Trauma Case Reports 20 (2019) 100169

Contents lists available at ScienceDirect

Trauma Case Reports

journal homepage: www.elsevier.com/locate/tcr

Case Report

Nonunion fragility fracture of the pelvis with complication from bladder rupture: A case report

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ARTICLE INFO

Keywords:
Fragility fracture of the pelvis (FFP)
Pelvic ring fracture
Bladder rupture
Nonunion

ABSTRACT

The incidence rate of bladder rupture associated with pelvic ring fractures is reported to be about 5–10%, mostly occurring at the time of injury. Fragility pelvic ring fractures are reported to increase fracture displacement or become nonunion if they are treated inadequately. Few case reports on bladder rupture associated with fragility pelvic ring fracture have been published. We report a rare case of delayed bladder rupture associated with a fragility fracture of the pelvis.

A 65-year-old female felt right hip pain without sustaining any trauma. She was diagnosed with a right pubic rami fracture. However, her pain deteriorated, and a sacral fracture was identified one month later. She was prescribed teriparatide, but her pain worsened and she was referred to our hospital. She was diagnosed with fragility fracture of the pelvis (Rommens classification type IVb) and was treated operatively. During the surgery, her thin bladder wall, which was compressed by a displaced pubic fragment, was torn and repaired.

This is the first report describing a fragility fracture of the pelvis associated with a bladder rupture. Our treatment led to a successful result.

Introduction

Fragility fractures of the pelvis (FFPs) have been recently reported; these publications have attracted a great deal of attention because of the increasing number of elderly patients with underlying osteoporosis [1].

Pelvic ring fractures in young patients occur following high energy trauma. In contrast, FFPs present in the elderly after low energy mechanisms such as a fall from a standing height. Sometimes, FFPs proceed to destructive nonunion fractures because of inadequate treatment.

Bladder ruptures associated with pelvic ring fracture in young patients have been reported, but only a few reports describing cases of bladder rupture associated with FFPs are available in English. We report a case of a bladder rupture associated with an FFP and our treatment, which led to a successful outcome.

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https://doi.org/10.1016/j.tcr.2019.100169
Accepted 4 February 2019
Available online 13 February 2019

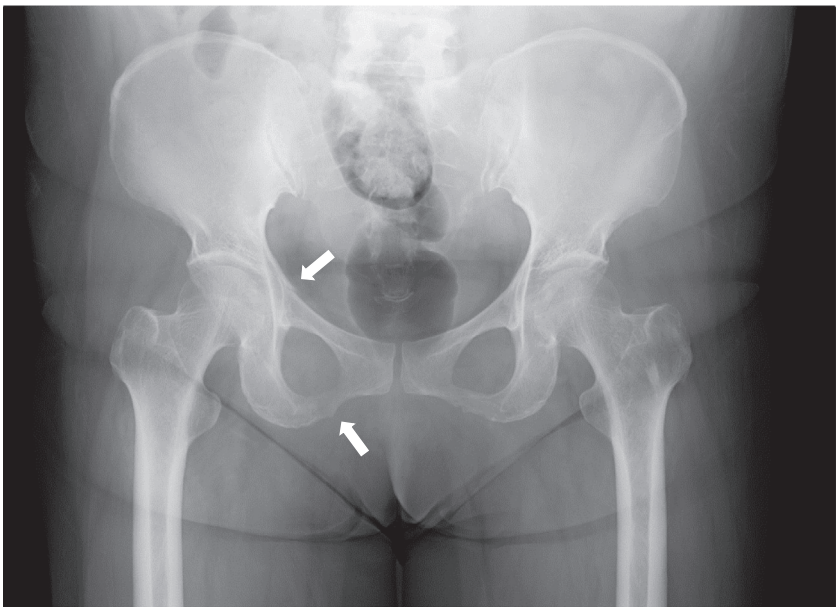

Fig. 1. X-ray image of pelvis at injury: white arrow shows fracture line.

