

**Demographic and Clinical Profile of Patients Treated with Proximal Femoral Nails:
A 10-Year Analysis of More Than 40,000 Cases**

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Purpose: Hip fractures can lead to loss of function and are potentially life-threatening. These fractures are commonly treated with cephalomedullary nails. Changes from 2010 to 2019 in patient presentation, comorbidities, implant choice, as well as length of stay and discharge status, are analyzed herein for patients treated with one of the following devices: the Natural Nail System, the Gamma3 System, the TFNAdvanced proximal femoral nailing system (TFNA), or the Titanium Trochanteric Fixation Nail System (TFN). This analysis uses patient cohorts identified previously in a published safety study that demonstrated similar nail breakage rates across all devices.

Methods: The Premier hospital billing database was queried for this analysis. Cohorts included all patients >21 years treated with a Gamma3, TFNA, TFN, or Natural Nail System (NNS) from 2010 to quarter 4 2019 (to avoid the acute pandemic COVID-19 era), with diagnoses for proximal femoral fractures. The date of surgical fixation was the index date. Bilateral cases and patients deceased during index were excluded. Patients were categorized by fracture type (subtrochanteric vs pertrochanteric [including intertrochanteric] vs intracapsular vs shaft), comorbidities at time of index (31 disease states of Elixhauser index [EI]). Patient demographics and provider characteristics were also queried. Descriptive analytics were performed on all outcomes. Planned analyses include generalized linear model and logistic regression analyses to understand the impact of surgical choices on length of hospital stay and discharge status.

Results: The cohort included 14,319 TFNA, 17,262 TFN, 10,495 Gamma3, and 1867 NNS-implanted patients. From 2010 to 2019, patient comorbidities increased significantly (average 2010 EI: 4.62 [standard deviation (SD): 3.02]; average 2019 EI: 5.12 [SD: 3.22], $P < 0.0001$). Despite increasing comorbidities, the average length of stay declined significantly from 6.1 (SD: 4.2) days to 5.68 (SD: 4.28) days ($P = 0.0008$). Pertrochanteric, subtrochanteric, intracapsular, and femoral shaft fractures remained fairly constant, affecting 79.9%, 10.5%, 3.8%, and 2.4% patients, respectively; 5.3% of patients presented with multiple fracture types. Pathological fractures, however, increased significantly, from 2.6% of all patients in 2010 to 6.9% in 2019. Long nails were increasingly used, from 39.0% in 2010 to 44.5% in 2019; the increase was particularly noticeable for treatment of pathological fractures (representing 4% of total cohort in 2010 and 10.2% in 2019).

Conclusion: Increasing comorbidities in patients with hip fractures present significant challenges and are met with changes in surgical practice. Ongoing statistical analyses are evaluating the impact of surgical choices on patient outcomes.