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Spontaneous rectus sheath hematomas: clinical and radiological features

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Abstract

We reviewed the clinical and radiological features in eight patients with spontaneous rectus sheath hematoma (RSH). The diagnosis was confirmed at surgery in four patients, and spontaneous resolution occurred in the other four. All patients were elderly adults. Acute abdominal pain and a palpable mass after muscular strain, such as coughing or twisting, were features highly suggestive of RSH. Sonographically, these hematomas may be confused with abdominal wall tumors. On CT scans, a hyperdense mass posterior to the rectus abdominis muscle with ipsilateral anterolateral muscular enlargement is considered characteristic of acute RSH, although chronic RSH may be isodense or hypodense relative to the surrounding muscle. MRI is very useful in the diagnosis of RSH, which is demonstrated as a high signal intensity area on both T1- and T2-weighted images, especially when the CT findings are not specific for RSH.

Key words: Abdominal wall—Rectus sheath—Hematoma—CT—MRI.

Rectus sheath hematoma (RSH) results from either rupture of the epigastric vessels or the rectus muscle itself. The hematoma may be caused by trauma, coagulation disorders, or anticoagulant therapy [1, 2], but it can also occur spontaneously [3]. The sonographic appearance of RSH, although well known [4, 5], is not specific. Moreover, the numbers of patients observed in each reported study have been rather few [6–9]. We describe the radiological and clinical manifestations of spontaneous RSH in eight patients.

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Materials and Methods

The eight patients consisted of two men and six women, ranging in age from 63 to 82 years, with an average age of 71 years. Four of the hematomas were confirmed at surgery, and the other four resolved spontaneously 1–6 months after the onset. Computed tomography (CT) and ultrasound (US) were performed in all patients, and magnetic resonance imaging (MRI) in two. The interval between onset of symptoms and performance of the imaging studies ranged from 2 to 34 days (CT, 2–27 days; US, 2–24 days; and MRI, 13–34 days). CT scans consisted of contiguous 1-cm transverse sections through the abdomen with and without the administration of 100 ml i.v. contrast material. The US scans were obtained by using various scanners, with either 3.5- or 5.0-MHz probes. MR imaging was performed by using a 0.5 T unit, and spin-echo T1-weighted images (TR/TE = 400–500/20) and T2-weighted images (TR/TE = 2000/80) were obtained.

Results

Clinical Features

All patients presented with abdominal pain and masses, ranging from 5 to 15 cm in diameter. The hematoma was on the right side in four patients and on the left in four. In no patient did the mass extend across the midline. None of the patients had had prior lower abdominal surgery or had received anticoagulant therapy.

Six patients had been suffering from pneumonia and/or bronchitis, and the hematoma had developed following coughing episodes in three of them. The hematoma appeared after a change in position in one patient. In the last patient there was no definite causal factor. Laboratory tests revealed decreased hemoglobin levels (<12 mg/dl) in six patients and increased serum LDH levels in three.

The leukocyte count was 14,500/mm^3 in one patient, but was within the normal range in the rest of the patients.

