Risk Factors for Major Thromboembolism in Orthopaedic Combat Casualties

*Benjamin W. Hoyt, MD; **Michael Baird, MD**; Seth A. Schobel, PhD; Henry Thomas Robertson, PhD; Ravi Sanka, PhD; Benjamin Kyle Potter, MD; Matthew Bradley, MD; John Oh, MD; Eric Elster, MD*
Walter Reed National Military Medical Center, Bethesda, MD, United States

Purpose: In combat casualty care, tranexamic acid (TXA) is administered as part of the initial resuscitation effort; however, conflicting data exist as to whether TXA contributes to increased risk of venous thromboembolism (VTE). The purpose of this study is to determine (1) What factors increase risk of pulmonary embolism (PE) after combat-related orthopaedic trauma? and (2) Is administration of TXA an independent risk factor for major thromboembolic events?

Methods: We performed a query of the Department of Defense Trauma Registry (DoDTR) for all combat-injured patients who sustained injuries from January 2011 through December 2015 necessitating medical evacuation from forward surgical care in Iraq or Afghanistan to a military trauma center within the United States. We included combat casualties with orthopaedic injuries. In total, 493 patients were identified. We evaluated patient characteristics, injury factors, treatment, and occurrence of major thromboembolic events, which we defined as segmental or greater PE or thromboembolism-associated pulseless electrical activity (PEA).

Results: Regression analysis revealed TXA administration, traumatic amputation, acute kidney failure, and hypertension to be associated with the development of a major thromboembolic event for all models. Injury characteristics independently associated with risk of major VTE were ISS ≥23, traumatic amputation, and vertebral fracture. The best performing model utilized had an area under the receiver operating characteristic curve of 0.84, a sensitivity of 0.72, and a specificity of 0.84.

Conclusion: TXA is an independent risk factor for major VTE after combat-related orthopaedic injury. Injury factors including severe trauma, major extremity amputation, and vertebral fracture should prompt suspicion for increased risk of major thromboembolic events and increased threshold for TXA use if no major hemorrhage is present.