CASE REPORT

Anterior Stabilisation of Sacroilliac Joint for Complex Pelvic Injuries

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Abstract

Sacroilliac joint diasthesis from high energy trauma is always complicated with chronic pain and long term morbidity. Open anterior stabilisation with plate allow direct reduction and stabilisation with biomechanically advantages. Here we report on four cases of pelvic injury with sacroiliac joint disruption treated with anterior plate stabilisation through a surgical approach similar to that used for anterior ring fractures.

***Keywords*:** *Pelvic fracture, internal fixation, anterior, sacroiliac joint*

Introduction

High-energy pelvic ring injuries represent a severe injury involving major disruption of the bony pelvis, ligament and surrounding soft tissues. Definitive stabilisation of the pelvic ring disruption remains a challenge for the managing team. Anterior external fixation is useful in acute situations to reduce pelvic volume and control haemorrhage; however, definitive anatomical reduction and stabilisation, particularly of the sacroiliac joint, is important to minimise chronic pain and long-term morbidity (1,2,3,4).

Case reports

Case 1

A forty-three-year-old offshore worker sustained multiple injuries after an electric pole fell and hit his right thigh and pelvis. He presented in casualty, fully conscious with tachycardia and blood pressure of 90/50 mmHg. Initial resuscitation with fluid and four pints of blood were able to stabilise his blood pressure. The trauma team review revealed that he had symphysis pubis diathesis of 2 cm and right sacroiliac joint disruption. There was no urethral injury and minimal bruises were seen over the perineal region. He also sustained grade 1 open fracture of the right femur, closed diaphyseal fracture of the right tibia, closed segmental fracture of the fibula and avulsion fracture of the medial malleolus.

The open fracture of the right femur was debrided eight hours after the injury. The right femur, tibia and malleolus fractures were stabilised with plates and screws. Surgery was uneventful as only two pints of blood were required and the coagulation profile was normal throughout. We proceeded with symphysis pubis plating and used a retroperitoneal approach to the sacroiliac joint for plate stabilisation. Bleeding was controlled; blood loss for pelvis surgery was estimated to be 500 mL and the patient did not require any additional transfusion. He was observed in the intensive care unit for twelve hours. However, the coagulation profile was slightly abnormal and was corrected with four units of plasma and cryoprecipitate. The patient was able to sit after three days and ambulated with crutches seven days later. At present, 3 years after injury, he has full function with no disability and chronic pain (Figure 1).

Figure 1: Symphysis pubis diasthesis with right sacroiliac joint vertical dislocation. Fracture reduced through anterior approach and stabilised with plate and screws.

Case 2

A nineteen-year-old motorcyclist sustained a head-on collision with a pick-up truck at the speed of approximately 100 km/h. He sustained multiple fractures of the limbs as well as pelvic injury. The hypovolaemia was transient and the patient was managed with a 3-pint blood transfusion. The pelvis was initially stabilised with external stabilisation; femoral and tibia fractures were stabilised with plates and screws within 24 hours of injury.

Further pelvic evaluation revealed a bi-columnar acetabulum fracture with central hip dislocation. The posterior sacroiliac joint was disrupted anteriorly; however, the posterior ligamentous structure remained intact (Figure 2A,B). The acetabulum was reduced and stabilised with long reconstruction plate and L-buttressing plate. The anterior sacroiliac joint was reduced and stabilised using a similar plate from the alar of the sacrum (Figure 2C). At present, 2 years after the injuries, the patient is ambulating pain-free with full hip motion and working as a petrol station attendant.

Case 3

A forty-year-old gentleman was found stuck under a fallen log. He was brought to casualty in a hypotensive state; emergency external stabilisation to the pelvic bone and eight pints of blood and fluid resuscitation were able to regain normotension. Emergency pelvic radiograph revealed complex fracture of the acetabulum, pelvic rami and iliac wing fracture. The ipsilateral sacroiliac joint was also disrupted and displaced (Figure 3A); otherwise no other injury was noted.

The fracture was stabilised through an extended ilio-inguinal approach. A long plate was placed from the alar of the sacrum at the medial iliac wall across the contra-lateral symphysis pubis. Further augmentation with another plate at the sacroiliac joint and ileum were able to achieve stable fixation (Figure 3B). At present, 1 year after the injuries, the patient has returned to his previous occupation with pain-free and full motion of the hip joint.

