

The Efficacy of Mini C-Arm Fluoroscopy for the Closed Reduction of Distal Radius Fractures in Adults: A Randomized Controlled Trial

Steven Kyle Dailey, MD; Ashley R. Miller, MD; Rafael Kakazu, MD; John D. Wyrick, MD; Peter J. Stern, MD

University of Cincinnati Medical Center, Cincinnati, Ohio, USA

Purpose: Most distal radius (DR) fractures are initially managed with closed reduction and application of a splint. Mini C-arm fluoroscopy for the closed reduction of pediatric forearm fractures has been shown to produce more accurate reductions with fewer reduction attempts when compared to conventional methods. No study to date has investigated mini C-arm fluoroscopy for the reduction of DR fractures in adults; furthermore, no randomized, controlled trials have been performed for any population. Our null hypothesis is that there will be no difference in the reduction quality of DR fractures in the emergency department (ED) when using mini C-arm fluoroscopy compared to standard reduction techniques.

Methods: This is a prospective, randomized controlled trial evaluating the efficacy of mini C-arm fluoroscopy for the closed reduction of DR fractures in the ED of a single academic Level I trauma center. 60 consecutive adult patients with closed DR fractures requiring reduction between April 2015 and January 2017 were randomized to standard versus fluoroscopically aided reductions. Patients with ipsilateral upper extremity fractures were excluded. All reductions were performed by orthopaedic residents implementing a standardized protocol. The primary outcome measurement was reduction quality (radial height, radial inclination, ulnar variance, and volar tilt) as measured on postreduction radiographs.

Results: Standard reductions were performed in 32 patients, and fluoroscopically aided reductions were performed in 28 patients. There were no statistically significant differences between groups in regards to age, gender, body mass index, mechanism of injury, fracture laterality, AO/OTA fracture classification, presence of an ulnar styloid fracture, or initial fracture displacement. No statistically significant differences were noted between groups on postreduction radiographs with regard to radial height, radial inclination, ulnar variance, or volar tilt. Overall reduction attempts were increased when using fluoroscopy (2.4 vs 1.8, $P = 0.03$), although the number of splints applied was not significantly different. The rate of operative management did not differ between groups.

Conclusion: Fluoroscopy exposes both the patient and practitioner to unnecessary radiation without enhancing reduction quality; therefore, mini C-arm fluoroscopy appears unnecessary for the initial closed reduction of adult DR fractures.