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# A case report on rectus sheath hematoma in an intubated COVID-19 patient

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## Abstract:

Rectus sheath hematoma (RSH) is a life-threatening condition. Its pathology lies behind its unique anatomy. Critically ill COVID-19 patients are managed in the emergency department for longer periods while awaiting critical care admission. Therefore, more complex procedures such as prone positioning are performed in the emergency department to ensure patient care continues. We report this case of RSH in an intubated critically ill COVID-19 patient requiring prone position. During her stay in the Emergency Department Acute Care Unit, she developed anemia, uremia, and worsening hypoxia. Emergency contrast-enhanced computed tomography leads to our diagnosis of RSH. She was treated with a conservative approach and blood transfusion. We would like to highlight this case for its diagnostic complexity since this ventilated patient required both biochemical and radiological markers to diagnose RSH in combination with high suspicion levels. RSH must be considered in patients with risk factors such as prone position and anticoagulant usage. Last, a holistic approach to critically ill patients will not only benefit patients but also health-care profession. The direction of care should be decided based on the patient's condition, imaging, and hospital resources.

## Keywords:

Anemia, emergency department, intubated, prone position, rectus sheath hematoma

## Introduction

Rectus sheath hematoma (RSH) is not be a common presentation for patients in the emergency department. Due to its unique anatomy, there are many articles in the literature on misdiagnosis and underdiagnosis.<sup>[1]</sup> Therefore, with the aid of physical examination, biochemical investigations, and radiological investigations emergency team should be able to identify RSH early. Several common risk factors are direct trauma, iatrogenic, surgery, and anticoagulant. Women are at higher risk as compared to men due to their less muscle mass. Acutely ill and intubated patients have many challenges

to overcome to diagnose this condition. Unrecognized, RSH can lead to catastrophic hemorrhage and death. A rapid diagnosis can improve patient's morbidity and mortality.<sup>[2]</sup> In this case report, we would like to highlight the emergency department's diagnostic dilemma in intubated patients, prone position complications, and a multidisciplinary approach to critically ill patients in the emergency department.

## Case Report

We would like to present this case of a 60-year-old obese female who had underlying diabetes mellitus and hypertension. She presented to the emergency department with a history of fever and shortness of breath. She had a strong epidemiological link to COVID-19 and tested positive with

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polymerase chain reaction test. On presentation, she was hypoxic and was intubated for respiratory distress. She was treated for severe COVID-19 pneumonia complicated with right segmental and subsegmental pulmonary artery embolism.

Postintubation, she remained hypoxic despite high ventilator settings using lung-protective strategy. She was admitted to the Emergency Critical Care (ECC) while awaiting bed in the intensive care unit (ICU) and managed by emergency physicians with critical care exposure. Her treatment in the ED included steroids (intravenous methylprednisolone 2 mg/kg daily), anticoagulant (subcutaneous enoxaparin sodium 60 mg twice daily), and immunomodulatory drug (Tablet baricitinib 4 mg daily). Decision to prone was made to improve ventilation. The patient was placed in prone position by trained staff, and she stayed in prone position for 20 h from day 2 to day 3 of admission. The patient remained hemodynamically stable during her prone position in Emergency Critical Care (ECC). No procedure or excessive movement was performed on her. She was put on a lateral position post supine and staff noticed several pressure sores over the left cheek; otherwise no obvious bruises or hematoma were seen over the body.

On day 5 of admission to ECC, we noticed downtrend hemoglobin levels and climbing urea levels as shown in Figure 1. Her coagulation profile and platelet were normal. Clinically, she had no evidence of active bleeding. From day 7 to day 8 of admission, her oxygen requirement increased drastically as her hemoglobin decreased. On examination, there was a vague mass palpable over the suprapubic region. She was referred to the Surgical Department to rule out occult bleeding. An urgent esophagogastroduodenoscopy (OGDS) revealed pangastritis with hemorrhagic spots and no active bleeding. We proceeded with computed tomography (CT) of the abdomen which revealed a

right RSH extending to the extraperitoneal space of the right hemipelvis and right lateral pelvis with no active blush wall as shown in Figure 2. Her anticoagulant was withheld and she was transfused with two units of packed red blood cells.

Posttransfusion, her oxygen requirement decreased and she was successfully extubated by the emergency team on day 13 of admission as described in Table 1. She was weaned down from noninvasive ventilation to high-flow mask and was admitted to the general ward. Her hemoglobin remained stable and her urea decreased drastically. Her abdomen girth was continuously observed in the ward.

Informed consent was obtained from patient's daughter to allow her data used scientifically.

