

Rectus sheath haematoma: are there prognostic risk factors of haemodynamic instability motivating an early operative treatment?

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Abstract

Purpose Rectus sheath haematoma (RSH) is an uncommon condition caused by lesion of the superior or inferior epigastric arteries or their branches or by rupture of the rectus muscle. Treatment is usually supportive; however, if haemodynamic compromise develops, intravascular embolisation or surgery may be required. Furthermore, in some cases, bleeding may be so conspicuous that it can determine the patient's death before an adequate treatment is performed. We performed a retrospective study on 78 consecutive patients with the diagnosis of RSH admitted to the General Surgery Unit of our hospital between January 2000 and December 2010 in order to identify possible prognostic risk factors that could affect the operational approach before the onset of haemodynamic instability.

Methods Demographic characteristics, patient history, laboratory and diagnostic imaging examinations were investigated. The variables considered were: gender, age, anti-coagulation or anti-platelet therapy, trauma, international normalised ratio (INR) and bleeding time in the first 72 h of observation and concomitant diseases. The data were used for statistical analysis.

Results Sixty patients received a conservative treatment, while 18 underwent operative treatment for haemodynamic instability (embolisation in 2 patients and surgery in 16 patients). Three of these 18 patients (17 %) died for

consumption coagulopathy after surgery. None of the variables included in the univariate statistical analysis was significant ($p = ns$).

Conclusion Ultrasonography or computed tomography are the most common methods used to establish the diagnosis of RSH, so it is no longer a diagnostic dilemma. Most patients can be treated conservatively and an operative treatment is justified only in case of haemodynamic instability. Our retrospective study could not identify any prognostic risk factor of haemodynamic instability in RSH. We believe that only a close observation of the patients with RSH and “common sense” can prevent a possible fatal outcome.

Keywords Rectus sheath haematoma (RSH) · Acute abdomen · Haemodynamic instability · Risks of the anti-coagulant/anti-platelet therapy

Introduction

Rectus sheath haematoma (RSH) is a relatively rare condition, presenting with an intense acute abdominal pain. For many authors, at its presentation, RSH is considered a “diagnostic dilemma”, as it can be easily mistaken for almost every acute abdominal disorder [1]. However, the execution of an ultrasonography (US) or a computed tomography (CT) examination is diagnostic in almost all patients [2].

This condition is characterised by an accumulation of blood in the anterior rectus abdominis muscle caused by the rupture of an epigastric vessel or muscular rupture [3, 4].

Owing to the supportive deficit of the posterior wall of the rectus abdominis, below the level of the linea semi-lunaris, RSH usually occurs in the sub-umbilical region [5].

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Predisposing factors of RSH include old age, anti-coagulant or anti-platelet therapy, hypertension, obesity, acute intra-abdominal pressure fluctuations (straining, coughing, exertion), direct abdominal trauma, previous abdominal surgery and pregnancy [6].

The conservative non-interventional treatment comprising analgesia, ice-packing, haematoma compression and blood or plasma transfusion is the most widely accepted approach.

Haemodynamic compromise, on the other hand, requires operative treatment such as vessel ligation via laparotomy or endovascular embolisation [7]. Although RSH can be relatively benign, in some cases (1.6–20 %), depending on the intensity and location of bleeding, a life-threatening haemodynamic instability can develop rapidly [3, 8–11].

The aim of our study was to identify prognostic risk factors of haemodynamic compromise onset in RSH in order to recognise those cases where an early operative treatment is mandatory.

Materials

The medical records of 78 consecutive patients with RSH admitted to the General Surgery Unit of our hospital between January 2000 and December 2010 were reviewed.

Demographic characteristics, patient history, laboratory and imaging examinations were investigated. The variables considered for statistical analysis were: gender, age, anti-coagulation or anti-platelet therapy, trauma, concomitant diseases (haematologic disorders, vascular diseases and diabetes), international normalised ratio (INR), bleeding time in the first 72 h of observation, blood transfusions and patient outcomes.

Patients with recent abdominal surgery and platelet disorders were not included in the study.

