Diagnostic evaluation and management of patients with rectus sheath hematoma. A retrospective study

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ABSTRACT

Introduction: Rectus sheath hematoma (RSH) is an uncommon cause of acute abdominal pain. It may mimic a wide variety of intraabdominal disorders thus frequently leading to delay in treatment, increased morbidity or even in an unnecessary surgery.
Patients and methods: This is a retrospective study of 10 patients with RSH who were treated in our department over a five-year period. There were 6 (60%) men and 4 (40%) women ranging in age from 38 to 86 years, with a mean age of 57.1 years.
Results: The most common clinical presentation was a palpable abdominal mass associated with abdominal pain. Computed tomography (CT) established the diagnosis in 100% of the cases. 4 patients had type I hematoma, 3 had type II hematoma and 3 had type III hematoma. Anticoagulation therapy was the most common predisposing factor. Conservative treatment was effective in 90% of the cases and in all cases of spontaneous RSHs in patients under anticoagulation therapy. One patient, who developed a very severe RSH following an abdominal injection of low-molecular-weight heparin (LMWH), underwent surgery. All patients with type III hematoma required blood transfusion.
Conclusions: RSH should be considered in the differential diagnosis of the elderly patients under anti-coagulation therapy presenting with acute abdominal pain and a palpable mass. CT is the diagnostic modality of choice. Conservative treatment is feasible in most cases. Early diagnosis is mandatory in order to avoid morbidity or unnecessary surgery. In order to prevent a traumatic RSH, trocar insertion under direct vision during laparoscopic surgery and careful attention in the abdominal administration of LMWH are essential.

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1. Introduction

Rectus sheath hematoma is the most common primary non neoplastic disorder of the rectus abdominis muscle.[1] It is an uncommon clinical entity resulting from accumulation of blood within the sheath of the rectus abdominis muscle secondary to tearing of the epigastric vessels or their branches or from direct tearing of the rectus abdominis muscle fibers. RSH may mimic a number of acute intraabdominal disorders thus posing a diagnostic dilemma on clinical examination. In the era before the advent of CT and ultrasonography a correct preoperative diagnosis was made in less than 30% of the cases.[2] Although the exact incidence is not known,[3] Klingler et al. found an incidence of 1.8% of RSH among 1257 patients who underwent ultrasonography for acute abdominal pain or unclear acute abdominal disorders.[4] In a recent literature review, an increasing prevalence and severity of RSH was observed largely due to the increased use of anti-coagulation in the elderly.[5] In this study we describe our experience in the diagnostic evaluation and management of patients with RSH who were treated in our department over the past five years.

2. Materials and methods

We retrospectively reviewed the medical records of patients with documented RSH who were treated in our department over a 5-year period (from January 2005 to November 2009). Demographic characteristics, mode of presentation, comorbid conditions, anatomic characteristics of RSHs, methods of diagnosis, laboratory data, treatment, hospital stay, and outcome were analyzed.

3. Results

During the study period we identified 10 patients with documented RSH. There were 6 (60%) men and 4 (40%) women ranging in age from 38 to 86 years, with a mean age of 57.1 years.

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In 2 patients the RSH was secondary to an epigastric vessel injury during trocar insertion for laparoscopic cholecystectomy, whereas 2 other patients developed a traumatic RSH due a car accident and a fall from a horse. All the above mentioned patients had no comorbid conditions. The remainder 6 patients with RSH were all receiving anticoagulation therapy. Out of those, 5 suffered a spontaneous RSH while 1 developed a RSH shortly after an abdominal injection of low-molecular-weight heparin (LMWH). The indications for anticoagulation therapy with warfarin were atrial fibrillation and coronary heart disease in 3 patients while 3 patients were receiving LMWH for deep vein thrombosis prophylaxis.

All patients presented with a palpable abdominal mass ranging from 4.2 to 18 cm in diameter. Severe acute abdominal pain occurred in 8 (80%) of the cases while in the postcholecystectomy patients the abdominal pain was mild. One patient had typical manifestations of acute abdomen at presentation. He was admitted with a sudden onset of severe abdominal pain associated with nausea and vomiting. On physical examination, his abdomen was distended with diffuse tenderness, guarding and rebound tenderness. The interval between the onset of symptoms and imaging ranged from 3 to 24 h.