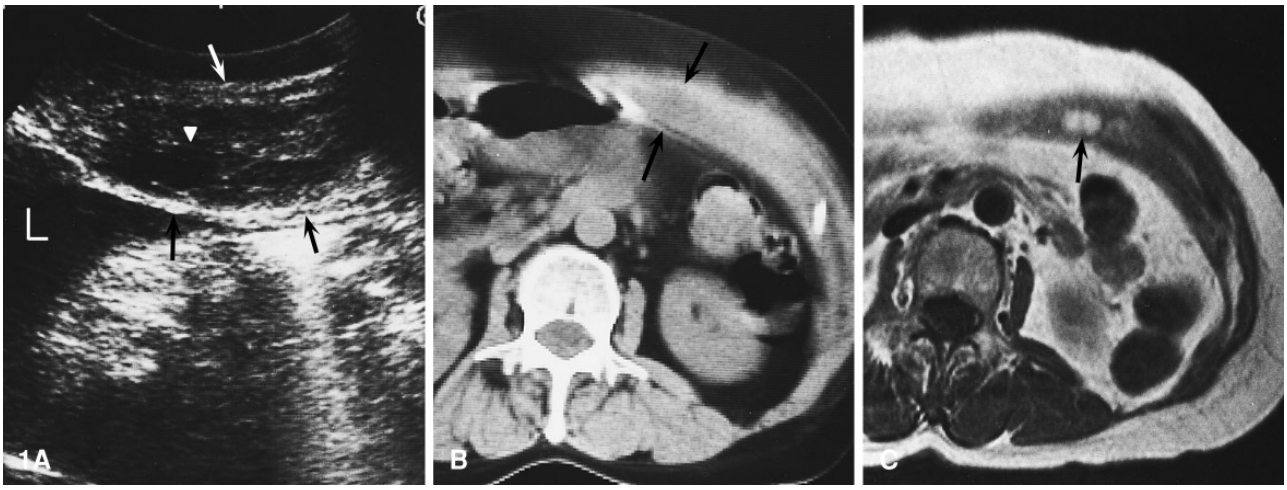

Fig. 1. A rectus sheath hematoma in a 65-year-old woman who suffered from pneumonia but had no history of onset after a coughing episode. **A** A longitudinal US scan of the midabdominal region obtained 20 days after the onset of symptoms demonstrates an oval mass (*arrows*) containing a small cystic region (*arrowhead*) (*L*-liver). **B** Unenhanced CT scan through the upper abdomen obtained the same day as the ultrasound image shows a slightly hypodense mass (*arrows*) with anterolateral muscular enlargement. **C** An axial T1-weighted MR image (TR/TE = 500/20) obtained 34 days after onset shows a round homogeneous high signal intensity (*arrow*) immediately posterior to the rectus abdominis muscle.

US Findings

US revealed solid masses containing small cystic regions in four patients (Fig. 1A). In two other patients, the lesions appeared cystic with thickened irregular septa. In the remaining two patients, the lesions had homogeneous internal echoes without septal or cystic components.

CT Findings

The lesions were generally spindle-shaped on transverse scans (Fig. 2A). However, those located below the arcuate line, which is 3.5–5.0 cm below the umbilical level, were spherical in shape (Fig. 2B). Four hematomas showed homogeneous hyperdensity (Fig. 2A,B), and two hematomas presented hyperdensity with thin circumferential halos of low density in the anterior abdominal wall immediately posterior to the rectus abdominis muscle. The remaining two hematomas appeared homogeneous and were of hypo- or isodensity relative to the surrounding tissues (Fig. 1B). The additional findings included increased density of the adjacent subcutaneous fat in four patients, and, in six patients, enlargement of the anterolateral muscles, i.e., the external and internal oblique and transversus abdominis muscles (Figs. 1B, 2A).

MR Imaging

MR images were obtained in two patients 13 and 34 days after onset. On both T1- and T2-weighted images, the hematomas exhibited hyperintensity with thin circumferential hypointensity bands located immediately posterior to the rectus abdominis muscle (Figs. 1C, 2C,D). In one patient, T2-weighted MR images clearly demonstrated hyperintensity in the adjacent fat tissue (Fig. 2D).

Discussion

Approximately 500 cases of RSH have been reported in the literature [9–11]. However, little emphasis has been placed on its radiological features. The present study of eight patients is the largest to date that includes the radiological findings of RSH.

RSH may be due to trauma, an underlying disease, or spontaneous rupture of the epigastric vessels or the rectus muscle. Underlying diseases or conditions include blood dyscrasia, degenerative muscular disease, anticoagulation therapy (especially heparin therapy) [12], and pregnancy. Titone et al. [3], from reviewing 50 cases of spontaneous RSH, reported that acute paroxysmal coughing associated with asthma, bronchitis, or influenza was the precipitating event in 56% of the cases. Among our eight patients, six suffered from pneumonia or bronchitis and one had twisted his body by standing erect at onset. Abdominal masses were palpable in all of our patients. Thus, the diagnosis of RSH begins with a careful history and physical examination [11].

