

Operative management of a ruptured lumbar artery with retroperitoneal hematoma

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Abstract

Lumbar artery injury is an uncommon source of bleeding in the trauma patient, however can be a rare cause of significant retroperitoneal hemorrhage. Surgical intervention is almost never indicated, as endovascular transcatheter embolization is highly effective and widely accepted except during rare cases of complications such as compartment syndrome [1,2]. We present the case of post-traumatic left lumbar artery hemorrhage with retroperitoneal hematoma formation and subsequent abdominal compartment syndrome, which was successfully treated with decompressive laparotomy, hematoma evacuation and vessel ligation.

Keywords

lumbar arteries; abdominal compartment syndrome; angiographic embolization; laparotomy; retroperitoneal hematoma

Introduction

Up to 40% of trauma-related deaths are noted to be due to significant hemorrhage and remains the focus of preventable trauma related mortality [3]. Blunt force torso trauma is associated with known sources of hemorrhage from intra-abdominal, retroperitoneal and pelvic injury [4]. Retroperitoneal hemorrhage is one that is often associated with significant morbidity and mortality. Hemorrhage secondary to pelvic fractures, including those stemming from bleeding of the retroperitoneum and pelvic vessels and soft tissue carry a risk of mortality as high as 60% [5].

Case Report

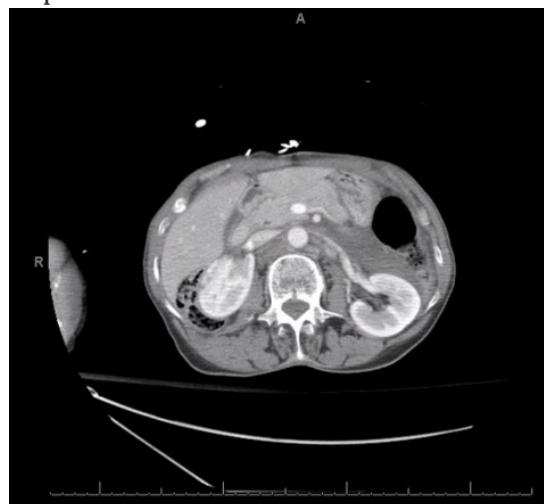
A 68-year-old patient was brought to the emergency department after sustaining multiple-trauma after being struck by a snowplow. She was taken to a local hospital that did not have trauma surgery services where computed tomography of the chest, abdomen and pelvis revealed hemoperitoneum, a hemothorax on the right, a left retroperitoneal hematoma, and open book pelvic fracture. At the time, the patient was noted to have a hemoglobin of 11.8 g/dl, with a BP of 94/62 and a heart rate of 90 BPM. A focal hypodensity along the posterior aspect of the right hepatic lobe was also seen, suggestive of a grade II liver laceration.

A chest tube was placed and drained 1000ml of blood. She was stabilized with continuous crystalloid and sent to our hospital via ALS ambulance, which took approximately 45 minutes. Upon arrival, she was conscious and able to maintain her airway, and was hypotensive (BP 75/56) with a heart rate of 81/min. The patient denied past medical history or use of medications. Her abdomen was soft, non-tender without evidence of peritonitis. A stable 15 cm hematoma over her left anterior superior iliac spine. Neither left nor right leg appeared rotated and shortened. Initial laboratory data revealed hemoglobin was 10.6 g/dl, hematocrit 32.7%, platelets 75,000/ μ l, PTT 36.2 seconds and INR 1.4. Focus assessment with sonography for trauma (FAST) was positive for free fluid in all windows.



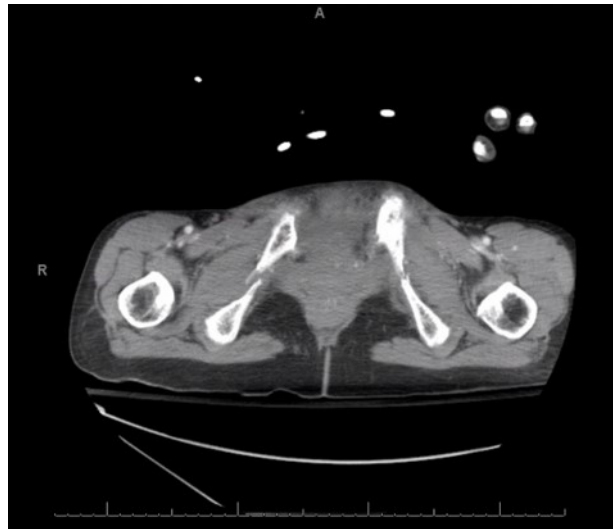
CT scan demonstrating right hemopneumothorax