CT of the abdomen and pelvis established the diagnosis of RSH in all patients (100%), while ultrasonography was performed in 5 patients but was inconclusive in 2 of the cases. According to the classification based on CT findings proposed by Berna et al,[6] 4 patients had type I hematoma, 3 had type II hematoma and 3 had type III hematoma (Figs. 1–3).

Six RSHs (60%) were right-sided: 4 in the right lower abdominal quadrant and 2 in the right hypochondrium. Of the 4 left-sided RSHs 3 located in the left lower quadrant and 1 in the left hypochondrium. In 2 cases the hematoma extended across the midline.

Leucocytosis (white blood cell count greater than 10.000/mm^3) was detected in 3 patients. Both hemoglogin and hematocrit levels declined in all patients but blood transfusions were necessary in all 3 patients with type III hematoma and in 1 patient with type II hematoma. Coagulation parameters were in therapeutic ranges in 5 patients but excessive warfarin anticoagulation was detected in one patient.

Nine out of 10 patients (90%) were treated conservatively with complete bed rest, adequate analgesia and discontinuance of anticoagulant therapy. Emergency reversal of excessive anticoagulation was achieved by administration of fresh frozen plasma and vitamin K.

Emergency surgery was performed in one patient who was receiving LWMH on an outpatient basis and presented with typical manifestations of an acute abdomen and signs of hypovolemic shock. The severe abdominal pain had started shortly after an
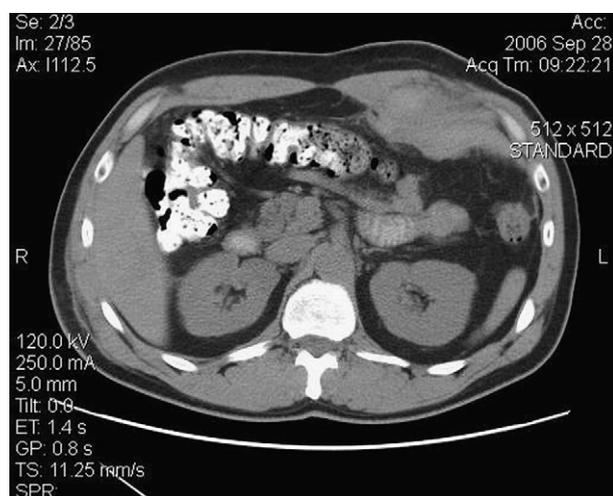

Fig. 2. Computed tomography scan of the abdomen demonstrating a left-sided type II RSH in a 38-years old man after laparoscopic cholecystectomy.

abdominal wall administration of LMWH. Laboratory data revealed a hematocrit of 18%. CT revealed a large type III RSH associated with massive hemoperitoneum. After resuscitation, the patient underwent surgical exploration of rectus sheath and abdomen. The bleeding vessel was ligated and the hematoma was evacuated.

In the group of patients on anticoagulants, the anticoagulation therapy was reintroduced after the stabilization of the patient's hemodynamic condition, by adjusting the dose of heparin or LMWH according to coagulation status and the judged risk of thromboembolism. Oral anticoagulation was reinstated 6–7 days after the start of heparin therapy. We did not observe any recurrent RSH after the reintroduction of anticoagulation therapy.

Mean hospital stay was 6.5 days (range 3–15 days). There was no mortality or thromboembolic complications.

4. Discussion

RSH is an uncommon clinical entity that was first accurately described in antiquity by Hippocrates and mentioned by Gallen. The first case in the United States was reported by Richardson in 1857.[7]
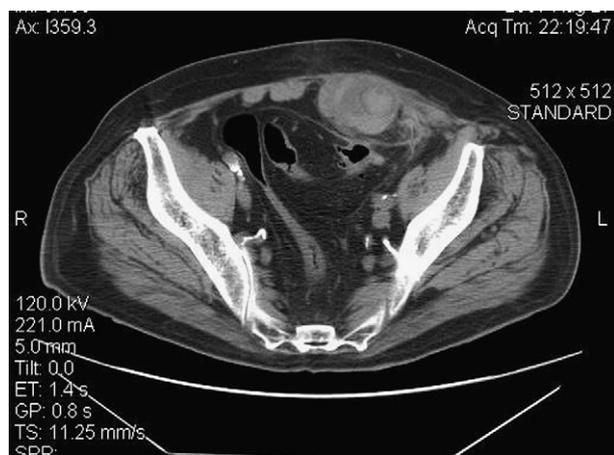

Fig. 1. Computed tomography scan of the pelvis demonstrating a left-sided type I RSH measuring 4.2 × 4.4 × 11 cm in a 78-years old man under anticoagulation therapy.

