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Case report

Left ventricular mass in a patient with severe heart failure

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ABSTRACT

Introduction: Cardiac masses have a wide range of etiologies with the most common being thrombi and less commonly tumors. However, in Sub-Saharan Africa other etiologies not commonly seen in developed countries such as endomyocardial fibrosis (EMF) must be considered. EMF is a disease process associated with poverty, a poor diet, and eosinophilia although its pathology is poorly understood.

Case report: We report a case of a 53-year-old male with a history of dilated cardiomyopathy who presented to a Ugandan Emergency Department in respiratory distress. Bedside echocardiography was performed which revealed a large mass in the apex of the left ventricle. The patient was subsequently given supplemental oxygen and intravenous furosemide, however he later died while in the emergency department due to limited resources and lack of definitive care.

Discussion: The list of potential etiologies of cardiac masses is widely variable, and in settings such as Sub-Saharan Africa, this list must be expanded to include possible diagnoses such as EMF. EMF is a diagnosis that should be considered in patients presenting with respiratory distress and a cardiac mass present on echocardiography, such as the case presented here. The limited opportunities for medical personnel to diagnose cardiovascular disease can be made more efficient by the use of diagnostic imaging devices which are portable, yet capable of diagnosing the most common local pathologies [9-11].

African relevance

- The various etiologies of cardiac masses in Africa are different than those in higher income settings
- It is important to consider tropical infections such as endomyocardial fibrosis as a possible cause of a cardiac mass and it is important to know the epidemiological, clinical, and ultrasonographic features of this disease process
- Learning and understanding how to perform a basic echocardiogram in African emergency departments, where resources may be limited, is important, especially in cases such as this where the patient is dyspneic and requiring supplemental oxygen

Introduction

Cardiac masses have a wide range of etiologies including thrombi, tumors, vegetations, anatomical variants, and other rare causes.

Thrombi are the most common intra-cardiac mass, occurring in up to 7% of hospitalized patients requiring transthoracic echocardiography (TTE) [1]. These thrombi are usually associated with atherosclerotic cardiovascular disease, cardiomyopathies, and hypercoagulable states [2]. On echocardiography thrombi have increased echogenicity compared to local tissue and well-delineated borders with or without adhesion to the endocardium. Complications include systemic embolism and decreased cardiac output secondary to outflow tract obstruction.

Cardiac tumors are significantly less common with an estimated prevalence of 0.3% of patients undergoing autopsy [2]. Tumors may be subdivided into primary cancer and secondary (metastatic) cancer, which is 20–40 times more common [3]. Primary cardiac tumors tend to be benign (80%) with the most common being the cardiac myxoma. Previous reports suggest that these tumors make up 50–90% of primary cardiac tumors [4,5].

Certain areas of the heart have specific tumor predilections. Primary tumors of the left atrium are predominantly myxomas and lipomas, while primary LV tumors include rhabdomyomas, lipomas, and fibromas [6]. Rhabdomyomas are the most common primary cardiac tumor seen in the pediatric population and the majority are seen in children with tuberous sclerosis. Children with tuberous sclerosis tend to have multiple tumors along ventricular walls or atrioventricular valves [6]. On echocardiography, rhabdomyomas appear to be small, well-circumscribed nodules or pedunculated masses in any of the cardiac cavities [6]. Cardiac fibromas are the second most common tumor

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and also primarily present in the pediatric population. On echocardiography, fibromas present as a well-demarcated, non-contractile mass that is highly echogenic, found in the left ventricular free wall, anterior free wall, or ventricular septum [6].

In developing countries such as Uganda, physicians must also consider other etiologies of cardiac masses such as endomyocardial fibrosis (EMF). Here we report a case of a 53-year-old male with severe heart failure and a cardiac mass discovered on bedside ultrasound.

Case report

A 53-year-old male with a past medical history of congestive heart failure (CHF) secondary to dilated cardiomyopathy presented to an emergency department in Uganda with gradual onset shortness of breath and reduced level of consciousness. According to family members that brought him in, he also reported worsening exertional dyspnea, orthopnea, and bilateral lower extremity and abdominal swelling. A complete review of systems was performed which revealed a dry cough, intermittent chest pain, polyuria, polydipsia, and a reduced appetite. Chart review revealed he was last admitted approximately one-month prior for a similar presentation and a discharge diagnosis of CHF exacerbation.

Vital signs upon presentation included a blood pressure of 120/69 mmHg, pulse of 101 beats/min, respiratory rate of approximately 30 breaths per minute, and oxygen saturation of 73% on room air. On general physical examination, the patient had moderate respiratory distress and altered mental status with a GCS of 5 (E1V1M3). The cardiac apex was palpated at the 6th intercostal space along the anterior axillary line. Normal S1 and S2 heart sounds were heard on auscultation and a moderate amount of jugular venous distension was also present. The abdomen was nontender and moderately distended. The liver was palpated approximately 4 cm below the costal margin. Lastly, there was significant, 2–3+, pitting edema of bilateral lower extremities.

