Case Report

Suspected and Unsuspected Serious Complications Following Traumatic Massive Pelvic Bleeding

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Abstract
Open book pelvic fractures are associated with significant morbidity and mortality. To meet this challenge treatment algorithms have been developed including immediate control of bleeding with a pelvic binder and subsequent embolization by interventional radiology (IR). However, pelvic binders have been reported to cause tissue breakdown after two to three hours. We demonstrate in this case report an unusual perianal decubitus ulcer associated with the use of an elastic pelvic binder and prolonged supine position. This required a diverting colostomy to allow the resultant ulcer to heal. We also describe an unsuspected finding in performing this laparoscopic descending colostomy associated with an extensive retroperitoneal hematoma. Consideration should be taken not to mobilize the descending colon after an extensive retroperitoneal hematoma formation following pelvic fracture. We recommend that a laparoscopic transverse colostomy should be considered primarily. It will not only be safer, but can decrease morbidity, infection and presumably length of hospital stay. Be wary of colostomy diversions in patients with extensive retroperitoneal hematomas and remove pelvic binders as soon as bleeding is controlled, preferably in less than three hours.

ABBREVIATIONS
IR: Interventional Radiology; CT: Computed Tomography; SDH: Subdural Hematoma; HD: Hospital Day

INTRODUCTION
Dealing with significant open book pelvic fractures can be complicated. There is an increased risk of bleeding associated with an increased morbidity and mortality [1,2]. According to Mohanty et. al mortality associated with open book fractures approaches 30%-50% compared to 10%-15% with closed pelvic fractures [3]. The pelvic binder is used to decrease the area of potential space by helping to tamponade the hemorrhage that can often be fatal [1]. Open book pelvic fracture treatment algorithms often include immediate control of bleeding with a pelvic binder and subsequent embolization by interventional radiology (IR). Well known complications from the pelvic binder include tissue breakdown [1,4]. Tissue damage begins within a few hours and binders should only be used for short periods of time until control of hemorrhage is obtained [1,4]. This case report demonstrates an unusual perianal decubitus ulcer secondary to use of a pelvic binder. This required a diverting colostomy to allow the ulcer to heal. We describe unsuspected findings: perianal ulceration and extensive retroperitoneal hematoma complicating this laparoscopic descending colostomy.

CASE PRESENTATION
A 20 year old male unrestrained driver was involved in a high speed motor vehicle rollover collision and was ejected from the vehicle. He arrived as Trauma 1 activation at John C. Lincoln Hospital North Mountain, Arizona. Upon arrival the patient was combative, had a Glasgow Coma Scale of 8, blood pressure 92/81 mm Hg, a heart rate of 184 beats per minute and a respiratory rate of 18 breaths per minute. In the trauma bay prior to computed tomography (CT) scan the patient was intubated and the massive transfusion protocol was initiated. Physical examination revealed an unstable pelvis. The hemoglobin was 12.7g/dl upon arrival. A pelvic x-ray in trauma bay demonstrated comminuted fractures of the right superior and inferior pubic rami with widening of the pubic symphysis after which a pelvic binder was placed. The patient underwent CT scan of the brain, neck, cervical, lumbar and thoracic spines, chest, abdomen and pelvis. He was found to have an epidural hematoma, large subdural hematoma (SDH) with mass effect, L3 vertebral...
fracture, bilateral pulmonary contusions, and bilateral renal infarction. CT abdomen/pelvis also demonstrated nondisplaced left rib fractures 9-10 posteriorly, grade 3 renal injuries with multiple infarcts in bilateral kidneys, left perirenal hematoma, and left retroperitoneal hematoma extending into the pelvis. An extensive retroperitoneal hematoma was observed with active extravasation off the right internal iliac artery. In addition to the pelvic fractures noted on the plain films a vertically oriented comminuted fracture of the right sacrum with multiple displaced sacral flaps and widened sacroiliac joint were found on CT scan. The patient was taken immediately to IR for embolization of bilateral internal iliac arteries as active extravasation was seen from multiple branches of internal iliac arteries within the pelvis. The patient then underwent the following procedures: on Hospital Day 1 (HD) left craniotomy for SDH; evacuation, HD7 open reduction internal fixation of symphysis diastasis and pubic fracture, followed by percutaneous tracheostomy and gastrostomy secondary to neurologic status and inability to wean and HD9 a spinal fusion.

