

# Spontaneous rectus sheath hematoma diagnosed by point-of-care ultrasonography

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## ABSTRACT

Spontaneous rectus sheath hematoma is an uncommon condition that can mimic other conditions associated with an acute abdomen. We report the case of a patient with a spontaneous rectus sheath hematoma due to a ruptured inferior epigastric artery pseudoaneurysm who presented with hypotension and severe abdominal pain and was diagnosed using emergency department point-of-care ultrasonography. Point-of-care ultrasonography has been increasingly used in the evaluation of emergency department patients with acute abdomen and hypotension to expedite the diagnosis and management of aortic aneurysm and intraperitoneal bleeding. Resuscitation and urgent surgical and interventional radiology consultations resulted in the successful embolization of a branch of the inferior epigastric artery and a good outcome.

## RÉSUMÉ

L'hématome spontané de la gaine du grand droit est un événement rare, qui peut simuler d'autres affections associées à un abdomen aigu. Nous faisons état, dans le présent article, du cas d'un patient qui a consulté pour un hématome spontané de la gaine du grand droit, attribuable à la rupture d'un pseudo-anévrisme de l'artère épigastrique inférieure; le malade était en état d'hypotension et ressentait de vives douleurs abdominales. Le diagnostic a été posé à partir d'une échographie pratiquée à l'urgence. On recourt de plus en plus à ce type d'examen pour évaluer les patients aux services des urgences, qui présentent un abdomen aigu et de l'hypotension, afin d'accélérer la pose du diagnostic d'anévrisme de l'aorte et d'hémorragie intrapéritonéale ainsi que leur prise en charge. Les manœuvres de réanimation auxquelles s'ajoutent les consultations urgentes en radiologie interventionnelle et en chirurgie ont permis l'embolisation d'une ramification de l'artère épigastrique inférieure et l'obtention d'une issue favorable.

**Keywords:** inferior epigastric artery rupture, rectus sheath hematoma, ultrasonography

Rectus sheath hematoma (RSH) is a rare and frequently misdiagnosed cause of abdominal pain that can mimic other conditions associated with an acute abdomen.<sup>1,2</sup> RSH is associated with a variety of etiologies, including 1) sudden abdominal wall muscular contraction from coughing, sneezing, or strenuous exercise; 2) direct trauma or surgical procedures; 3) pregnancy and labour; 4) hyperextension of the rectus muscle associated with obesity, ascites, or tumours; and 5) coagulopathy.<sup>1-3</sup> Abdominal surgery, trauma, and anticoagulant therapy are the most common predisposing factors for RSH,<sup>1-3</sup> and ultrasonography and computed tomography (CT) are the imaging modalities of choice in suspected cases.<sup>4-6</sup>

We report the case of a patient with a spontaneous RSH due to a ruptured inferior epigastric artery pseudoaneurysm who presented with hypotension and severe abdominal pain and was diagnosed using point-of-care ultrasonography. The purpose of this report is to increase awareness in the emergency medicine community regarding the possibility of RSH in the appropriate context and to highlight the role that point-of-care ultrasonography can play in detecting RSH and expediting its definitive management.

## CASE REPORT

A 76-year-old man presented to the emergency department (ED) with a 2-day history of abdominal pain, constipation, back pain, and weakness that had