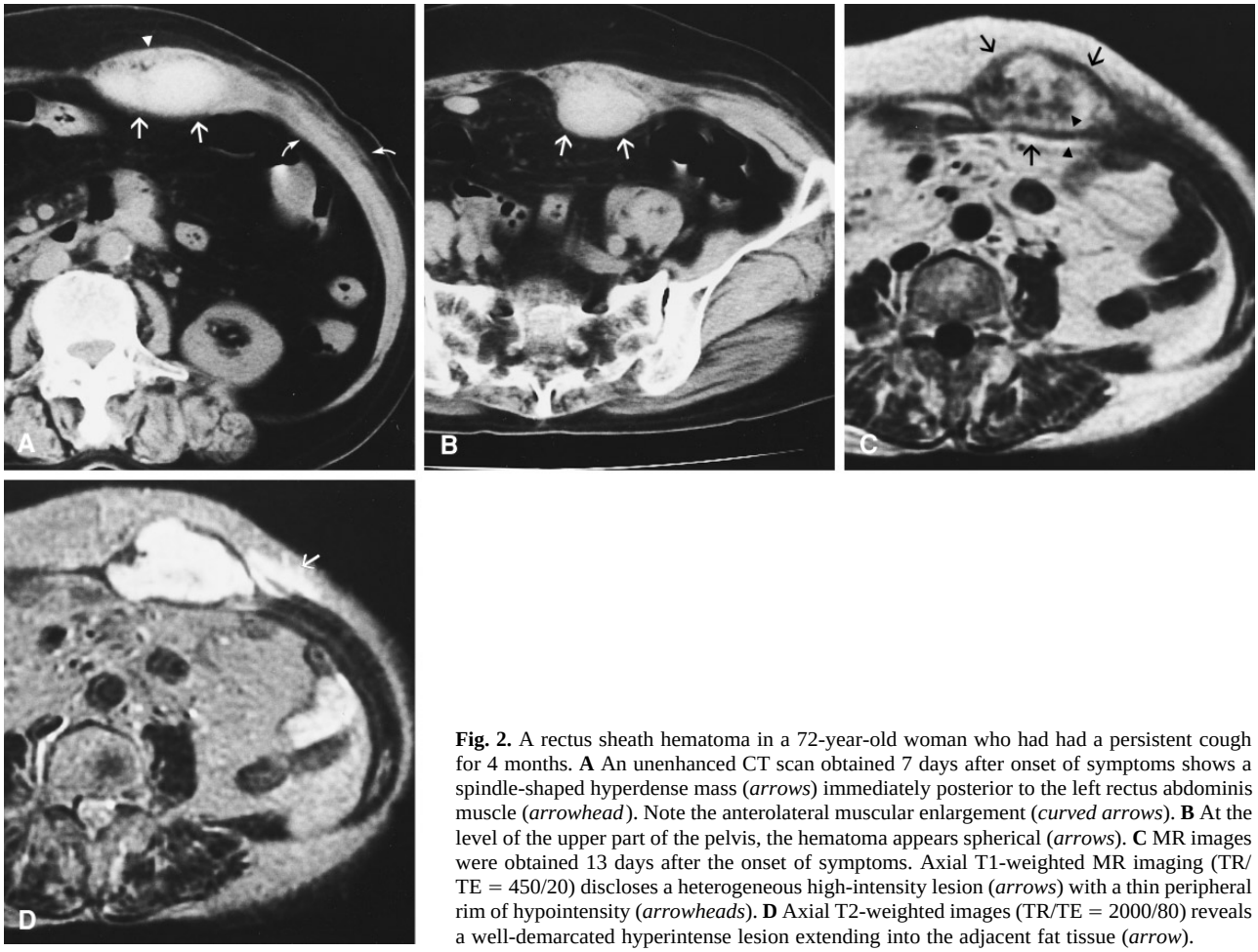

Fig. 2. A rectus sheath hematoma in a 72-year-old woman who had had a persistent cough for 4 months. **A** An unenhanced CT scan obtained 7 days after onset of symptoms shows a spindle-shaped hyperdense mass (*arrows*) immediately posterior to the left rectus abdominis muscle (*arrowhead*). Note the anterolateral muscular enlargement (*curved arrows*). **B** At the level of the upper part of the pelvis, the hematoma appears spherical (*arrows*). **C** MR images were obtained 13 days after the onset of symptoms. Axial T1-weighted MR imaging (TR/TE = 450/20) discloses a heterogeneous high-intensity lesion (*arrows*) with a thin peripheral rim of hypointensity (*arrowheads*). **D** Axial T2-weighted images (TR/TE = 2000/80) reveals a well-demarcated hyperintense lesion extending into the adjacent fat tissue (*arrow*).

