Case Report

Obturator artery disruption associated with acetabular fracture: A case study and anatomy review

Nabil A. Ebraheim a, Jiayong Liu a,*, Alan H. Lee a, Vishwas Patil a, Munier M.S. Nazzal b, Chris G. Sanford Jr. a

a Department of Orthopaedic Surgery, University of Toledo Health Science Campus, 3065 Arlington Avenue, Toledo, OH 43614 United States
b Department of Vascular Surgery, University of Toledo Health Science Campus, 3065 Arlington Avenue, Toledo, OH 43614 United States

Accepted 30 May 2007

Introduction

Due to the extensive network of arteries and veins in the pelvic area, pelvic trauma often results in injury to these vessels. These vascular injuries may be due to acute disruption (i.e. laceration or rupture), an intimal tear leading to vessel thrombosis, or late formation of a pseudoaneurysm. While there are several case reports discussing major vessel injury after pelvic trauma, disruption of the obturator artery associated with such injuries has rarely been reported. Therefore, the current authors report a case of disruption of the obturator artery in association with an acetabular fracture. In order to clearly understand this injury, an anatomy review and literature review of obturator artery injury is also included in the current report.

Case

A 31-year-old male was involved in a motor vehicle accident when his vehicle was struck on the driver’s side by another vehicle going at high speed, and was transferred to a level I trauma center. No loss of consciousness was reported, but the patient was in hemorrhagic shock, and suffered a rupture of the diaphragm, as well as an acetabular fracture (Fig. 1). He was treated by routine anti-shock therapy and underwent an exploratory laparotomy for repair of the left diaphragm injury. Following the exploratory laparotomy and repair of the left diaphragm, the orthopaedic team began an open reduction and internal fixation procedure to reduce the acetabular fracture through an ilioinguinal approach. During this procedure, a large dark colored, blood clot (approximately 5–6 cm in diameter) was observed deep within the pelvis. This clot was unintentionally disturbed with a suction tube leading to sudden gush of fresh bleeding. Though an effort was made to determine the source of the arterial bleeding, it was not possible due to the continuous bleeding and hence the area was

* Corresponding author. Tel.: +1 419 383 6558; fax: +1 419 383 3526.
E-mail address: liujayong@gmail.com (J. Liu).
packed. Intraoperative general surgery and vascular consults were then obtained. At this time, the patient had lost a large amount of blood and was being transfused with multiple blood products. Due to the patient’s haemodynamic instability, with a blood pressure of 80/60, pressure was held on this dressing until anesthesia personnel could administer sufficient blood and blood products to adequately correct his hypovolemia. The patient’s blood pressure had then dropped to 60/40, but then gradually rose to 115/80 after receiving 4–6 units of packed red blood cells and crystalloid solutions.

At this time, it was deemed proximal control should be gained, so the patient’s previous laparotomy incision was exposed to obtain access into the abdominal cavity. Upon entry into the abdominal cavity, no blood was noted intra-abdominally. Pressure was held in the region of the left common iliac artery and this was noted to decrease the bleeding from the left groin wound.

At this time, the peritoneum overlying the sacroprocmontory on the left side was opened, and the left common iliac artery was dissected. The packing in the left groin was removed and it was found that the patient had sustained a laceration of the left obturator artery, most likely caused by a bony spike of the superior pubic rami as a result of the trauma. This was ligated and repaired and no further active bleeding was noted from the left groin.

The orthopaedic team then finished the open reduction internal fixation. All incisions were then closed, and the patient was successfully taken off the operating room table and transferred to the surgical intensive care unit for monitoring.

### Anatomic review of the obturator artery

Anatomic dissection of 3 cadaveric pelvises (2 male, 1 female, aged 69, 73, and 65) was performed to look for the location of the obturator artery. The obturator artery arises from the internal iliac artery in the pelvis and courses anteroinferiorly on the lateral wall of the pelvis, to the upper part of the obturator foramen. It exits from the pelvic cavity through the obturator canal and divides into an anterior and a posterior branch. The anterior obturator artery supplies the obturator externus muscle and the adjacent bone. The posterior branch usually provides an acetabular branch that enters into the acetabular notch and supplies tissue in the acetabular fossa. An oblique angiographic view of the pelvic vessels from a normal patient is shown in Fig. 2. In the pelvis, the obturator artery sends one of its branches to the obturator internus muscle. Fig. 3 shows the close relationship between the superior pubic rami and the obturator artery.

A vascular anastomosis between the obturator artery and the external iliac or inferior epigastric arteries, called the corona mortis, literally meaning crown of death has been reported at an incidence ranging from 8 to 83%. This anastamosis frequently poses a surgical problem for orthopaedic surgeons operating around the superior pubic ramus, because of the failure to ligate them as they retract back into the obturator canal after being injured.

The patient discussed in the present case did not have a corona mortis anastamosis, but because of the close relationship between the obturator artery and the superior pubic ramus, fracture of the anterior column extending into the superior pubic rami resulted in laceration of the artery, leading to haemorrhage into the pelvic cavity.

**Figure 1** True pelvic A-P X-ray radiograph of the patient demonstrating a left superior pubic ramus fracture and associated acetabular fracture.

**Figure 2** Pelvic angiograph from the oblique view demonstrating the normal anatomy of the pelvic vessels. Note the close association of the obturator artery with the superior pubic ramus.
Discussion

There are limited case reports available documenting vascular disruptions of the obturator artery in patients presenting with an acetabular fracture. A previous article indicated that in patients with lateral compression injuries of the pelvis, bleeding of the anterior arterial vessels (pudendal or obturator) was statistically more common than injuries to the posterior vessels, with the pudendal artery being the most commonly injured vessel. Other articles discuss the corona mortis, a vascular anomaly between the external iliac and the obturator vessels.

However, as this case indicates, due to the close anatomic relationship between the superior pubic ramus and obturator artery, a superior pubic ramus fracture associated with an anterior column acetabular fracture can possibly lead to obturator artery injury. Therefore, it is important to consider disruption of the obturator artery in patients with a superior ramus fracture close to the obturator canal.

Furthermore, if a large clot is discovered intraoperatively, it is important for the surgeon to suspect an injury of a nearby vessel and take adequate precautions while dealing with it. The surgeon should then proceed cautiously to identify the laceration. It is important to note that in this case, the patient was haemodynamically stable until the large clot was accidentally disturbed.

Some authors have recommended the use of angiography to determine the presence or absence of an arterial injury. If an artery is injured, angiographic embolisation to stop the bleeding may be conducted. A study by Shapiro et al. confirms that angiographic embolisation is effective in controlling the arterial bleeding associated with pelvic fractures. However, there are also several drawbacks that have been cited in the literature, notably that angiography is a time-consuming procedure that prevents other interventions from taking place. In this particular case, it was decided that quick dissection to identify the arterial injury would provide greater benefit to the patient versus angiography. It proved to be a life saving procedure in our patient.

Therefore, if angiography cannot be used because of its time consuming, a life saving modality would be to use an midline approach of the abdomen and temporary occlude the common iliac artery to control the bleeding, as was performed in this case.

To conclude, a superior pubic ramus fracture can be associated with injury to the obturator artery. If the patient is stable, angiography may be considered to rule out arterial bleeding. If a patient is haemodynamically unstable, a midline abdominal approach to detect and control the bleeding is a potential life saving intervention.

References