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Case Report

Isolated Bilateral Sacroiliac Joint Dislocation Managed by Closed Reduction and Internal Fixation: A Case Report

Ali Yeganeh[1], Shayan Amiri[2], Mahan Babaei[3], Mehdi Komijani[4,*]

[1] Associate Professor, Department of Orthopedics, Bone and Joint Reconstruction Research Center, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
[2] Assistant Professor, Department of Orthopedic Surgery, Shahadaye Haftome Tir Hospital, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
[3] Students' Scientific Research Center, Center for Orthopedic Transdisciplinary Applied Research (COTAR), Tehran University of Medical Sciences, Tehran, Iran
[4] Assistant Professor, Department of Orthopedics, Center for Orthopedic Transdisciplinary Applied Research (COTAR), School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

[*] Corresponding author: Mehdi Komijani; Center for Orthopedic Transdisciplinary Applied Research (COTAR), Tehran University of Medical Sciences, Tehran, Iran.
Tel: +98-9396932967; Email: dr.m_komijani@yahoo.com

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Abstract

Background: Dislocations of the bilateral sacroiliac (SI) joint are serious injuries. It is extremely rare to experience SI joint dislocation without fracture or disruption of the anterior pelvic ring. Even though SI dislocations can be fixed via several different methods, the surgical technique should be tailored to everyone based on the patient's injuries. The treatment of these fractures with operative intervention remains difficult because of the possibility of other injuries associated with the fractures. Only three cases of this type of injury treated with open reduction and internal fixation (ORIF) have been reported in the literature.
Case Report: A 15-year-old girl presented with high-energy trauma. In the left hand, she had a fracture-dislocation of the wrist; in the right ankle, she had a pilon fracture and a calcaneus fracture. Her pelvis had a bilateral SI dislocation without a fracture in the pelvic ring. After hemodynamic stabilization, surgical management was performed for the wrist fracture-dislocation, as well as the pilon and calcaneus fractures. Four days later, the bilateral SI dislocations were fixed. We performed closed reduction and internal fixation (CRIF) due to the patient's situation and the high risk of infection. At the last follow-up, the fracture had united, and the patient experienced no discomfort in performing her daily activities.
Conclusion: While the optimal method for fixing this injury is unclear, ORIF is the conventional approach for similar cases. However, in this case, CRIF was chosen due to disadvantages associated with ORIF, such as nerve damage, swelling, incomplete bone healing, increased pressure, blood clots, and our patient's situation.

Keywords: Sacroiliac Joint; Hip Dislocation; Closed Fracture Reduction

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Background

Bilateral sacroiliac (SI) joint dislocation is a rare injury pattern, in contrast to bilateral fracture dislocations of the SI joint (1). The incidence of pelvic dislocation of the SI joint without significant bone structural damage is most likely due to high-energy trauma, mostly in young children or adolescents (1, 2). Importantly, dislocation of the SI joint can cause serious damage to the surrounding visceral, vascular, and neural structures in addition to the SI joint itself (3). The posterior pelvic ring accounts for 70% of the body's weight (4); therefore, restoring its integrity is essential for the treatment of dislocations of the SI joint. The definitive treatment for pelvic dislocations is internal fixation (5). For the fixation of SI joint dislocation, various techniques are currently available, including anterior or posterior SI plates, iliosacral screws, sacral bars, tension band plates (TBPs), spinopelvic fixation systems, and pedicle screw-rod fixations (6-10). Each type of fixation has advantages and disadvantages. Dislocation of the SI joint presents a challenge to orthopedic surgeons in choosing the best treatment. The ideal strategy for the reduction and fixation of this injury is poorly described in the current literature. In the literature, four reported cases of bilateral SI joint dislocation without associated fracture or anterior pelvic ring disruption have been reported (1, 3, 11, 12).

Case Report

The patient was a 15-year-old girl who fell from the fourth floor of a building and experienced pain in the pelvis, pain and deformity in the left wrist, and pain and deformity in the right ankle. The patient was conscious when she went to the emergency department (ED). The results of neurological and vascular examinations of the lower limbs and sensation around the perineum were normal, as well as the anal sphincter tone. Besides, the patient's hemodynamics were stable. Radiographs and computed tomography (CT) scans were acquired. In the left hand, there was a fracture-dislocation of the wrist; in the right ankle, there was a pilon fracture and a calcaneus fracture; and in the pelvis, the patient had a bilateral SI dislocation without a fracture in the pelvic ring (Figures 1 and 2).

