The Safety and Efficacy of Pelvic External Fixation as a Definitive Mode of Stabilization of the Anterior Pelvic Ring

*Hassaan Q. Sheikh; **Theodoros Tosounidis**; Nikolaos Kanakaris; Peter V. Giannoudis, MD; Academic Unit of Trauma and Orthopaedics, Leeds General Infirmary, Leeds, United Kingdom*

Background/Purpose: Pelvic external fixators (PEFs) are used either as a definitive or temporary stabilization device of the pelvis in the setting of trauma. When they are used as a definitive type of fixation, they can either be combined with posterior stabilization or used as a solitary definitive fixation depending upon the fracture configuration. The purpose of this study was to evaluate outcomes and complications of patients who sustained pelvic fractures and were treated with anterior PEFs as a definitive mode of fixation.

Methods: We identified all consecutive patients that were admitted in a Level I academic trauma center with pelvic fractures and had application of a PEF as definitive surgical management between March 2007 and December 2012. A retrospective analysis of prospectively documented data was performed. The clinical notes as well as all imaging studies (plain radiographs and CT scans) were independently reviewed by two pelvic surgeons. Patients with insufficient follow-up were excluded from the study. Details such as patient demographics, fracture type according to the Young-Burgess classification, ISS, associated injuries, and length of hospital stay were documented and analyzed. Particular emphasis was given to complications related to the PEF (superficial and deep infection, iatrogenic neurovascular injury, pin site loosening) and midterm efficacy of the procedure. The minimum follow-up was 12 months (range, 12-60).

Results: A total of 70 patients with a mean age of 36.3 years (range, 381) met the inclusion criteria with a mean ISS of 27.4 (range, 9-66). Fracture distribution included 6 APC (anterior-posterior compression), 56 LC (lateral compression), 3 VS (vertical shear), and 5 CM (combined mechanism) injuries. 65 PEFs were applied to the iliac crests and 5 to the supra-acetabular region. All the PEFs were applied utilizing small stab incisions. 12 PEFs were applied as the only definitive mode of fixation whereas 58 were applied in conjunction with anterior (retropubic screw) or posterior ring fixation (iliosacral screws or posterior open reduction and internal fixation [ORIF]). The PEFs were removed after a mean of 53 days (range, 30-94). The mean number of days to full weight bearing was 103 (range, 22-335). Mean inpatient stay was 27 days (range, 6-121) and mean intensive care stay was 5 days (range, 0-24). 13 patients (18.6%, 6 females and 7 males) developed superficial pin site infection that was managed with antibiotics. Mean time to diagnosis of infection was 23 days (range, 2-39). Another patient (1.4%) became septic from a deep pin site infection which required intensive care stay and pin site debridement. Only one patient (1.4%) had iatrogenic lateral femoral cutaneous nerve injury causing long-term paraesthesia. Pin site loosening was noted in 5 patients (7.1%), three of which occurred early in the course of management and required adjustment of the PEF. Two patients (2.9%) developed symptomatic pulmonary emboli. One patient (1.4%) with a VS injury developed a symptomatic nonunion of the pubic rami and sacrum. Loss of reduction at final follow-up defined as more than 1-cm displacement of the anterior pelvic ring compared to the intraoperative reduction was noted in 19 (27.1%) patients (16 LC, 1 VS, and 2 CM fractures). None of the

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patients with anterior malunion complained of anterior pelvic pain that required secondary operative intervention.

Conclusion: The application of iliac crest and supra-acetabular PEFs is a safe and effective intervention for the management of pelvic injuries, either in isolation or in combination with other modes of posterior and/or anterior pelvic ring stabilization. We attribute our low local soft-tissue complication rate to meticulous technique and the fact that the PEFs were applied by specialized pelvic surgeons.

See pages 99 - 147 for financial disclosure information.