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Case Report

Unsuspected finding of right coronary artery occlusion on nongated CT chest ☆

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ABSTRACT

Myocardial infarction (MI) is the main cause of morbidity and mortality globally. This occurs due to occlusion of the coronary artery resulting in ischemia of the cardiac muscles. Typical symptoms include chest pain and discomfort. However, there are atypical symptoms including, but not limited to epigastric pain, nausea, and syncope. Such atypical symptoms upon presentation to the emergency department make it rather easy to overlook a potential MI. We present a case of a 70-year-old woman who had a delayed presentation to the emergency department with epigastric pain, nausea, and syncope. A nongated CT scan of the chest was utilized to rule out an aortic dissection. Interestingly, an unsuspected finding of a right coronary artery occlusion was detected instead. The patient underwent coronary artery stenting and was discharged a week later with a beta-blocker, dual antiplatelet therapy, a diuretic, and an anti-reflux medication. Overall, this case report emphasizes the importance of recognizing other atypical presentations in relation to MI. Additionally, this highlights the importance of the clinician's role in assessing the heart and coronary arteries when evaluating CT scans.

Introduction

Myocardial infarction (MI) remains the leading cause of morbidity and mortality globally, despite advancements in prognosis over the last decade [1]. MI occurs due to occlusion of the coronary artery resulting in ischemia of the cardiac muscles. The coronary artery develops a blockage due to the buildup of atherosclerotic plaques, which are composed of fat, cholesterol, calcium, and inflammatory cells [2].

Chest pain is the most common presenting symptom in approximately 92% of patients with suspected MI [3,4]. The chest pain is often described to be retrosternal with a tightness and heaviness in nature [5]. However, there are instances where patients may present with atypical symptoms such as epigastric pain, nausea, and syncope [5]. These symptoms may be mistaken for other conditions since they are not entirely specific to myocardial ischemia. Such atypical symptoms can lead to delayed hospitalization and suboptimal treatment for the patient [6].

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Fig. 1 – The right coronary artery is occluded at its ostium (as shown by white arrows). There were subtle regions of segmental opacification, presumably secondary to retrograde collateral flow. The right coronary artery is the dominant artery in this patient.

Typically, angiography is utilized for the diagnosis of occlusion of the coronary artery and to perform therapeutic procedures such as percutaneous coronary intervention (PCI) [7]. An echocardiogram can also be used to assess cardiac function to measure specific cardiac features including, but not limited to wall motion and degree of valve abnormality [7]. Non-ECG gated chest computed tomography (CT) can also be used to visualize the heart and coronary arteries, although less common. The challenges of utilizing CT in visualizing and identifying cardiac pathologies are mainly due to motion artifacts [8]. Consequently, the heart tends to get overlooked by clinicians when reviewing CT. Despite this, there have been improvements in the quality of our current scanners within the last decade. Hence, this has increased the number of unsuspected findings on CT chest scans.

Herein, we present a patient with atypical symptoms of an acute MI. Nongated CT chest was initially utilized to eliminate an aortic dissection. However, an unsuspected finding on the nongated CT chest detected an occluded right coronary artery and MI. Hence, the details of this case emphasize the importance of recognizing atypical symptoms associated with MI. Additionally, clinicians should not overlook the heart and coronary artery assessments even on a nongated CT. Accurate and timely interpretation of atypical clinical symptoms of MI and utilizing nongated CT could have a vital bearing on patient triage, diagnosis, and successful management of this cardiac condition.

Case report

A 70-year-old patient presented to the emergency department with severe epigastric pain. She has had ongoing epigastric pain over last 3 days which worsened over the last 12 hours. She also had one episode of syncope and did not seek any medical attention for this. Her past medical history includes pulmonary embolism (PE), hypertension, and type II diabetes. She had unprovoked PE 10 years ago and was on anticoagulation for a year. However, she self-ceased the anticoagulation medication due to side effects.

On examination, her heart rate was 70 beats per minute, respiratory rate of 20 breaths per minute, saturating 99% at room air, blood pressure of 130/70 mm Hg and she was afebrile. Her heart sounds were dual with no murmur or added sounds. Her chest was clear on auscultation. Her abdomen was soft but tender over the epigastric region.

The ECG noted subtle findings for an inferior lead MI. There were subtle ST elevations lead II and III with reciprocal ST depression in avL. Her bloods noted raised troponin of 31,000. The ECG findings were not convincing for a MI and troponin results were not back at the time of scanning. She proceeded to have a nongated CT chest and abdomen pelvis to rule out cardiac causes such as aortic dissection or abdominal pathology for the epigastric pain whilst awaiting blood results.