## Discussion

RSH is an underdiagnosed clinical condition. It was first described 2500 years ago as a result of abdominal trauma.<sup>[2]</sup> The rectus abdominis muscle is made up of two parallel vertically aligned muscles, separated in the midline by the linea alba. The arterial supply to the rectus abdominis muscle arises from the superior and inferior epigastric arteries. The inferior epigastric artery runs superiorly on the posterior surface of the rectus abdominis muscle and anastomoses with superior epigastric vessels at the umbilicus level. Hence, injuries to the inferior epigastric vessels lead to bleeding profusely posteriorly due to the lack of tamponade effect. Whereas injury to the superior epigastric muscles and anastomosis sites is usually self-limiting with the aid of surrounding muscles.<sup>[3]</sup>

On the other hand, COVID-19 is a highly contagious infectious disease that causes a variety of symptoms and

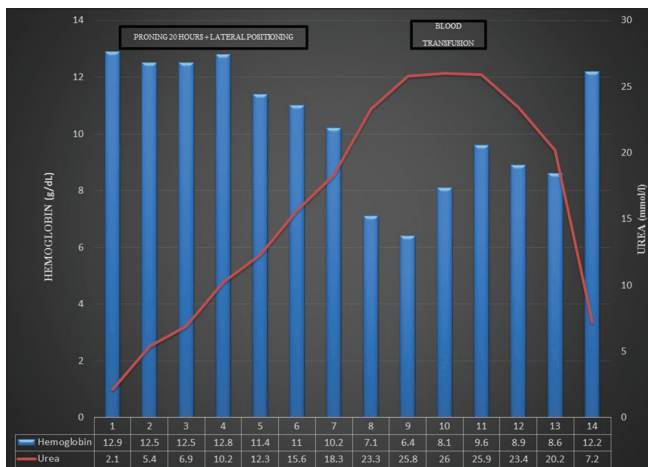


Figure 1: Hemoglobin and urea trend throughout the admission

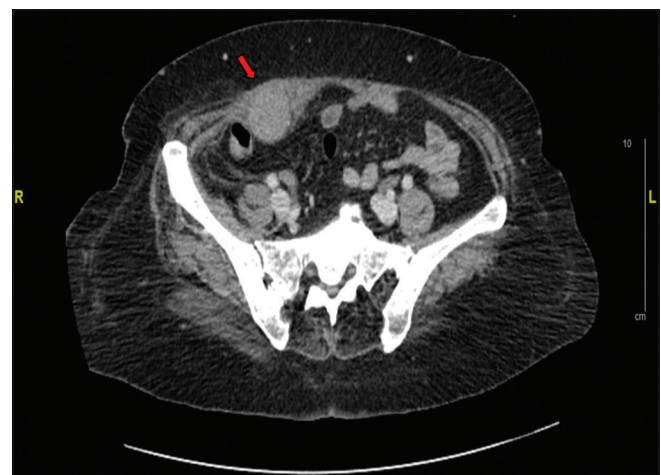


Figure 2: Venous phase: Hematoma over the lateral aspect of the inferior right rectus abdominis muscle and within rectus sheath extending to the right extraperitoneal space of the right hemipelvis (red arrow)

**Table 1: Oxygenation trend throughout the admission**

Arterial Blood gas	Day 1	Day 2	Day 3	Day 4	Day 5	Day 7	Day 9	Day 11
pH	7.57	7.43	7.47	7.44	7.46	7.44	7.50	7.47
PO <sub>2</sub>	57	53	275	81	84	86	183	74
PCO <sub>2</sub>	29	41	36	37	36	35	32	36
HCO <sub>3</sub>	26.6	27.2	26.2	25.1	25.6	23.8	25	26.2
Oxygen requirement	15 L/min	Supine FiO <sub>2</sub> : 1.0	Prone FiO <sub>2</sub> : 0.6	Supine FiO <sub>2</sub> : 0.6	Supine FiO <sub>2</sub> : 0.5	Supine FiO <sub>2</sub> : 1.0	Supine FiO <sub>2</sub> : 0.7	FiO <sub>2</sub> : 0.5

FiO<sub>2</sub>=Fraction inspired oxygen

complications. Sadly, overall mortality has been recorded as high as 31.5%.<sup>[3]</sup> However, with the increasing number of patients and limited critical care units, overcrowding in the EDs are at alarming levels. This directly affects patients' admission rates to critical care units, and the EDs have to evolve and expand their role in the care for these stranded patients.<sup>[4]</sup>

Intubated patients, in particular, carry more diagnostic difficulty for complications as they are sedated and paralyzed to facilitate ventilation. They are unable to accurately point out their pain or discomfort. Therefore, the attending physicians need to heighten their diagnostic senses using limited physical examination and biochemical values to make a diagnosis. Limited contact time with patients to prevent the spread of COVID-19 might not give us the liberty of performing frequent and serial exams.

