

Characteristics Associated with Vascular Injuries in Trauma Patients with Open Lower Extremity Fractures: Are We Overutilizing CT Angiography?

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INTRODUCTION:

Vascular injury in open lower extremity (LE) fractures is associated with significant morbidity, but early detection and intervention can reduce related complications. Although computed tomography angiography (CTA) is commonly performed in trauma patients with open LE fractures, there is no clear evidence supporting routine use or consensus on CTA utilization in the absence of clinical signs of vascular injury. This study aims to evaluate CTA utilization and identify characteristics associated with vascular injury and the need for vascular surgical intervention in trauma patients with open lower extremity fractures.

METHODS:

A retrospective review was conducted on patients with open fractures of the tibia, fibula, and femur treated at a Level I trauma center between March 2014 and March 2019. Patients under 18 years old, pregnant individuals, those with pathologic fractures, or those treated at outside hospitals were excluded. Demographic and clinical data, including injury and fracture characteristics, the presence of hard or soft signs of vascular injury, and CTA findings, were collected from the institution's electronic medical record (EMR) and analyzed.

RESULTS:

A total of 135 patients met inclusion criteria, including 214 open LE fractures. The patient population was 76.3% male, with a mean age of 43.8 ± 16.4 years and a mean BMI of 29 ± 6.1 kg/m². Among the 135 patients, 42 (31.1%) underwent CTA evaluation, 11 (8.1%) had positive CTA findings, and five (3.7%) required vascular surgical intervention. Patients who underwent CTA evaluation ($p=0.003$, $p=0.004$), those with positive CTA findings ($p=0.038$, $p<0.001$), and those who required vascular surgery ($p=0.006$, $p<0.001$) were each significantly more likely to present with compartment syndrome and hard signs of vascular injury compared to their respective counterparts. No other variables were significantly associated with vascular injury or the need for surgical repair. Of the 42 patients evaluated with CTA, 22 (52.4%) showed no clinical signs of vascular injury. All patients who required vascular surgery had both hard signs of vascular injury and positive CTA findings, except one in which the vascular injury was diagnosed intraoperatively.

DISCUSSION AND CONCLUSION:

This study found a low incidence of vascular injury among patients with open LE fractures, and an even lower rate requiring vascular surgical intervention. Despite this, nearly one-third of patients underwent CTA evaluation, and more than half of those patients had no clinical signs of vascular injury at presentation, raising concern for potential overuse of imaging and avoidable radiation and contrast exposure. Clinical examination is a reliable tool for assessing the need for advanced imaging, and clinical signs should guide CTA use to help minimize its overutilization in trauma patients with open LE fractures. Larger prospective studies are warranted to establish standardized algorithms guiding CTA use in this population.