Case 4

A twenty-two-year-old woman presented with hypovolaemic shock following a motor-vehicle accident. Initial assessment revealed intra-abdominal bleeding and severe pelvic disruption (Figure 4A). Emergency laporotomy identified multiple serosa bleeding with 500 mL of blood collected. Twelve pints of blood and temporary external fixation were able to stabilise the patient haemodynamically.

She underwent definitive stabilisation of the pelvic ring ten days later through bilateral ilio-inguinal approach. The entire pelvic ring was stabilised with a reconstruction plate and the sacroiliac joint was stabilised with two anterior plates (Figure 4B). The incomplete trans-foramina sacral fracture was not fixed with any metal implant, as the pelvic ring was stable throughout the intra-operative spring test. At present, the patient was pain-free and able to walk unaided at three months after surgery.

Discussion

Patients with unstable pelvic fracture usually present with complex problems to the trauma team or orthopaedic surgeon. These injuries are the result of high-energy trauma, which places patients at risk of multiple life-threatening injuries. The aims of management are rapid and accurate initial assessment including x-rays and CT-scan, as well as provisional stabilisation of the pelvic ring by either external fixation or pelvic clamp to maintain haemodynamic stability. Surgical management of severe pelvic ring fracture includes life-saving surgery, "damage-control orthopaedic surgery", early total care and delayed definitive surgery (5,6). However, the displaced pelvic ring disruption has to be reduced and stabilised to prevent a long-term disability.

High-energy pelvic ring disruptions occur in predictable locations. Combination injuries, which occur in the anterior pelvic ring (particularly the pubic rami) and anterior column of the acetabulum with sacroiliac joint disruption, are common in