Fig. 3. Computed tomography scan of the abdomen demonstrating a large left-sided type III RSH measuring 18 × 17 × 7 cm in a 46-year old man with chronic renal failure.

Women are affected more frequently than men in the sixth and seventh decades of life.[8–12] In our series though, as in others,[4,5] a slight male preponderance was observed with a male to female ratio of 1.5:1. This is likely because in our series there were 4 cases of traumatic RSH.

Several risk factors have been associated with the formation of RSH such as advanced age, anticoagulation, arteriosclerosis, hypertension, coughing, pregnancy, renal disease, vigorous rectus muscle contractions, blood dyscrasias, abdominal surgery, and abdominal wall injections.[5,7,13–16] However, the most frequently encountered predisposing factor is anticoagulation therapy and the most important precipitating factor is coughing.[11]

RSH most commonly occurs in the lower abdomen, as in 70% of our cases. This is because above the arcuate line (semicircular line of Douglas) the rectus muscle is well supported by both the anterior and the posterior rectus sheath which limits the size of hematoma. On the contrary, below the actuarate line the rectus muscle is supported posteriorly only by the weak transversalis fascia and peritoneum so the hematoma can easily spread extraperitoneally, dissect down into pelvis or rupture in the peritoneal cavity, as in 3 of our cases. In addition, movement associated changes in muscle length occur mainly in the lower half of the muscle exposing the branches of inferior epigastric vessels to shearing forces.[13]

The most common presentation of RSH are acute abdominal pain and a palpable mass,[8,9,11] whereas less frequently reported findings include nausea, vomiting low grade fever and moderate leucocytosis.[17] Patients with a large RSH may present with hemodynamic instability, symptoms due to compression of adjacent structures and a variety of symptoms depending on the degree of peritoneal irritation. In rare cases, as in one of our cases, patients with RSH may present with manifestations of typical acute abdomen and signs of peritonism, thus posing a diagnostic dilemma at initial examination.[17,18] In another series of 7 patients who presented with acute abdomen none of them was correctly diagnosed initially.[18] However, presentation may be atypical in the elderly, including the absence of pain[7] or a nonpalpable lesion.[7,11,19] Acute presentation of RSH may mimic several acute intraabdominal conditions such as appendicitis, cholecystitis, ruptured aneurysms, perforated ulcers, and incarcerated hernias.[18–20]

Fothergill's sign is useful for differentiating between a mass arising in the rectus muscle and other intraabdominal masses. In patients with RSH the painful palpable mass of the abdominal wall remains palpable when the patient tenses the rectus muscle.[21] Later signs of RSH include periumbilical ecchymosis (Cullen's sign) indicating intraperitoneal rupture and flank ecchymosis (Grey Turner's sign) indicating extraperitoneal extension of the hematoma.

CT is the diagnostic modality of choice for patients with RSH and it is more accurate than ultrasonography. In our series CT established the diagnosis in 100% of the cases. This is consistent with previous observations.[9,11,18] Ultrasonography has a role in follow-up after the diagnosis has been confirmed by CT.[18]

Berna et al[6] proposed a diagnostic classification in 1996 based on CT findings in patients with RSH. Type I hematomas are mild that do not require hospitalization. Type II are moderate requiring hospitalization, while type III are more severe, usually affect patients taking anticoagulants and require blood transfusion.[11] Magnetic resonance imaging (MRI) can be used in selected cases to differentiate chronic RSH from anterior abdominal wall tumors when CT findings are not specific.[10]