RSH is closely related to the anatomy of the anterior abdominal wall (Fig. 3) [13]. The epigastric vessels lie between the rectus abdominis muscle and the posterior leaf of the rectus sheath, and they form a rich anastomotic network between the superior and inferior epigastric vessels near the umbilical level. Therefore, the hematoma is most commonly observed immediately posterior to the rectus abdominis muscle. Hematomas above the arcuate line usually appear spindle-shaped because the rectus abdominis muscle is enveloped by strong aponeurotic sheaths. Below the arcuate line, only the transverse fascia and the peritoneum support the rectus abdominis muscle. Thus, hematomas here protrude posteriorly and appear spherical on transverse sections (Fig. 2B) [1].

US revealed various patterns ranging from solid masses to cystic masses with septa. Cystic components within hematomas have apparently increased in frequency with time. Although US is the diagnostic procedure of first choice, its images are not specific [14, 15] and can simulate those of abdominal wall tumors or inflammatory diseases.

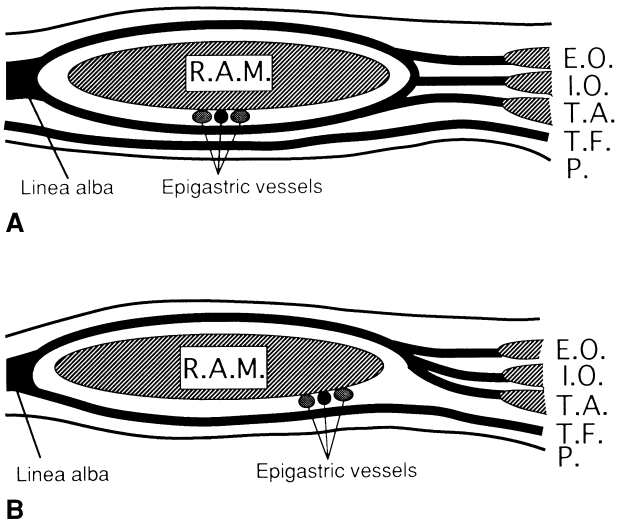

Fig. 3. This drawing shows the normal anatomy of the rectus sheath (modified from [13]). (**A**) above the arcuate line and (**B**) below the arcuate line. R.A.M. = rectus abdominis muscle; E.O. = external oblique muscle; I.O. = internal oblique muscle; T.A. = transversus abdominis muscle T.F. = transversalis fascia; P. = peritoneum.

Information about the rectus abdominis muscle itself, perimuscular tissue, and the anterolateral muscles is best obtained with CT scanning [11, 16]. Hyperdensity or central hyperdensity with peripherally decreasing density posterior to the rectus abdominis muscle is a characteristic findings on CT. Additional findings include enlargement of the anterolateral muscles and increased density in the adjacent fat tissue. Although diffuse or localized hyperdensity can be a specific sign of hemorrhage, clot resorption leads to diminution of density [17], and hematomas can become isodense or hypodense with time, as in two of our patients.

MR imaging is useful in differentiating such chronic RSH from anterior abdominal wall masses. RSH is described as being of high intensity on T1- and T2-weighted images, as in our patients, who underwent imaging 5–34 days after onset. Unger et al. [18] reported that, in contrast to acute hematomas (<48 h), subacute and chronic hematomas (up to 10-month duration) in the extracranial regions present areas of high signal intensity on both T1- and T2-weighted pulse sequences. Therefore, MR imaging adds specificity to the CT examination of RSH. Tumors of the anterior abdominal wall include lipoma, hemangioma, neurofibroma, desmoid tumor, soft-tissue sarcoma, lymphoma, and metastatic lesion. Although bleeding into the neoplasm may occur, hyperdense regions are rarely observed in tumors. Desmoids and malignant neoplasms are also aggressive tumors with invasion of contiguous structures.

In conclusion, the clinical course and the characteristic CT appearance are suggestive of RSH. MR imaging may be helpful in differentiating chronic hematomas from tumors, especially when no underlying disease or precipitating event is apparent.

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