



## Original article

## Diagnostic and management of spontaneous rectus sheath hematoma

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## ABSTRACT

**Background:** Spontaneous rectus sheath hematoma is an uncommon and often misdiagnosed cause of abdominal pain. The aim of this study is to describe our experience in their management.

**Methods:** Retrospective analysis of the characteristics and outcomes of the spontaneous rectus sheath hematomas diagnosed over the last 12 years was conducted.

**Results:** 24 patients were included (66% women; mean age: 74 years; range: 54–87). All cases presented predisposing factors mainly anticoagulant therapy in 21 (87.5%) patients, hypertension in 19 (79.1%) and abdominal surgery in 12 (50%) cases. Eighteen (75%) referred triggering factors like coughing being the most common one, present in 17 (70.8%) patients. The main clinical findings were abdominal pain in 21 (87.5%) cases and the existence of an abdominal mass in 20 (83.3%). The diagnosis was confirmed by abdominal ultrasonography and/or computerized tomography in 23 (95.8%) patients. Nineteen cases (79.1%) responded to conservative management while 5 (20.8%) required interventional treatment, which consisted in an arteriography with selective embolization of the epigastric arteries in all cases. Four (80%) of the patients needing interventional treatment were receiving low molecular weight heparin. Nine (37.5%) patients developed hypovolemic shock and 1 (4%) died.

**Conclusions:** Spontaneous rectus sheath hematomas should be considered in the differential diagnosis of abdominal pain, particularly in elderly women under anticoagulant therapy with onset of symptoms after a bout of cough. Most cases respond to conservative management, although those related to low molecular weight heparin might require interventional treatment; arteriography with selective embolization of the epigastric arteries is the first therapeutic option.

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## 1. Introduction

Rectus sheath hematoma of the abdomen is a rare entity and frequently an underestimated cause of acute abdominal pain with significant associated morbidity and mortality. It is caused by an accumulation of blood in the abdominal anterior rectus sheath due to a lesion of the epigastric artery, its branches or a direct trauma to the rectus muscle itself [1]. The most frequent localization is infraumbilical, below the arcuate line where the posterior rectus sheath is deficient and the epigastric vessels are relatively fixed and prone to sharing [2].

In an increasing percentage of cases there is a lack of a clear and recent traumatism and thus these cases are named spontaneous rectus sheath hematoma. Although most spontaneous abdominal wall hematomas are located within the rectus muscle, they can also happen elsewhere such as in the oblique muscle [3]. Anticoagulant therapy with either oral

anticoagulants or with low molecular weight heparins is considered the most frequent risk factor associated to spontaneous rectus sheath hematoma although other factors such as pregnancy, hypertension, previous abdominal surgery, hematological and coagulation disorders (for instance in patients with factor VII and factor X deficiency) and antiplatelet therapy have also been described as risk factors [1,2,4–8]. While anticoagulant therapy is the most frequent predisposing factor, acute paroxysmal coughing is the most common triggering factor, acting on patients with one or more of the above mentioned predisposing factors [2,4]. Apart from coughing paroxysm, other conditions that cause an increased intra-abdominal pressure such as vomiting or straining during urination, defecation or labor have also been described as triggering factors [1,2,4–6]. Women are more prone to spontaneous rectus sheath hematoma than men, due to differences in muscle mass and changes associated to pregnancy [9].

The most common form of presentation of spontaneous rectus sheath hematoma is abdominal pain, usually of sudden onset, followed by the finding of an abdominal mass [2,4–6]. The diagnosis is based on the patient's clinical history, the physical examination and the image findings provided by abdominal ultrasonography and/or computerized tomography. According to Berná et al. the computerized tomography

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has the potential advantage of allowing an accurate evaluation of the extension of the hematoma [10]. Even though most spontaneous rectus sheath hematoma cases are self-limited with conservative therapy, which basically consists on intravenous fluid resuscitation, anticoagulation reversal and transfusion when required, they have a 4% overall mortality that rises up to 25% in cases associated with anticoagulation therapy [11,12].

The aim of this study is to analyze the clinical characteristics, therapeutic management and outcomes of a series of patients diagnosed of spontaneous rectus sheath hematoma.

## 2. Materials and methods

Retrospective study of patients  $\geq 18$  years old diagnosed of spontaneous rectus sheath hematoma between January 2001 and June 2012 was performed. The study was performed in a first level hospital of 165 beds without intensive care unit, which attends a population of 211,600 inhabitants. Patients with a recent medical history of abdominal trauma were excluded from the study.

The following variables were recorded: age, sex, comorbidity, age adjusted comorbidity Charlson score [13] and previously described predisposing and triggering factors for spontaneous rectus sheath hematomas [1,2,4–8]. We also recorded the values of the complete blood count, the creatinine level, the international normalized ratio and the type of image study (abdominal ultrasonography or computerized tomography) done. In those cases in which an abdominal computerized tomography was performed, the extension of the hematoma according to the Berná et al. classification was evaluated [10]. In brief, spontaneous rectus sheath hematomas were classified as Type I if the hematoma was intramuscular and unilateral, as Type II if the hematoma was bilateral with some dissection between the muscle and the transversalis fascia and Type III in cases of bilateral hematomas that dissected between the transversalis fascia and muscle into the peritoneum and prevesical space.

