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Ruptured Splenic Artery Aneurysm (SAA) in an Elderly Patient with Hypercoagulability: A Very Vague Presentation

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Abstract

Here, we discuss a 78-year-old woman with symptoms of shortness of breath and intermittent productive cough, which worsened over time. She had a history of Factor V Leiden and unprovoked pulmonary embolism (PE) and was on lifelong warfarin. The patient was found to have a widened mediastinum and a small left-sided pleural effusion on chest X-ray, leading to CT aortogram to assess for aortic pathology. While in the CT scanner, she experienced an acute deterioration and went into shock. The initial diagnosis was anaphylactic reaction to the contrast agent, but the CT images revealed an active bleeding in the left upper quadrant, possibly of splenic origin. The patient was stabilized with aggressive resuscitation measures and transferred to a referral hospital for urgent surgery. The surgery revealed a ruptured splenic artery aneurysm (SAA), and the patient was taken to the intensive care unit (ICU) for further management. However, she developed a large infarct in the left occipital lobe and passed away after six days. The case highlights the significance of recognizing the symptoms and signs of SAA and then taking a multidisciplinary approach in managing SAA patients, particularly those with hypercoagulability (Graphic 1).

Keywords

Splenic Artery Aneurysm (SAA), Hypercoagulability, CT Aortography

1. Introduction

Splenic artery aneurysm (SAA) is a rare but potentially life-threatening condition characterized by the focal dilation of the splenic artery, with a diameter 50% greater than the normal vessel diameter [1]. It is the most common type of vis-

ceral artery aneurysm, accounting for about 60% to 70% of diagnosed cases [2]. A case series of maternal death in Australia from ruptured splenic artery aneurysms from 1997 to 2007 was published to emphasize the importance of this disease [3].

There are several risk factors associated with the development of SAA. Modifiable risk factors include atherosclerosis (build-up of plaque in the arteries), portal hypertension (high blood pressure in the portal vein), liver transplantation, pregnancy, and connective tissue disorders such as Marfan syndrome or Ehlers-Danlos syndrome. Chronic pancreatitis has also been linked to the development of splenic pseudoaneurysms. Non-modifiable risk factors include advanced age and female gender [4]-[6].

2. Case Report

Here, we report a case of a 78-year-old lady, with shortness of breath and intermittent productive cough as initial symptoms, presented to our small rural emergency department (ED) which has no inpatient surgical or intensive care services. She had been seen by her family doctor, who initiated symptomatic treatment and sent viral swabs for testing. However, over the course of the next few days, the patient's symptoms worsened. She reported increased work of breathing, dyspnea on exertion, and difficulty speaking fluently due to shortness of breath. She also complained of mild to moderate, sharp, and pleuritic right inferoposterior thoracic pain over the 11^{th} and 12^{th} ribs on the right side.

The physical examination revealed bilateral expiratory wheezing and significant tenderness on palpation of the 11^{th} and 12^{th} ribs with the following vital signs: blood pressure, 94/68 mm Hg; heart rate, 130; respiratory rate, 24; temperature, 36.4 C; O_2 saturation, 87% on room air. The patient had a background history of Factor V Leiden with unprovoked pulmonary embolism (PE) and was on lifelong warfarin, hypothyroidism on thyroxine, osteoporosis, diverticular disease, hysterectomy, left total knee replacement, deep vein thrombosis (DVT), and compression fractures of the T9 and T11-12 vertebrae.

Owing to the widened mediastinum and a small left sided pleural effusion shown on chest X-ray and unexplained thoracic pain, a CT aortogram was requested to assess for aortic pathology. However, while in the CT scanner, the patient experienced an acute deterioration, becoming pale, diaphoretic, and complaining of abdominal pain. The patient was immediately transferred to the resuscitation area in a shocked state, with hypotension (systolic blood pressure in the 80s) and tachycardia (heart rate of 110).

Active bleeding in the left upper quadrant, possibly of splenic origin, was noted on the CT images by the radiographer but the treating team were initially unaware of this. The shock was initially undifferentiated, and the early working diagnosis was anaphylactic reaction to the contrast agent.

Given the severity of the patient's presentation, immediate and aggressive resuscitation measures were initiated to stabilize her condition and to address the

shock state.

