Endovascular Stenting for Traumatic Common Iliac Pseudoaneurysm as an Adjunct following Exploratory Laparotomy in a Stab Injury Patient

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ABSTRACT

Traumatic iliac vessel injuries, especially secondary to penetrating wounds, are often associated with a very high mortality rate. The patients usually present to the trauma bay in profound hemorrhagic shock, which, in turn, triggers the vicious cycle of hypothermia, coagulopathy, and acidosis. Iliac artery injuries should be managed promptly because of the high incidence of late complications of pseudoaneurysm and arteriovenous fistulae and risks of subsequent arterial thrombosis and distal ischemia.

We report a case of a 17-year-old female who was brought in following a stab wound in the right lower quadrant (RLQ). A postlaparotomy computed tomography (CT) scan performed revealed a pseudoaneurysm on the right common iliac. A pelvic angiography was performed, which was followed by an endovascular placement of a covered stent on the right common iliac artery.

We discuss an interesting case along with discussion of relevant literature.

Keywords: Common iliac artery, Pseudoaneurysm, Stab wound, Stenting.

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INTRODUCTION

Traumatic iliac vessel injuries, especially secondary to penetrating wounds, are often associated with high mortality rates. The patients usually present with shock, due to massive blood loss, which, in turn, triggers the vicious cycle of hypothermia, coagulopathy, and acidosis.

We report the case of a 17-year-old female who was brought in with a stab wound in the right lower quadrant (RLQ). On exploratory laparotomy, there was a duodenal perforation with a retroperitoneal hematoma along the right Gerota’s fascia and right colon. However, medial rotation of the right-sided viscera did not reveal any obvious injury to the inferior vena cava and the iliac veins. After stabilizing the patient, the computed tomography (CT) scan performed postlaparotomy revealed a pseudoaneurysm on the right common iliac artery. A pelvic angiography was performed, which was followed by an endovascular placement of a covered stent on the right common iliac artery.

Fig. 1: Chest X-ray in the trauma bay

We discuss an interesting case along with discussion of relevant literature.

CASE REPORT

A 17-year-old female patient was brought in as an activated level 1 trauma following a stab wound in the RLQ. On primary survey, the patient was awake, but she was lethargic and barely responded to commands. Vitals on presentation to the trauma bay were as follows: Heart rate 145 bpm, respiration rate 30, and blood pressure at 101/70 saturating 99% on nonrebreather mask. She was started on 2 L of crystalloids followed by 4 units of O-negative blood. A massive transfusion protocol was then initiated for the patient.

A chest X-ray (Fig. 1) was obtained, which was viewed as negative for a pneumothorax. The patient was taken
Endovascular Stenting for Traumatic Common Iliac Pseudoaneurysm as an Adjunct following Exploratory Laparotomy

PAJT

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emergently to the operating room where she was intubated and underwent exploratory laparotomy. During the laparotomy, besides routine evaluation of solid organ injuries, a Cattell Braasch maneuver was performed to evaluate the right-sided organs and vessels to rule out retroperitoneal injuries. A perforation on the anterior surface of the duodenum was discovered. The duodenal perforation was closed primarily with interrupted sutures. A tongue of omentum was fashioned to reinforce the perforation. Medial rotation of the right-sided viscera showed a nonexpanding retroperitoneal hematoma, a right psoas muscle injury with some muscular bleeding, and a hematoma surrounding Gerota’s fascia of the right kidney. No obvious injury to the iliac vessels was identified.

The patient was then transferred to the surgical intensive care unit (ICU) for further volume resuscitation and correction of coagulopathy, hypothermia, and the base deficit.

A CT scan of the chest, abdomen, and pelvis (Fig. 2) was performed with intravenous (IV) contrast. A delayed phase scan of the pelvis was obtained to evaluate possible bladder injury. The CT showed a 5-mm pseudoaneurysm at the right common iliac artery (Fig. 3). It also showed intraperitoneal fluid, pneumoperitoneum secondary to the recent laparotomy, and a duodenal injury consistent with the residual bowel injury.

A pelvic angiography with covered stent placement on the right common iliac artery was done by interventional radiology, due to the moderate-sized pseudoaneurysm shown on the CT. Under concurrent ultrasound guidance, the micropuncture technique was utilized to access the right common femoral artery. The access was upsized to allow placement of a standard guide wire, followed by a 6 Fr sheath (Fig. 4). An Omni Flush catheter was positioned within the distal abdominal aorta and the left and right anterior oblique projection was used to better define the iliac bifurcation. A V-18 0.018 wire was then inserted and passed into the midabdominal aorta (Fig. 5). Over this, a 8 mm × 5 cm VIABAHN stent was advanced utilizing a Fluoro Fade technology. The stent was successfully deployed.
positioned at the origin of the right common iliac artery. The stent was then dilated utilizing an 8 mm × 4 cm EverCross balloon. The Omni Flush catheter was once again positioned in the distal abdominal aorta and follow-up imaging was obtained. The stent appeared well apposed to the vessel wall, and there was no further filling of the pseudoaneurysm. Digital subtraction angiography imaging was then performed at the right groin puncture site. The site was deemed suitable for the placement of a closure device. A 7 Fr Mynx device (Fig. 6) was successfully deployed and manual pressure was held until hemostasis was achieved. The patient was returned to the ICU in stable condition.