Based on the history and presentation, a complete blood count, fingerstick blood glucose, and TTE were ordered. The differential diagnosis included sepsis, acute CHF exacerbation, non-ketotic hyperosmolar hyperglycemic syndrome, diabetic ketoacidosis, and stroke. The patient's glucose quickly resulted and read “too high” by point of care meter. The patient was initially started on normal saline and given intravenous insulin for the hyperglycemia. A nasal cannula was placed for supplemental oxygen administration and after further exam was performed as well as bedside ultrasound, intravenous furosemide was given due to concerns for volume overload. Also, the patient was given cefotaxime and metronidazole due to the low suspicion of an infectious etiology causing the hyperglycemia. Bedside echocardiograph showed an immobile, homogenous appearing mass in the left ventricle with very similar echotexture to the adjacent myocardium. The mass was adherent to the wall and extending all the way to the papillary muscle of the mitral valve. Furthermore, the myocardium of the left ventricle was thinned out and the overall size of the LV chamber was enlarged with a significantly reduced ejection fraction. These echocardiographic findings were consistent with dilated cardiomyopathy, which is defined as chamber enlargement and decreased ejection fraction of the left ventricle [7] (Figs. 1–4).

Unfortunately, the patient succumbed to his illness after being managed for multiple hours in the emergency department. The specific hospital that this patient was managed in did not have access to intensive care resources.

Discussion

Clinical suspicion for a cardiac mass is often prompted by patients with known risk factors for intracardiac thrombosis such as atrial fibrillation, rheumatic heart disease, and endocarditis. Suspicion may also be prompted by symptoms suggestive of a cardiac mass. These symptoms are usually related to its obstructive nature and can vary from pre-syncope to chest pain or dyspnea [8]. The detection for cardiac tumors, however, is frequently incidental and driven by non-specific cardiac complaints including constitutional, embolic, and/or obstructive symptoms [7]. The initial imaging test of choice is transthoracic echocardiography (TTE) due to its noninvasive nature and widespread availability. When diagnostic doubt concerning the tumor remains after TTE, a transesophageal echocardiogram (TEE) can be performed to enhance visualization of the mass itself as well as presence or absence of attachment to cardiac tissue and mobility of the mass [8]. In resource-rich settings, cardiac magnetic resonance imaging (MRI) can be utilized after echocardiography to further characterize cardiac masses due to its superior tissue characterization and higher contrast resolution [8]. In developing countries, further classification may be difficult without access to higher level imaging such as MRI. In any case, ultrasound remains the first-line diagnostic modality for any cardiac mass [9-11].

Differentiating between thrombi and tumor may be difficult without formal biopsy, but several key features have been identified to assist the clinician. Features that favor thrombi include history of smoking, electrocardiography suggestive of previous anterior wall myocardial infarction, and presence of a wall motion abnormality on echocardiography [12]. Risk factors that suggest tumor include no history of atherosclerotic cardiovascular disease and family history. Features that suggest tumor on echocardiography include mass density akin to myocardial tissue and attachment to the anterior wall.

Another important etiology of cardiac masses to consider in patients from West and Central Africa is endomyocardial fibrosis (EMF). The pathogenesis of EMF is poorly understood; however, it is predominately a tropical disease with conditioning factors such as geography and diet. The triggering factor may be an unidentified infective agent and the perpetuating factor is eosinophilia [13]. In addition to geography, several other factors have been associated with the development of the disease – poverty, poor diet, female sex, young age, eosinophilia, and infection by *Plasmodium falciparum* [13,14]. The typical presentation is an older child or adolescent with fever, chills, night sweats, facial swelling, and urticaria who improves clinically while developing ascites with predominantly left or right ventricular disease [13]. Commonly, these patients may have an exudative pericardial effusion of variable degree [13]. On echocardiography, endomyocardial thickening and fibrosis of the apex, ventricular walls, and papillary muscles, with possible progression to fibrous obliteration of the right ventricular or left ventricular apex are frequently seen [15]. Thrombi and atrioventricular valvular dysfunction are frequently seen as well [15]. The chronic form presents with shrunken ventricles, dilated atria, and valvular dysfunction [15]. Although access may be limited, cardiac magnetic resonance imaging provides additional value in diagnosing and assessing the severity of the disease [15].

