CLINICAL VIGNETTE

A Growing Problem: A Case of Rectus Sheath Hematoma

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Case Report

An obese 45-year-old woman with antiphospholipid syndrome was transferred to UCLA and developed acute abdominal pain. She was initially admitted to an outside hospital with a right lower extremity deep venous thrombosis (DVT) and a superior mesenteric artery (SMA) thrombus. She developed necrotic bowel and underwent partial ileocolectomy. Subsequently, an inferior vena cava (IVC) filter was placed and anticoagulation was initiated. She was transferred to UCLA for higher level of care after developing lower gastrointestinal bleed on anticoagulation treatment with enoxaparin. When the patient had stabilized, anticoagulation was re-started due to her history of devastating thrombi with complications. She was initially started on heparin prophylaxis with 5000 units subcutaneous 3 times a day and eventually transitioned to treatment doses on a heparin drip.

Four days after the conversion from prophylactic subcutaneous heparin to therapeutic intravenous dosing, the patient reported acute right lower quadrant (RLQ) abdominal pain. Pain was waxing and waning with radiation to her right leg. She denied nausea, vomiting, change in appetite, constipation, diarrhea, fevers, or chills. On examination, her vital signs were unremarkable. She had no rebound, guarding, or Murphy's sign. However, a 2 by 3 centimeters (cm) mobile mass was noted in the RLQ over the site of the subcutaneous heparin and insulin injections. Her hemoglobin was 9.8 g/dL, unchanged from her baseline of 9 - 10 g/dL. Five hours later, the patient complained of increasing lower abdominal pain. Her vital signs remained stable with blood pressure of 140/80 mmHg, hemoglobin was 9.7 g/dL and her partial thromboplastin time (PTT) was 30 seconds (normal range 24.5 - 31 seconds). An abdominal x-ray was completed, which was negative for obstruction or free air. She was given intravenous morphine sulfate for pain and resumed on her heparin drip.

At 4:00 am, the patient developed severe RLQ pain with a progressively expanding abdominal mass. Her systolic blood pressure was 180 mmHg and her heart rate was 150 beats/minute. On examination, she had hypoactive bowel sounds, a soft abdomen, but significantly increased RLQ pain and a RLQ mass of approximately 20 by 10 cm was noted. The heparin drip was held. An emergent abdominal CT scan revealed a 9.7 by 16.1 cm anterior abdominal wall hematoma consistent with a rectus sheath hematoma. Her repeat hemoglobin was 5.5 g/dL.

The patient was emergently transfused 4 units of packed red blood cells and underwent emergent abdominal angiography with embolization of the right inferior epigastric artery. Because of the size of the rectal sheath hematoma, the patient subsequently required surgical evacuation to prevent abdominal compartment syndrome.

Discussion

Rectus Sheath Hematomas (RSH) are a unique complication of prophylactic or treatment doses of anticoagulation medications. They account for 1.5% - 2% of unexplained abdominal pain in hospitalized patients, but the incidence is increasing due to widespread use of anticoagulation.[1,2] Hematomas related to anticoagulation therapy usually develop

4 - 14 days after treatment is initiated, although the interval can be much longer.[3] They exhibit a male to female ratio of 1:2-3 and most often occur in patients between the ages of 50 and 60.[4] Several conditions predispose patients to development of RSH, including hypothyroidism, previous abdominal surgery, ascites, hypertension, collagen vascular disease, disorders of coagulation, pregnancy and obesity.[2,4]

RSH arise from shearing forces disrupting the inferior epigastric vessels, where they traverse the arcuate line of Douglas at the lower end of the rectus sheath (**Figure 1**). The inferior epigastric artery originates from the external iliac artery directly above the inguinal ligament and ascends between the rectus abdominis muscle and the posterior lamella of its sheath to the level of the umbilicus. From there, it divides into smaller branches. A tear of the rectus abdominis muscle or trauma to the inferior epigastric artery is thought to be the initiating event for RSH.[5] Strain of the rectus abdominis muscle with subsequent muscle tear can provide enough shearing force to disrupt the inferior epigastric artery. Disruption of this artery in conjunction with local anticoagulation effect of heparin can lead to the formation of large hematomas. Pain results from the blood collection stretching the rectus cutaneous medialis nerve sheath. The most common inciting factors are straining, coughing, exercising, prophylactic and treatment doses of anticoagulation, and trauma. Trauma can be external or internal, including strain from minimal physical exertion, vomiting, or seizures.[2,6]

