Contemporary Open Fracture Classification Systems:
The Good, The Bad and The Uncertain?
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Purpose: The classification of open fractures remains a contentious issue. Historically, the Gustilo-Anderson (GA) Classification has been widely used; however, it is limited by poor interobserver variability and outcome prediction. Contemporary systems such as the OTA (OTA Open Fracture Classification [OTA-OFC]) and the Orthopaedic Trauma Society (OTS) Open Fracture Classifications were developed to address these shortcomings; nonetheless, they are yet to see widespread use. This study aims to evaluate current open fracture classifications' performance in predicting outcome and interobserver agreement.

Methods: A retrospective review of all adult (>16 years) patients with a lower limb open fracture treated at a UK major (Level I) trauma center between January 2015 and December 2020 was performed. Injuries were classified according to the GA, OTA-OFC, and the OTS systems using patient notes, photographs, and radiographic studies by 2 independent observers. All patients had a minimum follow-up of 12 months. The primary outcome was complications (unplanned return to theater or hospital treatment). Secondary outcomes included infection, nonunion, and limb salvage.

Results: A total of 398 patients with 435 fractures were eligible for inclusion into this study with a median age of 45 years (interquartile range [IQR] 34). The majority of fractures were GA grade IIIb (198, 45.5%) with 135 (31%) grade IIIa, 60 (13.8%) grade II, 28 (6.4%) grade I, and 14 (3.2%) grade IIIc. The median OTA-OFC score was 6. Using the OTS classification, there were 197 (45.3%) simple fractures and 238 (54.7%) complex fractures of which 214 (49.2%) were complex B, 12 (2.8%) complex A, and 12 (2.8%) complex C. The GA ($P = 0.04$), OTA-OFC ($P = 0.001$), and OTS (0.028) classification systems were all significant predictors of complications. Similarly, all classification systems predicted limb salvage ($P<0.001$). Only the OTA-OFC could predict infection ($P = 0.048$) and nonunion ($P = 0.041$). Subcategory analysis of the OTA-OFC revealed that "muscle" and "bone loss" scores were consistently significant across all outcome measures. All classification systems displayed good interobserver agreement with the OTS (0.761) superior to GA (0.663) and OTA-OFC (0.519).

Conclusion: These results demonstrate the OTA-OFC as a superior predictor of outcome for open fractures with higher scores in muscle and bone loss as specific indicators of poor prognosis. The OTS benefited from its simplicity and showed excellent interobserver variability. This study adds to the growing body of evidence advocating the use of modern open fracture classification systems and confirms that we should move away from using the GA classification.

PAPER ABSTRACTS