The Risk of Subsequent Hip Fractures after Intramedullary Femur Nailing: Which Patients Should Have Femoral Neck Fixation?

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INTRODUCTION: Diaphyseal femur fractures are commonly treated with either retrograde or antegrade intramedullary nailing. While there are advantages to retrograde nailing for certain fracture patterns, for patients with larger body habitus, and in polytrauma settings, antegrade femoral nails offer the option to place reconstruction style screws across the femoral neck for prophylactic fixation. The risk of subsequent peri-implant hip fractures after femoral nailing may influence the use of antegrade versus retrograde nailing, especially in geriatric or osteoporotic patients. However, this risk is not well defined. This study investigates the incidence and risk factors for hip fractures following femoral intramedullary nailing for diaphyseal femur fractures.

METHODS: Patients with diaphyseal femur fractures presenting to a Level 1 trauma center from January 2016 to December 2021 were retrospectively identified using CPT and ICD-10 codes. Patients who underwent operative fixation for a diaphyseal femur fracture (OTA/AO 32) with intramedullary nailing and had at least 90 days of follow-up were included in the study. Patients were excluded if they had an ipsilateral hip fracture at the time of injury, a prior history of ipsilateral hip fracture, or incomplete follow-up. Demographic information, injury characteristics, and surgical details were collected. The primary outcome was secondary hip fracture defined as a postoperative peri-implant proximal femur fracture.

RESULTS:

Two hundred thirty-nine patients met inclusion criteria. The average age of the cohort was 71.9 years (SD 12.5), and it consisted of 59% females. The average length of follow up was 766.6 days (SD 706.7). There were 123 antegrade nails with neck fixation, 13 antegrade nails without neck fixation, and 103 retrograde nails without neck fixation. This resulted in were 123 patients with neck fixation (51.5%) and 116 patients without neck fixation (48.5%).

Five patients sustained an ipsilateral secondary hip fracture (2.1%). Among patients without femoral neck fixation, 4.3% sustained a secondary hip fracture, whereas no secondary fractures were observed in patients who received neck fixation ($p = 0.029$). In patients with secondary hip fracture, the average time to subsequent injury was 3.8 years after the initial femoral nailing. Secondary analysis revealed among patients without neck fixation, female gender was significantly associated with secondary hip fracture ($p=0.026$). There was no association with age ($p=0.877$). The use of an antegrade ($n = 2$) versus retrograde ($n = 3$) construct was not significantly associated with a subsequent ipsilateral hip fracture ($p = .075$). Secondary injuries were exclusively the result of a ground level fall, and all five patients required a surgical intervention for this fracture.

DISCUSSION AND CONCLUSION: Secondary hip fracture following femoral nailing is uncommon, with a 2% incidence in our cohort of diaphyseal femur fractures. All secondary fractures occurred in patients without prophylactic fixation of the femoral neck, and this should be considered in female patients at higher risk of proximal femur fracture.

Figure 1: Panels 1 and 2 demonstrate the initial femur fracture in the distal diaphysis. This was fixed with a retrograde femoral nail in 2018. The patient subsequently suffered an ipsilateral intertrochanteric fracture in 2020 (Panel 3). This was fixed with a Dynamic Hip Screw with a 2-hole Side Plate (Panel 4).