

Increased Efficiency With Use of a Mini C Arm in Emergency Department Closed Reductions

Mara Bajic, Medical Student; Carolyn M. Meinerz, MD; Matthew Laprade, MD; Andrew Kleven, MD, DPT; Peyton Keeling, MD; Steven M. Cherney, MD; Elizabeth Nolte, MD

Purpose: The purpose of this study was to evaluate the effects of mini C-arms versus traditional radiography on patient radiation exposure, the frequency of repeat closed reductions, and emergency department (ED) efficiency.

Methods: A retrospective chart review was conducted of adult patients with an isolated distal radius, bimalleolar, or trimalleolar ankle fracture requiring closed reduction by the orthopaedic surgery team in a busy academic Level I trauma center ED from 2013 to 2023. Pediatric patients and patients with pathologic or non-isolated fractures were excluded. Cases in which mini C-arms were used for imaging were compared to cases in which traditional postreduction radiographs were used. Total radiation exposure to the patient during the encounter was compared using the calculated radiation dose (mGy). The number of repeated reductions in the ED was also compared. Efficiency was compared using orthopaedic consult time, doctor visit to discharge time, and time under sedation (if applicable).

Results: In total, 199 subjects met inclusion criteria (81 ankle fractures and 118 distal radius fractures). The results showed that radiation exposure was significantly lower ($p < 0.001$) in the mini C-arm group compared to the traditional radiograph group. There was also a significant reduction in the time from doctor visit to discharge ($p < 0.001$), orthopaedic consult time ($p < 0.001$), and time spent under sedation ($p = 0.046$) when a mini C-arm was used, as opposed to traditional radiographs. The reduction in radiation exposure (mGy) indicates a marked increase in patient safety; the decreased doctor visit to discharge time, orthopaedic consult time, and time under sedation indicate an increase in ED efficiency. Additionally, the decrease in repeated reductions when mini C-arms were used could suggest an improvement in the quality of patient care as well as efficiency.

Conclusion: This study suggests that the use of mini C-arms instead of traditional postreduction radiographs improves ED efficiency, safety, and patient care.