

Ankle Brachial Index is a Safe and Effective Screening Tool for Vascular Injury in Schatzker IV-VI Tibial Plateau Fractures

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INTRODUCTION:

Tibial plateau fractures are common peri-articular injuries with a well-documented association with neurovascular injury. Certain high energy fracture patterns are akin to knee fracture dislocations and accordingly, there is an increased risk of popliteal artery injury. At our institution, we screen all Schatzker IV-VI tibial plateau fractures for a vascular injury by measuring the ankle brachial index (ABI). The purpose of this study is to describe our screening protocol and evaluate its effectiveness in identifying vascular injuries.

METHODS:

Retrospective review of all Schatzker IV-VI tibial plateau fractures from April 2006 – February 2023 that presented to a single, Level 1 academic trauma center was performed. Demographic, fracture characteristics, ABIs, and vascular injury data was collected from the electronic medical record. Our screening protocol consists of measuring the ABI of the injured extremity for all bicondylar tibial plateau fractures. For extremities with symmetric pulses and ABI > 0.9, no further vascular workup was pursued. For extremities with asymmetric pulses, a vascular surgery consult, and advanced imaging ensue without ABIs. If the ABI was \leq 0.9, this prompted a computerized tomography angiogram (CTA) of the injured extremity and vascular surgery consultation if an injury was identified by the CTA. A vascular injury was determined by the radiologist's interpretation of the CTA.

RESULTS:

We identified 442 patients with high energy tibial plateau fractures with a mean age of 47.03 (Std. Dev. 14.48). The cohort consisted of 179 (40.9%) female and 263 (59.1%) male patients. There were 102 (23.2%), 4 (0.9%), and 333 (75.9%) Schatzker IV, V, and VI fractures, respectively. Twelve (2.7%) of the patients suffered a vascular injury. There were 27 patients with an ABI \leq 0.9 and 5 (18.5%) of these patients had a vascular injury. There were no missed vascular injuries. The positive predictive value was 0.185 for an ABI \leq 0.9 but the negative predictive value of an ABI > 0.9 was 1.000. The sensitivity of ABI was 1.000 while the specificity was 0.151. Eighteen patients had an ABI > 0.9 at presentation and underwent a CTA of their injured limb for non-orthopaedic reasons. No vascular injuries were identified among this subset of patients.

DISCUSSION AND CONCLUSION:

ABIs have frequently been cited as a valuable screening tool for vascular injury after a knee dislocation, but its application in high energy tibial plateau fractures has yet to be described. Our results, particularly the high sensitivity and negative predictive value, indicate that this protocol utilizing ABIs to screen for vascular injuries in Schatzker IV-VI tibial plateau fractures is both safe and effective, given that there were no missed vascular injuries over a 15-year period.