Case Report

Locked Pubic Symphysis

An Open Reduction Technique

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Received: 30 October 2008 / Accepted: 3 March 2009 / Published online: 20 March 2009
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Abstract A locked pubic symphysis occasionally occurs after a lateral compression injury of the pelvic ring. One pubic bone becomes entrapped behind the contralateral pubis. Lateral compression pelvic injuries are well recognized, but a lateral compression pelvic injury resulting in a locked pubic symphysis is rare. We describe a locked pubic symphysis with greater than 4 cm overlap that was reduced with simple maneuvers and readily available instruments.

Introduction

A locked pubic symphysis occurs when one pubic bone becomes entrapped behind the contralateral pubis after a lateral compression mechanism of injury. Although lateral compression pelvic injuries are well recognized, those resulting in a locked pubic symphysis are uncommon. To the best of our knowledge, there are fewer than 10 case reports in

the English language literature regarding this injury since its original description in 1952 [1, 5, 6, 8–11].

We describe a locked pubic symphysis with greater than 4 cm overlap that was reduced with simple maneuvers and instruments that are readily available. We also describe the anatomic etiology, which may make reduction difficult. This technique involved less morbidity than a superior pubic ramus osteotomy described for a locked pubic symphysis [8].

Case Report

The patient was a 17-year-old boy who was a passenger in a motor vehicle collision with rollover. During the rollover, he was ejected from the vehicle. The patient was seen initially at an outside hospital and was transferred to our trauma center for treatment of his pelvic fracture. On arrival, his vital signs were stable. He was normotensive and had a Glasgow Coma Score [4] of 15 (the Glasgow Coma Score is a physiologic scale of brain injury and 15 represents normal). There was no loss of consciousness reported during his accident. The patient had a retrograde urethrogram at the outside hospital with a report of a transected urethra. The patient's radiographs showed the right pubis was trapped in the obturator ring of the left hemipelvis (Fig. 1). Computed tomography (CT) scans confirmed a pelvic fracture with a right posteriorly displaced pubic symphysis in the left obturator foramen, entrapped by the right pubic tubercle (Fig. 2). In addition, the CT scan showed a right sacral fracture (Fig. 3). There were no additional injuries.

The patient underwent placement of a suprapubic catheter by our hospital's urology service for treatment of his transected urethra. This was performed in the trauma hall. The patient was taken to the operating room the morning after his admission. Closed reduction of his pelvis was attempted with

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Each author certifies that his or her institution has approved the reporting of this case report, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

This work was performed at Parkland Memorial Hospital, Dallas, TX.

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Fig. 1 An emergency room radiograph shows the right pubis was trapped in the obturator ring of the left hemipelvis.

Fig. 2 A CT scan reveals a lateral compression pelvic fracture with a posterior locked pubic symphysis entrapped against the pubic tubercle.

the previously described technique [6] of using the femur as a lever by locking it in flexion, abduction, and external rotation, but this was unsuccessful. Additional attempts at reduction were made by firm grasp of the iliac wings bilaterally and distracting the iliac wings laterally, but this also failed. The decision was made to proceed with an open reduction of the pelvis. The open reduction was performed through a Pfannenstiel incision. We completed the incision down to the pubic rami and made a midline incision through

Fig. 3 A CT scan shows a right sacral fracture, delineated by arrows.

the fascia. We elevated the rectus off the pubic symphysis. The right pubic bone was posterior to the left pubis and incarcerated in the left obturator ring. We initially attempted to reduce the incarcerated pubis by pulling the left pubic ramus anteriorly with a serrated reduction forceps but this failed. We then used a ball-spike reduction tool, which we tapped with a mallet to help further release the trapped pubic tubercle. After the right pubic tubercle had been disengaged from the left obturator ring, the right pubic bone could be manipulated and the symphysis reduced with a blunt-tip Hohmann retractor between the pubic bones as a lever to restore normal anatomy. With this combination of maneuvers, we were able to reduce the pubic symphysis and observe the reduction on fluoroscopy. In most instances, we would recommend subsequent fixation of the pubic symphysis with a plate and screws to maintain reduction. However, because there was a previously placed suprapubic catheter that might be present for several weeks and could contaminate the retropubic space, we elected to stabilize the anterior pelvic ring with an external fixator using two supraacetabular pins. We placed a two-pin supraacetabular external fixator for definitive treatment of this lateral compression injury [2] (Fig. 4).

The patient recovered well and was discharged from the hospital on the fifth postoperative day. He was weight-bearing on the right with crutches. The suprapubic catheter was capped and removed by 8 weeks after the initial injury. The external fixator was removed at 8 weeks.