Results

Eighteen (23.1 %) patients underwent operative treatment for haemodynamic instability after the failure of conservative therapy (12 females and 6 males; mean age: 79.2 ± 4.1 years). All patients were under anti-coagulation therapy at the time of the onset of RSH. Four patients developed RSH after coughing, while two patients developed RSH after hitting the edge of furniture. In the remaining 12 patients, RSH occurred spontaneously (Table 1).

The indication for anti-coagulation therapy was atrial fibrillation in seven, cardiac valve replacement in two, previous artery thrombosis in four and coronary stenting in five patients.

Table 1 Patients included in our series

Number of patients: 78		
Type of treatment	Operative: 18 (23.1 %)	Conservative: 60 (76.9 %)
Sex	12 F; 6 M	36 F; 24 M
Age	Mean age 79.2 ± 4.1 years	Mean age 69.9 ± 7.7 years
Anti-coagulant therapy	18	16
Anti-aggregation therapy	0	11
Etiology	4 coughing	1 asthma exacerbation
	2 blunt trauma	4 chronic bronchitis
	12 spontaneous	39 blunt trauma
		3 muscle exertion
		13 spontaneous
Post-operative death	3	0

Three female patients died for consumption coagulopathy after surgery. The CT examination of these patients showed an extension of the haematoma to the pelvis with vesical and iliac vessels compression. Haemodynamic instability appeared 10 h after hospital admission in an 82-year-old patient, 20 h after hospital admission in a 78-year-old patient and 39 h after hospital admission in an 84-year-old patient.

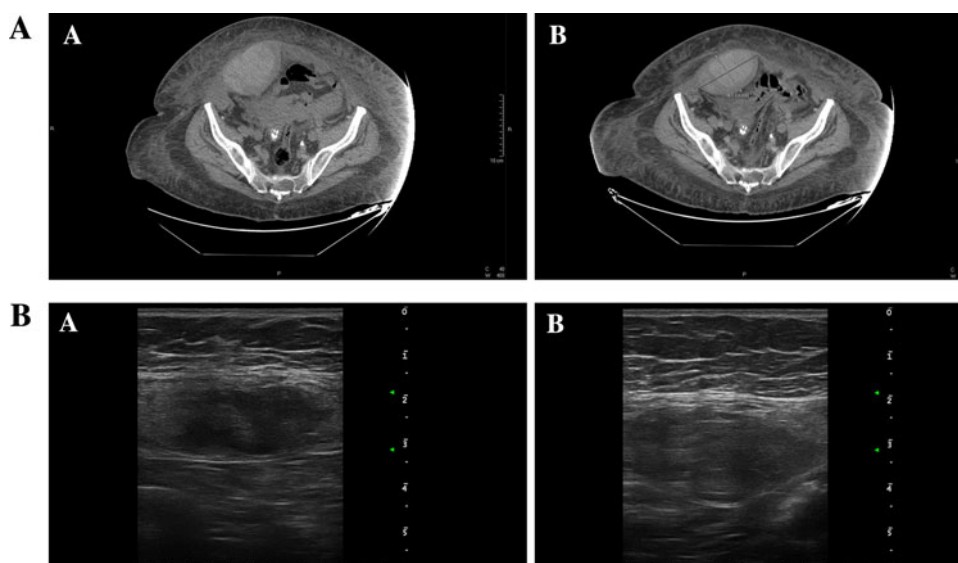
In all of the 18 patients treated operatively, CT examination showed the extension of the haematoma below the arcuate line.

Two of these patients presented contrast medium extravasation and were successfully treated by endovascular embolisation using polyvinyl alcohol (PVA) embolisation particles (Contour; Boston Scientific, Natick, MA, USA).

Conversely, the 60 (76.9 %) remaining patients required conservative treatment in 18 cases and medical observation in 42 cases (36 females and 24 males; age range 44–82 years; mean age; 69.9 ± 7.7 years). Of these patients, 16 were under anti-coagulation therapy (6 for atrial fibrillation and 10 for angina pectoris or previous acute myocardial infarction) and 22 were under anti-platelet therapy (12 for hypertension, 2 for thrombophilia, 6 for rheumatism and 2 for muscular pain). Twenty-two patients where neither under anti-coagulation nor under anti-platelet therapy.

RSH occurred after blunt trauma in 39 patients, during muscle exertion in three patients, after coughing in four patients and after an episode of asthma exacerbation in one patient. In the remaining 13 patients, it developed spontaneously (4 patients were pregnant) (Table 1).

