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Renal Infarction and Decreased Splenic Perfusion Secondary to a Left Ventricular Thrombus: A Case Report

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Abstract

We report a case of a 67-year-old man who presented to urgent care with a one-week history of left-sided abdominal pain and oliguria. Over the past month, he reported feeling fatigued as well as noticed decreased urine output. The patient does have a significant cardiac medical history that includes coronary artery disease with a previous myocardial infarction, reduced ejection fraction, and hypertension. Imaging studies were conducted which revealed the likely etiology of his current symptoms. A transthoracic echocardiogram (TTE) revealed the presence of a large non-mobile apical thrombus occupying most of the apex of the left ventricle. Computed Tomography (CT) confirmed an apical left ventricular thrombus and showed decreased perfusion to the spleen and ischemia/infarction of the left kidney. The patient was initially treated with heparin but subsequently given enoxaparin with bridging to warfarin. He began to feel better with less left flank pain. Although this presentation of an LV thrombus is a rare occurrence, it is important for physicians to consider abdominal pain as a presenting complaint.

Keywords

Left Ventricular Thrombus, Renal Infarct, Splenic Infarction, Abdominal Pain

Introduction

Left ventricular (LV) thrombus can manifest as a complication of LV dysfunction. With the potential to embolize, LV thrombus can lead to complications such as stroke. It also is associated with high rates of mortality and morbidity.

Thrombus formation is typically attributed to Virchow's triad of factors - reduced ventricular motion, local myocardial injury, and hypercoagulability/stasis of flow. The natural history of LV thrombi includes resolution and endothelialization. However, embolization may occur prior to one of these outcomes. Splenic infarction can result from occlusion,

via embolus or thrombus, of the splenic artery or one of its sub-branches. Splenic infarction accounts for 0.016% of admissions at a single academic medical center over 10 years [1]. The most common clinical features include left-sided abdominal pain, nausea and vomiting, and fever and chills [2].

Given this patient's prior history of myocardial infarction, coronary artery disease, reduced ejection fraction, hypertension, and hyperlipidemia, it is reasonable to conclude these patient's renal and splenic infarct findings are secondary to an LV thrombus. Although this correlation may have a historically low prevalence in literature, it is important for treating physicians to consider this diagnosis in order to initiate proper treatment and reduce morbidity.

Case Summary

A 67-year-old male with a past medical history of coronary artery disease (8 stents placed, none within the last year), type II diabetes, hypertension, hyperlipidemia, chronic heart failure, diverticulitis, and gastroesophageal reflux presented with the chief complaint of abdominal pain for the past one week. The pain was described as sharp and rated as an 8/10, intermittent occurrence. Along with the abdominal pain, the patient reports that he has felt fatigued for the past month and had noticed a decrease in urine output and difficulty urinating over the past week. He added that his urine had been darker in character and foul-smelling. The patient denied the occurrence of hematuria, blood in stool, constipation, or pain upon urination.

The patient was seen to have an elevated systolic blood pressure of 167/78, considered to be stage 2 hypertension. He also had an elevated respiratory rate of 29 breaths/min. Upon examination, the patient did not appear to be in distress, however, the presence of left lower abdomen tenderness was noted. Upon labs, an elevated glucose level of 324 mg/dl was observed, indicative of diabetes. An elevated troponin level of .43 ng/mL is also reported, indicative of heart disease or hypertrophy. Urine analysis exhibited an elevated glucose level with trace amounts of blood observed.

The patient was admitted with a clinical history of left ventricular thrombus and presenting a complaint of left lower quadrant abdominal pain. Physical examination of the chest exhibited an enlargement of the heart and the initial impression was no acute abnormality. A CT with the contrast of the abdomen/pelvis confirmed the enlargement of the heart (**Fig-1**). Additionally, a filling defect in the left

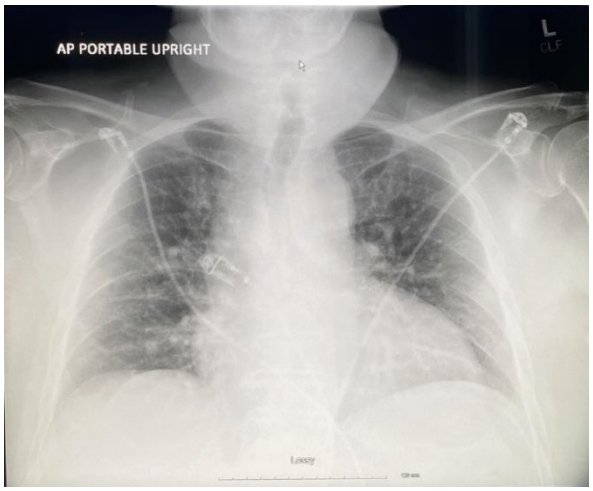


Fig-1: Chest X-ray indicating heart enlargement.

ventricular apex was observed (**Fig-2**). The physicians noted, compared with a visit three years prior, concluded that the wall motion abnormalities, as well as diastolic function, have worsened. A TTE three years prior measured LVEF of 45-50% with grade 1 diastolic dysfunction. Lexiscan two years prior showed LVEF 33% with akinetic to dyskinetic apical/periapical infarction. The patient was started on IV heparin.

