day delay group at 6 months (3.61 vs. 1.43, p=0.032). There was no significant difference in aggregate reoperation rates between the two cohorts (p=0.198), however a significantly higher rate of surgical site infection requiring debridement was observed in the <14 day cohort (10.26% vs. 0.00%, p=0.014).

DISCUSSION AND CONCLUSION: A two week delay in operative fixation of displaced proximal humerus fractures does not result in an increased risk of short term complications following open reduction and internal fixation. Furthermore, no significant differences were seen in reduction quality, restoration of neck-shaft angle, implant positioning and radiographic complications. Lastly, despite higher 6-month VAS pain scores in the ≥14 day delay group, there were no differences in pain scores, functional outcomes, nor reoperation rates between cohorts at final follow up.