Operative Ankle Fractures with Radiographic Vascular Calcifications are Associated with a High Wound Healing Complication Rate

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INTRODUCTION: Peripheral arterial calcifications are radiographic markers associated with impaired blood flow, reduced tissue oxygenation, and increased ischemic risk. These vascular changes may indirectly influence wound and fracture healing by compromising local perfusion. Ankle fractures are common orthopedic injuries that, due to their peripheral nature, may pose a higher risk for postoperative complications, especially in patients with comorbidities affecting vascular health and immunity. However, the direct impact of radiographic vascular calcifications on postoperative healing of ankle fractures has not been described and remains unclear, The purpose of this study is to report the incidence of radiographically evident peripheral arterial calcifications in ankle fractures and to determine if their presence is a risk factor for wound complications and reoperations following surgical fixation.

METHODS: A retrospective review was conducted of all operatively treated ankle fractures at a single institution between 2022-2025. Cases were identified via CPT codes for ankle open reduction internal fixation (ORIF), and categorized as bimalleolar equivalent, bimalleolar, trimalleolar, or other fracture. Peripheral arterial calcifications were identified by direct review of preoperative plain ankle radiographs at the time of injury. Patients with radiographically apparent arterial calcifications were reviewed within the clinical record for postoperative wound complications (delayed wound healing, wound dehiscence, superficial infection, deep infection), reoperation rates, and recovery milestones.

RESULTS: A total of 430 operative ankle fractures were identified in patients aged 18-88 years. Of these, 36 (8.4%) had radiographic evidence of peripheral arterial calcifications on their injury films. One patient was lost to follow up and one was deceased, leaving 34 fractures in the study cohort with a mean follow up time of 6.5 months. The average age of the cohort was 63.8 years of age. A total of 11 (32.4%) fractures experienced postoperative wound complications, with 7 (20.6%) of these undergoing return to the operating room for debridement and irrigation. Five patients initially presented with open fractures, four of whom experienced postoperative wound complications. Of note, one patient experienced wound complication of an ipsilateral foot injury rather than the ankle surgical site.

DISCUSSION AND CONCLUSION: This study found that peripheral arterial calcifications may be associated with an increased risk of postoperative wound complications following surgical fixation of ankle fractures. Overall, we found 8.4% of operative ankle fractures to have concomitant radiographically apparent arterial calcifications. Almost a third of these patients had some type of postoperative wound complication and one out of five required subsequent surgery as a result. These findings suggest that radiographic arterial calcifications may serve as a useful preoperative risk stratification tool. Early identification of high-risk patients may allow for targeted interventions to optimize wound healing and improve surgical outcomes. Further analysis is warranted and planned for comparative analysis, while adjusting for potential confounding factors including advanced age, prior surgery, diabetes, tobacco use, and obesity.