CASE REPORT

Obstructive Uropathy because of a Large Rectus Sheath Haematoma: A Case Report of Combined Interventional Radiology and Surgical Approach

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Introduction: Rectus sheath haematomas associated with anticoagulation are often self limiting. When large, however, they can even extend into the pelvis and cause compression of adjacent organs such as the bladder. A combined endovascular and surgical approach can decrease the operative exposure necessary to treat this occurrence.

Report: A 42 year old morbidly obese African American female on warfarin treatment for pulmonary embolism presented outside the hospital with pneumonia. During her hospitalisation, she developed a spontaneous right rectus abdominis haematoma below the level of the umbilicus with active bleeding in the extraperitoneal space causing mass compression of the bladder. She developed acute renal failure and became anuric. Following endovascular embolisation of the inferior epigastric artery, surgical exploration was successfully performed to remove the haematoma and relieve the urinary obstruction. Diuresis resumed and renal function normalised without any further evidence of bleeding.

Discussion: A large rectus sheath haematoma that extends into the bladder causing renal obstruction can be treated by endovascular embolisation and surgical exploration to limit operative risks and exposure in morbidly obese patients.

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INTRODUCTION

Rectus sheath haematomas (RSHs) are uncommon and can arise from disruption of a branch of the inferior epigastric artery at its insertion into the rectus abdominis muscle combined with an inability to tamponade the bleeding, especially below the arcuate line. RSHs have been found to be associated with severe bouts of coughing, anticoagulation therapy, subcutaneous abdominal injection of insulin, pregnancy, and connective tissue disorders. Pain and anaemia are the most common manifestations. Most RSHs are self limiting and the majority does not cause hypovolemic shock requiring emergency medical or surgical intervention. Herein is reported a rare rectus sheath haematoma complicated by compressive obstructive uropathy leading to acute postrenal failure that was successfully treated by a combined endovascular and surgical approach.

REPORT

A 42 year old African American female with past medical history significant for morbid obesity (body mass index 63.8 kg/m²), hypertension, systemic lupus erythematosus (SLE), pulmonary emboli on warfarin, and recent diagnosis of pneumonia, presented to an outside hospital with recurrent shortness of breath, severe cough, and new onset diarrhea. On presentation, the patient had fever (39.4 °C) and was tachycardic (106 beats per minute). She had mildly elevated serum creatinine (sCrea; 1.32 mg/dl) (baseline 0.8–0.9 mg/dl), normal haemoglobin (Hb; 10.2 mg/dl), and a normal international normalised ratio (INR; 1.0). Sputum culture revealed influenza A virus subtype H1N1, and stool culture was positive for Clostridium difficile attributable to her recent antibiotic use for the pneumonia. Her influenza infection was treated with oseltamivir and her C. difficile with vancomycin/cefepime. On her first hospital day, the patient began complaining of abdominal pain. CT abdomen/pelvis with contrast showed right rectus abdominis haematoma below the level of the umbilicus with active arterial bleeding in the extraperitoneal pelvis causing mass compression (Figs. 1–3). On the following day, the Hb level was on a downward trend, from 10.2 to 7.7 mg/dl. Two units of fresh frozen plasma (FFP) were given, two units of packed...
red blood cells were ordered, and the patient was transferred to the tertiary care medical centre. She was admitted to the intensive care unit and found to be anuric, tachycardic, and hypotensive but responsive to intravenous fluid resuscitation (heart rate ranging between 90 and 100 per minutes and systolic blood pressure ranging between 90 and 120 mm Hg with the mean arterial pressure (MAP) > 65 mm

Hg). Repeat laboratory tests upon transfer showed acute renal failure (sCrea 5.56 mg/dl) and the Hb level going down further from 7.7 to 7.2 mg/dl. The serum vancomycin level was 8.1 µg/ml (normal low 4 µg/ml; normal high 40 µg/ml). Anti-double stranded DNA antibody (anti-dsDNA) IgG and anti-nuclear antibodies (ANAs) for SLE in the serum were not detected. A Foley catheter was placed, and critically elevated bladder pressures (~50 mmHg) were measured that raised a concern of abdominal compartment syndrome. An emergency surgical consultation was requested. Abdominal examination showed significant tenderness, notably in the suprapubic, right lower, and right upper quadrant over a palpable haematoma. The patient had no urine output for almost 20 hours, with worsening and severe suprapubic pressure and pain. The decision was made to take the patient to the interventional radiology (IR) suite for coil embolisation of the inferior epigastric artery first followed by transfer to the operating room (OR) for evacuation of the compressive right pelvic haematoma.

In IR, embolisation of the right inferior epigastric artery was performed. Real time ultrasound guidance was used to access the contralateral femoral artery with placement of a 5F vascular sheath; a reverse curve catheter SOS1 was used to select the right common iliac artery under fluoroscopy. Over a guidewire, this catheter was exchanged for a 5F angled glide catheter that was positioned at the right external iliac artery. An angiogram showed diffusely small arteries related to the hypovolemic state. Then via a coaxial renegade high flow microcatheter and guidewire, the right inferior epigastric artery (RIEA) was selected; the angiogram showed no active arterial bleeding but compressive effects of the haematoma. Embolisation of the RIEA was performed with 0.018 inch tornado microcoils (Fig. 4). Additionally, given the extent of haematoma and the plan for immediate
surgical exploration, the right circumflex iliac artery was selected and prophylactic embolisation was performed. The patient was transferred to the OR.