Fig-2: Filling Defect in Left Ventricular Cardiac Apex visualized on CT scan

(delayed enhancement splenic artery dense calcifications, decreased enhancement lower left kidney likely ischemia/infarction).

Multiple gallbladder stones are noted, and the spleen was observed to show delayed enhancement with calcifications in the splenic artery. The physician noted the possibility of decreased blood flow. There were no significant findings observed in the right kidney, however, the left kidney exhibits a large area of decreased enhancement (suggestive of ischemia) (**Fig-3** and **Fig-4**). A left renal cyst was observed with a size of 3.6 x 4.9 cm (**Fig-5**). The glomerular filtration rate was observed to be 29 mL/min on the left, and 24 mL/min on the right for a total of 52 mL/min (elevated) (**Fig-6**). The physician noted the likely presence of a left renal cyst as well as possible infarct.

Diagnostic Assessment

In making a diagnosis of LV thrombus, TTE (transthoracic echocardiogram) is an acceptable first-line tool, but in cases with non-diagnostic imaging MRI with gadolinium contrast can be used as it is considered the gold standard. Patients with LV thrombus are recommended to receive anticoagulation therapy for at least three months [3].

Therapeutic Intervention

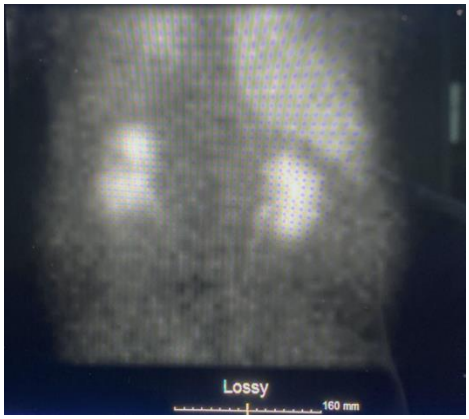
The discharge medications prescribed given this patient's left ventricular thrombus were 120 mg/0.8 mL of enoxaparin (Lovenox) and 5 mg tablets of warfarin (Coumadin). The therapeutic enoxaparin was to be used until the INR is >2.0. The reason for INR monitoring is to make the necessary adjustment to anticoagulant dosage because doses vary among patients [4]. Enoxaparin, an anticoagulant which is a low molecular weight heparin that is approved for a variety of clinical conditions that includes, but is not limited to, deep venous thrombosis treatment and prophylaxis, venous thromboembolism, and pulmonary embolism [5]. The other anticoagulant that the patient was prescribed was warfarin (5 mg PO once daily). Warfarin is a vitamin K antagonist, that is used in the prophylaxis and treatment of thromboembolic events. It works by inhibiting the vitamin K epoxide reductase complex. Factors V and VIII are responsible for forming clots, and when they are indirectly inactivated by the upstream warfarin, the risk of developing blood clots decreases [6].

Discussion

Findings of a splenic infarction secondary to a left ventricular thrombus are exceedingly rare. The typical causes for a splenic infarct are related to hematological causes which could include lymphoma, polycythemia, and sickle cell disease. The most common cause for left abdominal pain amongst patients is reported to be cholecystitis followed by diverticulitis [7].

There have been other cases detailing similar presentations in patients who present with initial left abdominal pain or splenomegaly. Within one particular case, a patient presented to the emergency department with left abdominal pain and cardiomegaly visualized with CT. On further investigation, it was found that there was a 2.3 cm calcified thrombus in the left ventricle which was thought to lead to secondary splenic infarction. As a result, the patient was treated with heparin that was bridged to warfarin which ultimately resolved the symptoms [8].

3)



4)

Fig-3 & 4:

Renal Ultrasound. Right kidney 11cm in length, left kidney 12 cm in length. Simple appearing left renal cysts measuring up to 4cm.

