

Delayed Fixation of Geriatric Distal Femur Fractures is Associated with Increased Complications and Mortality

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INTRODUCTION: Prolonged time from inpatient admission to fixation (>48 hours) in geriatric hip fractures is associated with increased complications, including mortality. Distal femur fractures (DFFs) are another common geriatric, low-energy fracture but have scant data on the impact of the timing of operative intervention on postoperative complications. We hypothesized that delayed (>2 days from admission) fixation of geriatric DFFs may also be associated with increased rates of postoperative complications and mortality compared to fixation within two days of admission.

METHODS: The Center for Medicare & Medicaid Services (CMS) database was queried for patients 65 years old and older who were admitted non-electively between 2016 and 2019 and underwent operative intervention for an isolated DFF. Subjects were identified with both an ICD-10 diagnosis code for DFF, including periprosthetic DFF, and a corresponding current procedural terminology (CPT) code for operative intervention (intramedullary nail, open reduction and internal fixation, or distal femoral replacement). Patients with concurrent proximal femur CPT codes were excluded. Demographic data and rates of complications were compared between patients who had surgery within two days of admission and more than two days from admission using Chi-square and t-tests as appropriate. Multivariate analysis and a Mahalanobis propensity match were performed (matching on age, sex, race, Charlson Comorbidity Index [CCI], fracture location, open fracture, and displaced fracture) to minimize indication bias and remove outliers.

RESULTS:

A total of 17,694 patients age 65 or greater were identified as undergoing operative intervention for DFFs with 2,763 (15.6%) in the delayed surgery category (>2 days from admission). There was no significant difference in age (mean 80 years old, [SD, 9]) or sex (85% women in both groups). The two groups had significant differences in grouped CCI (60% of delayed cohort level 2 versus 48% in early cohort, $p<0.001$), race (delayed cohort 7.4% black versus 5.0% early, $p<0.001$), fracture location (28% rate of periprosthetic DFF in delayed cohort versus 23% early, $p<0.001$), displacement (48% DFF displaced in delayed cohort versus 52% early, $p<0.001$), and open fracture rates (1.4% in delayed cohort versus 2.3% early, $p<0.001$). In unadjusted analysis, delayed surgery group had a significantly higher rate of 1-year death (27% versus 20%, $p<0.001$), readmission (54% versus 46%, $p<0.001$), and surgical complications (74% versus 64%, $p<0.001$). In a logistic regression, delayed surgery had odds ratio (OR) >1 for mortality at 1 year, along with increasing age and CCI complexity (Figure 1). Even in the propensity matched cohort, the delayed fixation group had a 9.6% higher rate of overall complications, a 7.8% higher rate of readmission, and a 5.7% higher rate of mortality at one year postoperatively ($p<0.001$).

DISCUSSION AND CONCLUSION: Delayed time to fixation (>2 days from admission) of geriatric DFFs was found to be independently associated with an increased rate of complications within one year postoperatively. This includes significantly higher rates of overall complications (10% increase), readmission (8% increase), and mortality (6% increase) in the delayed fixation group that persisted despite propensity matched analysis. This indicates that there may be a physiologic benefit to prioritizing early (within 2 days of admission) surgical intervention on geriatric distal femur fractures, similarly to geriatric hip fractures. Additional research is needed to better understand the optimal treatment pathway for this relatively common fragility fracture.

Coefficient plot from logistic regression showing odds ratios for mortality within 1 year following admission for distal femur fracture among Medicare beneficiaries

