



Heparin-induced Rectus Sheath Hematoma in a COVID-19 Patient with Pulmonary Emboli: A Case Report and Literature Review

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Received 2021 November 27; Revised 2022 January 13; Accepted 2022 January 31.

Abstract

Background: Rectus sheath hematoma (RSH) is an uncommon cause of acute abdominal pain that is often misinterpreted. Only about 2% of patients who present with acute abdominal pain display this condition. Damage to the superior or inferior epigastric arteries or their branches, as well as direct rupture of the rectus abdominis muscle, causes bleeding into the rectus sheath. In hospitalized COVID-19 patients, anticoagulant prophylaxis with heparin has become a standard part of medical care. This method may raise the risk of bleeding in older people with comorbidities.

Case presentation: The patient was a 60-year-old woman with a history of asthma and diabetes mellitus who was referred to the emergency department with shortness of breath and cough. Chest X-Ray demonstrated Covid-19 pneumonia. On the second day of hospitalization, after the exacerbation of tachypnea, computed tomography (CT) angiography was performed, and the results confirmed pulmonary embolism; therefore, the therapeutic dose of heparin was initiated. On the 21st day of hospitalization, the patient experienced abdominal pain and was visited by a general surgeon. A large ecchymosis was observed in the periumbilical; nonetheless, there was no significant tenderness in the abdominal exam. The patient's hemoglobin dropped to 7.9 mg/dl at this time. An abdominal and pelvic CT scan showed a 45 mm hematoma in the left rectus muscle.

Conclusion: In patients presenting with acute abdominal pain, any physician in the field of emergency or surgery should include RSH in their differential diagnosis list, especially those who have certain predisposing conditions.

Keywords: Anticoagulant therapy, Case report, Coronavirus, COVID-19, Heparin, Rectus sheath hematoma

1. Background

Hippocrates and Galen reported Rectus Sheath Hematoma (RSH) as a result of abdominal trauma was first described almost 2500 years ago. The first case in modern literature was published by Richardson in 1857. The RSH is 2-3 times more frequently observed in women, as compared to that in men. According to various studies, the mean age of patients varies from 46-69 years. The overall mortality rate is believed to be around %4, while it is estimated to increase to %25 in patients receiving anticoagulants. Over the years, several risk factors for RSH have been identified, including iatrogenic/surgery, trauma, anticoagulation, coughing/hard rectus muscle contractions, pregnancy, and a variety of medical issues (e.g., hypertension, atherosclerosis, vasculitis, and hematologic disorders) (1).

The RSH is an unusual clinical entity that is strongly linked to abdominal trauma and anticoagulation. Even though it only affects about 2% of patients with acute abdominal pain, every primary care and emergency medicine physician should be aware of this disorder since it can lead to unneeded

laparotomies or even death in some situations. Therefore, we would like to present our clinical experience with this unusual patient for more familiarity with its various facets. This study was documented by the Surgical CAse REport (SCARE) guidelines.

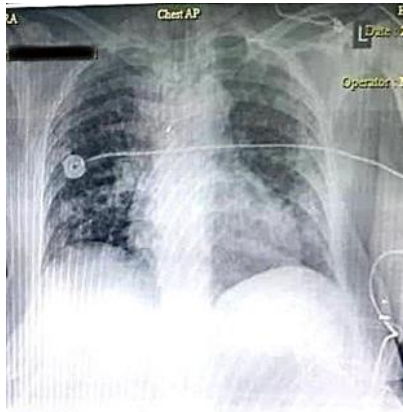
2. Case presentation

The patient was a 60-year-old overweight woman with a history of asthma and diabetes mellitus who presented to the emergency department with shortness of breath and cough. The patient's blood tests were examined (Table 1). Chest X-Ray showed Covid-19 pneumonia (Figure 1). The patient was admitted to the COVID-19 ward, and remdesivir, Dexamethasone, Atorvastatin, Famotidine, Salbutamol, and Atrovent, as well as a prophylactic dosage of heparin, were started according to the local protocol. On the second day of hospitalization, the patient's tachypnea intensified. Differential diagnoses presented to the patient included the exacerbation of pulmonary involvement of Covid-19, bacterial superinfection on Covid-19 pneumonia, pulmonary embolism, and pneumothorax.