Case report

The patient was a 65-year-old woman with a surgical history of cesarean delivery, as well as diabetes mellitus and depression. She suddenly experienced right coxalgia without any trauma history and went to the orthopedic department of another hospital. She was diagnosed with right inferior and superior rami fractures and conservative treatment was started (Fig. 1). Physiotherapy was started the day after hospital admission. After one month, she felt more severe right coxalgia and could not walk. Radiographic and computed tomographic (CT) scanning of the pelvis revealed displacement of pelvic fracture and sacral fracture (Fig. 2). Skeletal traction

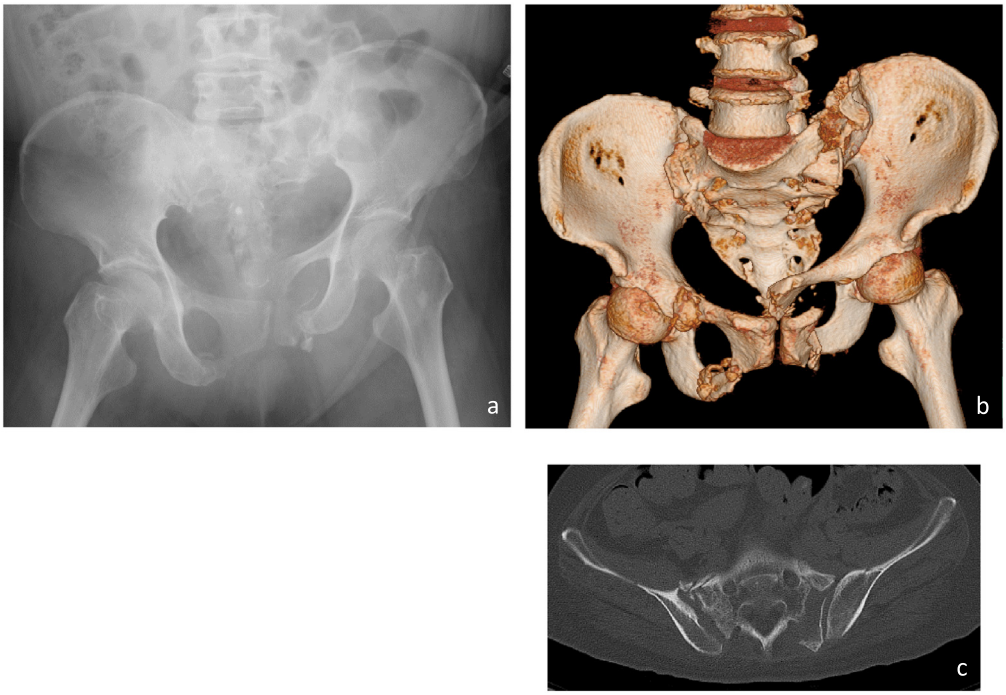

Fig. 2. a, b, c X-ray, 3DCT and axial CT slice of pelvis at one month after injury.
a, b: X-ray and 3DCT image showed both sacral fractures and left vertically displaced rami fracture.(FFP type 4b).
c: Vertical fracture line separates the sacral ala from neuroforamina.

