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Case Report

Incidental finding of a right ventricular mass: Fibroma or thrombosis?☆,☆☆

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ABSTRACT

Primary cardiac tumors are very rare and are often confused with other conditions due to clinical presentations or initial imaging. Here, we present a rare case of a 56-year-old male with right ventricular mass incidentally found on imaging. Appropriate testing should be conducted to rule out the possibility of a benign tumor. Asymptomatic patients with co-morbidities can be managed without surgery. More research is needed to devise guidelines for the management of these cases.

Introduction

Primary heart tumors are very rare, and the incidence is less than 0.01% which consists of benign nature ¾ times [1]. Rhabdomyoma and cardiac fibroma are the first and second most common primary and benign cardiac tumors, respectively, in infants. Cardiac fibroma is extremely rare in adults and occurs in left ventricle more commonly than right ventricle or atria. Clinically, it is very important because of conduction dysfunction, flow obstruction, and sudden death [2]. Surgical removal is a considerable option in symptomatic patients because this tumor does not regress on its own. On the other hand, most of the cardiac tumors are a result of metastasis from other primary sources. Cardiac tumors can cause symptoms by embolization, interference with heart valves, obstruction, invading myocardium, and constitutional symptoms [3]. However, some cardiac tumors can be asymptomatic and can present as an incidental finding on imaging [4,5]. Ventricular primary tumors are rare and imaging findings can be confused with thrombi and the symptoms can also mimic other cardiac conditions [6]. Here we present a rare case of a benign mass in the

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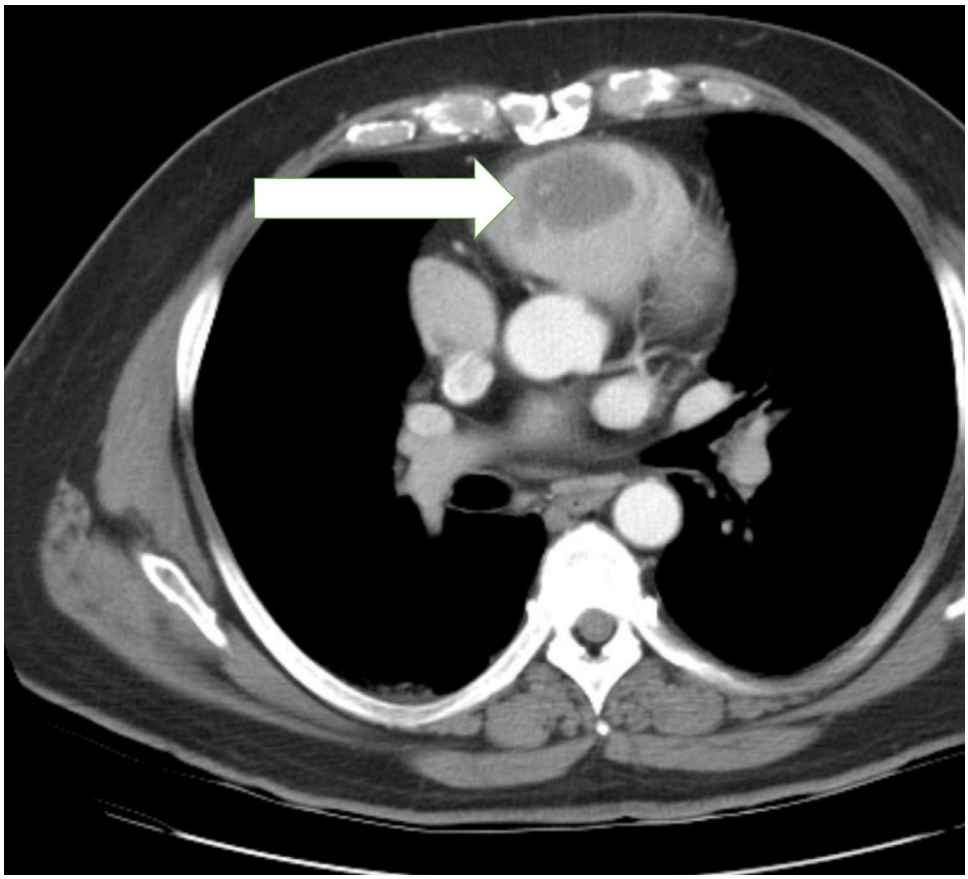

Fig. 1 – Right ventricle mass on CT scan (arrow).

right ventricle. This will help clinicians to keep the possibility of benign right ventricular tumor in mind so that appropriate testing can be conducted to confirm the diagnosis and timely management.

