Ipsilateral Femoral Shaft and Neck Fractures: Unraveling the Risk Factors for Nonunion

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Purpose: Ipsilateral femoral shaft and neck fractures are common in patients who sustain high-energy trauma; a recent study indicated a 22% femoral shaft nonunion rate. However, the specific risk factors for nonunion remain unclear. This study aims to evaluate the nonunion rate and associated risk factors in patients with these injuries at a single Level I trauma center.

Methods: A retrospective review was conducted on adult patients with ipsilateral femoral shaft and neck fractures treated between 2005 and 2024. The primary outcome was femoral shaft fracture union. Patient demographics, injury characteristics, surgical details, and radiographs were analyzed. Patients with less than 6 months of follow up or without both fractures were excluded.

Results: In total, 118 patients were included (male: 72.9%; mean age: 39.0 ± 14.7 years; body mass index [BMI]: 29.8 ± 6.8; ASA score: 2.5 ± 1.0; active nicotine use: 27.8%). Among them, 22.5% had open femoral shaft fractures, 19.7% had AO/OTA 32C fractures, and 60.7% had displaced femoral neck fractures (mean Pauwels angle: 63.1 ± 12.2). Open reduction was performed in 55.1% of femoral neck fractures and 33.6% of femoral shaft fractures. Femoral shaft nonunion occurred in 9.3% (11 patients), whereas femoral neck fractures healed in 99.2%. Nonunion was associated with AO/OTA Type C fractures, higher Garden classification, and open reduction of both femoral neck and shaft fractures. Multivariable regression identified open reduction of femoral neck fractures (relative risk [RR]: 1.94; p = 0.009) and higher Garden classification (RR: 3.72; p = 0.003) as independent risk factors for nonunion.

Conclusion: Despite the high union rate of femoral neck fractures, ipsilateral femoral shaft fractures have a 9.3% nonunion rate. Nonunion is associated with displaced femoral neck fractures requiring open reduction, likely serving as a surrogate for high-energy trauma, increased blood loss, and prolonged surgical time.

However, the precise mechanisms underlying this relationship remain unclear.