

Fixation Strategy Using Sequential Intraoperative Examination Under Anesthesia for Unstable Lateral Compression Pelvic Ring Injuries Reliably Predicts Union with Minimal Displacement

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Purpose: EUA has been used to identify pelvic instability. Surgeons may use percutaneous methods to fix the posterior and anterior pelvic ring in unstable lateral compression (LC) pelvic injuries, but no criteria exist to guide fixation strategy. A strategy has been developed to perform stepwise fixation and reassessment with sequential EUA. Our aim was to determine whether a fixation strategy based on sequential intraoperative EUA reliably results in union with minimal displacement.

Method: A multicenter retrospective review of all skeletally mature patients with a closed LC pelvic injury treated from 2013 to 2016 was completed. Inclusion included skeletally mature patients, pelvic CT, percutaneous fixation, and patients who underwent sequential EUA. Data included demographics, fracture pattern, associated injuries, screw type (fully and partially threaded), number and type of posterior screws (iliosacral versus transiliac transacral), intraoperative distraction frame, postoperative weight bearing, displacement measured on postoperative radiographs, and length of follow-up. Statistical analysis was completed using Pearson uncorrected chi-square test. $P < 0.05$ was considered statistically significant.

Results: Complete data was available in 74 patients. Mean age was 41 yrs (range, 14-77) and follow-up 11 mos. 53 patients (71.6%) had LC-1 injuries, 19 (25.6%) had LC-2 injuries, and 2 (2.7%) had LC-3 injuries. 25 of 53 patients (47.1%) with LC-1 and 11 of 19 (57.9%) with LC-2 injuries did not receive anterior fixation based upon the algorithm. The 36 LC-1/LC-2 patients who received anterior and posterior fixation had no measurable displacement at union. Of the remaining 36 LC-1/LC-2 patients with no anterior fixation, 27 with unilateral ramus fractures had no measurable displacement at union. The remaining 9 LC-1/LC-2 patients with no anterior fixation had bilateral superior ramus fractures; each of these 9 patients demonstrated a mean displacement of 7.5 mm (range, 5-12) within 6 weeks of fixation that remained until union ($P < 0.0001$). Of the LC-3 injuries, one patient had a unilateral superior ramus fracture and no anterior fixation was placed predicated on the algorithm; the patient healed with no displacement. The remaining patient with an LC-3 injury had anterior ring fixation and healed with no displacement.

Conclusion: A fixation strategy based on sequential intraoperative EUA reliably results in union with minimal displacement for unstable LC pelvic ring injuries.