

Complications Are Infrequent After Humeral Shaft Fractures Due to Low-Velocity Gunshot Injuries

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Purpose: Urban trauma centers manage patients with gunshot wounds (GSWs) frequently, and most are low energy. Recently associated fractures have been managed much like closed fractures. However, little literature exists depicting complications that are associated with ballistic humerus shaft fractures. We hypothesized that rates of infection and nerve injury will be similar to fractures due to blunt trauma.

Methods: Between 2004 and 2018, 66 skeletally-mature patients with 67 humerus shaft fractures after GSW were identified. Two were deceased due to lethal injuries to other systems, and 3 were excluded secondary to high-energy wounds (shotgun [n = 2] and rifle [n = 1]), leaving 61 patients with 62 fractures for review. Demographic, injury, and treatment data were collected. Complications and outcomes were noted. During the same time period a group of 342 patients with humerus shaft fractures after blunt trauma were reviewed for comparison.

Results: Mean patient age for GSW fractures was 30 years, and 6 (11%) were female, different than blunt injuries (mean 46 years and 43% female, both $P < 0.0001$). Isolated injuries occurred in 58% after GSW (vs 47% with blunt trauma). Nerve injury occurred in 29 patients (47%) after GSW (vs 25% after blunt trauma, $P = 0.001$), with 20/29 (69%) having radial nerve injury. Two GSW patients had arterial injury requiring revascularization. Overall 21 patients with 22 fractures (35%) were treated surgically after GSW; 2 of these were on a delayed basis several weeks after injury for delayed union. Other indications for fixation after GSW included lower extremity fractures (n = 3), bilateral humerus fracture (n = 1), and other system trauma (n = 7). Five GSW patients had insufficient follow-up to determine healing of their fracture. 55 of the other 57 fractures healed primarily (96%), including 95% of those managed nonoperatively, compared with primary union rates following operative and nonoperative blunt injury of 95% and 84% ($P = 0.08$), respectively. Of the 18n patients with radial nerve injury and sufficient follow-up, 17 had recovery (94%), similar to recovery after blunt injury (90%, not significant). One fracture developed deep infection after GSW (1.6%).

Conclusion: Low-energy ballistic humerus shaft fractures are more likely to have associated nerve injury than fractures from blunt trauma; however, most ballistic humerus fractures achieve primary union, and most nerve injuries recover spontaneously. Additionally, infection of ballistic humerus fractures is very uncommon. Initial nonoperative management of isolated low-energy ballistic humerus shaft fractures, even in the presence of radial nerve injury, appears appropriate.