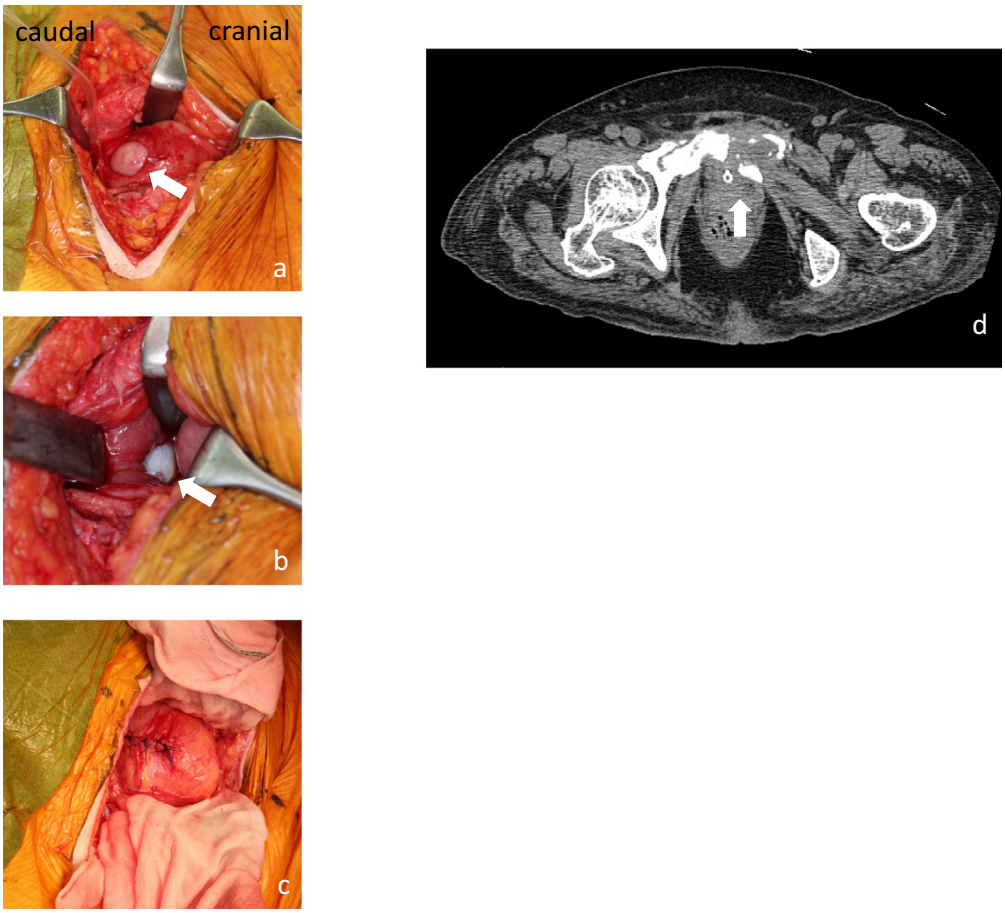

Fig. 3. a, b, c Intraoperative photograph d, axial CT slice of the pelvic fracture at our hospital visit.
a, b: White arrow indicates defect in bladder wall.
c: Bladder wall defect was sutured by urologist.
d: Rami bone fragment compress the bladder wall.

and medication with teriparatide were started. However, bone union and relief of the right coxalgia were not identified, at which time the patient was referred to our hospital.

CT showed both inferior and superior rami fracture and Denis Zone 2 sacral fracture with vertical displacement. We diagnosed the patient with FFP IVb according to Rommens Classification. Bone mineral density by dual energy X-ray absorptiometry (DEXA) was investigated. Preoperative T-scores of the lumbar was −1.4 and proximal femur was −1.1, which we diagnosed as osteopenia. Urine type I collagen cross-linked N-telopeptides showed 259 nmol BCE/mmol Cr, which is an abnormal increase for older postnatal woman. We considered that she may have an osteoporotic bone.

We planned surgical treatment combined with posterior fixation with spinal instrumentation and anterior fixation with reconstruction plate. First, we performed lumbosacral fixation with spinal instrumentation from L3 to ilium in the prone position, and about 10 mm of vertical displacement was reduced. After changing the body position to decubitus position, anterior fixation with a modified Stoppa approach was performed. While performing the anterior procedure, we found focal bladder wall thinness and identified a Foley catheter balloon that was inserted preoperatively (Fig. 3a). Preoperative CT showed bladder wall thinness and compression of the thin wall by the fragment (Fig. 3d). A finger technique to divide the adhesions easily tore the wall (Fig. 3b) and urine overflowed into the intrapelvic area. We consulted a urology doctor and bladder wall repair was performed (Fig. 3c). After that, her superior rami fracture was fixed with a reconstruction plate (Fig. 4a). The patient was transferred to her previous hospital without any other complications at day 14 after surgery with continuation of teriparatide treatment.

