

Fluoroscopic Radiation to the Surgeons' Hands: What's Our Exposure?

Michael M. Vosbikian, MD¹, Ronald Huang, MD¹, Charles F. Leinberry, MD², Asif M. Ilyas, MD²

¹ - Department of Orthopaedic Surgery – Thomas Jefferson University Hospital (Philadelphia, PA)
² - The Rothman Institute of Orthopaedics at Thomas Jefferson University Hospital (Philadelphia, PA)



Introduction:

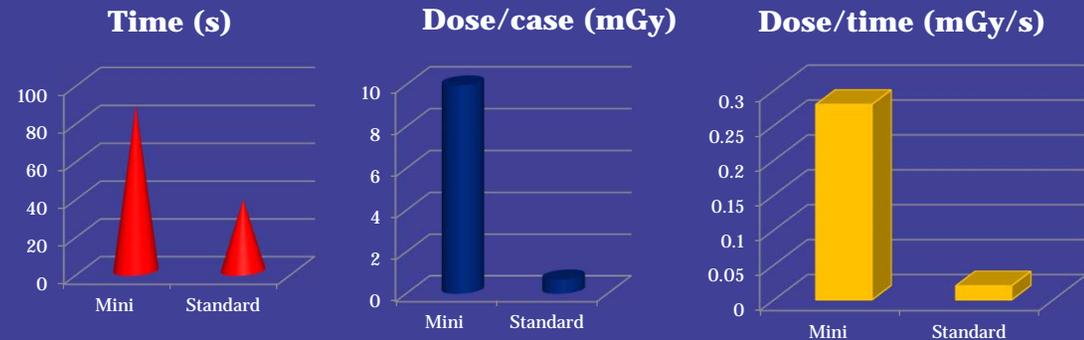
The use of fluoroscopy is common place in the practice of orthopaedic surgery. Fluoroscopy can be achieved with either the use of a standard or mini C-arm. It is also common for the hand surgeon to work in close proximity to the unit itself. Current literature shows great disagreement when it comes to which device is safer with respect to radiation exposure to the surgeon. However, little is known about the radiation exposure to the surgeon's hands, which is in closest proximity to the fluoroscope and most vulnerable to radiation exposure. The primary goal of this study was to examine the difference in exposure to the hands of the surgeon between the use of the standard C-arm versus mini C-arm units in a hand surgeons' practice.

Methods:

Two attending hand surgeons monitored the radiation exposure to their hands with a ring dosimeter over a 14 month period using standard and mini C-arm fluoroscopic units. One surgeon performed all cases with a standard C-arm unit in a hospital setting, while the other performed all cases with various mini C-arms at surgical centers affiliated with our institution. For each case, fluoroscopic time, the final dose displayed on the unit, and radiation per unit time were recorded and analyzed.

Results:

A total of 160 cases were reviewed with 71 cases and 89 cases in the standard and mini C-arm limbs of the study, respectively. The median fluoroscopy time per case was 37.7 seconds with the large C-arm and 88 seconds with the mini C-arm. The median dose reported by the large C-arm was 0.68 mGy/case, while the median dose reported by the mini C-arm was 9.97 mGy/case. With dose as a product of time, the median calculated values were 0.02 mGy/second for the large C-arm group and 0.28 mGy/second for the mini C-arm group. On preliminary analysis, the ring dosimeters demonstrated an increases surface dose exposure to the surgeons hands by a factor of two.



Discussion:

While it has been proven that the mini C-arm generates less scatter with respect to ionizing radiation, in a practical model, the mini C-arm may not be a safer alternative to the large C-arm with respect to the hand surgeon's hands. Though below the maximum recommended radiation dose per year with either model, due to these findings, it is prudent to take precautions towards radiation safety both with personal protective equipment and operative technique.