Fig. 1 **a** Computed tomography (CT) evolution of rectus sheath haematoma (RSH) treated conservatively (**A**: zero time; **B**: after 4 days). **b** Echographic evolution of RSH treated conservatively (**A**: zero time; **B**: after 2 days)



Diagnosis and follow-up was performed by US in 60 (76.9 %) patients, while in the remaining 18 (23.1 %) patients, it was performed by CT. CT examinations were performed with a 64-row MDCT (VCT, General Electric Medical Systems, Milwaukee, WI, USA) apparatus using a 0.625-mm reconstruction slice thickness. Contrast medium (ioversol, Optiray 350; Covidien Italy Spa, Italy) was administered intravenously at a dosage of 120 ml, followed by a 40-ml saline “chaser”, using a dual-syringe power injector with an injection rate of 3.5 ml/s.

The most common presenting symptom was acute abdominal pain, followed by the development of an abdominal wall mass. Physical abdominal examination revealed a tender mass.

The univariate analysis of the variables considered (gender, age, anti-coagulation or anti-platelet therapy, trauma, concomitant diseases, INR, bleeding time in the first 72 h of observation) did not yield statistically significant results ($p = ns$). Thereby, no prognostic risk factor of haemodynamic compromise following RSH, indicating the necessity of an emergency operative management, could be identified.

Discussion

Our series demonstrates that women are more prone to develop RSH than men. Furthermore, the mean age of the patients treated surgically was higher than those treated conservatively or those who underwent only medical observation (mean age 79.2 ± 4.1 years vs. 69.9 ± 7.7 years). Although these cases confirm that RSH typically occurs more in patients who receive anti-coagulant or anti-platelet therapy, we did not detect a statistically significant

relationship between the diagnosis of RSH and the variables included in the univariate statistical analysis ($p = ns$). Insofar as the relationship with the development of RSH is not concerned, our study has an important limitation: the small series of patients enrolled.

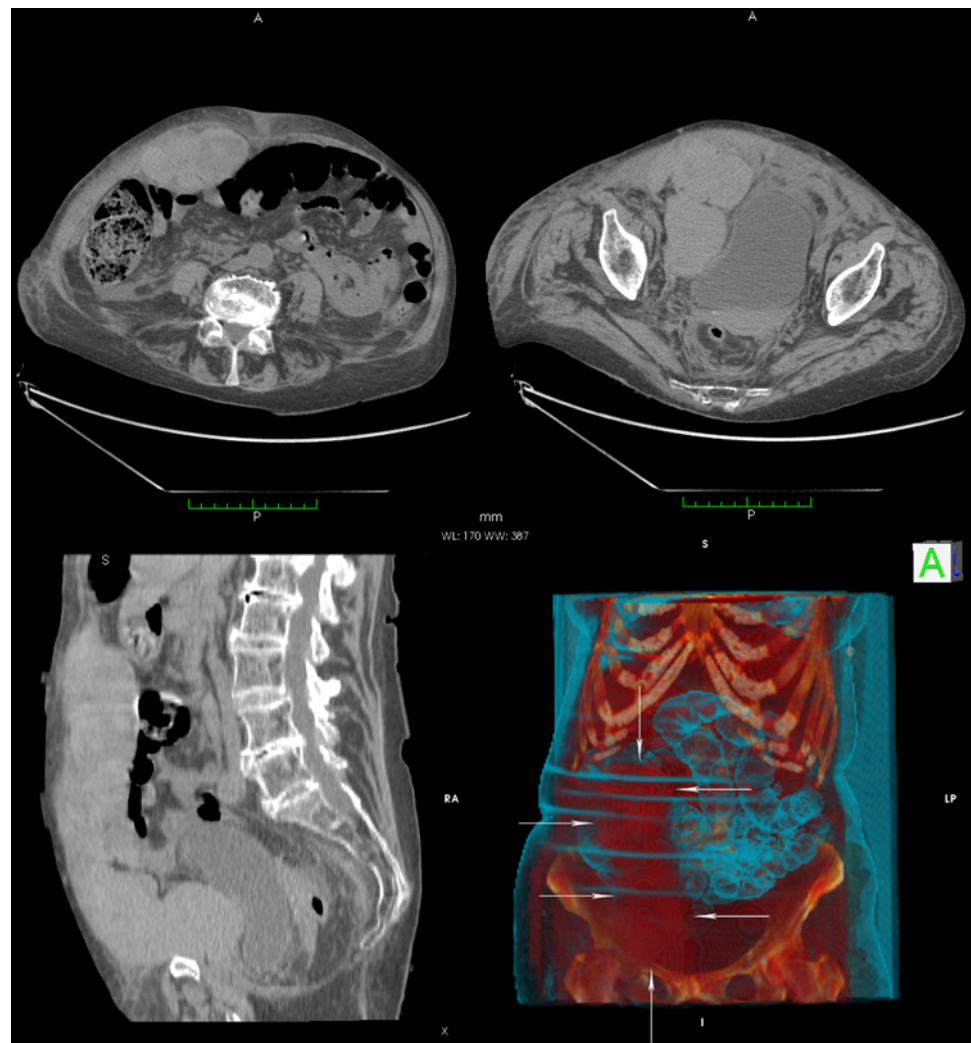
RSH accounts for up to 2 % of the cases of unexplained abdominal pain and may occur more often in the right lower quadrant [2, 12, 13]. US may be useful in the diagnosis of RSH; however, it is associated with a sensitivity of 70–90 %. On the other hand, CT, which is considered as the “gold standard” technique, can exclude other abdominal diseases and is associated to a sensitivity and specificity of 100 % [1, 12, 14, 15]. More over, CT is indicated when the clinical conditions of the patient suggest a progressive increase of the dimensions of the haematoma [1, 4, 14, 16].

