

Chapter Four

Nonunion of Unstable Fractures of the Pelvis

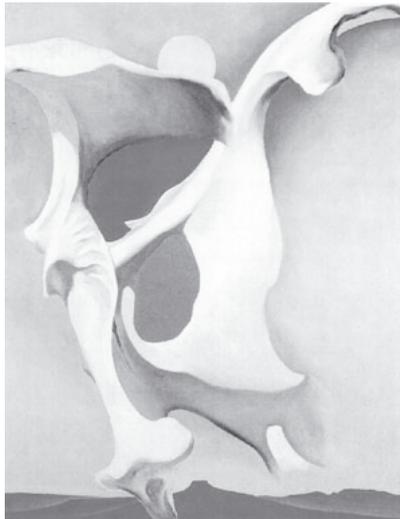
E.W. van den Bosch

R. van der Kleyn

C.M.A. van Zwienen

A.B. van Vugt

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SUMMARY

Background.

Nonunion after pelvic ring fractures is often disabling for the patient and difficult for the surgeon to treat. Little is known, however, about the functional outcome after treatment.

Methods.

All patients diagnosed with nonunion after an unstable pelvic ring fracture between 1st January 1990 and 1st May 1999 were evaluated, the health status was assessed using the SF-36 Health Status Questionnaire and a functional score based on Majeed.

Results.

Eleven patients presented themselves with nonunion after pelvic ring fracture. In five patients the initial treatment was surgery, six patients were treated conservatively. Pain was the main complaint in most patients. All patients had been operated, which led to an improvement of their complaints. However, post-operative limitations in physical functioning were seen in several cases.

Conclusions.

Persistent pain after pelvic ring fracture may indicate the presence of nonunion, which is often only visible on computed tomography. Internal fixation can improve complaints and quality of life, although some limitations may persist.

INTRODUCTION

Nonunion after fractures of the pelvic ring is thought to be rare and little can be found in the literature about the occurrence and treatment of this long term complication. However research has shown that nonunion is not uncommon and poses a difficult problem for both surgeon and patient¹⁻³. Due to modern operative techniques the treatment of nonunion usually leads to good bone consolidation yet little is known about the functional outcome of these patients. The present study examines the quality of life after internal fixation of nonunion of unstable pelvic ring fractures.

MATERIAL AND METHODS

Between January 1st 1991 and May 1st 1999 eleven patients were seen at the department of Traumatology of the Erasmus Medical Center Rotterdam with nonunion after an unstable pelvic ring fracture. The fractures were classified according to the Tile classification. Nonunion was diagnosed with anterior-posterior, inlet and outlet radiographs and additional C.T. scans when required. Nonunion was defined as a lack of bony consolidation six months after the initial trauma. A Dutch version of the SF-36 Health Status Questionnaire and a questionnaire based on the functional score of Majeed were given to each patient and each patient was examined clinically. The SF-36 Health Status Questionnaire is composed of thirty-six questions, divided into 8 categories (physical functioning, social functioning, physical and emotional role, mental health, general health, vitality and bodily pain). Several authors have used the SF-36 to score outcome after pelvic traumas⁴⁻⁶. The second outcome score used is a functional grading scale devised by Majeed et al, scoring both physical functioning and daily activities on a scale from 0 to 100⁷. Physical examination included muscle strength, deep tendon reflexes, sensation, gait and leg length discrepancy. The active Straight Leg Rising (ASLR) test, which is a sensitive test for pelvic mobility, was positive when active flexion against resistance was possible with manual compression of the posterior pelvic ring and not without compression⁸.

For comparison we used data from a previous study of 33 patients who were treated for a fresh unstable pelvic fracture. 24 men and 9 women with an average age of 33.5 years were operated for 14 B type and 19 C type fracture using the same technique. The overall follow-up was 29 months⁴.

