



Case Report

A Large Hiatal Hernia Causing Cardiac Compression and Leading to Arrhythmias

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Abstract

A large hiatal hernia (HH) can cause posterior cardiac compression. Though uncommon, it has been reported to cause both atrial and ventricular arrhythmias. We present a case of a 76-year-old female with a diaphragmatic defect after splenectomy, with no other cardiac history who was admitted to the hospital with severe nausea and vomiting caused by her hiatal hernia. She experienced episodes of atrial and ventricular arrhythmias, including an episode of ventricular standstill associated with HH-induced compression. Our case report highlights the importance of recognition of this association with arrhythmogenesis and identifying it as a treatable cause of arrhythmias.

Keywords: Large hiatal hernia; Cardiac compression; Arrhythmias

Introduction

A hiatal hernia is described when any element of the abdominal cavity is displaced through the esophageal hiatus of the diaphragm. They are further classified according to the amount of content that is herniated. Here we present the case of a 57-year-old patient with a grade IV hiatal hernia that occurred after splenectomy to treat immune thrombocytopenic purpura.

There are reports that show that large hiatal hernias can cause posterior compressions of the cardiac anatomy, leading to arrhythmias.

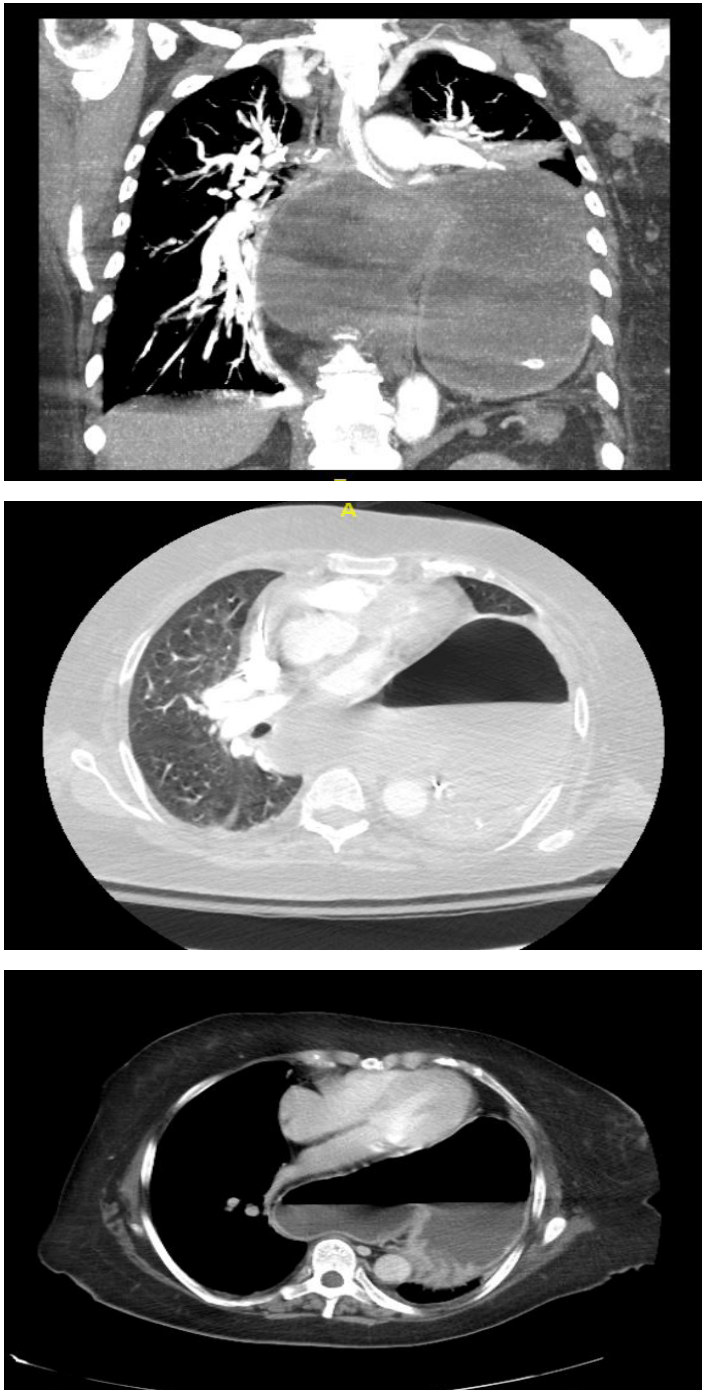
In our patient, she had no prior history of cardiac disease. She had presented with some near syncopal symptoms, which were initially thought to be due to hypovolemia from severe nausea and intractable vomiting. However, her symptoms of arrhythmia did not become evident until she attempted to have a bowel movement, and she was noted to have tachy-brady syndrome with a ventricular pause on telemetry. A previous study reports that Valsalva maneuvers decrease preload, which exacerbates the effects of the hiatal hernia on cardiac function [7]. It is believed more arrhythmias are seen in patients with hiatal hernias during

these maneuvers that increase intra-abdominal pressure because of impaired left ventricle filling. In our patient, she continued to have symptoms of nausea and vomiting with repeated Valsalva maneuvers, which could explain why her atrial fibrillation she developed during her admission was difficult to treat.

