## Reliability of Intraoperative 3-D Fluoroscopy in Assessing Acetabular Fracture Reduction

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INTRODUCTION: Anatomic acetabular reduction is critical for hip survivorship. 3D fluoroscopic imaging allows for implant placement and intraoperative reduction assessment in acetabular fractures but has not been compared postoperative CT, the current gold standard. This study compares reduction quality assessment and image quality between 3-D fluoroscopy and postoperative CT.

METHODS: A retrospective review of patients with acetabular fractures was conducted at a single institution between 2017-2023. Adult patients with acetabular fractures involving the weight-bearing dome and/or posterior wall with 3D fluoroscopic images and postoperative CT scans were included. Two independent trauma –fellowship trained graders measured gap displacement and step-off on intraoperative 3-D fluoroscopy and postoperative CT. Graders subjectively rated image quality and confidence in reduction assessment. Appropriate tests of significance, intra- and inter-grader reliability statistics were completed.

RESULTS: 54 patients were included, 72.2% males with a mean age of  $48.39\pm21.02$ . 48.1% of 3D fluoroscopic images were rated as poor quality compared to only 1.9% of CT images (p < 0.001). 43.3% of 3-D fluoroscopic measurements were made with high confidence compared to 70.7% of CT images (p<0.001). Moderate agreement was obtained when comparing 3-D fluoroscopy and postoperative CT gap displacement (ICC=0.52, p<0.01) and step-off (ICC=0.42, p<0.01). Intra-reliability showed good agreement for postoperative CT measurements in both graders (ICC=0.75 and 0.86. p<0.001) and moderate agreement for 3D fluoroscopy in both graders (ICC=0.64 and 0.60, p<0.001). Inter-reliability showed good agreement for postoperative CT (ICC=0.62, p<0.001) and poor agreement for 3-D fluoroscopy (ICC=0.22, p=0.05).

DISCUSSION AND CONCLUSION: While 3-D fluoroscopy assists with intraoperative evaluation, the ability to assess reduction quality is limited when compared to postoperative CT. 3-D fluoroscopy was associated with worse intra- and inter-observer reliability, decreased confidence, and poorer image quality compared to postoperative CT. Postoperative CT should remain the gold standard to accurately assess acetabular reduction following surgery.