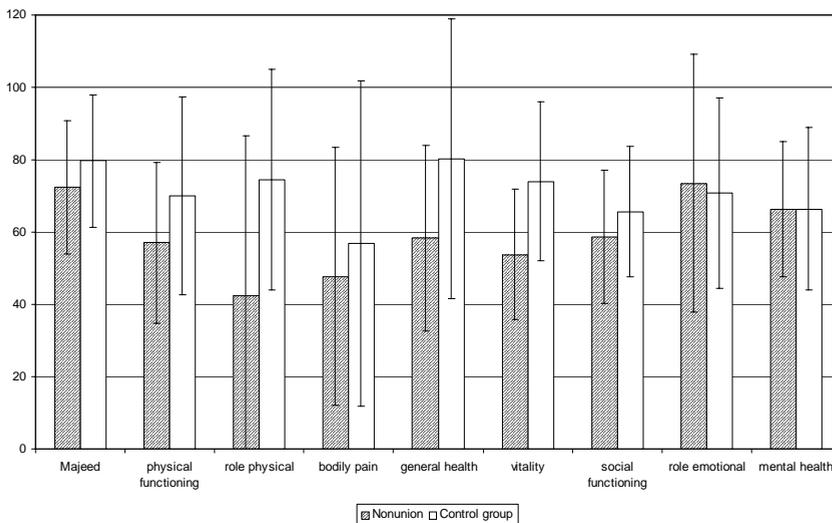
RESULTS

In this period eleven patients, five men and six women, were seen at our hospital for nonunion after an unstable pelvic fracture. The average age was 40.7 years (range 23-56 years). In five patients the initial trauma was a motor vehicle accident, in two a fall from height, one resulted from crush injury and the remaining three resulted from other accidents. Tile classifications were as follows: three B1, three B2, three C1 fractures, one C2 and one C3 fracture. Initially all but one patient with C-type fractures were treated operatively. The B-type lesions were treated with analgesics and/or bed rest, in one patient an external fixator was used. The average time between trauma and presentation with nonunion was 2.9 years.

All patients presented themselves with pain complaints and were found to have a positive ASLR-test, except one, in who nonunion was accidentally discovered when the patient was involved in a new trauma resulting in a separate pelvic fracture.

The average follow-up was 31 months (16 to 67). The outcome on the Majeed and the SF-36 are shown in graph 1. The scores of our control group are shown for comparison. On the SF-36 the role physical, vitality and general health were notably reduced in the nonunion group compared to the control group.

Nine patients stated that the fixation had improved their complaints and quality of life, the others stated that it had not improved. There was one complication; one patient suffered from a neuropraxia of the lateral cutaneous femoral nerve.



Graph 1. SF-36 and Majeed scores for nonunion versus control group (post fracture). Averages and standard deviation.

ILLUSTRATIVE CASES

Case 1. A 42-year-old male suffered an unstable pelvic ring fracture after a fall of six meters. The radiological examinations showed a complete symphysiolysis and a left-sided vertical fracture of the sacral bone with dislocation. The patient underwent internal fixation of the pubic bone using two DC-plates. The sacral fracture was treated with additional external fixation. Five years later we saw the patient as part of our follow-up study into unstable pelvic ring injuries. The patient still complained of pain in the left sacroiliac region. A C.T. scan showed nonunion of the sacral fracture. The patient was operated using two percutaneous canulated titanium Biomet® screws crossing the sacroiliac joint and the nonunion zone as a lagscrew. Three months later a new C.T. scan showed good bone consolidation. His Majeed score had increased from 71 to 89. The patient was very satisfied with the results.

Case 2. A 48 year old male suffered multiple injuries when his parachute opened up between his legs during a jump. Among his injuries he had posterior dislocation of the left hip, a symphysiolysis, a complete dislocation of his right sacroiliac joint and a fracture of his right sacral bone (Tile C1.3, figure 1). He was treated urgently because of haemorrhagic shock and urethral rupture. The symphysis was fixated with an AO plate, the posterior injury was treated conservatively. After four days he was operated for a posterior wall fracture of the left acetabulum. Eight months later he was referred to us with disabling pain in the right buttock. Two percutaneous canulated titanium sacroiliac screws were inserted posteriorly and two small AO reconstruction plates anteriorly, because of a



Figure 1. X-ray of initial trauma, showing a posterior dislocation of the left hip, a symphysiolysis, a complete dislocation of the right sacroiliac joint and a fracture of the right sacral bone

nonunion of the sacrum fracture and right sacroiliac joint, and material failure of the anterior osteosynthesis (figure 2 a+b). Eight months later, radiological examination showed total consolidation of all the fractures. Due to mild pain the patient changed to a less physically demanding job, but was thinking about jumping again. The direct postoperative X-ray, and the C.T. after 8 months are shown in figure 3. Although the postoperative score on the Majeed was 68 and his scores on the SF-36 were below average, partly because of urological problems due to the initial trauma, the patient was satisfied with the results.