Review of CT scan from the local hospital without trauma facilities confirmed moderate right hemothorax and small right pneumothorax, a probable ruptured right diaphragm, 1.1 cm laceration in the midpole of the right kidney, linear hypodensity on the pancreas suspicious for pancreatic laceration, grade II /III liver laceration of segments II and III and a moderate amount of retroperitoneal blood predominantly associated with the pelvic fractures.



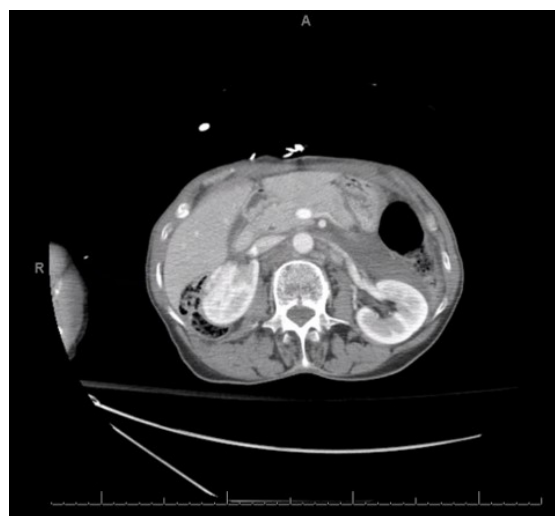
CT scan demonstrating liver injury

There were findings consistent with extraperitoneal bladder rupture. Pelvic fractures included, wide pubic diastasis, bilateral inferior and superior pubic rami fractures with extension of the fractures into the anterior column of the acetabulae bilaterally.



CT scan demonstrating pelvic fractures

The patient was taken to the OR for laparotomy, repair of ruptured right hemidiaphragm and hepatorrhaphy (suture ligation of bleeding portion of liver). Other findings included minor, stable non-expanding bilateral perinephric zone II retroperitoneal hematomas. Post-operatively the resuscitation efforts continued in the surgical intensive care unit where she received additional 7 units of blood, 4 units of plasma and 4 units of platelets. She began to require a norepinephrine drip at rates varying from 4-10 micograms/min. The patient became progressively more difficult to ventilate (with her peak pressures reaching 40 cmH₂O), developed oliguria, abdominal distension and falling hemoglobin/hematocrit levels suggesting the development of abdominal compartment syndrome. Bladder pressures were found to be 22 mmHg. Given this evidence there was concern for ongoing hemorrhage and therefore the patient was returned to the OR. A large hematoma was found in the left perirenal retroperitoneal space that had ruptured into the abdominal cavity, resulting in the increased compartment pressure. The clot was evacuated and a left medial visceral rotation (Mattox maneuver) was performed for adequate visualization of the midline retroperitoneum. An avulsed left lumbar artery was identified (just below the level of the left kidney) as the source of the ongoing retroperitoneal bleeding and was suture ligated proximally and distally.



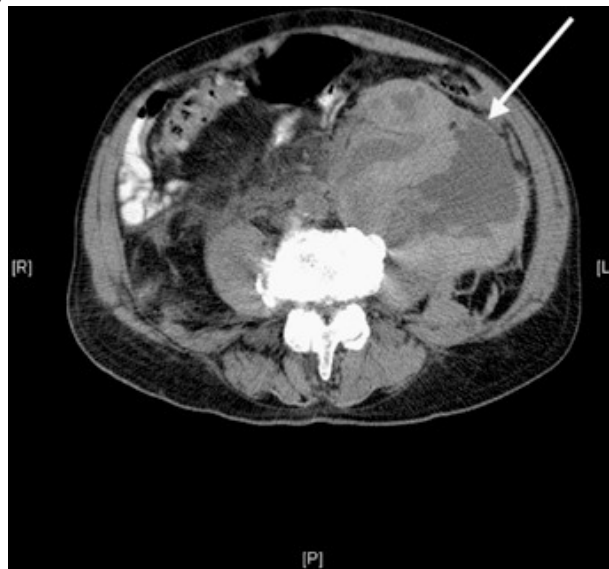
CT scan demonstrating small retroperitoneal hematoma anterior to left kidney