Case Report

We present a case of a 76-year-old female who presented to our hospital with three-four weeks of severe nausea and vomiting. She had a known past medical history of immune thrombocytopenic purpura requiring splenectomy. She developed regeneration of two accessory spleens requiring repeat splenectomy and subsequently developed a diaphragmatic defect. She had no prior cardiac history including arrhythmias, hypertension, coronary artery disease or myocardial infarction. Her other medical history was notable for gastroesophageal reflux disease. Her vital signs on admission were significant for heart rate of 76 beats per minute, blood pressure 103/74 mmHg, respiratory rate of 20 breaths per minute and oxygen saturation of 94% on room air. Her laboratory findings were unremarkable, and all electrolytes were noted to be within normal limits. Upon review of her imaging, she was found to have a significant left-sided hiatal herniation of her stomach, pancreas and colon (Figures 1-3). General surgery in conjunction with cardiothoracic surgery were consulted for surgical correction due

to significant ongoing symptoms.



Figures 1-3: Computed tomographic pictures with coronal and transverse views of left sided hiatal hernia causing cardiac compression.

During her hospitalization, she had reported episodes of near syncope and she monitored on telemetry. She noted to have a numerous arrhythmias during her admission, from transient complete heart block, paroxysmal atrial fibrillation with occasional episodes of rapid ventricular rate, paroxysmal supraventricular tachycardia, and one episode of ventricular standstill as well as occasional sinus bradycardia. She denied any use of atrioventricular node blocking agents and besides, a large hiatal hernia, had no other identifiable reversible causes for her conduction disturbances.

Due to her arrhythmias, she underwent placement of a permanent dual chamber pacemaker by the electrophysiologist and the patient had improvement of her near syncopal symptoms. She had an echocardiogram that showed a normal ejection fraction of 55-65%, no left ventricular dysfunction, no regional wall motion abnormalities, and a mildly increased pulmonary artery pressure. There were apparent abnormalities or valvular dysfunction that could otherwise explain her cardiac symptoms.

She did continue to have refractory atrial fibrillation with rapid ventricular response that would respond to therapy temporarily and then return. She was eventually stabilized with metoprolol tartrate and amiodarone at the time of discharge.

Discussion

A hiatal hernia occurs when there is displacement of the gastroesophageal junction, causing an upward herniation of the stomach into the thoracic cavity. There are two main types of hiatal hernias sliding and Para esophageal types. By having the stomach herniate into the thorax, the lower esophageal sphincter becomes incompetent leading to symptoms. Most commonly, patients experience symptoms of reflux, however in rare circumstances, especially if the hernia is greater than 30%, compression of cardiac structures results in a multitude of outcomes [1]. It is well known in pediatric medicine that congenital diaphragmatic hernia can and often does lead to lung hypoplasia when abdominal contents herniate into the thoracic cavity and prevent further development of lung tissue by virtue of space occupation. In adult medicine however, the effects of hiatal hernias are most clinically significant to the gastroesophageal system. Given the proximity of the esophagus to the left atrium, a large hiatal hernia or even an isolated expansion of the esophagus can cause mechanical compression on the chambers of the heart leading to not only arrhythmias but also impairments in systolic and diastolic function. A loss of the normal elasticity of the heart from this extrinsic compression mechanism on the left atrium has been described in a few case reports wherein their effects result in arrhythmias and hemodynamic compromise [1,2]. Although the mechanism is not well defined uniformly across all reports, one such explanation that appears in many of the

reports is that the compression of the left atrium distorts the mitral annular ring, which aggravates and potentiates the propensity for tachyarrhythmias [1-3]. Most case reports describe the physical compromise leading to a direct disruption of the conduction system. However, other possible mechanisms of arrhythmia likely exist. For example, the direct compression of a ventricular or atrial cavity by an esophageal hernia could lead to a significant reduction in systolic function, which then activates catecholamine's thus potentiating ventricular or atrial arrhythmias.

The most common arrhythmias associated with hiatal hernias is atrial fibrillation [4]. This incredibly common arrhythmia can be associated with underlying gastroesophageal reflux disease in a larger subset of patients than previously thought. The mechanism for this association is however multifactorial, including acid-induced sympathetic and parasympathetic imbalances as well as direct compression from a large hiatal hernia [5]. Ventricular arrhythmias are rare because of hiatal hernias but have certainly been reported [6]. Notable repair of Para esophageal hernias has actually been found to cure paroxysmal atrial fibrillation in some patients. Laparoscopic techniques exist for repair thus decreasing the overall risk of infection and increasing recovery time.

Conclusion

In this case report, our patient developed a variety of cardiac arrhythmias due to her large hiatal hernia. The association has been well documented with atrial fibrillation but the ventricular arrhythmias are rare and notable due to the possible catastrophic effects. Para esophageal hernias, which only compromise about 5% of hiatal hernias (HH), tend to be more dangerous due to the direct atrial compression mentioned above. If a patient with known gastroesophageal reflux disease develops atrial fibrillation or other tachyarrhythmias, imaging should also be considered to assess for an underlying hiatal hernias (HH). With minimally invasive techniques available for hiatal hernias (HH) repair, patients with Para esophageal hernias should be referred for surgery early on to prevent progression to cardiac arrhythmias.

Disclosures

Author contributions: All authors contributed to this manuscript. M. Barr is the article guarantor.

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