Due to limited resources, we were unfortunately unable to further characterize the mass or perform a more extensive, thorough, workup. However, after further discussion amongst the treating physicians, we surmised that the mass was likely due to a thrombus, given his history and echocardiographic evidence of dilated cardiomyopathy. Also, although EMF is relatively common in Uganda where it is the second leading cause of hospital admission for children with acquired heart disease, the 2 year mortality rate is 75% in advanced disease and it has a bimodal distribution peaking at 10 and 30 years of age [15]. Furthermore, EMF commonly leads to a restrictive cardiomyopathy with shrunken ventricles rather than a dilated cardiomyopathy [15]. The patient was managed in the emergency room for nonketotic hyperosmolar hyperglycemic syndrome and congestive heart failure exacerbation complicated by dilated cardiomyopathy. Unfortunately, the patient passed in the emergency room due to the severity of his condition and lack of critical care resources.

With the increasing availability of portable ultrasound devices more of these masses may be discovered. It is therefore imperative that we

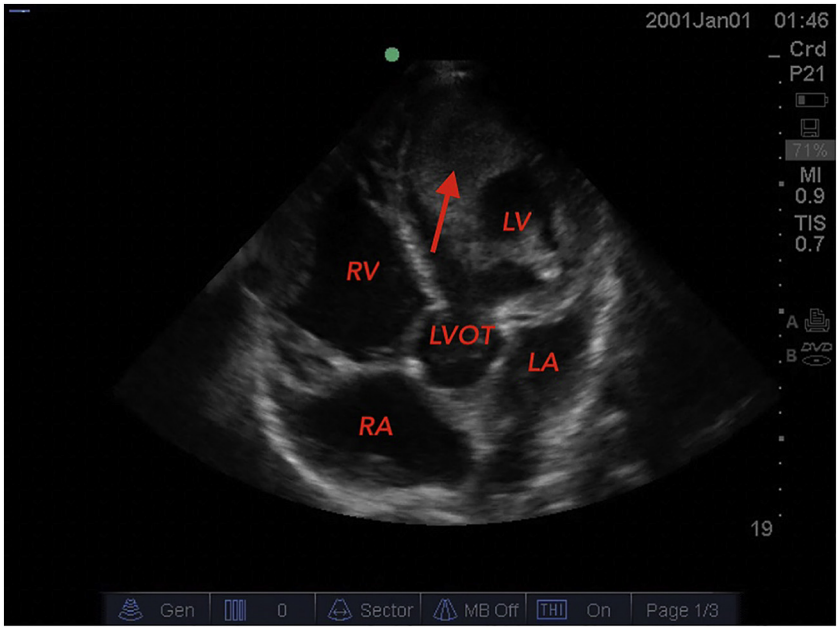

Fig. 1. Apical 4 chamber view of the heart. The arrow is pointing to the left ventricular mass that spans from the apex to the subvalvular structures of the mitral valve. RV = right ventricle. LV = left ventricle. LVOT = left ventricular outflow tract. LA = left atrium. RA = right atrium.

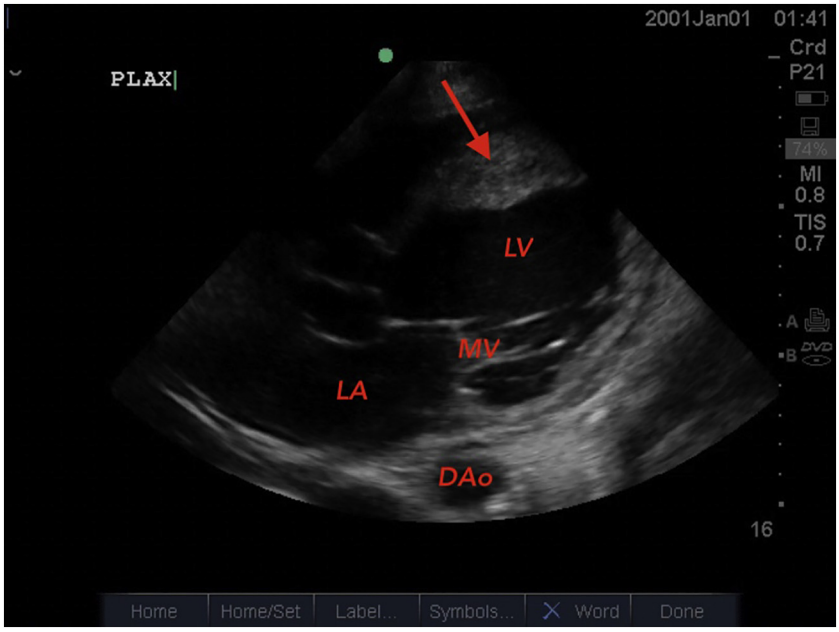

Fig. 2. Parasternal long axis view of the heart. The arrow is pointing to the mass within the left ventricle running along the interventricular septum. LV = left ventricle. LA = left atrium. MV = mitral valve. DAo = descending aorta.

have a thorough understanding of the various possible diagnoses and take into consideration epidemiological and geographic factors. This is especially important when practicing in a limited resource setting where further workup may be limited. Consultation with a cardiothoracic surgeon or transfer to a facility with a higher level of care and/or more advanced imaging is suggested.