Table 1. Blood Results

Blood	Result	Unit	Normal Range
WBC	18.6	*10 ³ /μl	4.4-11.3
HB	13	g/dl	12.3-15.3
HCT	40.6	%	36-45
PLT	261	*10 ³ /μl	150-450
CRP	33.5	mg/l	Up to 6.0
D-Dimer	5000	ng/FEU ml	<500
BUN	32	mg/dl	17-45
Cr	0.6	mg/dl	0.6-1.3
Blood Sugar	204	mg/dl	<140

WBC: white blood cell, HB: Hemoglobin, HCT: Hematocrit, PLT: platelet count, CRP: C-reactive protein, BUN: Blood urea nitrogen, Cr: complete remission

**Figure 1.** Chest X-Ray

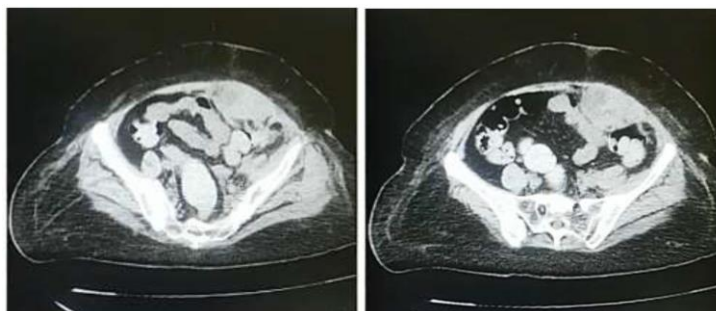
The computed tomography (CT) angiography was performed. A filling defect in the upper and lower lobar branches of the left lung (with extension to the segmental branches) and the segmental branch of the lower lobe of the right lung were observed (involvement in the branches of the pulmonary artery). In addition, both lungs illustrated bilateral ground glass opacity, with a lung involvement score of 20 out of 24. After the diagnosis of pulmonary embolism, a therapeutic dose of heparin (1000 mg per hour) was administered. Color doppler ultrasound of the lower extremities was performed, which was normal.

The patient's D-Dimer was 5,000 on the second day. After four days, when the Activated partial thromboplastin time (PTT) reached the desired level, warfarin was started. After the international normalized ratio (INR) reached 2 for two consecutive

**Figure 2.** Ecchymosis on the abdominal wall

days, the patient's heparin was discontinued. On the seventh day of hospitalization, the patient hemoglobin dropped from 13 to 10.9 mg/dl (No reason was found). On the 21st day of hospitalization, the patient was visited by a general surgeon due to abdominal pain. A large ecchymosis was observed in the periumbilical; however, there was no significant tenderness in the abdominal exam (Figure 2).

The patient's hemoglobin reached down to 7.9 mg/dl. An abdominal and pelvic CT scan was performed. A 45-mm hematoma was reported in the left rectus muscle (Figure 3). Two packed red blood cells were transfused. Daily serial complete blood count (CBC) and continuous monitoring of vital signs were performed. Hemoglobin depletion stopped and abdominal wall ecchymosis did not spread any longer. Fortunately, no surgical intervention was required. The patient died of extensive lung involvement caused by COVID-19 and massive pulmonary embolism on the 24th day of hospitalization.

**Figure 3.** Abdominal and pelvic computed tomography scan

3. Discussion

The RSH is more frequent in women, peaking in the fifth decade, and is difficult to detect clinically since it can mimic a variety of other acute abdominal diseases. Acute abdominal pain, which is sometimes accompanied by nausea, fever, and vomiting, is a common feature found in history. Therefore, many patients have undergone exploratory laparotomies since it is difficult to differentiate between RSH and other intra-abdominal diseases. (2)

Abdominal pain (84%-97%), palpable abdominal wall mass (63%-92%), tenderness (71%), abdominal guarding (49%), nausea (23%), vomiting (15%), fever, and chills are the most prevalent signs and symptoms of RSH. Carnett's sign can assist determine if the tenderness is caused by the inside abdomen or the abdominal wall. If the tenderness increases or stays the same after tensing the abdominal muscles, the test is positive, and pathology of the abdominal wall is more likely. Fothergill's sign can assist determine if the tumor is coming from the abdominal wall or the inside abdomen. The RSH is diagnosed when the mass does not cross the midline and remains palpable after tightening the rectus muscles.

Depending on the size and location of the hematoma, as well as the degree of peritoneal irritation, the patient's presentation may vary dramatically. If the RSH causes peritoneal irritation, the patient may present with abdominal rigidity, rebound tenderness, and gastrointestinal symptoms (1). Although most RSHs are self-limiting, they can cause severe morbidity and have a documented fatality rate of 4%. The mortality rate for patients taking anticoagulants has been reported to be as high as 25%. This is assumed to be due to the patient's older age and comorbidity, as well as the larger size of the hematoma (2).