There are various clinical presentations in nonventilated patients diagnosed with RSH. The most common presentation is abdominal pain (84%–97%); however, in ventilated patients, it is important to pay special attention to other biochemical parameters to detect this condition. Expanding hematoma may present with signs of hypovolemic shock and most definitely anemia, as detected in this patient.<sup>[2]</sup> Serial hematocrit and hemoglobin can be normal in initial acute blood loss but will be reducing if the bleeding continues requiring urgent transfusion.<sup>[5,6]</sup> Anemia can also lead to respiratory dysfunction. Sudden increase in oxygen requirement and clinical deterioration not corresponding to lung pathology should warrant further investigation. Hemoglobin concentration <10 g/dL is an independent predictor of extubation failure (sensitivity 76% and specificity 72%).<sup>[7]</sup> Thus, prompt transfusion to increase oxygen-carrying capacity is warranted in all patients. As we see in this case, the patient's oxygen requirements significantly reduce after blood transfusion.<sup>[8]</sup>

In this COVID era, imaging is one of the best diagnostic modalities in hemodynamically stable patients. Ultrasound has a sensitivity of 80%–90%, whereas CT abdomen has a 100% sensitivity in detecting RCH. Not only can it accurately classify the severity of the pathology but also can be used to identify alternative diagnoses in a diagnostic dilemma.<sup>[2]</sup>

Prone ventilation has recently been incorporated as a part of ventilation strategy in patients with COVID-19 by reducing the ventral-dorsal transpulmonary pressure difference, improving lung perfusion and oxygenation. However, like all procedures, prone position also comes with certain complications. Mild trauma, vigorous contraction of rectus abdominis muscle, or sudden position change can easily cause tear of the inferior epigastric vessels causing RSH.<sup>[1,9]</sup> Therefore, it is of utmost importance for us to weigh the risk and benefits before the procedure. Our ED team has recently designed an Emergency Critical Care (ECC) to provide higher standards of care to ventilated patients awaiting ICU admission. Training for all levels has definitely installed more confidence in performing complicated procedures such as proning in the emergency setting.

Another common cause of RSH is the use of low-molecular-weight-heparin. About 70% of patients therapeutically anticoagulated are at high risk of RSH. Patients with abdominal wall injections and steroid therapy should also be inspected for any signs of RSH that can lead to catastrophic internal bleeding if left unidentified.<sup>[10]</sup>

The role of handling critical care patients has shifted to the ED team both in acute and critical phases. It is also important to involve surgical, radiology, and anesthesiology teams early when considering the diagnosis of RSH.

The evaluation of surgical versus conservative management should be discussed in the team. The majority of the cases are treated conservatively with blood transfusion, fluid resuscitation, and anticoagulant reversal. This is only suitable for patients who are hemodynamically stable and with nonexpanding hematoma.<sup>[1,5]</sup> It is crucial to monitor serial hemoglobin and signs of infection.<sup>[1]</sup> For patients who are unstable, a more invasive approach is warranted to stop the bleeding.

In COVID-19, it is important to remember the overall risk of thrombotic events in critically ill patients is 18.1%.<sup>[11]</sup> Therefore, the decision to restart anticoagulants should be carefully deliberated if there is a stable hemoglobin trend with no ongoing blood transfusion, no evidence of

expanding hematoma, and low possibility for surgical interventions.<sup>[6]</sup>

## Conclusion

RSH is a life-threatening emergency requiring rapid diagnosis and urgent intervention. However, due to the complexity of its presentation in ventilated patients, it may give rise to a diagnostic dilemma. Highlighting this case will help treating physicians to diagnose RSH with the aid of laboratory and radiological investigations. Multidisciplinary approach should be emphasized in managing complex patients. In the COVID-19 era, health-care professionals must consider feasibility in terms of human resources, equipment, and environment in managing patients.

### Author contributions statement

BN contributed to clinical management of the patients, writing of the manuscript, approval of the final draft of the manuscript, and corresponding author. Special thank you to all emergency department team for managing and resuscitation of patient. Thank you to surgical team for co-managing patient.

### Conflicts of interest

None Declared.

### Consent to participate

Written informed consent was obtained from the patient's daughter for her anonymized information to be published.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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