Active extravasation of contrast medium in a rectus sheath haematoma

A female patient hospitalized in the internal medicine clinic for stroke complained of pain in the right inguinal region, which started after intense coughing. Clinical examination revealed a palpable mass in this region, while the haematocrit fell from 45% to 35% in 24 hours.

The patient was referred for CT in order to exclude the presence of an intra-abdominal inflammation. CT revealed the presence of a heterogeneous mass, which was predominantly hyperdense and situated in the right rectus sheath, mainly below the level of umbilicus. The mass's transverse dimensions were 8.7x6.3 cm while it extended for approximately 23 cm in the cephalocaudal plane. (Fig. 1) There were some fluid-fluid levels inside the mass which represented the "haematocrit effect". (Fig.1c, e) After the intravenous administration of a contrast medium, the mass showed a heterogeneous enhancement while the epigastric vessels were seen inside the mass. (Fig.1b, 2) Of note was the extravasation and pooling of contrast in one fluid-fluid level. (Fig.2c, 3) Ultrasound was performed to further evaluate the mass, which was heterogeneous in echogenicity and contained collections with fluid-fluid levels. In these collections there was hyperechoic fluid, suggestive of haemorrhage, correlating with the CT findings. (Fig. 4, 5) Colour Doppler examination confirmed the presence of vessels. (Fig. 4b)

Rectus sheath haematomas (RSH) are caused by trauma, intense coughing, strenuous exercise, twisting, surgery or may occur spontaneously. There are also reports about RSH caused by rupture of an epigastric artery aneurysm. [1, 2, 3] Anticoagulant therapy is an important predisposing factor. RSH arise from either rupture of the epigastric vessels or the rectus muscle itself. [4]

RSH cause abdominal pain and an abdominal wall palpable mass. Laboratory examinations may sometimes reveal decreased haemoglobin levels. [4]

Ultrasound represents the first-line modality to evaluate RSH, even in the emergency department. [1] RSH appear as hyper- or hypoechoic partially cystic masses which may contain thickened and irregular septa. Fluid-fluid levels or varying echogenicities can be found depending on the haematoma’s content and age. However, ultrasound is not
always specific and CT is performed. CT demonstrates RSH as homogeneously hyperdense, hypo- or isodense masses, depending on their age and clot resorption. A hypodense halo surrounding the haematoma, stranding of the adjacent fat and enlargement of the anterolateral abdominal muscles are other possible findings. MRI can be used to diagnose a RSH, which appears with high signal intensity on both T1 and T2 weighted images. [1, 4, 5, 6] RSH are usually spindle-shaped on transverse scans above the level of the arcuate line but become spherical under this level. This is explained by the abdominal wall anatomy. Namely, the superior and inferior epigastric vessels are situated behind the rectus abdominis muscle and form an anastomotic network. RSH situated above the arcuate line appear spindle-shaped due to the bounding by the posterior layer of the rectus sheath. The transverse abdominis and internal oblique aponeuroses, which form the latter, are situated anterior to the muscle below the arcuate line leaving the posterior surface of the muscle supported only by the transverse fascia. As a result, RSH protrude posteriorly below the arcuate line and become rounded in shape. [4, 6, 7] Fluid-fluid levels are also visible on CT and represent a “haematocrit effect”, indicating active haemorrhage and the need for close observation. [1] Arterial phase CT is useful in identifying active bleeding by visualizing active extravasation of the contrast medium. [1] RSH are classified by CT in type I when they simply cause enlargement of the muscle, type II in cases with bilateral involvement and fluid-fluid levels and type III when containing a fluid-fluid level and situated in the prevesical space. This classification indicates the haematoma's severity. RSH are treated conservatively with blood transfusion, or surgically, depending on the severity. [8]

**Differential Diagnosis List:** Rectus sheath haematoma with active bleeding, Rectus sheath haematoma, Lipoma, Haemangioma, Neurofibroma, Desmoid neoplasm, Abdominal wall abscess

**Final Diagnosis:** Rectus sheath haematoma with active bleeding

**References:**


Figure 1

a

Description: This transverse CT image shows the enlargement of the right rectus abdominis muscle. 
Origin: Radiology Department, AHEPA Hospital, Thessaloniki, Greece.

b

Description: A lower transverse CT image shows the presence of a spindle-shaped heterogeneous hyperdense mass. There is also a contrast enhanced epigastric vessel traversing the mass (arrow). This slice is situated just above the umbilicus (omphalocele-arrowhead). Origin: Radiology Department, AHEPA Hospital, Thessaloniki, Greece.
**Description:** The mass is still spindle-shaped while there is enlargement of the lateral abdominal muscles. A fluid-fluid level can be seen inside the mass (curved arrow). **Origin:** Radiology Department, AHEPA Hospital, Thessaloniki, Greece.

**Description:** Below the level of the umbilicus and the arcuate line, the mass is rounded and projects posteriorly. **Origin:** Radiology Department, AHEPA Hospital, Thessaloniki, Greece.
Description: The mass is rounded in shape and contains a fluid-fluid level (curved arrow). There is also stranding of the adjacent fat. Origin: Radiology Department, AHEPA Hospital, Thessaloniki, Greece.
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Description: This MIP contrast-enhanced CT image shows a branch of the superior epigastric vessels (arrow) entering the mass. **Origin:** Radiology Department, AHEPA Hospital, Thessaloniki, Greece.

Description: A lower MIP image demonstrates another vascular branch (arrow) near the posterior surface of the mass. **Origin:** Radiology Department, AHEPA Hospital, Thessaloniki, Greece.
Description: A thick MIP image demonstrates the course of the inferior epigastric artery originating from the external iliac artery. These vessels can be seen anastomosing with branches of the superior epigastric vessels. Arrowhead-contrast medium pooling. Origin: Radiology Department, AHEPA Hospital, Thessaloniki, Greece.
Description: An erect thick MIP image showing the course of the inferior epigastric artery (arrow) originating from the external iliac artery. The pooling of the contrast medium is also seen (arrowhead).

Origin: Radiology Department, AHEPA Hospital, Thessaloniki, Greece.
Figure 3

Description: This image demonstrates the extravasation and pooling of the contrast medium inside a fluid-fluid level. Origin: Radiology Department, AHEPA Hospital, Thessaloniki, Greece.
Description: This ultrasound image confirmed the presence of a solid mass with heterogeneous echogenicity inside the rectus abdominis muscle. **Origin:** Radiology Department, AHEPA Hospital, Thessaloniki, Greece.

Description: Colour Doppler technique confirmed the presence of blood vessels inside the mass. **Origin:** Radiology Department, AHEPA Hospital, Thessaloniki, Greece.
Description: This ultrasonographic image identifies the presence of fluid-fluid collections with hyperechoic fluid inside the mass, correlating with the CT findings. These collections are consistent with the “hematocrit effect” and suggestive of active haemorrhage. Origin: Radiology Department, AHEPA Hospital, Thessaloniki, Greece.
Description: This ultrasonographic image reveals the presence of septa inside a fluid-fluid collection. There is also posterior enhancement of the acoustic energy. Origin: Radiology Department, AHEPA Hospital, Thessaloniki, Greece.