Given the raw appearance of the area, we placed Fibrillar hemostatic agent, packed open with a single laparotomy sponge in the left retroperitoneum and temporary closure with a negative pressure vacuum dressing. The patient stabilized with normalization of her hemodynamics and diuresis of approximately 4 liters of fluid in the intervening week, at a rate of approximately 30cc per 24 hours. She was returned to the operating room 24 hours after her decompressive laparotomy for packing removal and abdominal closure.

The patient's post-operative course was complicated by urosepsis following repair of the pelvic fracture and urinary bladder injury. She returned to the operating room for exploratory laparotomy and drainage of an infected collection in the space of Retzius. The patient also developed acalculous cholecystitis necessitating cholecystectomy. She ultimately recovered well and was discharged to a rehabilitation facility in stable condition. Her total length of stay was 36 days, with 16 of those in the ICU.

Discussion

Retroperitoneal bleeding from a lumbar artery injury can be a significant cause of hemorrhage in patients with pelvic or abdominal trauma [4]. The incidence of this injury is quite uncommon with 31 patients reported in the literature [6,7]. The proposed traumatic mechanisms resulting in this type of injury include rapid deceleration, flexion-extension of the spine or rotational injuries generating the sheering force necessary to cause these vascular injuries. Additionally, the direct trauma from penetration or fracture of vertebral transverse processes can cause direct avulsion or laceration. Rarely, patients may have aneurysms or pseudoaneurysms of these arteries secondary to other causes, including prior trauma or surgery, [8,9] and in some rare cases, vascular manifestations of collagen vascular disease or Von Recklinghausen's disease [10]. Aneurysmal changes are therefore more prone to disruption than normal vasculature, although it is unlikely that this was the case in our patient given its avulsed appearance in the operating room.



CT scan displaying retroperitoneal hematoma - www.medicalopedia.org [16]

Retroperitoneal containment usually results in tamponade of bleeding from many retroperitoneal vascular sources however trauma related coagulopathy may result in significant ongoing blood loss into the retroperitoneal space. Prompt diagnosis and intervention is therefore essential. Diagnosis is frequently best accomplished with Computed Tomography (CT) with contrast, which aids in

the determination of the location and extent of the bleeding. The diagnosis of arterial bleeding with extravasation of contrast is demonstrated by this imaging study, with sensitivities of 60% to 84% and specificities of 85% to 98% [4, 11-13]. Additionally, aortography and segmental angiography may be used to further localize the bleeding artery and confirms the bleeding in 80-90% of cases [1].

Management in the current literature is almost exclusively limited to interventional radiology embolization, with varied levels of success [4,14]. Various agents are used, including coils, microparticles, glue or gelfoam [1,9]. Embolization has the greatest success in cases where the site of extravasation is clear. Possible complications of this intervention include failure to achieve adequate hemostasis, abscess formation and rarely, end organ infarction, such as neurological injury if a low artery of Adamkiewicz were embolized [15].

Our patient was admitted to the SICU after her initial trauma and damage control surgeries and given her sudden decompensation and development of abdominal compartment syndrome, surgical re-exploration and suture ligation of the injured lumbar artery was the most expeditious and definitive means of achieving hemostasis and ensuring that no other missed injuries accounted for the patient's deterioration.

Conclusion

This case illustrates the potential for significant bleeding from an uncommon injury to the lumbar artery resulting in destabilizing hemorrhage and abdominal compartment syndrome. CT scan of the abdomen and pelvis readily identifies retroperitoneal hematoma, however the exact source of the hemorrhage may remain obscure. When there is evidence of vascular injury such as contrast extravasation angiographic intervention often works well to achieve hemorrhage control particularly in challenging anatomic locations. The role for prompt definitive surgical intervention remains the gold standard approach for the complex, deteriorating patient. Our case demonstrates that surgical control of lumbar artery hemorrhage can be done safely and expeditiously.

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