Timing of Radiographic Healing for Distal Femur Fractures Treated with an Intramedullary Nail

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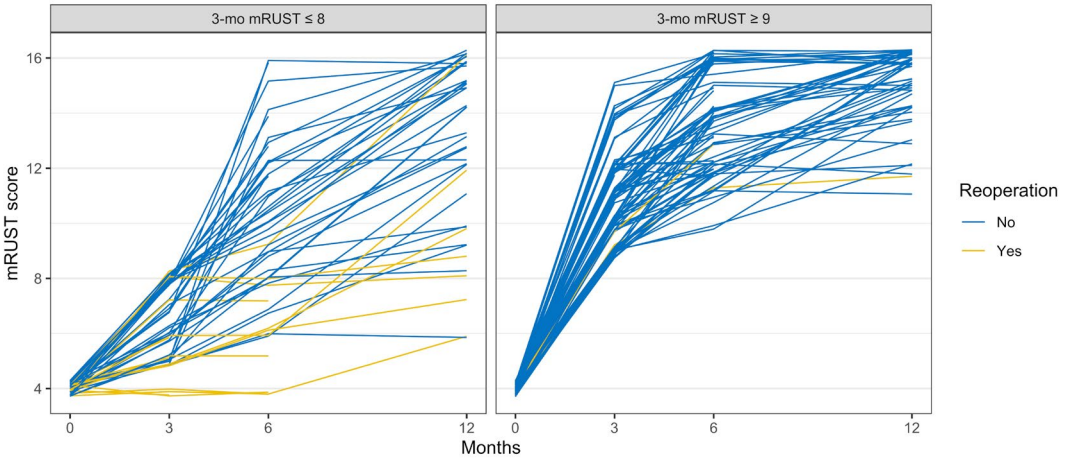
Purpose: Modified Radiolographic Union Scale for Tibia fractures (mRUST) scores have been found to be a reliable metric of radiographic healing in distal femur fractures treated with intramedullary nails. The purpose of this study was to descriptively profile mRUST scores in a large cohort of distal femur fractures and analyze predictors of timing of healing.

Methods: A multicenter retrospective cohort study was undertaken. Patients presenting to 1 of 10 tertiary care referral centers with a distal femur fracture (OTA 33A or C) between 2012 and 2019, treated with an isolated intramedullary nail, were eligible for inclusion. Patients with less than 1 year of radiographic follow-up were excluded unless they achieved radiographic union (defined as an mRUST score of 12) or underwent unplanned reoperation to promote union prior to 1 year. mRUST scores collected at 3, 6, and 12 months were graphed for each patient (Figure). Receiver operating characteristic curve analysis was utilized to identify the optimal cut-off in 3-month mRUST score that predicted reoperation to promote union. Multivariable models identified predictors of the timing of radiographic union and predictors of delayed progression.

Results: 157 fractures in 154 patients were included. Mean follow-up was 17 months. 118 fractures achieved radiographic union at a mean 6.2 months. The timing of radiographic union was predicted by female sex (1.2 months longer, $P = 0.04$), tobacco use (1.3 months longer, $P = 0.03$), open fracture (1.2 months longer, $P = 0.04$), and the use of topical antibiotics (1.9 months longer, $P = 0.03$). Delayed progression was predicted by chronic kidney disease (odds ratio 13.7, $P<0.01$). A 3-month mRUST score of ≤8 predicted reoperation to promote union with a sensitivity of 88%, a specificity of 70%, a positive predictive value of 26%, and a negative predictive value of 98%.

Conclusion: Distal femur fractures treated with intramedullary nail fixation heal radiographically at 6 months on average and have a 98% likelihood of treatment success if an mRUST threshold of ≥9 is surpassed at 3 months postoperatively. Factors associated with prolonged healing included female sex, tobacco use, open fracture, and the use of topical antibiotics. Surgeons can use this information to better understand the normal healing trajectory of distal femur fractures and stratify patients prognostically.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device they wish to use in clinical practice.



See the meeting website for complete listing of authors' disclosure information. Schedule and presenters subject to change.