On postoperative day 3, a simple contrast watersoluble upper gastrointestinal follow-through (Fig. 7) was performed to rule out a leak of the repaired duodenum. There was no evidence of extraluminal contrast to suggest a leak. There, however, was a light delay of progression of contrast from the duodenum to the proximal jejunum. This was most likely due to a mild amount of postoperative edema.

A pulmonary embolism (PE) protocol CT scan was performed on postoperative day 6 for persistent tachycardia. Although negative for PE, new small bilateral pleural effusions were found besides adjacent compressive atelectasis. The CT revealed that the retroperitoneal hematoma decreased slightly. There was also mild bilateral renal collecting system fullness present. This was most likely due to the compression of the ureter by the retroperitoneal hematoma. The findings of the pelvis showed that the vascular stent across the right common iliac artery appeared to be patent. The extraperitoneal hematoma of the pelvis also showed slight decrease in volume.

On postoperative day 15, a CT of the abdomen–pelvis was ordered to rule out a possible abscess as workup for pyrexia and diarrhea. The CT came back negative for an abscess. A magnetic resonance cholangiopancreatography (MRCP) was ordered the next day, without IV contrast, to see if there was an injury to the biliary system or pancreas. This was important considering its vicinity to the injured duodenum. The results of the MRCP were unremarkable and showed that the retroperitoneal hematoma was unchanged.

The patient made an unremarkable recovery and was discharged on postoperative day 17. She was followed up as an outpatient in a week’s time, and she was afebrile, vitals stable, pain adequately controlled, and tolerating oral diet. We followed the patient in the clinic with a thorough clinical examination along with a scheduled ultrasonography (USG) at 4 weeks and a repeat CT at 3 months. The patient was lost to further follow-up.

DISCUSSION

The finding of the pseudoaneurysm at the right common iliac artery was incidental on the CT scan of the abdomen and pelvis. Isolated traumatic aneurysms of the common iliac artery are very rare. Although it is estimated that the prevalence of this type of aneurysm in vascular literature is between 0.008 and 0.03%, the true incidence in trauma literature is difficult to predict considering its rarity and description in isolated case reports. About half of the patients are asymptomatic (as in our case report) and often very hard to identify through physical examination. The other half of the patients may present with symptoms based on the structure the aneurysm is compressing. These can manifest as hydroureter or deep venous thrombosis. The cause of mortality is most commonly attributed to the rupture of the aneurysm.

The risk of rupture increases with the size of the aneurysm itself. There is a 31% rate of rupture in aneurysms with a mean diameter of 5.6 cm. It is suggested that an asymptomatic aneurysm, i.e., greater than 3 cm diameter needs to be addressed with surgery. Other indications for repair are a ruptured iliac artery aneurysm.
Endovascular Stenting for Traumatic Common Iliac Pseudoaneurysm as an Adjunct following Exploratory Laparotomy

PAJT

of penetrating trauma,4-6 which can be partly because of ing injuries. More vascular injuries are found in the setting up soon after. The CTs are useful in picking up unsuspect-
ondary to penetrating or blunt trauma to the abdomen, patients who are hemodynamically unstable and have
are advantages of using endovascular repair. The major
lar management in most institutions including ours. There
aneurysms. Today, the paradigm has shifted to endovascu-
believes is best in that particular scenario. Conventionally,
flow can be reduced. If not enough collateral circulation
protein.13 These can often be observed with conserva-
lization.14 It constitutes a low-grade fever, abdominal
pain, leukocytosis, and an elevation of the C-reactive
protein.15 These can often be observed with conserva-
tive management in most cases. In extreme cases, blood
loss can be reduced. If not enough collateral circulation
exists, ischemia can occur in the colonic mucosa.15 Most
of the existing literature regarding endovascular repair
of iliac vessels is in the setting of atherosclerotic disease. Emergency stenting cases are rare and limited to isolated case reports. No definite set protocol exists for long-term follow-up of such patients. Further studies are warranted.

CONCLUSION

Penetrating abdominal injuries often cause significant vascular and nonvascular injuries that often require emergency surgery. Vascular injuries in a polytrauma patient are often associated with significant cardiovascular instability and solid organ injury. Wound contamination in acute scenarios, either due to visceral trauma or open wound, can make nonautologous repair of such injuries not an attractive option. Endovascular methods have become the standard of care in many institutions. The endovascular management of hemodynamically unstable patient involves the application of covered stent grafts. Such stent grafts are associated with decreased blood loss. It is a relatively less invasive procedure. Therefore, this requires less anesthesia and alleviates the need for elaborate dissection in a already traumatized field, as in our case. Such advantages can make a difference in critically injured trauma patients, especially in the geriatric population with multiple comorbidities. The fact is that endovascular approach can be performed from easily accessible sites, often remote from the injury sites, especially when identification and exposure of a vessel injury may be technically demanding.

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REFERENCES