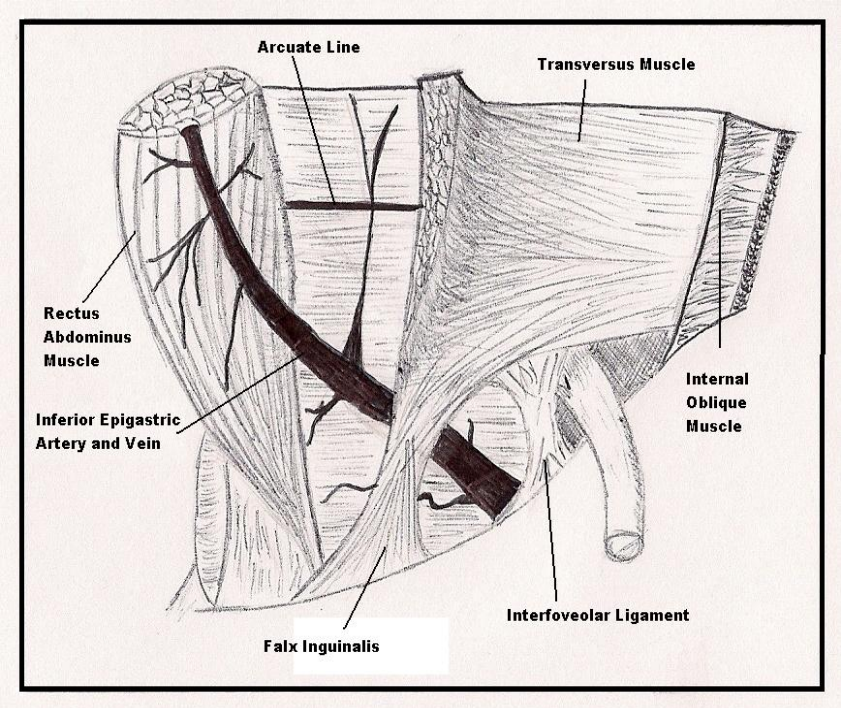

Figure 1. Anatomy of the Rectus Sheath

Clinical presentation of RSH is non-specific and includes abdominal pain, nausea, vomiting, and fever.[4,6] On physical examination, the patient may have an abdominal mass. The Fothergill sign is diagnostic of RSH.[3] This sign is positive if the palpated mass becomes fixed when the rectus muscle is contracted. Normally, when a patient is supine, a rectus sheath hematoma shows lateral mobility. When a patient voluntarily elevates his or her head, the side to side mobility disappears and the mass becomes fixed and more tender to palpation.

Diagnosis of RSH is challenging since only 50% of patients will have a visible hematoma at the time of presentation.[7] As a result, RSH are often confused with other causes of acute abdomen such as appendicitis, cholecystitis, incarcerated inguinal hernia, torsion of ovarian cyst, or acute pancreatitis.[2,7] Presence of an ecchymosis (such as Cullen's or

Turner's signs) is not always helpful as it often occurs late in the presentation.[2,4] Abdominal ultrasound (US) has only an 80% - 85% diagnostic sensitivity for RSH.[8,9] Diagnosis of RSH is often confirmed by abdominal and pelvic CT. It is 100% sensitive and specific in diagnosis of acute RSH of less than 5 days duration. RSH are divided into 3 classifications based on CT findings[10] (**Table 1**). After 5 days, MRI may be required to differentiate a chronic RSH from tumors of the abdominal wall.

