

Gunshot Wounds to the Foot and Ankle: A Multicenter Study with 264 Patients

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Purpose: There is a paucity of research evaluating outcomes of ballistic injuries in the foot and ankle. We aim to report the characteristics, demographics, treatments, outcomes, and complications of fractures of the foot and ankle due to firearms in a multicenter retrospective study.

Methods: Patients who sustained gunshot wounds (GSWs) resulting in ankle or foot fracture (OTA 8, 43, 44), over a 10-year period, were identified at 5 trauma centers. Patient charts and radiographs were reviewed and demographics, fracture characteristics, initial management, additional procedures, and subsequent infection, malunion, or nonunion were collected. Data were analyzed using SAS/STAT software. Univariate and multivariate analyses were performed. Multivariate logistic regression included risk factors that were associated with infection in univariate analysis.

Results: 264 patients met inclusion criteria. 95.5% were males, averaging 30 years old (range, 12-73 years). 15.3% of the GSWs were high velocity, and 84.7% were low velocity (n = 216). Bullet fragments were retained in 58.7% of patients. Antibiotics were given to most patients (79.5%), and 41.8% of patients were managed surgically at time of injury (n = 263). Nerve injury was found in 8.8% of cases (n = 263), and vascular injury was found in 7.3% of cases (n = 262). Malunion and nonunion were observed in 8.3% and 1.9% of the patients, respectively. Infection was observed in 17.4% of patients, and was associated with GSW velocity (P = 0.002) as well as retained bullet fragments (P = 0.009). Infection was not associated with antibiotics on arrival (P = 0.227), initial surgical management (P = 0.070), nerve injury (P = 0.145), or vascular injury (P = 0.053), in unadjusted analysis. In our multivariable model, which included ballistic velocity, retained bullet fragments, vascular injury, and surgical management, the odds of infection were 3.47 times higher for high-velocity GSWs compared to low-velocity GSWs (95% confidence interval [CI]: 1.38, 8.75) and 3.33 times higher when the ballistic was retained versus not retained (95% CI: 1.42, 7.84).

Conclusion: In this multicenter, retrospective study evaluating fractures secondary to gunshot to the foot and ankle, we found subsequent infection associated with high-velocity GSWs and retained bullet fragments. In fractures due to high-velocity GSWs, managed operatively, we recommend caution regarding the increased chance of infection. In all GSW fractures of the foot and ankle, we recommend consideration for removing retained bullet fragments when feasible. Further prospective studies will be needed to validate this finding.