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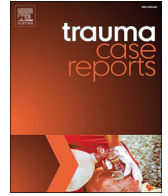
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Case Report

Spontaneous pubic symphysis disruption and concomitant bladder rupture during competitive squatting: A case report

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ABSTRACT

Pubic symphysis disruption is typically secondary to external blunt force trauma. This report presents a case of concomitant bladder wall rupture and pubic symphysis diastasis during competitive squatting. This required open bladder repair, small artery embolization, and internal fixation of the pubic symphysis. Surgeons should be aware that pelvic ring instability and organ damage can result even without any external trauma.

Introduction

Disruption of the pubic symphysis is classically associated with an anterior-posterior compression (APC) mechanism from external blunt force trauma as described by Young and Burgess [1]. Pubic symphysis diastasis is also seen in the intrapartum or postpartum period of spontaneous vaginal delivery, though this is often associated with hormonal changes that cause relaxation and lengthening of ligaments [2,3]. Here, we present an injury to the pelvic ring along with bladder rupture and small arterial injury requiring embolization. The resulting injury pattern appears similar to an APC mechanism, though without an external blunt force source.

Case report

A 54-year-old male competitive powerlifter with a past medical history of hypertension, hyperlipidemia, and coronary artery disease presented to our emergency department (ED) with a complaint of right greater than left lower abdominal pain. He had been performing a back-squat with 670 lbs. when he felt a painful “pop” in his lower abdomen. He also reported experiencing urinary urgency, frequency, and hematuria. He denied any lower extremity motor weakness or sensory changes.

On visual inspection, there was ecchymosis at the base of his penis. No obvious scrotal swelling was seen. Initial physical examination by the ED physician was positive for abdominal distension, tenderness, and guarding, but no rebound tenderness or signs of peritonitis were elicited. A rapid bedside ultrasound examination was negative for intraperitoneal pathology. A CT angiogram of the abdomen and pelvis was performed followed by CT urogram. Results showed widening of the pubic symphysis measuring up to 18 mm (Fig. 1A). Close review of the CT imaging demonstrated small amounts of air in both sacroiliac joints, but it was felt that the overall stability of the pelvic ring had not been compromised and that the air may represent chronic degenerative joint changes (Fig. 1B). There was also a large intraluminal bladder hematoma taking up over 50% of the bladder volume with contrast extravasation along the right side of the retropubic space anterior to the prostate (Fig. 2).

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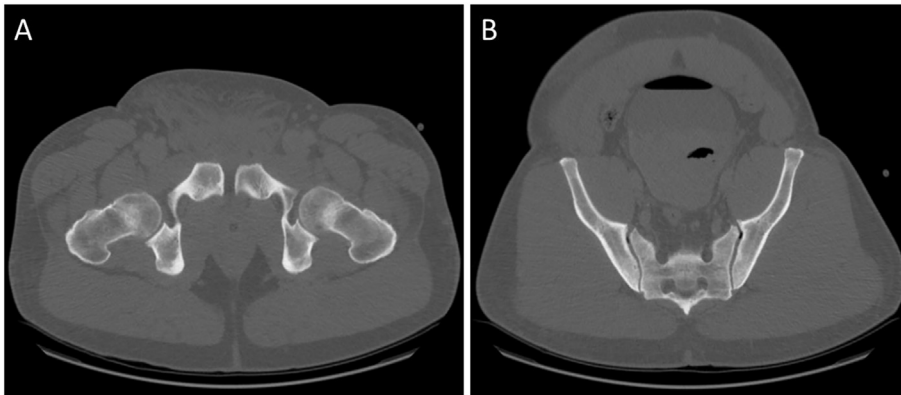


Fig. 1. (A) Initial CT imaging showing 18 mm diastasis of the pubic symphysis. (B) Air can be seen in both sacroiliac joints.

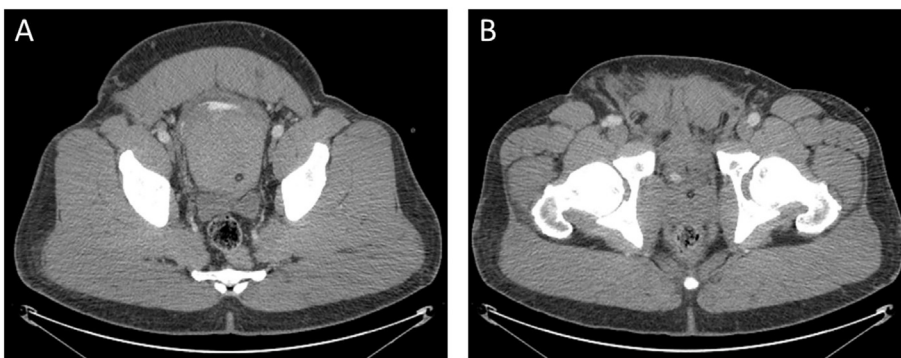


Fig. 2. (A) Hematoma and contrast extravasation both seen within the bladder. (B) There is contrast extravasation immediately anterior to the prostate.

The patient was taken to the operating room (OR) by a urologist for cystoscopy and intraluminal hematoma evacuation. Cauterization of the bleeding was unsuccessful so the procedure was concluded and the patient was transferred to the interventional radiology suite. An arteriogram was performed which showed active extravasation of a “replaced” or “accessory” obturator artery, an anatomic variant of the obturator artery as a branch from the inferior epigastric artery rather than from the usual anterior division of the internal iliac artery (Fig. 3) [4–7]. This artery was coiled and repeat arteriogram showed no further extravasation. No injury to the internal iliac artery system was seen.