Figure 1. X-ray of the pelvis with bilateral sacroiliac (SI) dislocation and no associated pelvic ring injury

Figure 2. Three-dimensional (3D) computed tomography (CT) reconstruction of the pelvis with dislocations of the sacroiliac (SI) joints

In the ED, the wrist fracture-dislocation was reduced and the extremity was immobilized in a splint. A short leg splint was applied for the patient's pilon and calcaneus fractures. Bilateral skeletal traction of the distal femur was used for the patient.

Owing to the presence of pelvic hematoma, the patient was taken under the supervision of the surgery service. On the fourth day of hospitalization, the patient underwent open reduction and internal fixation (ORIF) surgery for the pilon fracture. On the seventh day of hospitalization, the patient was transferred to the operating room for bilateral SI dislocation surgery. After general anesthesia, the patient was placed in the prone position. Bed sores were present in the sacrum region. First, under the C-arm CT guidance, traction was applied to the lower limb while medial translation force was applied to the greater trochanter in an attempt to achieve better reduction of the SI joint. Therefore, a decision was made to perform closed reduction and iliosacral screw insertion. After the patient was prepared and draped in the prone position, traction was first applied to the left side by the orthopedic assistant through the distal femur pin, and a medial translation force was applied by another assistant under the C-arm CT guidance. Initially, the fixation was performed using a few 2.5-mm pins, and finally, it was fixed in the left SI joint with two iliosacral cannulated screws of 110 and 40 mm. On the right side, traction and medial translation force were applied, and reduction was performed by the orthopedic assistants. On this side, the reduction was first maintained with 2.5-mm pins, and finally, under the C-arm CT guidance, two iliosacral cannulated screws of 110 and 40 mm were inserted (Figure 3). At the same time, we finished traction when screw insertion was finished.

As soon as the patient recovered from the surgery, we performed a neurosensory examination. The examination was normal, which included satisfactory sensation in the perineum and normal anal sphincter tone.

Discussion

A variety of posterior pelvic injuries can occur as a result of high-energy injuries, such as sacral fractures, SI fracture-dislocations, spondylopelvic dissociations, and pure dislocations of the SI joints. Among adult trauma patients, pelvic injuries are uncommon, occurring in approximately 3% to 8% of cases (13, 14). As a result of these pelvic injuries, the surrounding structures are usually disrupted (15).

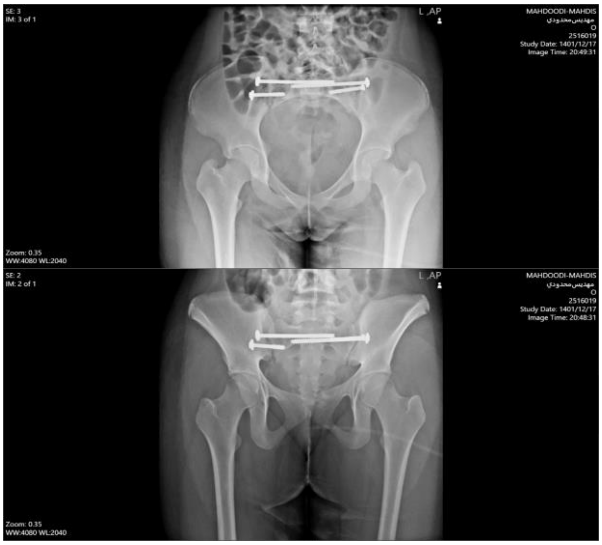

Figure 3. Postoperative X-ray of the pelvis: A) inlet view; B) outlet view

Radiographic findings of pelvic injuries are not impressive, but they are often associated with serious intestinal, neural, or urinary injuries (16).

According to the literature, posterior injuries of the pelvis can never appear alone but can always be accompanied by anterior injuries. There are cases in which posterior structures can be disrupted without anterior damage under special circumstances. This can be explained by the fact that anterior injury is not always necessary when the ring is broken in two areas posteriorly rather than one. In most cases, the mechanism of the injury seems to be posterior-to-anterior force directed to the sacral area (11, 12, 17-19). However, Tile reported that a posterior-anterior thrust with the lower limbs hyperflexed could also cause injury to the lower extremities (20).