The management of the patient included ensuring patent airway however she did not require endotracheal intubation or adjuncts, providing supplemental oxygen via a non-rebreather mask, establishing a second intravenous (IV) access (she already had one for the contrast material injection) with a 16 G IV cannula, placing an arterial line for continuous blood pressure monitoring, administering small aliquots of 10 mcg of IV adrenaline to address potential allergic reaction or anaphylaxis from the contrast, elevating the patient's legs, administrating Prothrombinex (a blood clotting factor), infusing noradrenaline to support blood pressure, initiating a blood transfusion with O-positive blood (1 unit of packed red blood cells), administering 10 mg of vitamin K (due to the patient being on warfarin), and titrating fentanyl for pain control. Then, we were alerted to the likely splenic rupture by a radiographer. So, adrenaline was ceased and we managed her using trauma principles including permissive hypotension and she was referred for surgical management of her splenic hemorrhage.

A repeat venous blood gas (VBG) revealed a 20-point reduction in hemoglobin, and lactate level was 9.6, indicating ongoing bleeding. The surgical registrar at our referral center was notified regarding her condition, who agreed for urgent transfer.

Intra-hospital transfer arranged to our local referral hospital, which is approximately 25 - 30 minutes by road. Surgery, ICU and Emergency teams were notified at the receiving hospital.

On arrival in the accepting hospital the patient was still hypotensive (BP 62/45 mmHg, PR 112/min), had already received 4 units of packed red blood cells at the previous hospital and during transport, as well as several aliquots of IV adrenaline.

Upon assessment, the patient appeared peri-arrest, with labored breathing and pallor. Her radial pulse was absent, and her arterial blood pressure was in the 40 s. However, she was maintaining her ability to respond to spoken voice.

The CT aortogram revealed an acute hemorrhage, with the patient becoming pale, diaphoretic, and complaining of abdominal pain. The initial non-contrast CT showed the minimal free fluid in abdomen, while the arterial phase-contrast CT images revealed significant left upper quadrant (LUQ) hemorrhage. These findings suggested that the patient actually bled to hemorrhaged in between CT scans, possibly originating from the spleen.

Findings from CT imaging, raise concern for a potentially ruptured splenic artery aneurysm. This is a life-threatening condition that requires urgent intervention.

The management in this case involved taking the patient to the operating theater (OT) for an exploratory laparotomy. During the surgery, the findings included ruptured splenic artery (**Figure 1**) aneurysms, adjacent bowel wall edema, and a decision was made to perform a splenectomy (removal of the spleen). The patient was then transported to the intensive care unit (ICU), where a massive transfusion protocol was initiated to address the acute blood loss.

A repeat CT abdomen performed the day after the surgery showed no fluid

collection, renal cortical necrosis, and foci of hemorrhage in the right upper quadrant. There was no evidence of gastrointestinal ischemia or pancreatitis. The scan also revealed thrombosis of the inferior mesenteric artery, no evidence of aortic aneurysm or dissection, no pulmonary arterial thrombosis, and a large hiatus hernia.

In the 3rd day of admission in ICU the patient had low GCS score and unresponsive. Neurological examination was inconclusive. Brain CT scan requested which showed acute infarct in the posterior aspect the left occipital lobe. Small volume acute subarachnoid blood in both sylvian fissures greater on the left side of the brain and moderate chronic ischaemic change in cerebral white matter.

In the 4th day of admission, the patient's vital signs were stable. She had diverging gaze and bilateral non-reactive pupils. There was a significant lactic acidosis. CT scan imaging series including brain perfusion, chest, abdomen, and pelvis was completed.

The imaging series showed large areas of hypoperfusion in both occipital lobes (Figure 2), patchy consolidation in the right lung apex, no evidence of GIT ischemia and no mural gastrointestinal emphysema reported.

