

Management of Forearm Arterial Injuries and Predictors of Amputation

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Introduction: Traumatic injuries to the radial and/or ulnar arteries represent a small subset of traumatic arterial injuries. In the absence of injury to both the radial and ulnar arteries, treatment was historically ligation if the uninjured artery had adequate flow. Rates of upper extremity amputation have been reported lower than rates of lower extremity amputation following arterial trauma. However, upper extremity amputation has significant effects on quality of life.

Methods: The American College of Surgeons Trauma Quality Improvement Program (TQIP) database was queried by ICD-10 code for traumatic radial and/or ulnar arterial injuries occurring within the year 2019 that survived greater than 24 hours. Patient demographics, Injury Severity Score (ISS), compartment syndrome, need for fasciotomy, rate of amputation, time to operating room, return to operating room, type of repair, outcomes and mortality were collected. Univariable analysis was performed. Multivariable logistic regression was used to identify predictors of amputation.

Results: A total of 4048 patients with traumatic radial and/or ulnar arterial injuries were identified with 80% male, mean age 38(SD: 17), and median ISS 8(IQR: 4,10). A penetrating mechanism of injury was present in 77%. Surgical intervention was performed in 2758 patients, 65%. A total of 1907 radial artery operations were performed with repair (59%) most common, followed by ligation (29%), and bypass or interposition (12%) with median time to OR 2.3 hours (IQR 1.1-5.5). A total of 1637 ulnar artery operations were completed with repair most common (67%), followed by ligation (21%) and bypass or interposition (12%) with median time to OR 2.8 hours (IQR: 1.4-9). Median length of stay was 3 days (IQR: 2,5). Overall, complications were rare with upper extremity compartment syndrome occurring in 1%, upper extremity fasciotomy rate of 3%, and proximal amputation rate (hand or more proximal) of 0.6%. Overall mortality was 0.44%. When multivariable logistic regression was performed, only age (AOR:1.014, 95%CI: 1.004-1.024, p=0.0048), blunt mechanism (AOR: 2.457, 95%CI: 1.730-3.497, p<0.0001), and ipsilateral radial and ulnar artery injury (AOR:2.148, 95%CI: 1.298-3.553, p=0.0029) predicted major amputation. Injury severity score, fasciotomy, presence of compartment syndrome, time to OR, and type of repair were not predictors of amputation.

Conclusion: Recently, ulnar and radial arterial injuries are increasingly managed with restoration of flow compared to ligation. However type of repair, time to OR, fasciotomy, and presence of compartment syndrome did not correlate with risk of amputation. Only combined ipsilateral radial and ulnar artery injury, age, and blunt mechanism predicted amputation after traumatic radial or ulnar artery injury in this cohort of TQIP patients.