It is difficult to treat SI dislocations nonoperatively, because they are pure ligamentous disruptions; therefore, it is quite difficult to achieve satisfactory union (21). In addition to ligaments aligned vertically, transverse ligaments create tension and hold the posterior iliac spines to the sacrum, maintaining the strength and alignment of the SI joints (20). The rupture of the SI ligaments requires considerable force, because they are among the strongest ligaments in the body. According to Tile, most injuries to the posterior pelvic ring are caused by severe rotational forces and disruption of the symphysis, which compromise the stability of the pelvis (20).

It is challenging to treat complete disruptions of the SI complex, because they are inherently unstable injuries. It has been shown that pure dislocations of the SI joint result in a high rate of long-term morbidity. According to Tile, a posterior-superior displacement of 1 cm or the appearance of a posterior gap on a CT scan are indications that surgical correction is needed for posterior pelvic instability. According to his study, 60% of those with sustained pain had dislocations of the SI joint, which were vertically unstable, unreduced, or malreduced (20). Poor reduction can cause permanent malposition, instability, and long-term pain in pure SI joint dislocations. The best treatment for pure SI joint dislocations is anatomic reduction and fixation (22). It is possible to use temporary external fixation early to provide provisional stabilization of SI joints, but it does not provide sufficient stability for definitive treatment (5, 20, 23, 24). An option for treatment

would have been bilateral iliosacral screw fixation. With this technique, the maximum accuracy of the screw position can be achieved with minimally-invasive surgery and computer-assisted navigation (25). Some authors recommend ORIF to restore congruency to SI joints with marked dislocation (26).

Threaded compression rods or posterior plating would have been alternative methods for stabilizing the SI joint disruption. Even though these techniques allow the reduction of dislocations and some stabilization, their mechanical stiffness is not sufficient to allow early ambulation or rehabilitation (27-29). Surgical reduction and internal fixation are recommended to be performed as soon as possible (20, 23, 24). Iliosacral screws are commonly placed percutaneously if closed reduction can be achieved (23, 30-32). Other methods include sacral bar stabilization (33, 34), anterior plate stabilization (5, 20, 31, 35), stabilization via a posterior approach (36), combination of S1 pedicle screws and the Galveston technique (37), and triangular osteosynthesis via lumbopelvic stabilization combined with iliosacral and superior pubic ramus screw fixation (38).

Only four studies reported patients with isolated bilateral SI dislocations (1, 3, 11, 12). In Wright et al.'s study, a 17-year-old boy experienced isolated bilateral dislocations of the SI joints and slight pelvic intrusions of the sacrum due to a motor vehicle accident. In addition to the pelvic ring and spinal pathology, no other pathology was detected. With two contoured plates for large fragment reconstruction, the SI joint was reduced and stabilized (3). In a case reported by Hungerer et al., a 16-year-old boy sustained a direct impact to the buttocks following a ski jump. Initial X-rays of the pelvis revealed bilateral disruptions of the SI joints as well as marked asymmetry of the pelvic ring. To exclude occult fractures of the anterior ring or symphysis disruption, CT was performed. C-clamps and external fixation devices were not effective in temporarily stabilizing the joint. In this case, four pedicel screws were inserted for iliolumbar transfixation (1).

A 27-year-old man fell from the second floor in the Loupasis et al.'s study. Pelvic radiographs revealed a fracture of the right transverse process of the fifth lumbar vertebra and bilateral dislocations of the SI joints. Even after traction and medial translation force, anatomical reduction of the dislocations was not achieved. There was a residual displacement of 1 cm. Fixation was achieved with two three-hole 3.5-mm dynamic compression plates (DCPs) (11).

The reason that our case is unique and different from others is that we used closed reduction and internal fixation (CRIF) instead of ORIF and performed surgery in a prone position. Generally, iliosacral screws are placed in the supine position, but in certain situations, such as the present case - where an open reduction of the SI joint or management of a crescent fracture may be needed - a percutaneous screw can be placed in the prone position (39). This approach facilitates early mobilization, allowing the patient to utilize a wheelchair shortly after the surgery, and progress to full weight-bearing by eight weeks.

Conclusion

The present case involved pure bilateral SI joint dislocation without associated injuries to the pelvic ring or posterior fracture, which, according to the literature, is a unique and rare pattern. A favorable outcome was achieved via bilateral closed reduction and screw fixation.

Conflict of Interest

The authors declare no conflict of interest in this study.

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