Unfortunately, her condition continued to deteriorate, and she passed away

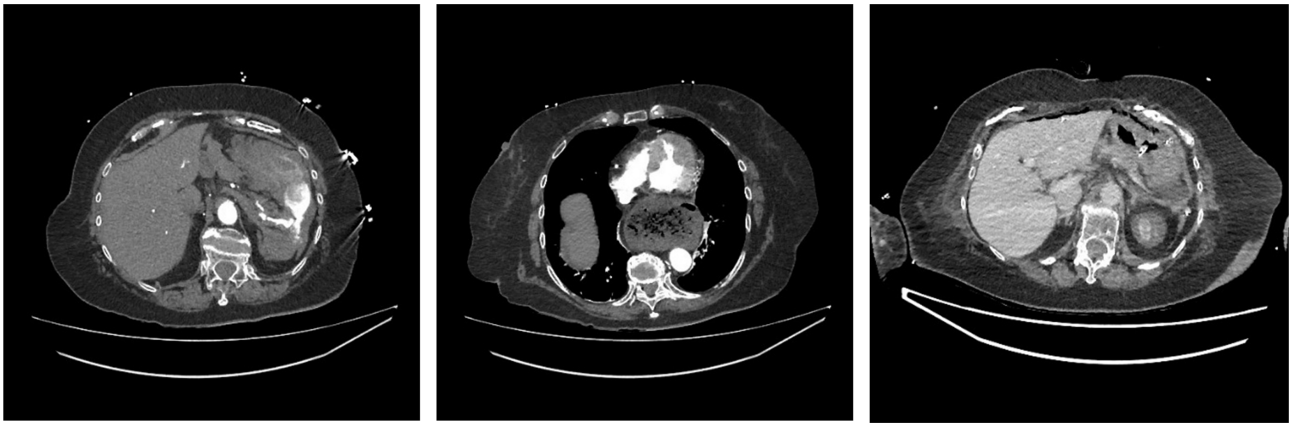

Figure 1. Axial computed tomography image showing splenic artery aneurysm.

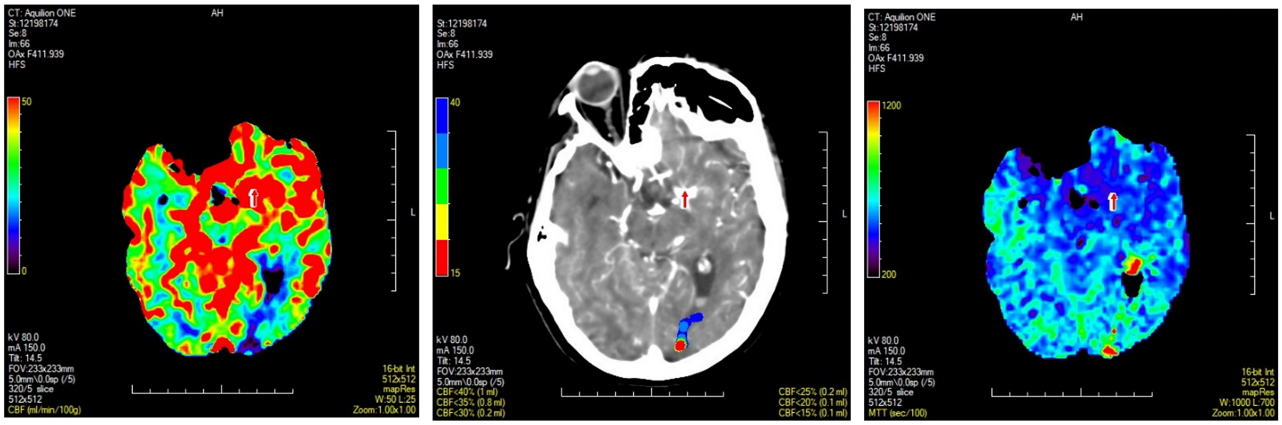

Figure 2. Small volume of core infarct and larger areas of hypoperfusion in both occipital lobes.

after 6 days following her initial presentation. Of particular difficulty was managing both the need for anti-coagulation against her bleeding and hypercoagulable state. She never regained consciousness, and the family decided to stop actively managing and she was palliated.

3. Discussion

In general, the prevalence of SAA in the general population is less than 1%, as most cases remain asymptomatic and undetected. However, when rupture occurs, the mortality rate is significant, ranging from 25% to 40% in non-pregnant patients. In pregnant patients, the mortality rate increases up to 75%, and fetal mortality can be as high as 95% [2] [7] [8].

Due to the increased risk of rupture and associated mortality, intervention is recommended for aneurysms larger than 2 cm in diameter. Other indications for intervention include symptomatic patients, women of childbearing age, concomitant pregnancy, and cirrhotic patients planning to undergo liver transplantation or portosystemic shunting procedures [9]-[11].

The management of splenic artery aneurysms can be approached through various methods:

1) Open surgical approach: This approach is considered the gold standard for SAA repair. It involves resection of the aneurysm with interposition bypass, particularly for aneurysms located in the proximal to mid-splenic artery. In cases of a hostile abdomen or distal aneurysms near the splenic hilum, splenectomy may be combined with aneurysm resection [9] [12].