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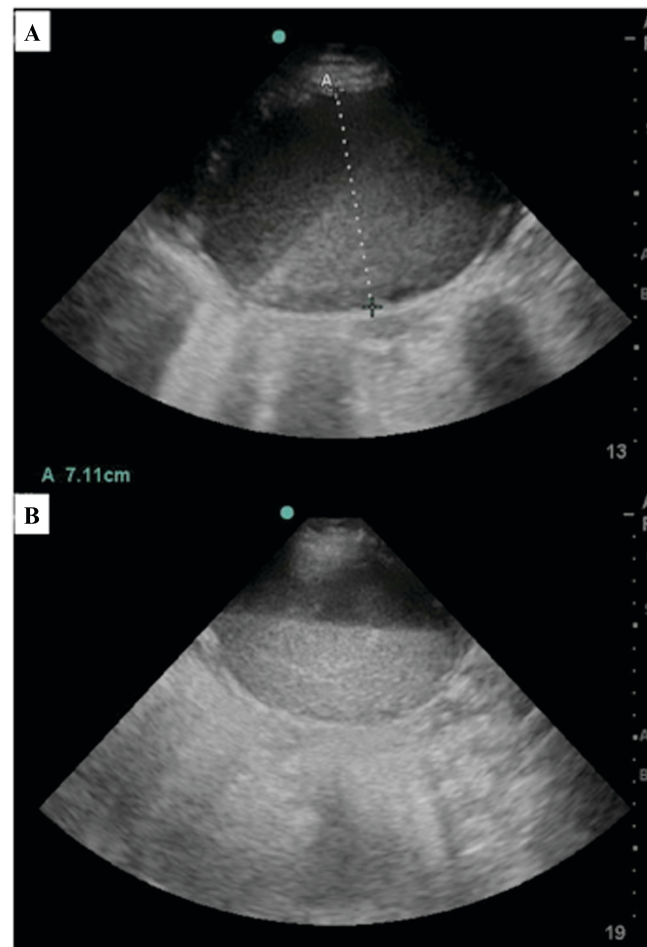
suddenly worsened and was associated with diaphoresis. His past medical history included a laparotomy 3 months prior to presentation for small bowel obstruction. During that previous admission, a postoperative abdominal CT scan identified bilateral lower lobe pulmonary emboli, and the patient was treated with enoxaparin and warfarin. Two weeks prior to presentation, he was admitted to hospital with chest pain and underwent coronary angiography and stent placement. He was subsequently started on clopidigrel and aspirin and continued on enoxaparin.

On examination, he was pale, profusely diaphoretic, and in extreme distress from pain. He had blood pressure of 94/62 mm Hg, a pulse rate of 110 beats/min, a respiratory rate of 24 breaths/min, a temperature of 37.5°C (99.5°F), and an oxygen saturation of 97% on room air. His abdomen was severely distended, rigid, and diffusely tender with guarding in all quadrants; the point of maximal tenderness was in the left periumbilical area.

Investigations showed a prothrombin time of 13.8 seconds and an international normalized ratio of 1.16. A complete blood count showed a white blood cell count of  $11 \times 10^9/L$ , hemoglobin of 65 g/L, hematocrit of 20.8%, and a platelet count of  $525 \times 10^9/L$ . The patient's hemoglobin and hematocrit had dropped from 114 g/L and 36.3% in the 2 weeks since his previous admission.

ED point-of-care ultrasonography of the abdomen was performed using the SonoSite MicroMaxx system (SonoSite, Bothell, WA) and a multifrequency 5-2 MHz phased array transducer. There was no intraperitoneal free fluid, and the aorta was incompletely visualized. A large, heterogeneous, hypoechoic mass with a fluid-fluid level deep to rectus muscle and encircled by the dorsal rectus sheath was identified (Figure 1).

A presumptive diagnosis of RSH was made, and intravenous crystalloid resuscitation and blood transfusion were commenced, resulting in hemodynamic stabilization. A contrast-enhanced CT scan of the abdomen confirmed the presence of an RSH between the left rectus abdominis muscle and the posterior rectus sheath, measuring  $16 \times 11 \times 22$  cm. An area of extravasation extended from the rectus abdominis muscles likely representing active bleeding from the inferior epigastric vessels. There was an associated mass effect on the underlying bowel loops and no evidence of intra-abdominal or pelvic hemorrhage



**Figure 1.** Transverse (A) and longitudinal (B) anterior abdominal wall ultrasound scans showing a large mass deep to the rectus muscles with a fluid-fluid level consistent with the "hematocrit effect" from unclotted blood and active hemorrhage.

