

## **Treatment of pelvic ring non-unions: Does surgical treatment improve outcomes?**

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### **INTRODUCTION:**

Pelvic ring non-unions are infrequent but can be associated with long term functional impairment and disability. Moreover, the quality of life and mental state of this cohort of patients can be greatly affected leading to narcotics dependency and loss of employment. The purpose of this study is to report on the incidence of pelvic ring non-unions, treatment protocol and outcomes from a Level I trauma institution.

**METHODS:** Between 2010 and 2018 all consecutive adult patients who presented in our institution with the diagnosis of pelvic ring non-union were eligible to participate. Exclusion criteria were skeletally immature patients, and patients lost to follow up. Prospective data documented included patient demographics, mechanism of injury, type of injury and presence of associated injuries; open or closed injury, type of original fracture according to the Young Burgess classification, time elapsed between original injury and surgery carried out, type of surgery, graft material implanted, re-interventions and complications and functional status/clinical outcome. All patients were managed surgically taken into account the involvement of the anterior and or posterior pelvic ring, the state of the bone and patient co-morbidities. Surgery was carried out in a radiolucent table (OSI) with preoperative planning based on CT scans and acquisition of 3-D reconstruction models. Post-operatively patients were mobilising either partial weight bearing or in a wheelchair depending on the type of lesion. All patients received thromboprophylaxis (low molecular weight heparin subcutaneously-Tinzaparin 4.500 IU) for 8 weeks. Following discharge from the hospital patients were followed up at regular intervals in the outpatient clinic at 4,8,12 weeks, 6,9,12 months and as it was indicated thereafter. The minimum follow up time was 12 months (range 1-10 years). Visual analogue pain scale (VAS) was recorded prior to surgical intervention and at the time of hospital discharge. Quality of life was evaluated using the EUQuol-5D instrument. Descriptive statistics were used to evaluate differences in outcomes.

**RESULTS:** Out of 32 patients, 25 patients (16 females) with a mean age of 57.4 years (range 28-79 years) met the inclusion criteria. Original fracture distribution included: 7 LC-1, 5 LC-2, 2 AP-2, 1 AP-3 lesion; 4 iliac wing fractures; 3 sacral fractures Dennis II zone, 3 bilateral insufficiency fractures (Dennis I zone). In 3 cases there was involvement of the acetabulum (1 anterior column, 1 transverse posterior wall, 1 transverse fracture). Six patients had sustained polytrauma. The mean time from initial injury to the diagnosis of non-union was 11 months (range 7-24 months). All original fractures but one were closed injuries. In 60% of the cases the index injury was managed initially non-operatively. Subsequent reconstruction of the pelvic ring non-union included 18 ORIF procedures with plating, 5 retropubic screws, 8 sacroiliac screws, and 3 antegrade screws. In complete unstable lesions fixation was carried out in both the anterior and posterior elements of the ring. Autologous bone grafting from the iliac crest was used in 7 cases, RIA graft in one case and DBM in two cases. Revision of fixation due to failure prior to union was required in two cases. Cement augmentation was implanted in two cases for the insufficiency fractures. The mean time of surgery was 3 hours (range 1 to 6 hours). The mean hospital stay was 10 days (range 4 days to 4 weeks). No intraoperative bleeding events were recorded. Complications recorded included: 1 superficial infection that resolved with a course of oral antibiotics, 1 abscess that required surgical drainage, 1 left flank inguinal hernia repair, 1 urinary bladder tear due to adhesions that required repair, 1 right femoral head avascular necrosis necessitating subsequently total hip arthroplasty, and two lateral femoral cutaneous nerve palsies (one fully recovered after 9 months). One patient has been diagnosed with partial union of his sacrum but remains asymptomatic. The mean time to radiological union of 23 patients (patients with THA with partial union were excluded) was 11 months (range 2- 24). There was an improvement in the VAS score from an average of 7 points to 2 at discharge ( $p < 0.05$ ). Similarly, an improvement in the EuroQuol scores was observed after reconstruction, statistically significantly so, ( $p < 0.05$ ).

**DISCUSSION AND CONCLUSION:** Non-union of the pelvic ring remains a challenging complication. The treatment is mainly surgical, and complications are to be expected. However, adhering to a standardised protocol and following established principles of reconstruction good results can be expected as seen in this patient cohort.