

The Presence of Additional Fracture on Complications in Patients Undergoing Femoral Neck Fracture Fixation

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INTRODUCTION: Femoral neck fractures occur at the junction between the femoral head and shaft and are associated with significant morbidity, mortality, and functional impairment in those affected. It is a challenging injury, most commonly affecting older adults. These injuries are much less common in younger adults and children but place a significant burden on these patients when they do occur. Typically, femoral neck fractures are repaired via screw fixation, nail fixation, or arthroplasty. Specifically, cancellous screw (CS) fixation is a surgical technique where multiple screws are inserted across the femoral neck and into the head. This provides stability by engaging the trabecular bone of the femoral head and neck, promoting healing and fracture alignment. The screws are typically placed in a parallel orientation forming an inverted triangle, crossing the fracture line to increase stability. Additionally, sliding hip screw (SHS) fixation is another commonly used technique for femoral neck fractures. The hip screw assembly consists of a large lag screw and a side plate with a sliding mechanism. The screw is inserted into the femoral head, while the side plate is attached to the lateral aspect of the femoral shaft. The sliding mechanism allows controlled dynamic compression across the fracture site. Despite many advancements, complications following femoral neck fracture surgery remain a significant concern. Complications such as non-union, osteonecrosis, implant failure, and infection can lead to poor surgical outcomes, increased costs, and decreased quality of life. Many factors can influence the risk of complications in femoral neck fracture surgery, including patient demographics, comorbidities, fracture characteristics, and fixation method. There are few comparative studies that explore complication rates between fixation methods in patients under 60 years of age. This study aimed to analyze the characteristics and complication rates among patients under 60 years of age who underwent femoral neck fracture surgery.

METHODS: This retrospective cohort study reviewed data from medical records and radiographs of patients who underwent surgical treatment for femoral neck fractures at a tertiary care center between 2007 and 2020 with a target of following these patients for a minimum duration of 3 years. 58 patients met criteria and were evaluated based on medical history, comorbidities, fracture classification, and fixation method. Post-surgical complications were recorded including osteonecrosis, non-union, limb length discrepancy and conversion to total hip arthroplasty (THA). Complication rates and a Cox-proportional-regression-generated hazard rates for comparison between groups were calculated.

RESULTS SECTION: In total, 36 patients (avg. age 42.4 ± 17.2) had CS fixation, 12 (40.4 ± 12.7) SHS fixation, and 10 underwent a different type of fixation. Demographics and clinically relevant comorbidities were similar between groups. The complication rate for CS fixation was 16.7% (6/36) and 33.3% for SHS (4/12) with non-significant p-values for all complication subtypes. Cox proportional regression showed hypertension ($p=0.03$) and additional fracture/polytrauma at surgery ($p=0.01$) being the most significant predictors of complications with β coefficients of -3.39 and -3.25 respectively. The presence of additional fracture or polytrauma are also significant negative predictors of survival at 12 months and beyond (Figure 1).

DISCUSSION: Pre-existing hypertension and the presence of additional fracture/polytrauma at the time of surgery were predictive of post-operative complications following CS and SHS fixation in this retrospective study. No significant differences between CS and SHS fixation were seen. These findings reiterate the importance of considering individualized patient factors when assessing potential complication risk in hip fracture patients to minimize complications in femoral neck fracture surgery. Potential pre- and post-surgical interventions should be explored by care teams to best follow these at-risk patient groups with the end goal of optimize functional outcomes, vitality and longevity following fixation. Further investigation with additional patients is warranted to develop a more complete view of how various comorbidities and other patient factors impact surgical outcomes in this fracture population.

SIGNIFICANCE/CLINICAL RELEVANCE: The presence of additional fractures in patients undergoing femoral neck fracture fixation have a higher likelihood of poor survivability.

IMAGES AND TABLES:

Variable	β coefficient	Hazard Ratio	Confidence Interval	P-value
Age	-0.06	0.95	0.880 – 1.015	0.12
Additional Fractures Yes No	-3.25	Ref 0.01	0.003 – 0.467	0.01
Hypertension Yes No	-3.39	Ref 0.02	0.002 – 0.562	0.03
Fixation Method SHS CS	-0.22	Ref 0.76	0.191 – 3.387	0.77

Table 1: Cox proportional regression showing hazard rate of failure (any complication) among patients.

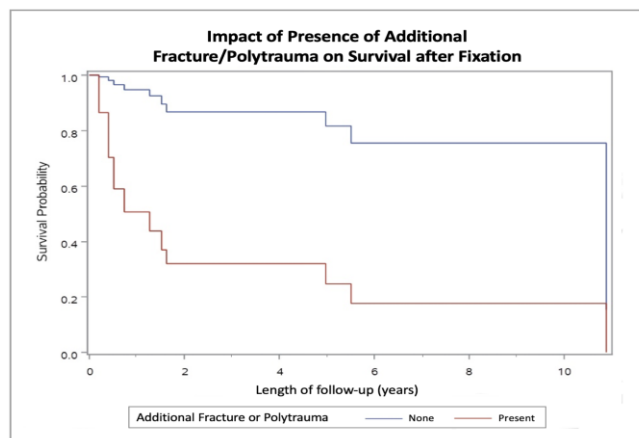


Figure 1: Survival probability comparison in patients undergoing femoral neck fracture fixation with and without polytrauma/additional fractures at time of surgery.