The ultrasonography has a sensitivity of 80%-90% and may be inaccurate in a small percentage of patients, particularly incorrectly differentiating the origin of a detected mass, resulting in unnecessary laparotomy. A CT scan is a perfect predictor of acute RSH, with 100% sensitivity and specificity. It provides accurate data regarding the size, location, origin, extension, and type of 45hematoma, as well as assisting in the exclusion of other abdominal diseases (1).

Kalayci et al. recommended that enoxaparin must be discontinued immediately upon the detection of RSH. The patient's vital signs, abdomen condition, and hemoglobin levels should be evaluated regularly (3). Analgesia, management of predisposing factors, and discontinuation of anticoagulation are all effective treatments for most RSHs. Fluid resuscitation and reversal of anticoagulation or antiplatelet therapy should be performed if necessary. Active bleeding can be treated either

surgically by removing the hematoma and ligating the bleeding vessels, or it can be treated radiologically by catheter embolization (1,2).

Nematihonar et al. reported two patients with COVID 19 and RSH. The first case was a 65-year-old woman with a known case of COVID-19 and a history of diabetes mellitus developed with abrupt tachycardia and hypogastric discomfort on the second day of admission; an abdomen physical examination revealed a large lower abdominal sensitive mass. The second case was a 50-year-old woman with COVID-19, who began to complain of tachycardia, discomfort, and a mass in her lower abdomen four days after admission. A large lower abdominal painful mass was discovered during a physical examination of the abdomen. A CT scan of the abdomen on both patients revealed a large RSH. The inferior epigastric artery was angioembolized in both patients. After two weeks of follow-up, the patients recovered completely (4). Although these two patients resemble our patient in age, gender, and medical history, our patient did not have a mass in the abdominal wall. Furthermore, no angioembolization or surgery was performed due to our patient's stable hemodynamics.

Bakirov et al. presented a 75-year-old man with mild hypertension, fever, cough, and shortness of breath. The CT of the chest showed bilateral opacifications which matched COVID-19 pneumonia. Therapeutic-dose anticoagulation (Clexane) was injected subcutaneously. He collapsed unexpectedly while going to the lavatory in the ward after four days of admission. The patient fell and went into hemorrhagic shock when a left rectus hematoma was discovered. Despite receiving adequate therapy, he continued to deteriorate. The hematoma was evacuated, and hemostasis was achieved through a laparotomy. The patient was discharged home 14 days following the laparotomy in good condition and on oral anticoagulation. (5) In our patient, there was no history of trauma, and no surgery was required due to stable hemodynamics.

Dennison et al. presented a man in his 70s with deteriorating dyspnea, dry cough, fever, as well as a history of hypertension. Enoxaparin, dexamethasone, and remdesivir were started. Following that, the patient began to have significant left lower quadrant abdominal pain. Several abnormalities were discovered during the CT scan. A 4 cm well-demarcated region of non-enhancement compatible with acute infarct, as well as significant hematomas on both sides of the rectus muscles, were detected. Hemoglobin levels were checked and found to have dropped from 13.7 g/dl upon admission to 10.7 g/dl immediately after the CT scan. Interventional radiology embolization and huge rectus hematomas treatment were performed in the tertiary care center (6). In our patient, there was no evidence of splenic infarction on the CT scan; moreover,

Angioembolization was not used due to the patient's stable hemodynamics.

It is believed that our patient's RSH was caused by shearing of the epigastric vessels as a result of a combination of anticoagulant therapy and trauma from straining and/or coughing.

4. Conclusion

The RSH should be included in the differential diagnosis of any patients who complain of abdominal pain following an anticoagulant injection. This can lead to a faster and more accurate diagnosis, a lower mortality rate, fewer unnecessary surgeries, and cost reduction. A complete physical examination is necessary for diagnosis since it can represent palpable painful lumps and ecchymotic regions of the abdomen skin. Unless contraindicated, we recommend contrast-enhanced CT to confirm the diagnosis. Contrast extravasation and all intra-abdominal structures are also revealed by a CT scan with contrast.

Acknowledgments

We acknowledge Imam Reza Hospital and its medical staff, who worked hard during the COVID-19 epidemic.

Footnotes

Conflicts of Interest: The authors declare that they

have no conflict of interest.

Ethical Statement: The Family's informed written consent was obtained for the publication of this case report.

Funding: This case report received no funding.

Author contribution: TZ, YA and, AAB wrote the manuscript and reviewed the literature. MEK, and HS collecting data and reviewed the literature. All authors read and approved the final manuscript.

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