Case Report

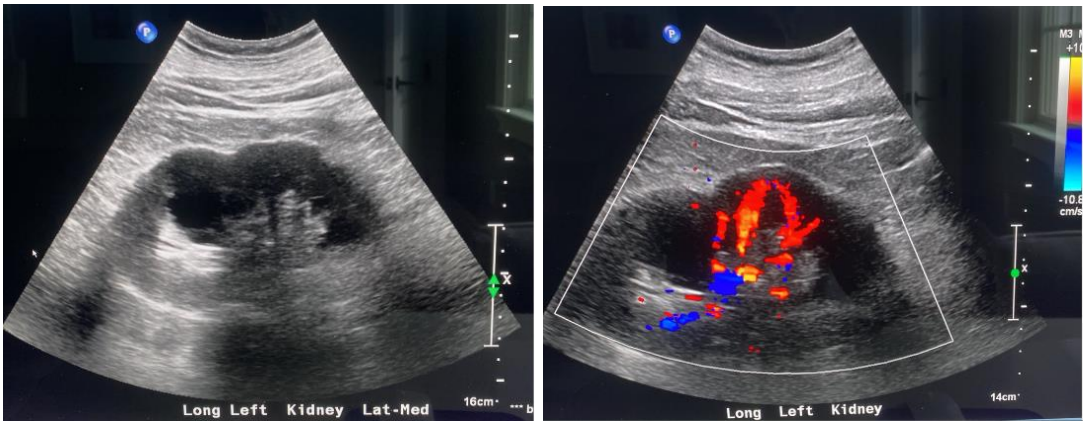


Fig-5: Left Kidney ultrasound.

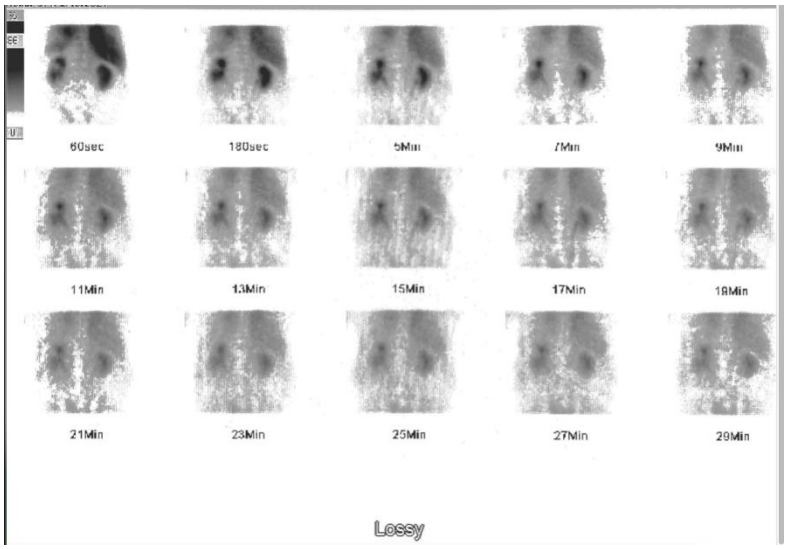


Fig-6:

Nuclear Medicine Renal Scan. 29mL/min left kidney, 24mL/min right, total 52mL/min. Normalized GFR 39mL/min. Interpolar left kidney shows defect consistent with cyst. Indeterminate lesion at lower pole of left kidney, suggestive of infarct, subtly apparent.

In a separate case study, a patient presented to the hospital with similar left abdominal pain as well as fever. In this case, however, there existed a history of MI as well as polycythemia vera. Transthoracic echocardiography found that the patient had an LV thrombus in addition to the previous findings. This patient was then treated with slow anticoagulation therapy [9].

It has also been detailed that within adolescents, abdominal pain is a common first presentation of heart failure [10]. While splenomegaly presentations may be rarely correlated with heart conditions, it should be taken into account in assessing an appropriate diagnosis for underlying causes.

The diagnostic process is a complex process that requires the gathering of information about every region or location of the patient's body. This case is an important reminder to take in all the information about the patient before assuming a diagnosis. In relation to this case, when there is left abdominal pain in the patient, it is necessary to also think about a cardiovascular etiology.

The patient was negative for chest pain, palpitations, and leg swelling. As a result, it would seem likely that physicians would steer away from a cardiovascular cause of the splenic infarct. However, splenic infarct was secondary to the patient's LV thrombus. Knowing that some causes of left abdominal pain include diverticulitis, inguinal hernia, thoracic

aortic aneurysm, and damaged spleen, it would seem that the cause of the left abdominal pain is localized or primary, but this is not the case in the patient.

Conclusion

For patients who present with acute abdominal pain, it is important to consider splenic infarction as a potential cause. Although this patient's extensive cardiovascular medical history may have prompted the need for heart imaging and labs, it is important to explore cardiac dysfunction, especially thrombus, for all patients. Thus, for our patient it is appropriate to conclude the decreased splenic perfusion and left kidney ischemia are due to a left ventricular thrombus.

Conflict of Interest

The authors have read and approved the final version of the manuscript. The authors have no conflicts of interest to declare.

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