Differences between Orthopaedic Surgery and Podiatry in Intraoperative Fluoroscopic Radiation Exposure during Ankle Fracture Open Reduction Internal Fixation

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INTRODUCTION: Ankle fractures pose a unique situation as both podiatrists and orthopaedic surgeons are licensed to treat them. Intraoperative fluoroscopy is routinely used, however, excessive radiation doses can be harmful to both the patient and surgical team. The primary aim of this study is to determine if there is a difference in the amount of intraoperative fluoroscopic radiation exposure during ankle fracture open reduction and internal fixation (ORIF) when performed by orthopaedic surgeons versus podiatrists.

METHODS: This is a retrospective chart review of patients who underwent ankle fracture ORIF at an academic, level I trauma center in an urban setting between January 1, 2018 and June 30, 2020. Using International Classification of Diseases nine and 10 codes associated with ankle fractures, the electronic health record was queried for patient encounters during the aforementioned time frame. Patients were included in the study if they were above the age of 18 and sustained an ankle fracture that was managed operatively. Subjects with concomitant procedures also requiring intraoperative fluoroscopy recorded on the same radiographic encounter, managed initially with an external fixator, younger than the age of 18, and those with incomplete electronic medical records, or those who were incarcerated were excluded. Demographic information, past medical history, and data points related to the procedure performed and intraoperative fluoroscopy were collected. Subjects were then stratified by procedure type. The mean total intraoperative radiation dose (mRad), mean total fluoroscopic time (seconds), and median number of images taken intraoperatively were then compared between those performed by orthopaedic surgeons and podiatrists using student's t-test.

RESULTS: A total of 172 cases met inclusion and exclusion criteria. One-hundred procedures were performed by orthopaedic surgeons and 72 procedures were performed by podiatrists. When comparing the total fluoroscopic time (seconds) in medial malleolus ORIF, those performed by podiatrists were associated with a statistically significantly higher fluoroscopic time as compared to those performed by orthopaedic surgeons (mean 97.5s versus 41.5s; p = 0.0322). Additionally, when comparing the mean total radiation dose (mRad) in bimalleolar fracture ORIF with syndesmosis repair, those performed by podiatrists had a statistically significantly larger dose of radiation as compared to those performed by orthopaedic surgeons (mean 543.0mRad versus 208.0 mRad; p = 0.0308). Similarly, when comparing the mean total radiation dose (mRad) in trimalleolar fracture ORIF with syndesmosis repair between podiatrists and orthopaedic surgeons, procedures performed by podiatrists had a statistically significantly higher dose of radiation (mean 551.0 mRad versus 230.5 mRad; p = 0.0329).

DISCUSSION AND CONCLUSION:

Patients and surgical teams are exposed to significantly less radiation during bimalleolar and trimalleolar fracture ORIF with syndesmosis repair when performed by an orthopaedic surgeon as compared to those performed by a podiatrist.

	Orthopaedic Surgeons	Podiatrists	p-value
Bimalleolar Ankle Fracture ORIF with Syndesmosis Repair (n = 26)			
Mean Total Radiation Dose (mRad)	207.97	543.02	**0.0308**
Mean Total Fluoroscopic Time (s)	97.89	138.07	0.2918
Trimalleolar Ankle Fracture ORIF with Syndesmosis Repair (n = 10)			
Mean Total Radiation Dose (mRad)	230.49	551.02	**0.0329**
Mean Total Fluoroscopic Time (s)	113.65	159.25	0.1749