Several hours later, despite the embolization procedure and continuous bladder irrigation, the patient continued to experience hematuria. The treatment teams decide to return to the OR for open exploration and bladder repair. A low midline incision was used to enter the retropubic space and significant hematoma was evacuated. A running suture was used to repair a hole in the bladder wall. Repeat cystoscopy was performed and an additional suture was used to seal a small intraluminal leak. The retropubic space continued to ooze blood so packing was placed around the prostate and hemostasis was achieved. A temporary abdominal closure was performed with a plan to return to the OR for removal of packing material and repeat exploration.

On hospital day 3, the patient was brought back to the OR, packing material was removed, and no further bleeding was noted. At this point, the orthopaedic trauma team was asked to re-examine his symphysis given the direct visualization of the pelvic ring disruption. The diastasis was measured to be 30 mm using a sterile ruler so the decision was made to proceed with plate fixation of the symphysis (Fig. 4). This was accomplished with a Jungbluth clamp along the anterior surface for reduction and placement of a Synthes 3.5 mm 6-hole pubic symphysis plate (Synthes) with 3.5 mm Bone Screw Fasteners (OsteoCentric) (Fig. 5). A medium Hemovac drain was placed and primary closure was performed of his fascia and skin incision. Post-operatively he was allowed to weight bear for transfers only. By 3 months following surgery, he was allowed to weight-bear as tolerated, and has gone on to do well without any radiographic or clinical signs of implant failure.

Discussion

Here we report a patient who sustained an APC pelvic ring injury as well as a bladder wall rupture without any blunt external force. This patient was performing a competitive back-squat of 670 lbs., which is performed with the legs hyperflexed, hyperabducted and externally rotated. We suspect that the primary mechanism was due to excessive external rotation forces placed on the bilateral hips transmitted to the pelvis while attempting to overcome a heavy load on the upper back. The substantial load combined



Fig. 3. Arteriogram demonstrates contrast extravasation (white arrow) along the right pubic ramus through an anastomosis from the inferior epigastric artery, known as a replaced or accessory obturator artery.



Fig. 4. Intra-operative supine radiograph taken after open bladder repair showing significant symphyseal widening after an open surgical approach. The coil along the right anterior pelvis can be seen.

with the significant muscular forces generated in the pelvic region created enough tensile stress on the pubic symphyseal ligaments that resulted in complete disruption of the symphysis. Adhesions connecting the anterior-inferior portion of the bladder and the nearby small vessels to the symphysis likely resulted in the bladder wall rupture and the arterial bleed.

Pubic symphyseal diastasis has also been reported to occur during or following vaginal delivery in childbirth [8]. This appears to be mediated by two mechanisms: changes in several hormones, such as progesterone, estrogen, and relaxin, during pregnancy lead to relaxation of the symphyseal ligaments and forceful descent of the fetus' head against the pelvic ring [2,3,9]. Although our male patient presumably did not have intra-pelvic mechanical stress or any of the hormonal changes associated with pregnancy, his hip position did mimic the McRoberts' position commonly seen during natural childbirth [10].

Various physiologic changes occur during weightlifting events such as the traditional back squat. Primarily, there is an increase in intra-abdominal pressure (IAP), especially when the trunk is extended, thereby stabilizing and unloading the lumbar spine [11,12]. This is accomplished by abdominal muscle contraction against the diaphragm and pelvic floor, as in a Valsalva maneuver [13]. Excessive physiologic loads have also been implicated in other spontaneous thoracic, gastrointestinal or pelvic organ pathologies [14–16]. It is unclear whether or how much IAP contributed to the injuries sustained by this patient. Nevertheless, to our knowledge, this is the first reported case of spontaneous pelvic ring injury secondary to competitive weightlifting.

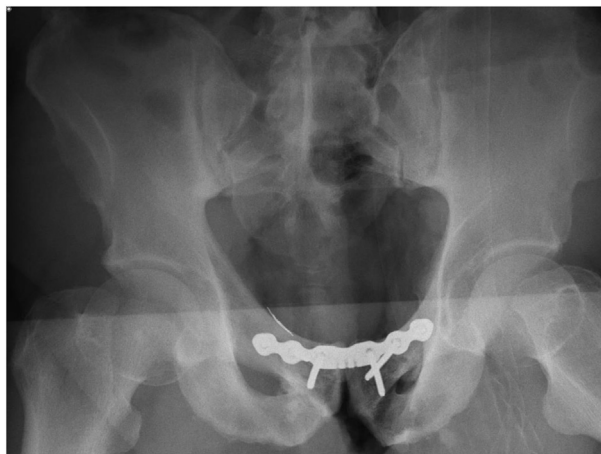


Fig. 5. Intra-operative supine radiograph taken immediately after plate fixation of the symphysis.

Conclusion

We present the first report of a triad of injuries sustained during competitive squatting: spontaneous pubic symphysis disruption, bladder wall rupture, and small artery injury requiring embolization. His initial presentation was notable for low abdominal pain, ecchymosis, and hematuria. This injury required coil embolization of a replaced obturator artery by an interventional radiologist, an open bladder wall repair by a urologist, and plate fixation of the pubic symphysis. Surgeons should be aware that this constellation of injuries can occur without blunt external trauma, and the proximity of these anatomic structures to each other may necessitate multi-disciplinary care.

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Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Declaration of competing interest

The authors declare that they have no conflict of interest.

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