

SAVIT, a Novel Risk Score Based on the Orthopaedic Trauma Association Open Fracture Classification, Predicts Limb Salvage after Severe Open Tibia Fractures

Jefferson Lansford¹, Conor Flynn McCarthy, Colin Harrington², Julio Rivera, Lisa Reider, Christopher Hunt Renninger¹, Robert V O'Toole, Benjamin Kyle Potter, FIXIT METRC

¹Walter Reed National Military Medical Center, ²United States Army

INTRODUCTION: Previous composite injury scores that failed to predict amputation after severe lower extremity injury were typically based on lower quality retrospective data. This secondary analysis of the prospective FIXIT study develops and validates a composite injury score to identify limbs at decreased risk for amputation after attempted limb salvage of severe open tibia fractures.

METHODS: All patients enrolled in the randomized and observational FIXIT cohorts were included (n=430). We performed logistic regression to predict amputation (n=23) using three pre-specified, fixed variables: insurance status, Gustilo classification, and bone loss. Within the successfully salvaged cohort (n=407), we performed additional logistic regressions using elements of the OTA Open Fracture Classification and other injury variables to predict the proxy variable of a major limb complication as defined in FIXIT. We selected significant injury variables using the Akaike Information Criterion (AIC) and established the SAVIT (salvage and amputation for severely injured tibias) score by transforming model coefficients to an integer scale. We applied SAVIT to the original cohort to validate the score's ability to predict limb salvage vs. amputation.

RESULTS:

SAVIT was calculated as:

$$4*[GA-IIIB = 1] + 3*[Contamination (0 to 2)] + 2*[Muscle Loss (0 to 2)] + 1*[Bone Defect (>2cm = 2, other = 1)]$$

SAVIT values were approximately normally distributed from 0 to 16 with a median of 9. When predicting limb salvage success in the full cohort of IIIB and severe IIIA tibia fractures (overall risk of amputation = 5.3%, mean follow up = 620days), SAVIT of 10 or less had a sensitivity of 68.0%, a specificity of 87.0%, a positive predictive value of 98.9%, and a negative predictive value of 13.3%.

DISCUSSION AND CONCLUSION:

The SAVIT risk score based on the gross contamination, soft tissue, and bony components of severe open tibia fractures predicts successful limb salvage in a complex limb salvage cohort. Although further validation is needed in other data sets, the SAVIT score has potential to help clinicians and patients evaluate the risk of amputation if limb salvage is attempted

Composition of SAVIT Risk Score Among Patients with Amputations