The CT chest noted an occluded right coronary artery with inferior wall changes of hypo enhancement of the left ventricle concerning of infarction (Figs. 1 and 2) The CT also noted antidependent fixed filling defect within the right atrium was most adherent with right thrombus (Fig. 3). CT chest showed no signs of pulmonary embolism or aortic dissection. Subsequently, her blood results included a raised troponin of 31,000 ng/L.

This patient was treated as a late presentation of inferior ST elevation MI (STEMI) and was admitted to coronary care unit under the cardiology team. The echocardiogram revealed normal left ventricular size and function but a severely dilated right ventricle with severely compromised systolic function.

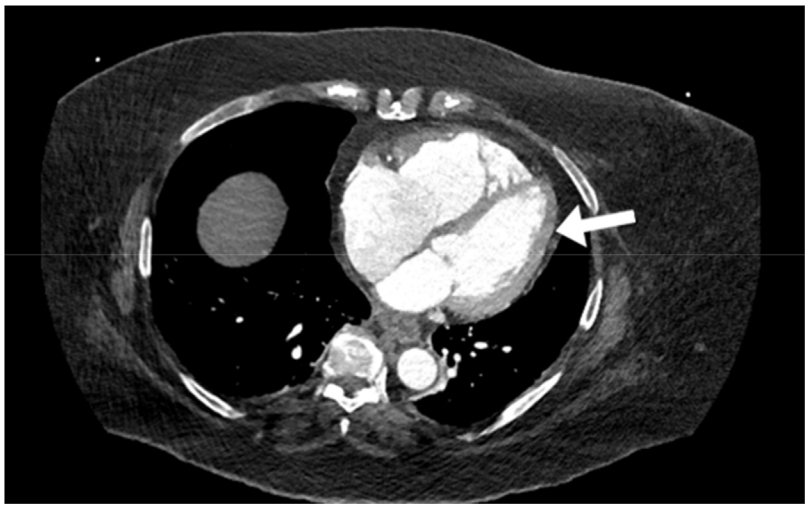

Fig. 2 – There is relative hypoattenuation of the left ventricle indicating a possible infarction (as shown by white arrows).

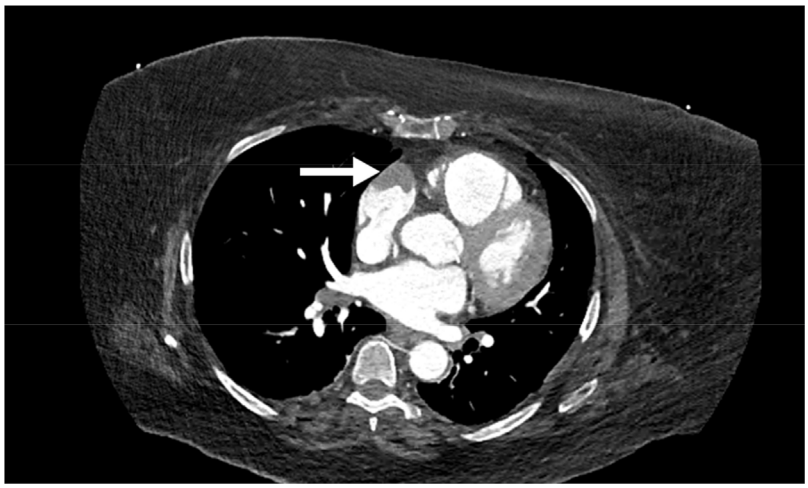

Fig. 3 – Abnormal wall thickening of the right atrium noted. This is most in keeping with thrombus within right atrium (as shown by white arrows).

Urgent coronary catheterization was performed and demonstrated 100% occlusion of the proximal right coronary artery. The patient had a successful PCI with 3 stents (Fig. 4).

During the catheterization, she went into ventricular fibrillation arrest which was managed with direct current cardioversion (DCCV). She was discharged a week later from CCU and was prescribed a beta-blocker, dual antiplatelet therapy, a diuretic, and an antireflux medication.

Discussion

MI is caused by a rupture of unstable plaque formed within the coronary artery [9]. Majority of MI cases are due to an underlying coronary artery disease, which is the leading cause of death globally and accounts for 17.8 million deaths annually [10]. For a coronary artery occlusion, the myocardium becomes deprived of oxygen which can lead to an eventual myocardial cell death and necrosis [11].

