

## Clinical and Radiological Outcomes of the Anterior Subcutaneous Internal Pelvic Fixator

*Rahul Vaidya, MD; Adam Martin, BSc; Frederick Tonnos, DO; Bryant Oliphant, MD; Anil Sethi, MD;*

*Detroit Medical Center, Wayne State University, Ann Arbor, Michigan, USA*

**Background/Purpose:** The use of an anterior external fixator (Exfix) in the treatment of pelvic injuries is effective and may be lifesaving. Exfix is associated with pin tract infections (25%-50% of patients), osteomyelitis (7%), loosening (10%), loss of reduction (up to 33%), is difficult to use in obese patients, and can be restrictive to movement. The anterior subcutaneous internal pelvic fixator (Infix) device attempts to address these issues but has its own complications, which include heterotopic ossification (HO), lateral femoral cutaneous nerve irritation, loss of fixation, and recent reports of femoral nerve palsy. The purpose of this study is to evaluate our clinical and radiological outcomes with the Infix device over the last 6 years.

**Methods:** An IRB-approved retrospective study was performed. 73 patients who suffered an unstable fracture of the pelvic ring and were subsequently treated using Infix were included. 67 suffered a traumatic fracture, while 6 were pathologic fractures. 11 patients were placed in an Exfix before being converted to Infix. The patient population included 4 A, 37 B, and 36 C AO/OTA type injuries. The average ISS was  $23.21 \pm 11.26$  (range, 5-57), follow-up was 31.27 months (range, 12-80.37). Six patients died prior to 12-month follow-up unrelated to the device. BMI (body mass index) was  $27.1 \pm 7$  (with 30% over 30 and 18% over 35). Reduction and loss of reduction was measured using the "Keyshiyian cross method," injuries to the pubic symphysis were measured directly and healing was assessed by radiographs at each follow-up. Functional outcome was assessed using the Majeed pelvic scoring system. HO was judged as none, mild (diffuse or <15 mm), moderate (dense and >15 mm), and severe (dense and >30 mm).

**Results:** The average reduction of the pelvic injuries as measured using the Keshiyian method was 40.77%. The average reduction in pubic symphysis injuries was found to be 63.48%. Reduction was maintained after removal and all patients healed. HO was a common occurrence. We found absence of HO in 32% of patients (ISS 18.78), some HO in 32% (ISS 21.2), and severe 36% (ISS 25.62). HO severity was positively correlated with the ISS ( $P < 0.05$ ). HO was symptomatic in 2 patients, one we felt was directly related to the Infix and needed excision and the other not related to the Infix that led to an ankylosed hip that also needed excision. Other complications were pesitant paresthesias in the distribution of the lateral femoral cutaneous nerve (8 cases, none problematic at latest follow-up), problems with implantation of the device (3 cases in the first series), pain associated with the device (3 cases) leading to early removal, and surgical site infection (4 cases), but no instance of femoral nerve palsy. The Majeed outcome score (average  $78.87 \pm 13.91$ ; range, 47-100) rated the patients as excellent, 35%; good, 38%; fair, 23%; poor, 4% and was correlated with length of follow-up (>24 months 83.39 vs <24 months 72.67,  $P < 0.05$ ) and ISS.

**Conclusion:** Infix has benefits over an external fixator that make it more desirable for use in pelvic ring injuries but is not complication free. Most of the technical difficulties were noted in the original 30 cases performed. Good reduction was achieved and maintained until healing. Many patients had multiple injuries that affect outcome measures. Patients continue to improve over time and much improvement continues to take place after 24 months postoperatively.