A lower midline skin incision was performed and a flap was dissected on the right side to separate the skin and subcutaneous layers from the fascial layer. The haematoma was confirmed to be a rectus sheath haematoma by palpation and indirect visualisation through the rectus sheath (Fig. 5). A longitudinal incision over the rectus sheath fascia to the right of the margin of the rectus muscle was performed. The large haematoma was found to extend for at least 25 cm from lateral to medial and from cephalad to caudal, approaching the Retzius space and sitting on top of the bladder and to its right side. The haematoma was then scooped out with a fingers and hand manoeuvre. haemostasis of the oozing surfaces of the surgical field was successfully achieved.

The urinary bladder wall could be visualised through the peritoneal reflection and seemed quite ecchymotic but overall viable. The anterior rectus sheath was re-approximated with interrupted PDS0 sutures. The skin layer was re-approximated. Intra-operatively, clots were noted inside the Foley catheter.

On the same post-operative day (Day 0), she underwent haemodialysis with ultrafiltration of 500 ml. Her urinary output started to improve immediately and reached 2.6 l/24 hours by the second post-operative day. The sCrea level normalised to 0.99 mg/dl, and post-operative renal ultrasound showed resolution of hydronephrosis (Fig. 6). The patient was restarted on warfarin without any further bleeding. The patient was discharged to a long-term acute care facility and had uneventful clinic follow-up 2 weeks later after having fully recovered.

**DISCUSSION**

This case supports prior evidence that rectus sheath haematomas developing below the arcuate line tend to bleed more and dissect more extensively because of the lack of tamponade exercised by the posterior sheath and the tendinous insertions that are indeed present above the arcuate line. Obstructive uropathy secondary to large RSHs is very rare and usually presents in the setting of hypovolemic shock.2–4

The management of RSHs including large ones has shifted over the past few years from an aggressive surgical approach5 to non-operative treatment that is based on withdrawal of anticoagulants and immediate reversal of anticoagulation, with prothrombin complex concentrates being preferred over FFP administration.6 However, this patient developed acute

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Figure 4. Embolisation of right inferior epigastric artery. Coaxial microcatheter into the right inferior epigastric artery shows proximal embolisation with several microcoils.

Figure 5. Intra-operative evacuation of haematoma. Intra-operative picture showing rectus sheath haematoma visible through the rectus sheath.

Figure 6. Resolution of hydronephrosis. Post-operative right renal ultrasound shows interval resolution of hydronephrosis.
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post-renal failure with critically elevated bladder pressures, severe suprapubic pain that was not responsive to analgesics, and right hydronephrosis ipsilateral to the side of the injury. With the degree of renal failure, if left untreated the condition would have led inexorably to irreversible renal damage and possible chronic renal failure. A temporising treatment option could have been nephrostomy tube placement, but this would not have addressed the underlying cause of the obstructive uropathy from the pelvic haematoma. The increased intra-abdominal pressure, hypovolemia, co-existing medical condition (SLE), and the use of nephrotoxic drugs (vancomycin) might have contributed to the onset of acute renal failure although the patient’s MAP and serum levels of vancomycin were within normal limits and anti-dsDNA and ANA for SLE were not detected. Furthermore, the critically elevated bladder pressure recorded prior to surgical exploration, the concomitant hydronephrosis on the same side as the RSH, and the prompt restarting of the urinary output post-operatively seem to support the idea that the mass compression of the bladder by this very large haematoma was the cause of the acute renal syndrome. This interpretation of the aetiology is also substantiated by the repeat renal US after surgery which showed resolution of hydronephrosis (Fig. 6).

It is not known if the chronic treatment with warfarin might have played a role in the aetiology of the RSH since the patient’s INR was found to be within normal limits (1.0). Rather, it is believed that the aetiology of the RSH was probably traumatic because of the severe coughing the patient experienced for several days as a result of her pneumonia.

Endovascular embolisation of the inferior epigastric artery has been successfully and effectively performed and may prevent further bleeding at the time of the surgical exploration to remove, and at least partially tamponade, the large haematoma.

This combined approach is of further value when considering that the surgical exploration might fail to find the bleeding source, obligating the surgeon to ligate the inferior epigastric artery at its origin from the femoral artery in close proximity to the inguinal ligament area. A long skin incision extending through the entire lower abdomen and reaching into the groin is potentially associated with sub-optimal cosmetic outcome, greater intra-operative blood loss, and peri-operative pain and an overall longer recovery time. One potential disadvantage of the combined endovascular and surgical approach is represented by the unavailability of an endovascular specialist at a local level or lack of available staff after office hours and the need for close coordination with the surgical team so that the patient can be transferred from the endovascular suite to the OR for the staged surgical treatment. At this institution, IR is available 24/7 and works closely with the surgical team; therefore, this consideration did not represent a concern in this case.

CONCLUSION

A combined approach based on embolisation of the inferior epigastric artery and staged surgical evacuation of a large compressive rectus sheath haematoma leading to acute post-renal failure is feasible and should be considered as an alternative to aggressive surgical intervention requiring ligation of the inferior epigastric artery at its origin. Further studies are needed to provide definitive evidence in favour of this innovative and effective approach that was carried out on this isolated case.

CONFLICT OF INTEREST

None.

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