Case presentation

A 56-year-old male with a past medical history of HIV, hypertension, dyslipidemia, depression, and surgically treated prostate cancer presented to the emergency department with periumbilical abdominal pain for 1 month. The pain was intermittent, 6/10 in intensity, without any aggravating or relieving factors. He denied any nausea, vomiting, change in bowel habits, change in urinary habits, shortness of breath, chest pain, cough, heart racing, or syncope. The vital signs were within normal limits, and the physical exam was normal without any significant findings. The patient had colonoscopy with polypectomy 6 months ago.

Computed tomography (CT) scan of abdomen/pelvis was done to rule out hernia or any other cause of abdominal pain. It did not show any acute findings in abdomen/pelvis. However, incidentally, a large mass was found within the incompletely imaged right ventricle (RV), and further evaluations were suggested. Proton pump inhibitors were started for the management of abdominal pain. Cardiology department was consulted for the evaluation of RV mass (Fig. 1).

Investigations

Transthoracic echocardiography (TE) was done immediately. Right ventricular systolic function was normal. The echogenic mass was attached to the anterior wall of the right ventricle, measuring 2.79 × 5.67 cm. There was no uptake of definity contrast, suggesting lack of vascularity. Echo images are given in Fig. 2 (Supplemental Video 1). Trace mitral regurgitation and mild tricuspid regurgitation were reported with no apparent pulmonary hypertension.

On magnetic resonance imaging (MRI) without contrast, left ventricle was normal in thickness with normal wall motion. While high anterior wall mass was noted in the right ventricle. The size was approximately 3.1, 3.7, and 4.1 cm in anteroposterior, transverse, and craniocaudal dimensions, respectively. The mass was extending into the proximal portion of the right ventricular outflow tract. However, the mass was well adherent to the anterior wall and outflow tract without significant mobility or a pedunculated stalk. The right ventricular wall motion and thickness was normal otherwise. No pericardial effusion or lymphadenopathy was reported on MRI (Fig. 3A) (Supplemental Video 2). With contrast, the right ven-

