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

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INTRODUCTION: This study focuses on patients with either distal radius, bimalleolar or trimalleolar ankle fractures requiring closed reduction and splinting by the orthopaedic surgery staff in the Froedtert Emergency Department (ED). The purpose of this study is to evaluate the effects of mini C-arms versus traditional radiography on the quality of patient care. We hypothesize that mini C-arms allow for reduced patient radiation exposure, decrease the frequency of repeat closed reductions, and improve emergency department visit efficiency.

METHODS: A retrospective chart review was conducted. Adult patients with an isolated distal radius, bimalleolar or trimalleolar ankle fracture requiring closed reduction by the orthopaedic surgery service in the Froedtert ED from 2013-2023 were identified. We excluded pediatric patients and patients with pathological or non-isolated fractures. Cases in which mini C-arms were utilized for imaging were compared to cases in which traditional post-reduction radiographs were utilized. Total radiation exposure to the patient during the encounter was compared using the calculated radiation dose (mGy). We also compared the number of repeated reductions in the ED. Efficiency was compared using orthopaedic consult time, doctor visit to discharge time, and time under sedation (if applicable).

RESULTS: In total, n=130 subjects met inclusion criteria (51 ankle fractures and 79 distal radius fractures). The results show that radiation exposure was significantly lower (p=0.004) in the mini C-arm group, as compared to the traditional radiographs group. There was also a significant reduction in the time from doctor visit to discharge (p=0.041) 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, and the decreased doctor visit to discharge time indicates an increase in ED efficiency.

DISCUSSION AND CONCLUSION: This pilot study suggests that mini C-arms would improve ED efficiency and safety. Future studies will increase our sample size to determine whether this also impacts orthopaedic treatment outcomes.