Conclusion

We reported a case of a patient presenting with respiratory distress and altered mentation in whom a large mass in the left ventricle was discovered on bedside ultrasound. To the best of our knowledge, this is the first case in which a large left ventricular mass was initially discovered using bedside ultrasound in a resource limited setting. Unfortunately, the patient passed away after being managed in the emergency department for multiple hours, so an official diagnosis was not made.

Dissemination of results

This case report will be disseminated to the physicians and practitioners working at this hospital as well as the MMED program at Makarere University of Science and Technology.

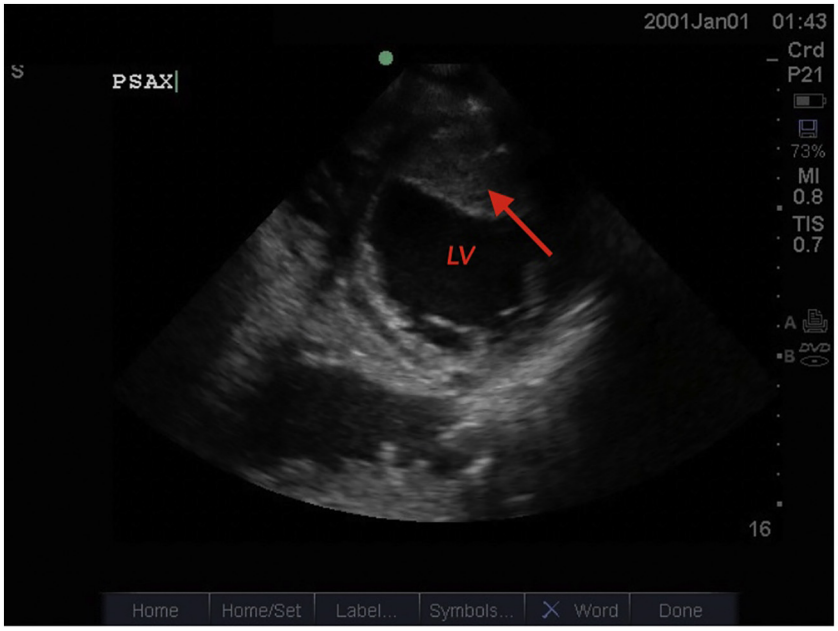

Fig. 3. Parasternal short axis view of the heart. The arrow is pointing to the mass within the left ventricle. LV = left ventricle.

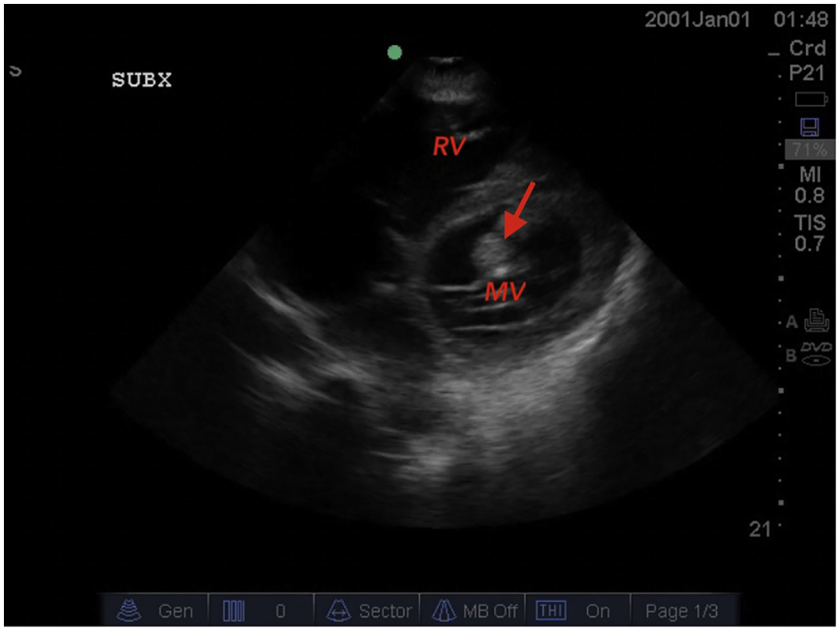

Fig. 4. Subxiphoid (or substernal) view of the heart. The arrow is pointing to the mass within the left ventricle. Here you can see it going into the mitral valve. MV = mitral valve. RV = right ventricle.

Authors' contribution

Authors contributed as follow to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: FW and RJ 50% each. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

Declaration of competing interest

The author declares no conflict of interest.

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