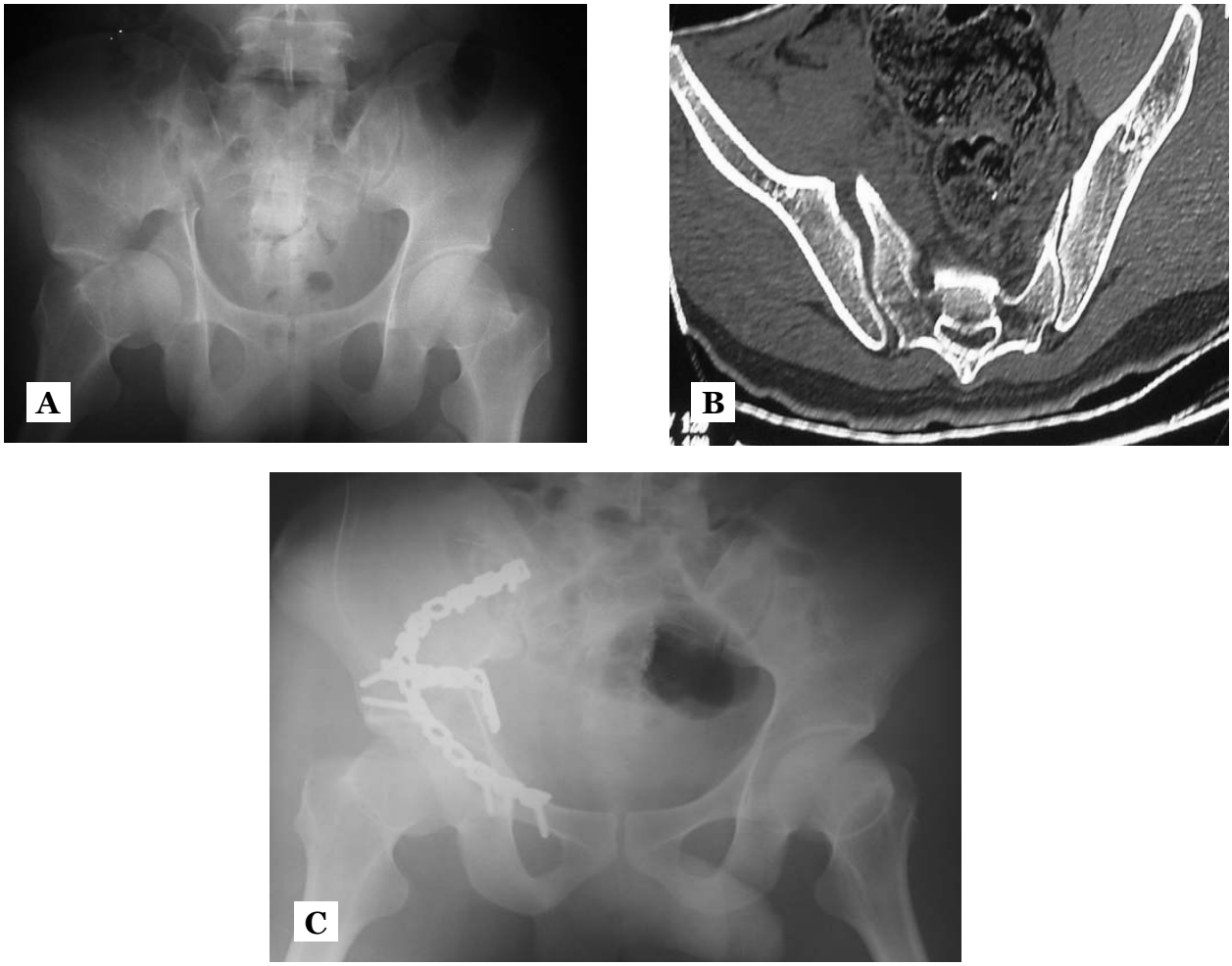

Figure 2: 2A. Bi-columnar transverse acetabulum fracture. **2B.** Sacroiliac joint disruption confirmed on CT scan. **2C.** Acetabulum and sacroiliac joint reduced and stabilised using a single reconstruction plate through the ilio-inguinal approach.

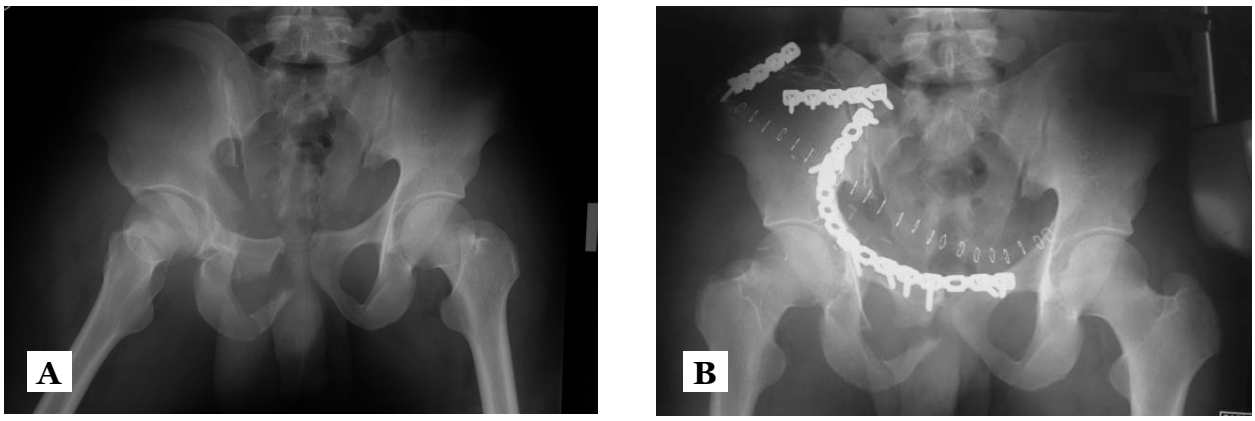

Figure 3: A. Radiographs showing complex bi-columnar acetabulum fracture with sacroiliac joint diasthesis. This resulted in floating segments of the ileum and grossly unstable pelvis. **B.** Acetabulum fracture was reduced and the medial segment of the pelvis was stabilised with a long plate. Sacroiliac and ileum fracture was adequately stabilised for early rehabilitation of the patient.