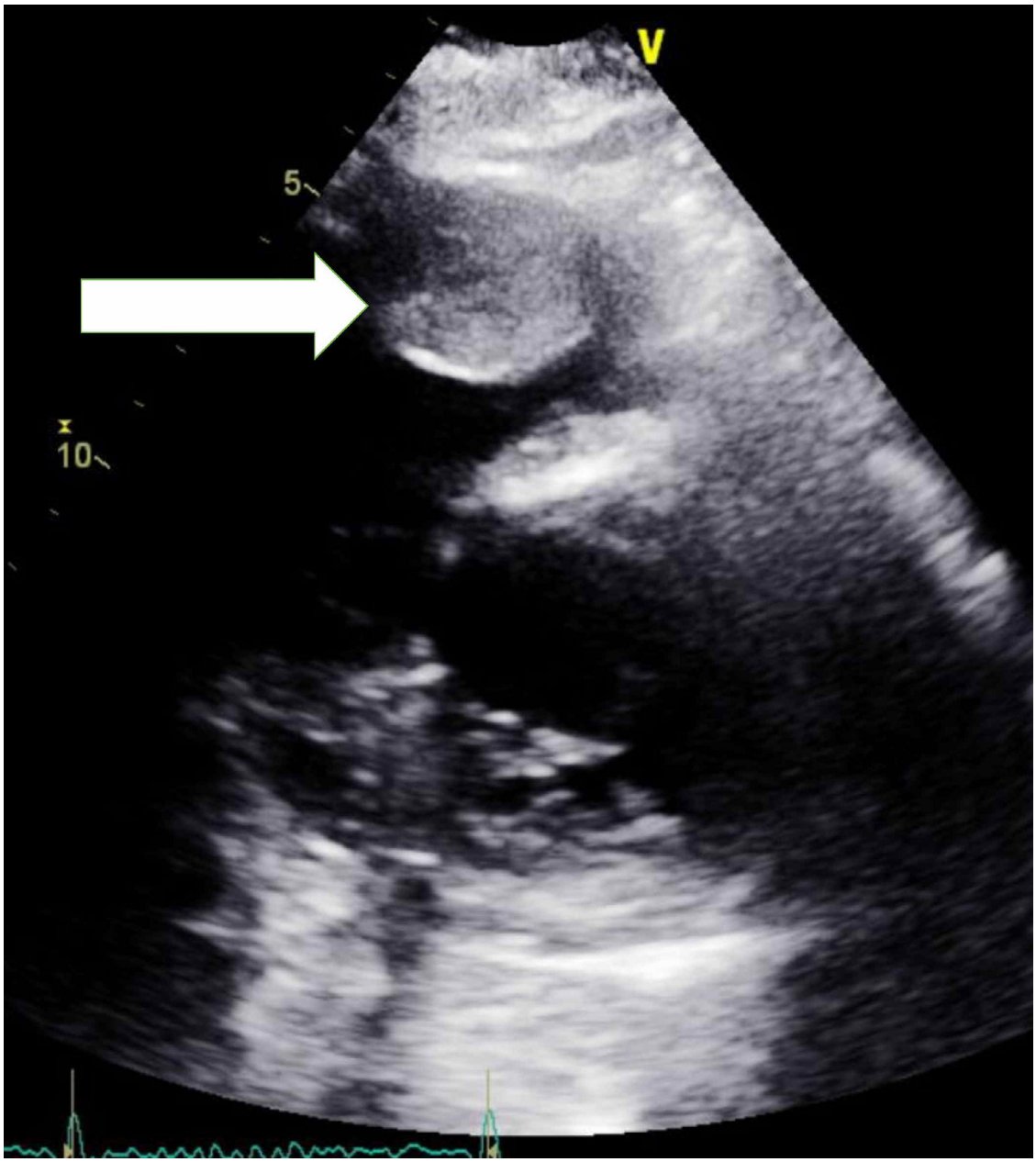

Fig. 2 – Right ventricle mass on echocardiography (arrow).

tricular mass showed robust enhancement with delayed sequences and helped to establish a diagnosis of cardiac fibroma (Fig. 3B) (Supplemental Video 3). Mild mitral and tricuspid regurgitation were noted with turbulent blood flow in the proximal main pulmonary artery after blood passes the right ventricular mass. However, no regurgitant or stenotic jet was identified.

Endomyocardial biopsy (ECB) was performed to confirm the origin of cardiac mass. On microscopic examination, endomyocardial fragments with mild endocardial and interstitial fibrosis and a fragment of blood clot were found. The endomyocardial fragments had no signs of pathological alterations. The Endo myocardium was free from any infiltrative process or any other signs of mass lesion or malignancy. Congo-red and Prussian blue stains were negative, ruling out amyloidosis or iron deposition; therefore, the diagnosis of cardiac fibroma was confirmed.

Follow-up

The patient is under observation to look for any signs of right ventricular outflow tract obstruction, arrhythmias, interference with cardiac valves, pulmonary hypertension, embolization, or constitutional symptoms. No symptoms or change on ECG were reported after 2-month follow-up. Department of cardiac surgery was consulted to look for the feasibility of sur-

