

Does Subcutaneous Internal Fixation (INFIX) Perform Similarly Radiographically to Other Methods of Anterior Pelvic Fixation for Pelvic Ring Injury?

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Purpose: Optimal treatment for high-energy pelvic ring injuries remains a challenge for orthopaedic surgeons. Particularly, anterior pelvic ring fixation remains controversial. Many techniques have been described, including open reduction and internal fixation (ORIF), percutaneous cannulated screw fixation, subcutaneous internal fixation (INFIX), and external fixation. Despite a variety of fixation techniques, there is scarce literature investigating direct comparisons between common methods of anterior pelvic fixation. We hypothesize that INFIX will not show a significant difference in pelvic deformity or pubic symphysis reduction when compared to ORIF and external fixation methods in the setting of pelvic ring injury.

Methods: We retrospectively reviewed orthopedic trauma patients from 2011 to 2015 who sustained high-energy pelvic ring injuries treated with ORIF, external fixation, or INFIX. Reduction assessment included pelvic deformity index and pubic symphysis widening measured from pre- and postoperative AP pelvis radiographs. Interrater reliability of radiographic measurements was calculated between two independent reviewers. Comparison between fixation techniques was analyzed using t test with significance as $P < 0.005$.

Results: 37 patients were included, average age 45.4 years. Anterior-posterior compression (APC)3 injuries were seen in 29.7%, and lateral compression (LC)3 injuries in 21.6% patients. In more severely displaced injuries, INFIX was used in 42.1% of patients, ORIF in 36.8%, and external fixation in 21.1%. 15 patients underwent INFIX, 11 underwent ORIF of pubic symphysis or innominate bone, 6 underwent external fixation, and 5 underwent isolated sacroiliac screw placement. Average pelvic deformity index reduction with INFIX was 35.9% versus 38.1% with external fixation ($P = 0.71$), and 51.4% with ORIF ($P = 0.78$). Average reduction of pubic diastasis with INFIX was 52.1% versus 41.4% with external fixation ($P = 0.34$), and 72.5% with ORIF ($P = 0.002$). Interrater reliability of pre- and postoperative measurements was 0.93 and 0.91, respectively. Full weight bearing with INFIX averaged 10.9 weeks, 12 weeks with external fixation, and 15.9 weeks with ORIF. Complications included 23 cases of lateral femoral cutaneous nerve (LCFN) neuritis (9 in INFIX patients), 2 cases of heterotopic ossification, 1 case of deep infection, and 1 case of hardware failure. Average follow-up was 1.2 years.

Conclusion: INFIX radiological reduction outcomes were comparable to traditional methods of anterior pelvic fixation. Consistent with prior anatomic and case series, a higher incidence of LCFN neuritis was reported in those patients with INFIX. In the cases of more severe injury, INFIX and ORIF were preferentially used over external fixation.