Abstract

Objective(s): Objectives: Vascular injury is a leading cause of death and disability in military and civilian settings. Most wartime and an increasing amount of civilian vascular trauma arises from penetrating mechanisms due to gunshot or explosion. The objective of this study was to provide a comprehensive examination of penetrating, lower extremity arterial injury and to characterize long-term limb salvage and differences related to mechanism of injury (MOI). 

Methods: The military trauma registries of the United States and the United Kingdom were analysed to identify service members who sustained penetrating lower limb arterial injury (2001-2014). Treatment and limb salvage data were studied and comparisons made between those patients whose penetrating vascular trauma arose from explosion (Group 1) versus gunshot
(Group 2) MOI. Standardized statistical testing was used, with Bonferroni corrections for multiple comparisons.

**Results:** The cohort consisted of 574 combat casualties (mean age: 25.2 years) with 597 injuries (explosion n=416; gunshot n=181). Group 1 had higher injury severity score (p<0.05), mangled extremity severity (p<0.001), required more blood transfusion (p<0.05) and had more tibial (p<0.01) and popliteal (p<0.05) arterial injuries; group 2 had more profunda femoris injuries (p<0.05). Initial surgical management for the whole cohort included vein interposition graft (33%); ligation (31%); primary repair with or without patch angioplasty (16%); temporary vascular shunting (15%); and primary amputation (6%). No difference in patency of arterial reconstruction was found between Groups 1 and 2, although Group 1 exhibited a higher incidence of primary (13% vs. 2%; p<0.05) and secondary (19% vs. 9%; p<0.05) amputation. Similarly, longer-term freedom from amputation was lower for Group 1 than Group 2 (68% vs. 89% at 5.5 yrs; Cox Hazard ratio 0.30, p<0.0001), as was physical functioning (SF-36 data) (mean 39.80 vs. 43.20; p<0.05).

**Conclusions:** Explosive mechanism of injury makes salvage of a functional limb less likely in the long term, but this is not attributable to failed vascular repair. Instead, the association of explosive mechanism with higher rates of secondary amputation is likely due to the greater burden of soft tissue and skeletal injury. This study provides an important benchmark for future military and civilian practice from the most comprehensive data available.

**Author Disclosure Block:**