Pelvic Binder Radiography Is Safe, Feasible, and Effective for Quantifying Fracture Instability in LC1 Pelvis Fractures: A Clinical Trial

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Purpose: We sought to determine if patients with LC1 pelvis fracture tolerate awake stress radiography using a pelvic binder (PBR) without injury, and to investigate the diagnostic performance of PBR compared to examination under anesthesia (EUA).

Methods: This prospective clinical trial of PBR diagnostic intervention was conducted in 2 centers, a public Level I trauma center and private academic referral hospital. We included only awake, alert adults with LC1 (OTA/AO B1.1/2.1) pelvic fractures from blunt or blast mechanism presenting within 3 weeks of injury between February and December 2023 without hypotension or injury precluding safe pelvic binder application. Portable pelvis inlet stress radiographs were obtained using a pelvic binder to apply 0, 5, and 10 kg of force using a hanging scale. LC1 fracture displacement was measured as the difference in distance between acetabular teardrops between stressed and unstressed views. Primary outcomes were safety (no major adverse events) and feasibility (≥85% patient tolerance of PBR). Secondary outcomes included pain, opioid medication use within 96 hours, length of hospital stay, discharge destination, mortality, correlation between fracture displacement on PBR and EUA, and PBR sensitivity and specificity for ≥1-cm displacement on EUA.

Results: 169 patients were screened, 58 were eligible, and 31 enrolled. Enrolled patients were age 58.7 ± 23 years, 54.8% female, 22.6% Caucasian, and 67.7% Hispanic. 100% tolerated PBR examination. 52% reported pain during PBR. Patients received 40.4 ± 56.4 mg oral morphine equivalents within 96 hours. 10 patients received EUA and internal fixation. Median hospital stay was 6 days (interquartile range 5.5 days) with no inpatient mortality. 45.2% of patients were discharged home with services. Fracture displacement was 4.3 ± 4.7mm on PBR at 5 kg, 8.4 ± 9.0mm at 10 kg, and 14.8 ± 8.4mm on EUA. At 10 kg, PBR correlated very strongly with EUA ($r = 0.95$, $P<0.001$) and was 100% sensitive and 100% specific for ≥1-cm displacement on EUA.

Conclusion: PBR at 10 kg is a safe, feasible, and effective point-of-care test for quantifying instability of LC1 pelvis fractures in awake patients with minimal risk and similar performance compared to EUA.