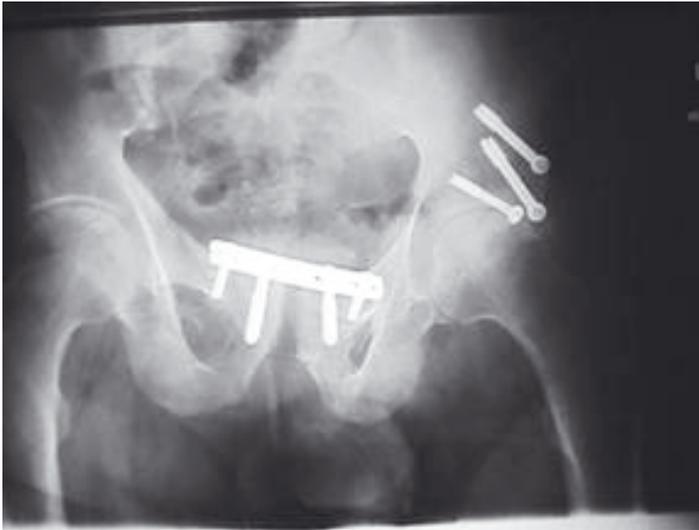


Figure 2. X-ray (8 months after initial trauma) showing a) Loosening of the plate osteosynthesis scan

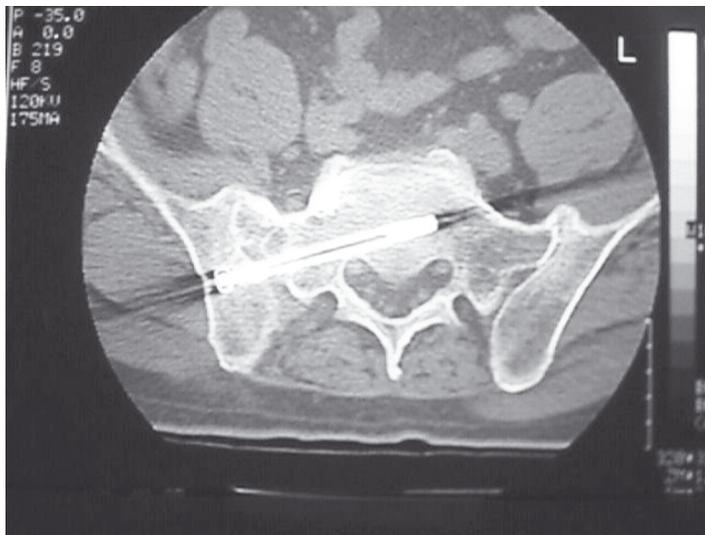


b) Hypertrophic nonunion of the right sacroiliac joint on C.T.



Figure 3.

a) Direct postoperative results showing plate osteosynthesis of pubic bones and (percutaneously inserted) cannulated sacroiliac screws posteriorly.



b) Postoperative C.T. scan after 4 months. Union of the sacroiliac joint and sacroiliac screw positioned in the first sacral body (compression lag-screw penetrating the cortex of the iliac bone).

DISCUSSION

Nonunion seems to occur most often after conservative or suboptimal operative treatment of unstable fractures of the pelvic ring (Tile classification B or C)⁹. This can be seen in the two cases described in detail above, where at the time internal fixation of the posterior fracture was not deemed necessary. Although there is little evidence that internal fixation might reduce the incidence of nonunion, except for a study by Matta¹⁰, all patients received a, in our opinion, suboptimal treatment for their fractures. Therefore we recommend internal fixation anterior for B-type fractures and combined anterior and posterior pelvic ring fixation for C-type pelvic ring fractures.

Pain is often the main complaint of patients with nonunion, especially if it involves the sacrum or sacroiliac joint. The Active Straight Leg Raising test was positive in all cases, in one case, however, nonunion of the sacrum did not give any complaints and was only discovered by coincidence.

Although the dislocation in patients with malunion is usually easily seen on normal radiological examinations, nonunion is often difficult to identify, especially if it involves the posterior pelvic ring. We therefore recommend C.T. scan in all patients where pain persists after the normal recovery period.

If nonunion is present it is advisable to refer the patient to a surgeon specialising in pelvic surgery, as these operations are usually technically difficult, especially if the nonunion is combined with malunion. For nonunions where there is no or little malunion and no significant leg length difference we recommend using percutaneous sacroiliac lagscrews since they are minimally invasive and give good compression of the nonunion zone. If anterior nonunion coexists anterior plate or pubic screw fixation is required. In cases where there is significant malunion open posterior reduction may be required. Nine patients stated that surgery reduced the complaints and improved quality of life. However considerable differences between the nonunion group and the control group, specifically role physical, vitality and general health on the SF-36 score, were seen.

Nonunion of pelvic fractures is probably not as rare as once thought and is a complication that the trauma surgeon needs to be aware of as treatment can lead to a better quality of life for the patient.

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