Finally the length of hospitalization, need for blood transfusion, type of management (conservative versus interventional) and outcomes were also collected. Interventional treatment was defined as the necessity of undergoing an arteriography with selective embolization of the epigastric arteries or the surgical removal of the hematoma.

## 3. Results

During the observational period 24 patients were diagnosed as having a spontaneous rectus sheath hematomas and subsequently were included in the study. Table 1 shows the patients' clinical characteristics. Twenty-one (87.5%) were elderly ( $\geq 65$  years) and 23 (95.8%) had one or more associated long-term medical conditions.

All patients had some predisposing factors. Twenty-one (87.5%) were receiving anticoagulant treatment: 12 (50%) only with oral anticoagulants, 5 (20.8%) only with low molecular weight heparin and 4 (16.6%) were receiving oral anticoagulants and low molecular weight heparin simultaneously. Regarding anticoagulants, patients under oral anticoagulation treatment were receiving acenocumarol or warfarin whereas those under low molecular weight heparin were all receiving enoxaparin. Indications for anticoagulation treatment were atrial fibrillation in 17 (70.8%) patients, cardiac valvulopathy in 4 (16.6%), confirmed or suspected thromboembolic disease in 2 (8.3%) and thromboembolic prophylaxis in 3 (12.5%) cases. Other predisposing factors, in order of decreasing frequency, were: arterial hypertension, abdominal surgery and the administration of antiplatelet therapy (salicylic acid in all cases) (Table 1). Eighteen (75%) cases presented triggering factors of which 17 (70.8%) were cough bouts.

The most frequent symptoms were abdominal pain in 21 (87.5%) patients and the presence of an abdominal mass in 20 cases (83.3%), 13 on the left side (54.1%), 9 on the right side (37.5%) while 2 were bilateral (8.3%). Table 1 shows the most relevant analytical characteristics. The mean hemoglobin decrease was 3.3 mg/dl (range 0–7.3 mg/dl).

**Table 1**

Clinical and analytical characteristics of the 24 patients included in the study.

Characteristics <sup>a</sup>	Value
Age (years)	74.3 $\pm$ 9
Sex (women)	16 (66.6)
Arterial hypertension	19 (79.1)
Diabetes mellitus	7 (29.1)
Active neoplasia	1 (4.1)
Cirrhosis	0
Chronic obstructive lung disease	10 (41.6)
Chronic kidney failure	5 (20.8)
Congestive cardiac insufficiency	5 (20.8)
Anticoagulation therapy	21 (87.5)
Antiplatelet therapy	3 (12.5)
Previous abdominal surgery	12 (50)
Charlson index	4.3 $\pm$ 1.5
Creatinine (mg/dl)	1.3 $\pm$ 0.7
Hemoglobin (mg/dl)	12.8 $\pm$ 2
Hematocrit (%)	39.3 $\pm$ 5.5
Leucocytes (cells/mm <sup>3</sup> )	11,585.4 $\pm$ 4,500.3
Platelets (cells/mm <sup>3</sup> )	276,791.7 $\pm$ 113,724
International normalized ratio	2.8 $\pm$ 1.6

<sup>a</sup> Data is presented as mean  $\pm$  SD or the number of patients (percentage).

Among the 16 patients receiving oral anticoagulants the mean international normalized ratio was 3.5 (range 2.1–6.2) presenting 8 (50%) of them an international normalized ratio higher than 3.5. With the exception of one case in which the diagnosis of spontaneous rectus sheath hematomas was clinical the remaining cases were confirmed by ultrasonography in 16 (66.6%) cases and/or by abdominal computerized tomography (Fig. 1) in 10 (41.6%) patients. The computerized tomography classified the hematoma as Type I in 2 (20%) cases, as Type II in 3 (30%) cases and as Type III in the remaining 5 (50%) cases.

Nine (37.5%) patients developed hypovolemic shock. Nineteen (79.1%) cases received conservative therapy, which consisted on intravenous fluid resuscitation, anticoagulation reversal when possible and transfusion. Five (20.8%) patients required interventional treatment, which consisted in an arteriography with selective embolization of the epigastric arteries that was carried in our reference center. One patient underwent open surgery due to failure of arteriography to control the bleeding and was the only one admitted to the intensive care unit of our reference center. Twelve patients (50%) needed a pack of red blood cells for blood transfusion (mean number of units



**Fig. 1.** Abdominal computerized tomography of an eighty-year old man with a history of deep venous thrombosis receiving low molecular weight heparin treatment. The patient developed an important spontaneous rectus sheath hematomas on the left part of the abdomen. The arrow shows leaking of contrast suggesting active bleeding.

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