

Anterior Pelvic Ring Fixation Techniques: A Retrospective Assessment of Reduction Quality and Reduction Maintenance After Unstable Pelvic Ring Disruptions

Samantha Nino, MD; Jonathan Paul Yawman, MD; Elias Eid, BS; Mohamad Shaath, MD; Frank Avilucea, MD

Orlando Health, Orlando, FL, United States

Purpose: We sought to compare reduction quality, reduction maintenance, and postoperative complications of anterior pelvic ring injuries stabilized with either anterior pelvic external fixation (APEF), anterior subcutaneous internal pelvic fixation (INFIX), or medullary ramus screw fixation (RSF) with the hypothesis that RSF results in comparable reduction quality and maintenance with fewer postoperative complications, as compared to APEF or INFIX.

Methods: A retrospective review was performed for 115 patients with unstable anterior and posterior pelvic ring disruptions (OTA / AO 61B2-61C3). All patients were treated with combined anterior and posterior fixation. Patients were grouped based on the method of anterior ring fixation utilized: APEF (n = 48), INFIX (n = 39), or RSF (n = 28). Reductions of the pelvic ring were evaluated using the pelvic deformity index (PDI) and pelvic asymmetry value (PAV), calculated from postoperative pelvic radiograph measurements. Reduction maintenance was evaluated based on the change in PDI and PAV from the initial postoperative radiograph to the radiograph at final follow-up. Complications were tabulated, including surgical site infections, lateral femoral cutaneous nerve injuries, symptomatic heterotopic ossification, and unplanned reoperations.

Results: Reduction quality was similar among the three groups with no significant differences in PDI ($P = 0.297$) or PAV ($P = 0.189$). RSF demonstrated superior reduction maintenance with less change in PDI ($P = 0.019$) and less change in PAV ($P = 0.017$) than APEF or INFIX. Average follow-up was 6.53 months with no significant differences in follow-up time among the groups ($P = 0.542$). The groups also did not differ significantly in demographic characteristics (age, gender, and body mass index). Complications were seen more frequently in the INFIX (51.3%) and APEF (35.4%) groups than the RSF group (14.3%) ($P = 0.008$). Surgical site infections were most common in the APEF group ($P = 0.038$). Lateral femoral cutaneous nerve (LFCN) injuries were seen in 13 INFIX patients (33.3%), 6 APEF patients (12.5%), and 3 RSF patients (10.7%). LFCN injuries in the RSF group were seen only in patients who sustained combined anterior ring disruption with symphysis diastasis and/or acetabular fracture injury patterns, which necessitated an open reduction. No patients in the RSF group who underwent closed reduction reported an LFCN injury.

Conclusion: The quality of pelvic ring reduction was not significantly different between APEF, INFIX, or RSF. RSF demonstrated the greatest ability to maintain the reduction at final follow-up. Overall complications were least in the RSF group and highest in the INFIX group.