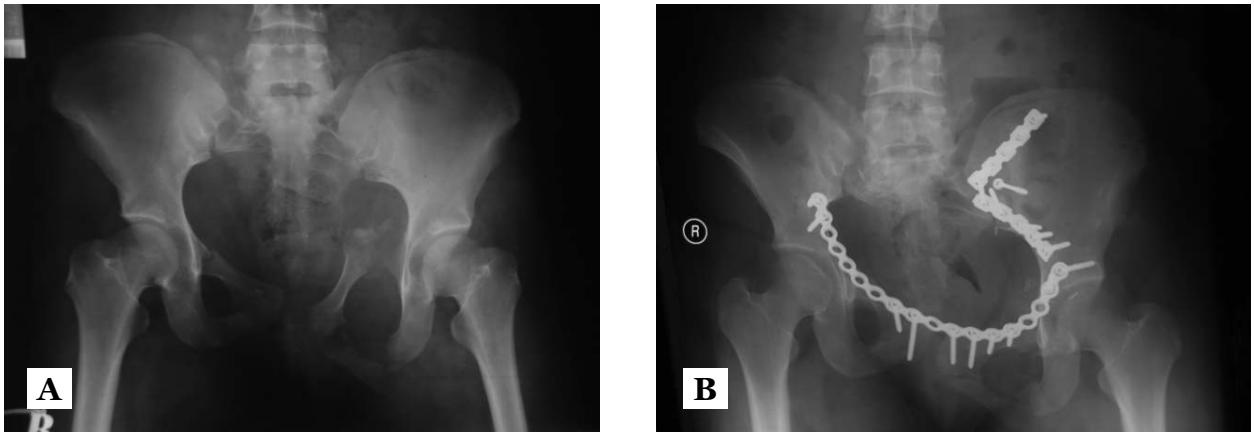

Figure 4: A. Severe pelvic ring disruption and unstable pelvis; symphysis pubis diasthesis, left superior and inferior pubic rami fracture, left sacroiliac joint and un-displaced trans-foramina sacral fracture. **B.** The fractures are entirely stabilised with a ring reconstruction plate and two sacroiliac joint plates.

high-energy trauma. Emergency temporary pelvic stabilisation has led to increased survival after pelvic fracture (5,6). A pelvic external fixation frame will stabilise the pelvis, as well as secure the tamponade effect and haematoma formation in the context of ongoing venous bleeding. Pelvic anti-shock clamp may be used to stabilise posterior pelvic ring injury to limit pelvic ring expansion and to control continuous bleeding. However, both constructs have limited roles, especially when the pelvic column is involved and the iliac bone is fractured, as shown in our cases.

Pelvic external fixator alone rarely provides sufficient stability to be used as definitive treatment in high-energy pelvic ring disruption. Lindahl et al. found that pelvic fixation is useful in acute resuscitation but it is of limited value in definitive treatment of unstable type C or even open-book injury (7). Pelvic fixation controls instability, decreases bleeding, diminishes risk of chronic pain and allows early patient mobilisation. Pelvic stability should be achieved immediately after injury, and it plays a vital part in the resuscitation of patients experiencing ongoing haemorrhage (6).

Early pelvic stabilisation has been shown to improve patient outcome (2,3,4,8). The suitable time for definitive stabilisation has been subjected to debate, due to a lack of clear evidence in the literature (6). Haemodynamic stability and local CT scan contrast evaluation for retroperitoneal bleeding are important factors in determining whether early surgical stabilisation is justified. The first case illustrated that early internal pelvic stabilisation did not increase additional risk, provided that the patient was haemodynamically stable throughout the initial resuscitation surgery.

Unstable posterior pelvic disruption such as dislocation of the sacroiliac joint is always complicated with significant disability (1). Adverse consequences of non-operative treatment include leg-length discrepancy, rotational mal-union; prolonged recumbency, delayed neurological compromised and chronic pain (1). Numerous techniques with variable success have been described to overcome this problem. These include anterior plate stabilisation and the posterior iliosacral screw-through percutaneous technique or open methods (2,3,4,8,9). Sacroiliac plating allows direct visualisation of the joint, removal of any intra-articular debris and anatomical reduction of the unstable disrupted sacroiliac joint (2,9). Our approach is anterior because a similar approach was used successfully to stabilise the symphysis pubis diasthesis. Furthermore, extensile Letournel surgical approach for reconstruction of acetabulum fractures provides excellent exposure of the sacroiliac joint for reduction and stabilisation. Lumbar 5 nerve root can be visualised and a nerve injury is preventable.

More than two-thirds of patients with surgically treated unstable pelvic injury returned to their original occupation without any disability, however neurological impairment may compromise the final outcome (1). Open reduction and definitive internal stabilisation provide the best long-term clinical results. Successful treatment of high-energy pelvic injuries relies on early intervention, accurate reduction, stable fixation and low rates of associated injuries and complications.

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