

# **Intraoperative 3D Fluoroscopy for Peri-articular, Pelvis, and Acetabular Fractures Results in Fewer Reoperations than Post-operative CT**

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**INTRODUCTION:** Multidimensional (3D) fluoroscopy provides cross-sectional imaging that allows surgeons to assess reduction and implant placement intraoperatively beyond traditional 2D fluoroscopy. This study compares the surgeon's ability to judge quality of reduction and implant positioning in pelvis, acetabulum and peri-articular fractures using intraoperative 3D fluoroscopy versus post-operative CT scan. Patient radiation exposure was also evaluated.

**METHODS:** All adult trauma patients with pelvis, acetabulum, tibial plateau, pilon, and/or calcaneus fractures treated between February 2021 and November 2023 at a Level 1 trauma center were reviewed. Fracture gap, articular step-off and implant positioning were measured on either intraoperative 3D fluoroscopic CT or post-operative CT. The primary outcome was surgeon confidence in these measurements as graded on a five-point Likert scale (1 = very confident, 5 = not confident). Total operative time, estimated blood loss, return to OR, and total radiation exposure were also calculated.

**RESULTS:** 197 patients were included in the final analysis utilizing a general comparison cohort for each fracture group in a 1:2 ratio. There was a statistically significant difference in surgeon confidence level in reviewing imaging between 3D fluoroscopy and post-op CT in the calcaneus fracture group (1.87 vs 1.17,  $P < 0.001$ ) while pelvis, acetabulum, plateau, and pilon groups showed no significant difference. Only intraoperative 3D fluoroscopy used in acetabular surgery yielded statistically significant increases in radiation exposure (136.9 mGy vs 85.7 mGy,  $P = 0.02$ ). There was no significant increase in operative time or blood loss in any fracture group. 8/132 (6%) patients in the post-operative CT cohort required return trips to the OR for reduction or implant revision, while 0/65 patients in the 3D fluoroscopy group returned to the OR.

**DISCUSSION AND CONCLUSION:** Intraoperative 3D fluoroscopy provides surgeons with real-time ability to correct reduction and implant positioning to prevent reoperation compared to post-operative CT. This study demonstrates no significant difference in the ability to judge these parameters (other than possibly calcaneus fractures) and no significant increase in total radiation exposure (other than acetabulum fractures) compared to postoperative CT.