(Figure 2). Angiography identified hemorrhage from a branch of the inferior epigastric artery, and embolization was performed (Figure 3). A postembolization angiogram showed no evidence of ongoing bleeding, and the patient was admitted to hospital. His subsequent clinical course was uneventful, and he was discharged home after 1 week.

## DISCUSSION

RSH is a relatively uncommon cause of acute abdominal pain that is frequently misdiagnosed.<sup>2,3,6-8</sup> Bleeding into the rectus sheath is usually caused by damage to the superior or inferior epigastric arteries. Abdominal trauma, previous laparotomy or laparoscopic procedures, minimally invasive procedures such as drain placement and paracentesis, and increased



**Figure 2.** A, Contrast-enhanced computed tomographic scan of the abdomen during arterial phase showing active contrast extravasation from an inferior epigastric artery branch (*dashed arrow*), which settled onto the dependent portion of the rectus sheath hematoma (*arrow*). B, A delayed venous phase image showing dilution and pooling of the active extravasation (*arrow*).

intra-abdominal pressure from straining or sneezing are etiologies associated with RSH.<sup>6,9</sup> The use of anticoagulant medications is particularly associated with RSH, as was the situation in the case we present.<sup>6,7,10</sup>

Point-of-care ultrasonography has been increasingly used in the evaluation of ED patients with acute abdominal pain. In patients with suspected RSH,



**Figure 3.** Superimposition of an early and late arterial phase of the left inferior epigastric artery showing active extravasation of contrast from a branch of the inferior epigastric artery (*arrow*).

point-of care ultrasonography is a useful modality not only diagnostically but also to rule in or out other causes of acute abdomen associated with hypotension or shock (in particular aortic aneurysm or intraperitoneal bleeding).<sup>4,5</sup>

Abdominal ultrasound scanning can be completed in any plane or body section with the patient in any position using a curvilinear 3.5 to 5 MHz transducer. The ultrasound characteristics of RSH include a hypoechoic or anechoic spindle-shaped mass located in the anatomic structure of the rectus sheath. More superiorly (above the semicircular line), the hematoma is limited laterally by the semilunar line and medially by the linea alba. At the lower levels, given that the sheath exists posteriorly, the hematoma may cross the midline or extend toward the bladder. The hematoma may be echo free during its initial liquid phase, but if a significant amount of liquid is present, it may contain echoes or develop a fluid-fluid level.<sup>4,5,11</sup>

If the diagnosis of RSH is suspected or suggested by ED ultrasonography, an abdominal CT scan should be obtained. RSH can be categorized by its cross-sectional CT appearance into one of three groups: 1) intramuscular hematoma, resulting in diffuse enlargement of the muscle; 2) bilateral intramuscular hematoma with fluid-fluid level; or 3) hematoma with a fluid-fluid level, centred in the prevesical space (i.e., between the transversalis fascia and the muscle).<sup>12</sup> A fluid-fluid level, as existed in the case we present, represents the “hematocrit effect” and implies the presence of unclotted blood, indicating either coagulopathy or active hemorrhage, warranting hospitalization for close observation and indicating the possibility that blood transfusion will be required.<sup>12,13</sup>

In cases where ED ultrasonography suggests the presence of RSH, emergency physicians should consider obtaining a CT angiogram in the arterial phase (as opposed to a routine contrast-enhanced CT scan of the abdomen, which is typically obtained in the venous phase). Arterial phase CT has the advantage of identifying the presence of, and source of, active arterial extravasation. This finding would facilitate early consultation with an interventional radiologist for the consideration of embolization of the disrupted vessel.

### CONCLUSION

RSH is a rare but potentially serious condition, particularly in frail elderly patients. Emergency physicians should be aware of the possibility of RSH, particularly in the setting of abdominal surgery, trauma, or patients on anticoagulant therapy. Point-of-care ED ultrasonography can play an important role in detecting RSH and expediting its definitive management; however, CT is usually required to confirm the diagnosis and assess the extent of the hematoma.

**Competing interests:** None declared.

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