The pelvic binder was placed in the trauma bay to temporize bleeding and was left in place for greater than 48 hours. When the binder was removed the patient was noted to have erythema and blisters on the anterior thighs (Figure 1). The orthopedic surgeon then recommended taping the lower legs in internal rotation for continued stabilization of the pelvis until the patient was able to tolerate pelvic fixation. On HD12 he was found to have a circumferential perianal wound (Figure 2). Wound care was consulted regarding the perianal ulcer and a diverting colostomy was recommended. On hospital day 20 patient underwent a laparoscopic attempt at a diverting colostomy. However, the descending colon was difficult to bring up secondary to extensive adhesions to the retroperitoneum. A colotomy was inadvertently made trying to mobilize the sigmoid colon. Decision was made to convert to an open procedure. The large retroperitoneal hematoma extending to the left diaphragm caused the descending colon to be densely adherent making laparoscopic descending colostomy impossible.

**DISCUSSION**

This case report focuses on two issues. The first is the use of pelvic binders for open book fractures in patients who present in hemorrhagic shock. Pelvic binders should be used for short term, preferably less than 2-3 hours based on Knopps et al. [4], demonstrating tissue breakdown occurring within 3 hours. It has been noted in another case report the development of skin necrosis even after correct application of the pelvic binder [1]. We also note an additional report by Takahira et al. [5] in which tissue damage including gluteal muscle necrosis following arterial embolization in pelvic trauma was observed. Although, we do not believe IR played a major role as the gluteal region had no skin necrosis throughout the patients course. The causal relationship between placement of pelvic binders at bony prominences such as greater trochanter, iliac crest and sacrum with the development of pressure ulcers has been reported in the literature. However, because the perianal ulcer found 12 days later the pelvic binder use we infer that the association between the pelvic binder and the perianal ulcer although important may be secondary.

The pelvic binder was left on in this case due to concerns that the patient may rebleed. It is most likely that the prolonged supine position of the patient was a contributory factor in the development of the perianal ulcer. In particular, the patient’s ankles taped in internal rotation to prevent abduction and external rotation of the hips. In addition, the patient remained in this supine position for a prolonged period of time because of hemodynamic instability which presented major management challenges to the trauma team. Although the patient’s skin was examined daily by nurses for decubitus ulcers there was no evidence that the nurses examined the perianal area for erythema during the first time the ankles were taped. It appeared there was care discretion to refrain from examining the perianal area for ulceration to minimize further movement of pelvic and spinal fractures. We believe it is the congruence of noted interacting events and factors that resulted in the development of the perianal ulcer.

Also noted is the extensive resuscitation this patient undergone receiving massive transfusion greater than ten units of blood products. The patient also received fluids and albumin to maintain a central venous pressure greater than 10 which contributed to edema under the binder. This was also observed by Krieg et al [1]. Surgeons must be reminded that the use of pelvic binders is an immediate temporizing measure and not
for long term control. Once control of hemorrhage is obtained i.e., after IR embolization, the pelvic binder should be removed. In our institution currently no padding is applied to pressure points including the greater trochanters, an abdominal pad is only applied if skin changes are present prior to application of the binder [1,2,4]. In retrospect, when using the binder for a prolonged period, cushions should have been used in the gluteal fold to prevent tissue breakdown. This would have been helpful in our case when the legs remained taped. Although the nursing staff was diligent about checking patient’s backside, the perianal region was not examined closely. The perianal area should be routinely examined in cases like this for tissue breakdown.

The second issue is a large retroperitoneal hematoma that dissected up the retroperitoneum to the diaphragm complicating performing laparoscopic colostomy. This case report demonstrates that consideration should be taken not to mobilize the descending colon after an extensive retroperitoneal hematoma formation following pelvic fracture. The hematoma created extensive adhesions around the descending colon making it tremendously difficult to mobilize laparoscopically or open. Our attempt to mobilize the colon laparoscopically led to a perforation of the colon as it was extremely adherent to the retroperitoneum. Alternatively, creation of a transverse colostomy should be considered as the primary procedure. This may help decrease the complication of colotomy created during mobilization. These precautions may decrease the risk conversion risk. A laparoscopic transverse colostomy will not only be safer, but may decrease morbidity, infection and presumably length of hospital stay. Be wary of colostomy diversions in patients with extensive retroperitoneal hematomas and remove pelvic binders as soon as bleeding is controlled, preferably less than three hours. Make when checking for sacral decubitus ulcers to make sure to check the perianal region as well.

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REFERENCES