RSH Grade	RSH Description	Treatment	Recovery
Type 1	• Mild • Intramuscular and unilateral • Does not dissect along fascia adjacent to the rectus muscle	Does not require hospitalization	1 month
Type 2	• Moderate • Intramuscular • May involve bilateral rectus abdominis muscles • Does not extend into prevesical space • Dissects along adjacent fascia	Requires hospitalization for first 24-48 hours; most do not require transfusions	2 - 4 months
Type 3	• Severe • Dissects along the fascia and extend into the peritoneum and prevesical space • Usually associated with anticoagulation	Requires hospitalization, blood transfusions, and hemodynamic stabilization	> 3 months. May require evacuation

Table 1: CT Classification of Rectus Sheath Hematoma

Treatment for RSH depends on the classification (e.g. size and location), the patient's underlying medical conditions, and identification of potential complications. Conservative treatment such as rest, analgesics, and discontinuation of anticoagulation products are utilized for nonexpanding and small hematomas (usually Type I or Type II). Blood products can be used as needed. More aggressive treatments should be considered for Type III RSH. Appropriate anticoagulation reversal, including fresh frozen plasma or protamine, should be utilized in patients with expanding hematomas, symptomatic anemia, or hemodynamic instability. Surgical evacuation and hemostasis are only necessary if the hematoma is expanding or hemostasis cannot be achieved despite anticoagulation reversal and adequate blood product delivery.[11] In the absence of a penetrating wound, antibiotics are usually not indicated since infection is rare. However, surgery is required if a secondary infection at the site of the hematoma develops.[7] RSH are not a contraindication to resuming anticoagulation once the hematoma is no longer expanding and the patient is hemodynamically and clinically stable. After resolution, RSH usually do not recur and typically do not cause long-term sequelae. Depending on the severity of the presentation, most patients may resume anticoagulation within 2 weeks after complete stabilization.[12]

Measures should be taken to prevent the occurrence of RSH in hospitalized patients. Mortality rate is estimated at 4% and can be as high as 25% in patients on anticoagulation.[12] Patients with cough or tracheal irritation secondary to ventilatory support should receive injections on the thigh or arm.

The American College of Chest Physicians (ACCP) has recommended DVT prophylaxis for all hospitalized patients who are confined to bed, have thrombotic risk factors such as cancer, and all patients with congestive heart failure or severe respiratory disease.[13] A meta-analysis by Bump and colleagues reviewing the efficacy of these guidelines shows that thromboembolism prophylaxis significantly decreases the rates of DVT and pulmonary embolisms in hospitalized medical patients.[14] With conclusive evidence that at-risk patients should receive DVT prophylaxis, greater emphasis is being placed on implementing empiric therapy. This will inevitably lead to a greater number of patients exposed to heparin, enoxaparin, and fondaparinux injections and RSH will continue to be growing problem.

Although rare, complications of thromboembolism injections such as RSH must be recognized. Immediate evaluation and monitoring is critical to ensure timely management and prevention of complications including hemodynamic insta-

bility, unnecessary surgery, abdominal compartment syndrome, hypovolemic shock, muscle necrosis, or even death.[11,12,15] In addition, hospitalized medical patients with increased risk factors should be identified on admission and alternative injection sites to the thigh or arm should be ordered. If there is a suspicion of RSH, abdominal CT rather than US should be ordered. With increased awareness of RSH, clinicians can ensure patient safety while complying with standard of care for prophylaxis and treatment with anticoagulants.

Teaching Points:

1) Rectus sheath hematoma (RSH) should be considered in hospitalized patients on injectable anticoagulation with presentation of acute abdominal pain.
2) Mortality with RSH can be as high as 25% and is attributed to delay in diagnosis. Treatment includes cessation of anticoagulation therapy and aggressive resuscitation with fluids and blood products.
3) Abdominal CT scans (100% sensitive) should be used over abdominal US (80% - 85% sensitive) for diagnosis of RSH.
4) Complications can include unnecessary surgery, hemodynamic instability, abdominal compartment syndrome, muscle necrosis, hypovolemic shock, and even death.
5) High risk patients should be identified and an alternative site for anticoagulation injection should be selected.

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