Civilian Ballistic Proximal Femoral Shaft Fractures and Blunt Proximal Shaft Fractures: Should They Be Treated Equally?

***Rodney Y. Arthur, MD**; Clayton Farris, BA; Cole Garrison, BS; Samuel Schick, MD; David A. Patch, MD; Joseph Johnson; Clay A. Spitler, MD*

Purpose: Ballistic proximal femur fractures are an increasingly common clinical entity that can represent a challenging clinical scenario. We aim to identify a group of ballistic proximal femur fractures and compare the demographics, injury characteristics, and outcomes with proximal femur fractures sustained by blunt mechanisms. We hypothesized that ballistic proximal femur fractures and blunt fractures would have similar outcomes.

Methods: This retrospective cohort study was conducted over a 9-year period (2013-2022) at a single academic Level I trauma center. All adult patients presenting with ballistic proximal femur fractures (femoral neck, intertrochanteric, and subtrochanteric) managed with fixation (open reduction and internal fixation or intramedullary nailing) were identified. A control group was then created via best-fit matching from all patients who sustained similar fractures but via blunt mechanisms over the same period. Matching characteristics included age, sex, and body mass index. Outcomes measured include unplanned reoperation, soft-tissue reconstruction, nonunion, compartment syndrome, and fracture-related infection.

Results: A total of 248 patients were included with 124 (50%) suffering ballistic proximal femur fractures. Most blunt fractures were closed (97.6%) while most ballistic fractures were Gustilo Anderson type 1 open fractures (86.3%). Demographically, patients in the ballistic fracture cohort were more likely to be younger (30.2 vs 38.4, $P<0.001$), male (94.4% vs 83.9%, $P = 0.0144$), and Black (90.3% vs 29.8%, $P<0.001$). Patients with ballistic fractures were more likely to develop thigh compartment syndrome (7.26% vs 0.81%, $P = 0.0238$), have associated genitourinary injury (12.1% vs 3.23%, $P = 0.017$), and have vascular injury requiring surgical intervention (8.87% vs 1.61%, $P = 0.0226$). There were no statistically significant differences in rates of unplanned reoperation, soft-tissue reconstruction, nonunion, and fracture-related infection.

Conclusion: Ballistic proximal femur fractures lead to higher rates of compartment syndrome and significant vascular injury compared to blunt proximal femur fractures but do not significantly increase the risk of unplanned reoperation, soft-tissue reconstruction, nonunion, or fracture-related infection. Diligence regarding the presence of compartment syndrome and assessment of neurovascular status is critical during the care of these patients.