2) Endovascular approach: Endovascular interventions, such as stent graft placement for true aneurysms or embolization for pseudoaneurysms, have gained popularity. The specific technique depends on the type and location of the aneurysm, collateral circulation, and the decision to preserve the splenic artery [13]-[15].

3) Minimally invasive laparoscopic approach: Laparoscopic surgery is a safe alternative for elective SAA repair. Techniques include ligation of the mid-splenic artery using stapling or clipping, splenectomy alone for distal SAAs near the hilum, or splenectomy with distal pancreatectomy in cases where the aneurysmal wall is inflamed and adherent to the tail of the pancreas. The laparoscopic approach offers advantages such as faster recovery, shorter hospital stays, and reduced postoperative pain compared to open surgery. It can also be considered for pregnant patients with SAA, as it minimizes manipulation of intra-abdominal contents and reduces the risk of preterm labor [16] [17].

In summary, splenic artery aneurysm is a rare but serious condition that requires intervention to prevent rupture and associated complications. The choice of treatment approach depends on various factors, including the size and location of the aneurysm, patient characteristics and surgeon expertise.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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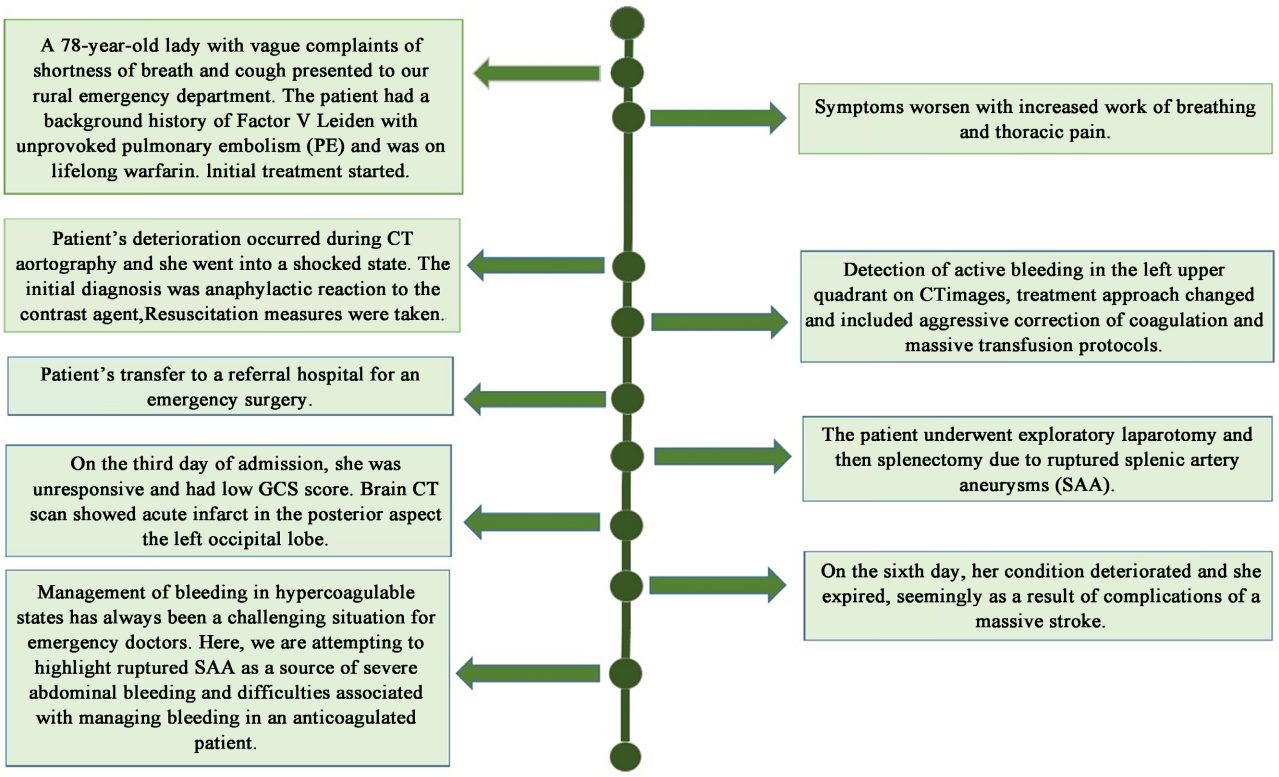
Appendix



Graphic 1. The graphical abstract depicts the complexity of an elderly lady's condition with hypercoagulability background who experienced ruptured splenic artery aneurysm (SAA).