Six months after surgery, bone union was identified with CT scan and she could walk aided by one crutch without pain (Fig. 4b). Finally, we followed up on her for 14 months, during which no obvious problems occurred.

Discussion

The incidence rate of bladder rupture associated with pelvic ring fracture is reported to be about 5–10%, with most cases

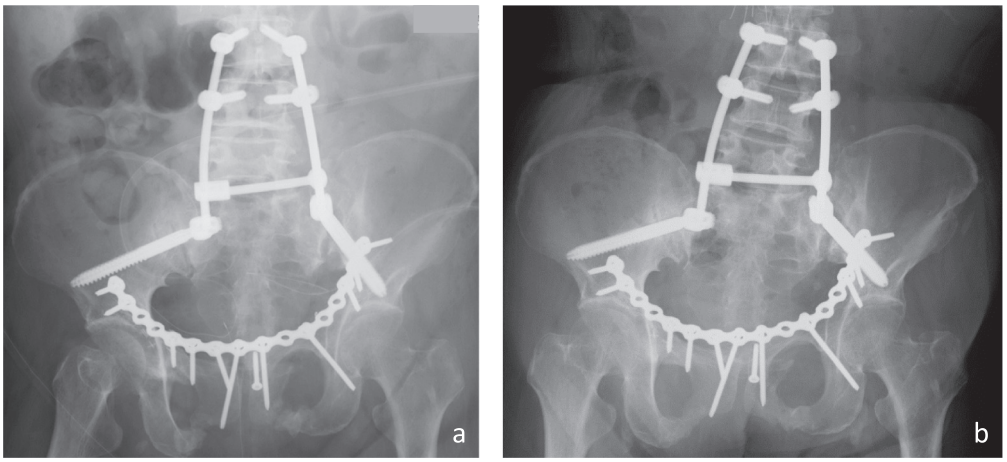

Fig. 4. a, b X-ray image of postoperative and final follow-up.
a: Postoperative X-ray.
b: At final follow-up (14 months after operation).

occurring at the time of injury [2,3]. However, very few cases of bladder rupture associated with FFP have been reported [4,5]. We experienced a bladder rupture associated with a nonunion FFP. Min reported a case of the delayed bladder rupture associated with malunion of pelvic ring fracture [5]. Seven months passed when the bladder rupture was identified. The cause of the bladder rupture was an internally projecting rami fragment entrapping the bladder wall. Dotchin reported a case of delayed displacement of a pelvic ring fracture causing a bladder rupture in an elderly woman [4]. This case may have had the same mechanism of injury as our case, but interpretation of FFPs was not widespread in those days and the term “FFP” was not used in the paper.

In our case, the cause of the delayed bladder rupture is considered due to the increasing pelvic ring fracture displacement and displaced fracture fragment compressing the bladder wall and gradually leading to bladder wall penetration. Rommens reported the concept of the FFP and it has widely spread [1]. In his literature, he stated that FFPs could show progressive displacement of the fracture. Penetration of the displaced rami fragment threatened the bladder wall due to continuous compression. Finally, intraoperative exposure in front of the bladder revealed its rupture. Moreover, our patient's history of cesarean delivery might have influenced the bladder rupture. During the anterior approach, adhesion from a previous surgery was identified.

This bladder rupture was partly iatrogenic, but repetitive compression and abrasion of the bladder wall by the displaced fragment might also lead to bladder rupture. Rupture would not be avoidable because we detached tissues very carefully before identifying the impending bladder wall tear. To expect and respond to this scenario, preoperative examination including CT to check rami fragment located close to the bladder and preparing for the repair of bladder rupture are needed. Consideration of a patient's history, especially previous abdominal surgery, is also needed before going to the operating room.

We conclude that health care professionals should consider the risk of bladder rupture in cases of nonunion or progressive displacement in FFPs.

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