Variability in Fluoroscopic Image Acquisition during Operative Fixation of Ankle Fractures at an Academic Institution

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Introduction: Increased use of intraoperative fluoroscopy exposes patients and operating room personnel to increased radiation. Patient-, injury-, and surgeon-specific factors related to fluoroscopic use in common orthopedic procedures are not well defined. The purpose of this study was to determine if injury, surgeon training level, and patient factors are associated with increased fluoroscopy during open reduction and internal fixation (ORIF) of ankle fractures.

Methods: The study was a retrospective chart review of patients treated at an academic institution with primary ORIF of an ankle. Patient demographics, including sex, age, and BMI were collected, as was surgeon year in training (residency and fellowship). Image acquisition data included total number of images, total imaging time, and cumulative dose. Ankle fractures were classified according to the Weber and Lauge-Hansen classification and the number of fixation points. Bivariate analysis and multiple regression models were used to predict increasing fluoroscopic image acquisition. Alpha was set at 0.05.

Results: A total of 158 patients were identified; 58 were excluded. Following bivariate analysis, fracture complexity and year in training showed a significant correlation with increasing image acquisition. Fracture complexity and year in training retained clinical significance and were independent predictors of increased image acquisition after multiple regression analysis. Increasing fracture complexity resulted in 20 additional shots, 16 additional seconds, and a radiation increase of 0.7 mGy. Increasing year in training resulted in an additional 6 shots and an increase of 0.35 mGy in cumulative dose.

Discussion: This study demonstrated that year in training and fracture complexity are significantly correlated with increasing fluoroscopic image acquisition, and these factors are independent predictors of increased fluoroscopy use. The findings suggest that protocols aimed at educating trainee surgeons on minimizing use of fluoroscopy would be beneficial at all levels of training and should target multiple fracture patterns.

Significance: Year in orthopedic surgical training and fracture complexity are significantly correlated with increasing fluoroscopic image acquisition, and these factors are independent predictors of increased fluoroscopy use. The findings suggest that protocols aimed at educating trainee surgeons on minimizing use of fluoroscopy would be beneficial at all levels of training and should target multiple fracture patterns. Evidence level IV.

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