Impact of Orthopaedic Trauma Association Open Fracture Classification on Amputation Rates in Patients with Lower Extremity Open Fractures and Major Arterial Injuries

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INTRODUCTION:

Lower extremity open fractures with concomitant arterial injuries requiring repair are devastating injuries at high-risk for amputation with historic rates approaching 80%. Previous lower extremity injury severity scoring systems failed to reliably predict subsequent amputation among patients sustaining high-energy, lower extremity traumatic injuries. However, when retrospectively applied to patients with open, long bone fractures, the Orthopaedic Trauma Association Open Fracture Classification (OTA-OFC) demonstrated improved predictive ability of postoperative complications including limb amputation. This retrospective review of prospectively scored OTA-OFC data aims to analyze injury severity based on the OTA-OFC and subsequent risk for amputation following lower extremity open fractures with major arterial injuries.

METHODS:

We retrospectively reviewed all patients with Gustilo-Anderson IIIC injuries of the lower extremity and prospective OTA-OFC scores treated at a single Level I Trauma Center from 2016 to 2021. We performed logistic regressions to predict amputation using composite OTA-OFC scores.

RESULTS:

We identified 36 patients (38 extremities) with open fractures and major arterial injuries: 21 femur (55%), 17 tibia (45%). Eleven limbs underwent acute amputation without revascularization (29%). Of the 27 limbs that were revascularized, 9 required delayed amputation (33%) which occurred at a median of six days following initial injury. Amputation levels were: 6 transtibial (30%), 11 transfemoral (55%), 3 knee disarticulation (15%). Each additional point of the OTA-OFC was associated with a 94% increase in the odds of overall amputation (95% confidence interval = 17% - 224%, p=0.01) and a 124% increase in the odds of acute amputation (95% confidence interval = 24% - 303%, p=0.007). An OTA-OFC score of 10 or higher had a sensitivity of 0.71 and specificity of 0.79 for predicting amputation.

DISCUSSION AND CONCLUSION:

Greater than 50% of patients with lower extremity open fractures and associated limb threatening arterial injuries ultimately required amputation in this series. Injury severity as described by composite OTA-OFC predicted amputation. Collaborative studies are warranted to further investigate the association between injury severity, ischemia time, and delayed amputation following lower extremity open fractures with major arterial injuries.
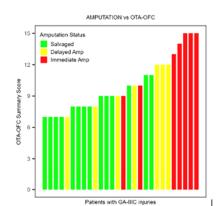
Figure 1: Extremity Outcome with Associated Composite OTA-OFC Scores