One year after injury he had no anterior pain. He reported posterior pain in the sacral region with athletic activities. The patient initially had difficulty with urinary tract infections, but those resolved by 3 months with no recurrences. The patient has erectile dysfunction, with difficulty maintaining an erection, and is under the care of a urologist. He was walking without evidence of antalgic gait and his neurologic

Fig. 4 A postoperative anteroposterior pelvis radiograph shows restoration of normal pelvic anatomy.

Fig. 5 A most recent followup film shows heterotopic ossification.

examination was normal. The patient's most recent followup radiograph was taken 10 months after the injury (Fig. 5). He had some heterotopic ossification around the right pubic rami. The sacral fracture is not seen on the followup radiographs. The patient is older than 18 years at this time and is aware his case would be submitted for publication. He provided consent and reviewed the report.

Discussion

A locked pubic symphysis results from substantial trauma. The injury can occur from a lateral compression force to

the pelvis with forced hyperextension and adduction of the hip [6]. When this happens, the ligaments stabilizing the symphysis [5] are disrupted and one pubic bone passes behind the other and becomes locked in the obturator ring. Less substantial similar injuries occur where one pubic tubercle bone becomes displaced behind the other, but not locked. These injuries should be reducible by closed means, which include figure-of-four positioning by using the femur as a lever with an external rotation force on that femur while stabilizing the contralateral iliac crest.

Another technique is to apply lateral compression to the pelvis while applying posterior directed force to the symphysis [5]. If the closed reduction is unsuccessful, open reduction should be attempted. Open reduction has been recommended [1, 8, 10]. In our patient, the locked pubic symphysis occurred through a lateral compression mechanism and was not reducible with closed reduction techniques. We were able to reduce this through use of a Hohmann retractor to disengage the pubic symphysis from the pubic tubercle and then we stabilized it with a simple two-pin anterior external fixator. This technique involves less morbidity than a superior pubic ramus osteotomy.

With the mechanism of injury and substantial overlap of the locked symphysis, the posterior elements should be considered whether there is a fracture through the sacrum or a ligamentous injury. Posterior fixation has not been used in any reported patient with this injury.

Injuries to the posterior pelvic ring with these serious lateral compression injuries are not well described, and posterior fixation was not used in any of the patients described here. In lateral compression pelvic injuries, there is a posterior component involved that can range from the less-serious sacral buckle fracture to complete sacroiliac disruption [3]. With a locked pubic symphysis, perhaps once the pubic bone becomes locked, it limits further and more serious injury to the posterior pelvic ring. In these cases, there is an infolding of the sacrum resulting in a sacral buckle type of fracture, which was seen in our patient and in other cases.

All patients reported with this injury were males. The female pelvis has a thicker cartilaginous disc and usually has 2 to 3 mm greater mobility than the male pelvis (and increases in pregnancy) [7]. In addition, the outer dimensions of the pelvis are wider in males, whereas the inner diameter is greater in females to allow for childbirth. The symphysis is longer in males in the vertical direction. Perhaps the few millimeters of increased mobility and the thicker disc contribute to decreasing the likelihood of overlapping pubic symphysis dislocation in females.

Three reported patients underwent open reduction (Table 1). In two of those patients, there was substantial overlap with a posterior-type dislocation as described by Eggers [6]. In the third patient, the open reduction was performed because of a femoral neck fracture and overlap

Table 1. Reported cases of a locked pubic symphysis

Study	Injury mechanism	Open vs closed reduction	Urethral injury	Pubic symphysis overlap	Posterior sacral injury
Shanmugasundaram [10] (1970)	Crush	Open	Yes	Significant	No
Webb [11] (1977)	MCC	Closed	Yes	Significant	Yes
Robinson et al. [9] (1989)	Parachute	Closed	No	Minimal	Yes
Dorai and Kareem [5] (1991)	MCC	Closed	Yes	Minimal	Yes
Ansari et al. [1] (2003)*	MVC	Open	No	Minimal	No
O'Toole et al. [8] (2006)	MVC	Open	Yes	Significant	Yes
Current study	MVC	Open	Yes	Significant	Yes

* This patient had a displaced femoral neck fracture necessitating open reduction; MCC = motorcycle collision; MVC = motor vehicle collision.

of the pubic symphysis was minimal. We suspect with substantial overlap in a posterior dislocation of the pubic symphysis, the locked symphysis arises from the posteriorly displaced pubic tubercle engaged in the contralateral obturator foramen. We were able to reduce this by disengaging the pubic tubercle from the obturator foramen using standard orthopaedic instruments.

In all but two patients reported in the literature, there was urethral disruption consistent with our findings [5, 8, 10, 11]. It is important to maintain a high index of suspicion of this injury and communicate with urologists regarding any surgical plans to place a suprapubic catheter.

With the injured pubic symphysis locked owing to entrapment of the displaced pubic tubercle in the contralateral obturator foramen, strategies for reduction to disengage the tubercle can be used. We were able to achieve reduction without substantial morbidity to the patient and the patient had a good outcome.

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