Conservative management is the most common treatment because in the majority of the cases RSH is a self-limited condition.[12] It consists of complete bed rest, analgesia, ice packs application, compression, volume replacement, discontinuance of anticoagulants correction of coagulopathy and antibiotics if signs of infection are present.[17,22]

In our study conservative treatment was feasible in 90% of the cases, and in 100% of the patients receiving anticoagulants who developed spontaneous RSH. Surgical intervention consisting of ligation of the bleeding vessel and evacuation of the clotted hematoma is indicated in cases with uncertain diagnosis, restricted mobility and/or bleeding, and hemodynamic instability unresponsive to fluid resuscitation.[9,11] One patient in our series underwent emergency surgery. As he presented with a large hematoma with free intraperitoneal rupture, massive hemoperitoneum and signs of hypovolemic shock, we believe that surgery was the most appropriate treatment. Surgical intervention has been associated with shorter hospital stay and less need for analgesics.[4]

Digital subtraction angiography and arterial embolization is a safe and effective method in cases of large hematomas with hemodynamic instability. Rimola et al. reported successful selective catheterization in all 12 patients who were included in their study.[12] Follow-up of 19 ± 18 days revealed no evidence of rebleeding. Although this series of percutaneous embolization is the largest reported, the number of patients is small to allow comparison of embolization and surgery in terms of efficacy and safety.[12]

Reported complications of RSH include hypovolemic shock, infection, abdominal compartment syndrome, myonecrosis, myocardial infarction, acute renal failure, small bowel ileus, small bowel infarction and death.[8,11,12,14,20,22–24] Although RSH is usually self-limiting a few fatal cases have been reported mainly in elderly patients with significant comorbidities.[14,25,26] This outcome should always be kept in mind when treating frail elderly patients on anticoagulation therapy or those with underlying clotting disorder.[8]

An overall mortality of 4% has been reported for RSH. Mortality for iatrogenic RSH is 18% while for patients on anticoagulation therapy it is 25%. Pregnant patients and the fetus have a mortality rate of 13% and 50% respectively.[7,25] Early diagnosis and proper management of RSH may significantly decrease the maternal and perinatal morbidity and mortality rates.[15] The most common incorrect diagnosis is placental abruption followed by torsed ovary or ovary cyst. Ultrasonography is the diagnostic modality of choice. Cesarean–section delivery should be performed only for fetal indications.[15]

Reintroduction of anticoagulant therapy is a critical issue. In our patients reintroduction was made after the hemodynamic stability was achieved. We did not observe any repeat hematoma. Chery et al. reported that 2 of 41 patients developed another hematoma after the reintroduction of anticoagulation therapy.[8] Clinical judgment is very important in these cases, as the clinician must weigh the risks and benefits of anticoagulation therapy after a diagnosis of RSH.[8]

LMWHs are being increasingly used both in the hospital and the outpatient setting, as they have advantages over unfractionated heparin.[27] There are some reported cases describing huge abdominal hematomas,[28] with life threatening clinical courses[14,27] and fatal outcome[26] associated with the use of LMWH. Our patient who underwent emergency surgery and who had the most severe clinical course developed RSH after an abdominal injection of LMWH. Therefore, special attention to the technique is needed when the abdominal wall is used as the injection site.[14] The deltoid region might be a safer alternative.[26]

There are a few reports of RSH formation due to trocar insertion during laparoscopic cholecystectomy.[29,30] However, the true incidence may be under-reported, as all cases of post-operative pain are not evaluated by abdominal ultrasonography and post-operative haemoglobin levels are not routinely measured.[30] Treatment of hematomas was conservative as in our 2 patients.

5. Conclusions

RSH is usually associated with abdominal trauma and anticoagulation therapy. Although it is an uncommon clinical entity, it

should always be considered in the differential diagnosis of acute abdominal pain in elderly patients on anticoagulation therapy. CT is the imaging modality of choice. Conservative treatment is feasible in most cases. Early diagnosis is essential in order to avoid morbidity or unnecessary surgery. Careful attention to injection technique is essential in the abdominal administration of LMWH. In addition, RSH can be prevented if the initial insertion of the trocars is done under direct vision during abdominal laparoscopic surgery.

Conflicts of interest
None declare.

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