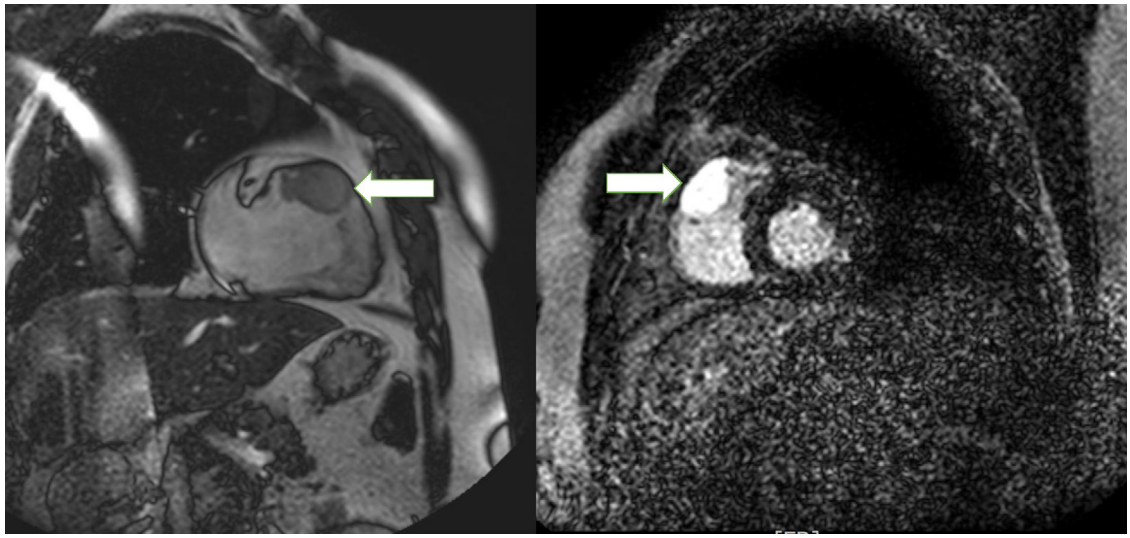

Fig. 3 – Right ventricular mass in non-contrast MRI [left (A)] and contrast MRI [right (B)].

gical removal. However, no emergent surgical procedures were performed as the patient was asymptomatic with comorbidities and the risk of recurrence of the tumor is undetermined. The patient is under routine surveillance.

Discussion

Most common cardiac tumors are secondary in nature and primary tumors are highly rare [1]. In primary tumors, benign are more prevalent than malignant and usually two-third occurs in left ventricle, with one-third possibility in right ventricle. One of the primary benign tumors is a mesenchymal tumor, cardiac fibroma consists of collagen fibers and fibroblasts collectively causing fibrosis. This benign tumor is very rare in adults but common in fetuses or infants with a prevalence of 5%-25% of all primary cardiac tumors [7]. Presenting symptoms include chest pain, fatigue, dyspnea, faint, arrythmias, dysfunction in conduction, or sudden death. Diagnostic methods include CT, echocardiography, and MRI. To prevent invasive growth, tumor should be resected completely in symptomatic patients but there are no clear guidelines for non-resect able or asymptomatic patients.

This patient had a history of prostate cancer, the biopsy findings and lack of contrast uptake on echocardiography ruled out the possibility of malignant cardiac tumor. Malignant and high vascular tumors, that is, angiosarcoma show high contrast uptake on echocardiography therefore the suspicion of malignancy was low. However, the risk of a clot or primary cardiac tumor was high and demanded further investigations. Isolated lesions of 1-10 cm diameter with demarcated boundaries and no envelope are characteristics of cardiac fibroma.

The MRI narrowed it further and the possibility of a clot was excluded. Benign myxomas, malignant angiosarcoma or undifferentiated sarcomas mostly show heterogeneous enhancement with MRI contrast. However, the enhancement pattern was slightly different in this case as it showed hyperenhancement that is seen in cardiac fibromas.

The results of ECB showed endomyocardial fragments with endocardial and interstitial fibrosis that is constant with benign growth of right ventricular endo-myocardium. These tumors are rich in fibroblasts in children but in adults, the composition mainly consists of collagen and fibers with low fibroblasts. There are multiple other conditions previously known to cause endocardial and interstitial fibrosis, like myocardial infarction, healed acute rejection site, adjacent prosthetic device, hyper eosinophilic syndrome, endocardial fibroelastosis, cardiomyopathy, drug toxicity, etc. [8]. However, none of these conditions is associated with a cardiac mass.

