

Δ Validity of Utilizing the RUST Scoring System in Radiographic Evaluation of Femoral Shaft Fractures

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Purpose: Evaluation of fracture healing requires radiographic and clinical assessment. There are little data regarding radiographic evaluation of femoral shaft fractures and their healing after treatment. A scoring system was developed to assess tibial fractures using 2 radiographic views—the RUST (Radiographic Union Score for Tibial fractures) scoring system. This study aims to determine the validity of using RUST scores to evaluate femoral shaft fracture healing, and if a modified RUST score using a single AP view is valid in settings where radiographic quality is limited.

Methods: This study consisted of 321 adult patients in Tanzania who underwent intramedullary (IM) nailing for diaphyseal femur fractures. Radiographic healing was assessed at 6, 12, 26, and 52 weeks. RUST scores were assigned using defined guidelines. Additionally, a modified RUST score was utilized for patients with only one radiographic view. For data analysis, 4 RUST scoring categories were used: conventional RUST score (AP + lateral), modified RUST score, RUST of AP view, and RUST of lateral view. The modified RUST score was equal to the single-view RUST score doubled. With both views present, the modified and conventional scores were equal. Convergent validity was assessed by correlating RUST scores with the EQ-5D. Divergent validity was assessed by comparing the difference in RUST scores between patients requiring reoperation and those who did not (uncomplicated). Finally, modified RUST scores were correlated with conventional RUST scores to assess the appropriateness of utilizing the modified score.

Results: All categories of RUST scores correlated with EQ-5D values. Resultant Spearman coefficients were 0.5 or greater. Patients who required subsequent reoperation had lower RUST scores than uncomplicated patients. Scores were 4.0 versus 5.79 ($P < 0.0005$), 5.38 versus 7.35 ($P = 0.005$), and 5.30 versus 8.99 ($P < 0.0005$) at 6, 12, and 26 weeks, respectively. RUST scores were similar at 52 weeks. Modified RUST scores correlated with conventional RUST scores, with all Spearman coefficients > 0.96 .

Conclusion: The RUST score demonstrated excellent convergent and divergent validity in femoral shaft fractures managed with IM nailing in Tanzania. Additionally, the modified RUST score was very strongly correlated with conventional RUST scores and demonstrated equivalent validity characteristics, suggesting it may be a viable alternative in settings where orthogonal views of the fracture are not consistently available.

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See pages 401 - 442 for financial disclosure information.