Typical symptoms of MI include chest pain and discomfort. Risk factors associated with MI include smoking, abdominal obesity, hypertension, and diabetes mellitus [12,13]. In conjunction with the medical history, myocardial ischemia is correlated with ECG changes and increased biochemical markers such as cardiac troponin [14,15]. MI is typically diagnosed via angiography, but significant developments in CT technology have allowed for unsuspected cardiac findings using CT alone [16,17].

A 70-year-old woman presented to the emergency department with epigastric pain that started 3 days prior to the presentation. Twelve hours before hospitalization, the pain worsened, and she had an episode of syncope. Our patient has a medical history of hypertension, diabetes, and pulmonary embolism. She self-ceased her anticoagulation medicine rivaroxaban 9 years ago, which could have increased the risk of developing MI [18].

This is a late presentation of MI. This is noteworthy as most deaths from MI occur within the first hour of disease onset

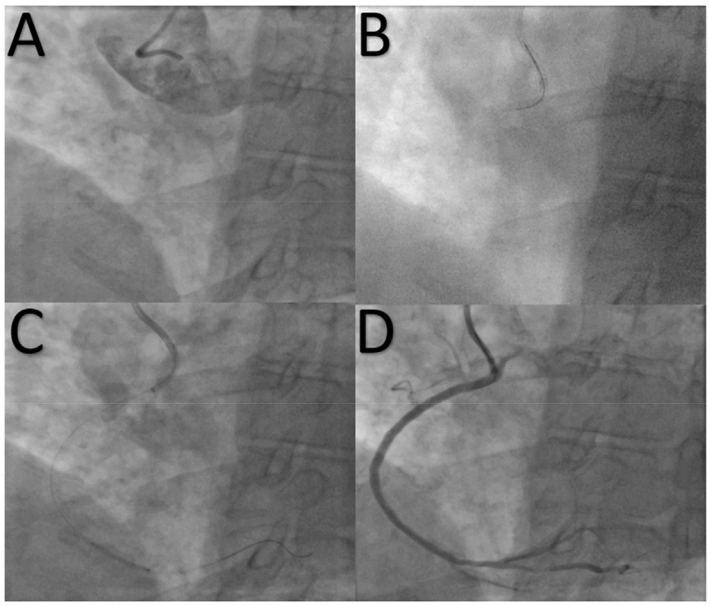

Fig. 4 – This (A) image illustrates occlusion of the right coronary artery. (B and C) image slices denote the placement of the stents in the right coronary artery. The (D) image illustrates the flow that has been restored poststent placement.

(40%-65%), and approximately 80% in the first 24 hours [19,20]. This late presentation to the emergency department is likely due to her experiencing atypical symptoms including epigastric pain, nausea, vomiting, and syncope [5]. Typically, chest pain is the most well-recognized symptom of MI, but it maybe invariably absent in some patients. The ECG was unconvincing of MI as ST changes in the leads were subtle and the blood test results were not back yet. Hence, a CT chest scan for epigastric pain was ordered to eliminate the possibility of an aortic dissection. Remarkably, the CT scan noted a right coronary artery occlusion. A recent systematic review revealed that the presentation of atypical MI symptoms includes, but is not limited to epigastric pain, syncope, and nausea [21]. The international guidelines also emphasize that this atypical presentation is usually prevalent in older women with a history of diabetes, and hypertension, which is consistent with our patient's case [22].

Interestingly, our patient's diagnosis was visualized via CT before utilization of angiography. This is rather significant as an examination of the heart is often partially marred by motion artefact in the CT chest. Additionally, occlusion of the right coronary artery was also detected in this CT scan. The occlusion was assessed to be either acute or chronic by evaluating the RAG sign in the CT scan. It is clinically beneficial to determine if the occlusion is chronic or acute, as the latter offers a better prognosis and fewer challenges with percutaneous coronary intervention [23]. RAG sign is characterized as a reverse gradient of the intraluminal opacification of the coronary arteries [8,24]. This suggests that there is more opacification at the distal segments than at the proximal segment of the coronary artery. In our patient's case, no RAG sign was noted in the CT scan. This indicates that the occlusion is acute. This finding was also confirmed via an angiogram, where they noted occlusion at the proximal end of the right coronary artery [25].

Overall, this case report highlights the importance of recognizing atypical symptoms associated with MI. Additionally, this case report also illustrates the significance of a clinician's role in carefully evaluating the heart and coronary arteries, even in a nongated CT chest scan.

Patient consent

Patient has provided written, informed consent for this publication.

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