Surgical versus medical management of the mass in this patient is also debatable. According to our knowledge, no clear guidelines are available. We performed a literature search on RV cardiac fibromas in the last 20 years (Table 1). One of 13 patients (78-year-old female) had symptomatic medical management without recurrence of symptoms for a year [9]. Twelve of 13 were managed surgically. Nine of 12 were symptomatic without serious comorbidities contraindicating surgery. Three of 12 patients were incidentally diagnosed. After surgical management, 1/3 had a recurrence of mass with second successful resection, 1/3 developed mild hypokinesis postsurgery, and 1/3 patient had a successful resection [10–12]. Pedunculated single benign tumors are usually resected as they have a lower risk of recurrence [13]. However, atypical single benign tumors or multiple tumors are not surgically removed especially in patients with comorbidities due to higher risk of recurrence of these tumors unless it is indicated by the symptoms. Similarly, in this case, no immediate surgical resection was performed due to sessile nature of the tumor with challenging complete resection, the patients' comorbidities, and lack of symptoms. However, the patient was carefully monitored for arrhythmias, and outflow tract obstruction [14]. Long term anti-arrhythmic medications or cardiac defibrillators can be considered in such patients.

Table 1 – Literature review of right ventricular cardiac fibroma in adult patients

Author et al.	Year	Sex	Age	Presentation	Comorbidities	Management	Outcomes
Kusano et al. [9]	2002	F	78Y	Wide complex tachycardia	NA	Atenolol 50mg	No recurrence in 12 months
Henaine et al. [15]	2009	F	40Y	Syncope	NA	Surgical	2-year lesion stability
Krane et al. [16]	2009	M	61Y	New -ve T-waves in V3 & V5	CAD	Surgical	Uncomplicated
Dobrilovic et al. [17]	2011	F	55Y	SOB & dizziness	NA	Surgical	No recurrence or side effect
Nwachukwu et al. [18]	2011	F	61Y	SOB	Right renal angiomyolipoma & occult micropapillary thyroid carcinoma	Surgical	No recurrence but mild reduction in RV contractility
Teis et al. [19]	2011	F	37Y	Palpitations & chest discomfort	NA	Surgical	No event reported
Albaghdadi et al. [20]	2012	NA	44Y	Back pain & dyspnea	NA	Surgical	No recurrence or side effects
Atik et al. [21]	2012	M	25Y	Progressive fatigue & unstable chest pain	NA	Surgical	Harsh systolic murmur persisted
Yong et al. [10]	2015	F	34Y	Incidentally found RV mass	Left occipital infarct	Surgical	Recurrence with syncope and asymptomatic after second surgery
Liu et al. [12]	2020	M	28Y	Asymptomatic detected on a regular visit	NA	Surgical	No recurrence or side effect
Francis et al. [22]	2021	M	37Y	Intermittent chest heaviness	Hypertrophic cardiomyopathy	NA	NA
Ikegami et al. [11]	2021	F	64Y	Incidental finding of RV mass	HTN, hyperlipidemia, and arthritis	Surgical	Mild septal hypokinesis but no recurrence
Liu et al. [12]	2021	M	27Y	Exertional chest tightness & SOB	NA	Surgical	No recurrence or side effects

Conclusion

We reported a case of asymptomatic benign endomyocardial RV cardiac fibroma. The mass showed no contrast uptake on echocardiography, well adherence to the wall on MRI, robust enhancement with contrast MRI, and endomyocardial fragments with endocardial interstitial fibrosis on biopsy. Therefore, care should be taken while diagnosing a patient with ventricular mass. The possibility of benign endomyocardial right ventricular cardiac fibroma should be kept in mind and should be differentiated from a ventricular thrombus. Asymptomatic patients with multiple comorbidities can be considered for medical management. However, more large-scale studies are needed to devise a guideline for the management of these patients.

Patient consent

Written consent has been obtained from the patient to publish the case and relevant images as case report.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2022.07.026.

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