As the lesion is self-limited, most RSH can be treated conservatively with analgesia, the treatment of predisposing conditions and cessation of anti-coagulation and anti-platelet therapy (Fig. 1a, b).

The mortality can be explained by the patient’s accompanying haemodynamic instability and/or comorbid conditions. RSH can be fatal (1.6–20 %) [3, 11] and occur particularly in elderly patients on anti-coagulant medications. In our series, however, none of the variables considered was statistically relevant and no early prognostic factors of haemodynamic instability could be identified.

We observed that, in all patients with a large haematoma and haemodynamic instability, the bleeding had extended beyond the posterior aspect of the rectus muscle and below the arcuate line, where it can easily invade the pelvis due to the lack of an aponeurosis [16]. Here, it can cause compression of the urinary bladder and the iliac vessels (Fig. 2).

Fig. 2 Evolution over 48 h of an RSH which required surgery



We believe that the extension of the haematoma can be predictive of haemodynamic instability, thereby contrast-enhanced CT examination is mandatory in all patients presenting a large haematoma, regardless of haemodynamic stability.

Patients with RSH that are treated conservatively, by blood, plasma and liquid infusion, ice-packing and analgesics can remain haemodynamically stable for several hours without showing clinical signs of the haematoma extending into the pelvis. In these patients, when infusion therapy is insufficient to compensate for the loss of blood, haemodynamic instability can occur suddenly and surgery, although promptly undertaken, may be ineffective.

We believe that patients requiring several blood transfusions need to be assessed by repeated contrast-enhanced CT examinations for a careful evaluation of the dimensions and extension of the haematoma. The establishment of the correct time interval between the CT examinations and the

exact moment at which surgery should be performed is extremely difficult.

In our series, despite successful operative treatment, the excessive number of transfusions determined a consumption coagulopathy leading to death in three (16.7 %) patients.

Presently, no prognostic risk factors of haemodynamic compromise that could lead to an early operative treatment of RSH have been identified. A conservative non-interventional approach should be undertaken in all patients with RSH, while an operative treatment should be reserved only for patients developing a haemodynamic instability.

Especially in elderly patients under anti-coagulation or anti-platelet therapy, a close clinical and laboratory assessment and repeated contrast-enhanced CT examinations should be performed in the first 72 h. The number of blood transfusions need to be carefully evaluated in order to prevent the instauration of a consumption coagulopathy that would lead to a fatal outcome despite surgical treatment.

Conflict of interest The authors declare that they have no conflicts of interest relevant to the manuscript submitted.

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