## Do computed tomography angiography findings correlate with postoperative complications for tibial fractures?

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INTRODUCTION: Computed tomography angiography (CTA) can be used to assess vascular injury in tibia fractures. Prior investigations discourage routine use for fractures without at least one hard or soft sign of vascular injury. However, studies have shown that fracture and wound healing are related to perfusion. The purpose of this study was to assess if CTA abnormalities were associated with postoperative complications for tibial fractures. We hypothesized that the presence of vascular abnormalities was associated with worse surgical outcomes in tibial fractures; furthermore, concomitant involvement with the optimal surgical fixation approach would have an additive effect.

METHODS: A retrospective review was conducted on tibial fracture patients (AO/OTA 41-44) who underwent CTA and fixation at a Level 1 trauma center between 2014-2023 with >6 weeks follow-up. Demographics, injury, and surgical characteristics were collected. CTA reports were analyzed for vessel abnormalities. Patients were stratified based on whether the operative approach overlapped with the injured angiosome. Univariate regressions assessed associations with clinical outcomes (unplanned return to OR (UROR), nonunion, infection).

RESULTS: Among 177 tibia fractures (167 patients, mean age=43.8, 74.9% male), CTA revealed 97 (58.1%) had zero, 33 (19.8%) one, 17 (10.2%) two, and 20 (12.0%) three abnormal vessels. Open fractures (p=0.003), nerve deficit (p=0.003), and non-palpable dorsalis pedis (p<0.001) on initial exam correlated with increased likelihood of vessel injury. High-energy mechanism of injury had a higher incidence of vascular injury, while penetrating injuries had a higher proportion of 3 vessel injury (p=0.035). Approach/angiosome overlap did not correlate with postoperative outcomes. Predictors of UROR included open fracture [OR=2.71 (95%CI 1.34-5.52)], 2 abnormal vessels [OR=3.09 (95%CI 1.12-8.52)], and nerve deficit [OR=4.10 (95%CI 1.03-16.3)]. Deep infection was associated with open fracture [OR=2.56 (95%CI 1.04-6.29)], and 3 abnormal vessels [OR=3.94 (95%CI 1.24-12.55)]. Nonunion was predicted by open fracture [OR=5.76 (95%CI 1.86-17.80)] and nerve deficit [OR=8.23 (95%CI 1.92-35.15)].

DISCUSSION AND CONCLUSION: Multi-vessel abnormality on CTA and open injury are both predictors of UROR and postoperative infection for tibia fracture patients. However, vessel injury on CTA is not associated with fracture nonunion, and surgical approach overlap with the injured angiosome is not correlated with postoperative complications. Surgeons should feel confident using the approaches deemed necessary for the fracture without concern for a second hit to the angiosome.