Mechanism of Injury Impacts the Incidence and Time to Recovery of Nerve Injuries Associated with Humeral Shaft Fractures

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Purpose: Humeral shaft fractures have a risk of causing associated nerve injuries. The aim of this study was to (1) determine the incidence of pre- and postoperative nerve injuries associated with humeral shaft fractures, (2) evaluate the effect of injury mechanism on nerve injury, and (3) identify other risk factors of preoperative nerve injury.

Methods: The study retrospectively reviewed 308 humeral shaft fractures (OTA/AO 12) that underwent operative treatment at a single, urban Level I trauma center from 2009 to 2020. Information regarding demographics, injury, treatment, and medical history were collected. The presence of nerve injury was identified by motor or sensory deficits documented within the physical examination. The patients were grouped based on mechanism of injury including gunshot wound (GSW), high-energy mechanism, and low-energy mechanism.

Results: Within the 308 patients, 24 suffered from GSWs, 73 high-energy mechanisms, and 211 low-energy mechanism. 50 preoperative and 20 postoperative nerve injuries were identified. Of the 24 GSWs, there were 8 (33%) preoperative and 2 (8%) postoperative nerve injuries. Of the 73 high-energy injuries, there were 15 (21%) preoperative and 5 (7%) postoperative nerve injuries. Of the low-energy injuries, there were 29 (14%) preoperative and 13 (6%) postoperative nerve injuries. Preoperative nerve injuries from GSWs and high-energy mechanisms required more time for nerve recovery compared to low-energy mechanisms (9.3 vs 9.3 vs 4.6 months) where postoperative nerve injuries did not require more time for nerve recovery based on injury mechanism (5 vs 6.2 vs 5.8 months). Logistic regression analysis for risk factors showed that GSW mechanism (odds ratio [OR] = 5.24, P = 0.002, confidence interval CI = 1.806-15.221), high-energy mechanism (OR = 2.33, P = 0.029, CI = 1.088-4.986), body mass index (OR = 1.04, P = 0.076, CI = 0.996-1.080), and alcohol abuse (OR = 2.401, P = 0.084, CI = 0.889-6.487) were all associated with preoperative nerve injury. There was no difference in nerve recovery (P = 0.252) or time to nerve recovery (P = 0.325) with intraoperative nerve exploration following preoperative injury.

Conclusion: GSWs and high-energy injury mechanisms have a higher incidence of nerve injury associated with humeral shaft fractures. Additionally, patients can be advised that nerve injuries from these mechanisms require more time to recover. Aside from injury mechanism, alcohol use and body mass index were found to be risk factors for preoperative nerve injury.