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A Rare Case of Cardiac Calcified Amorphous Tumor: Multi-Modality Imaging Evaluation

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Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Patient: Male, 47
Final Diagnosis: Cardiac calcified amorphous tumor
Symptoms: Dizziness
Medication: —
Clinical Procedure: —
Specialty: Cardiac Procedure

Objective: Rare disease
Background: Cardiac calcified amorphous tumors (CAT) are rarely presented and featured as calcification and eosinophilic amorphous material in dense collagenous fibrous tissue.
Case Report: Our case report describes a 47-year-old man presenting cardiac CAT with only chronic cough and occasional dizziness. Preoperative multi-modality imaging was used to evaluate it and postoperative histological study was used to confirm the diagnosis. The mass was resected and the patient was fully recovered and discharged on the 7th postoperative day. In the 1-year follow-up, transthoracic echography showed no further pathological changes.
Conclusions: Cardiac CAT is a non-neoplastic cardiac tumor of unknown etiology. The tumor is commonly an incidental finding and the treatment of choice is complete surgical resection. In this case, we found that that multi-modality images were helpful in evaluating and diagnosing the cardiac CAT.

MeSH Keywords: Heart Neoplasms • Magnetic Resonance Imaging • Tomography Scanners, X-Ray Computed

Abbreviations: **CAT** – calcified amorphous tumor; **CMRI** – cardiac magnetic resonance imaging; **CT** – computed tomography; **TEE** – transesophageal echocardiography

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Background

Intracardiac tumors are rare, and are divided into primary or secondary. Approximately 75% are benign and nearly half of them are myxomas [1–3]. Further, the differential diagnoses of calcified masses consist of calcified mural thrombus, cardiac fibroma, osteosarcoma, vegetation and cysts [4]. Recently, cardiac calcified amorphous tumor (CAT) has been reported in some studies [5]. Here, we report the interesting case of a 47-year-old man who presented with asymptomatic cardiac CAT. We evaluated it preoperatively via multi-modality images and postoperatively through pathological studies.

Case Report

A 47-year-old man presenting with chronic cough and occasional dizziness for 2 years was admitted to the Department of Cardiovascular Surgery, West China Hospital. The patient did not have shortness of breath or edema. Physical examinations did not reveal positive findings and an ECG showed sinus rhythm. His medical history showed long-term oral use of thiazines due to hypertension, and medical records of the local hospital showed a mass in the right atrium by transthoracic echocardiography (TTE). Further, a contrast-enhanced computed tomography (CT) scan showed a highly dense shadow in the right atrium (Figure 1A). Cardiac magnetic resonance imaging (CMRI) showed a solid mass that appeared to be broad-based with extension into the right atrium (Figure 1B, 1C). Transesophageal echocardiography (TEE) confirmed an approximately 25×15 mm mobile mass in the right atrium (Figure 1D, Video 1). The large attachment was located between the coronary sinus and inferior vena cava without any disturbances of hemodynamics. Abdominal ultrasonography results were normal and no other thrombotic embolism was revealed. Blood tests only revealed slight elevation of calcium. Due to the symptoms and severe potential complications, surgery was performed.

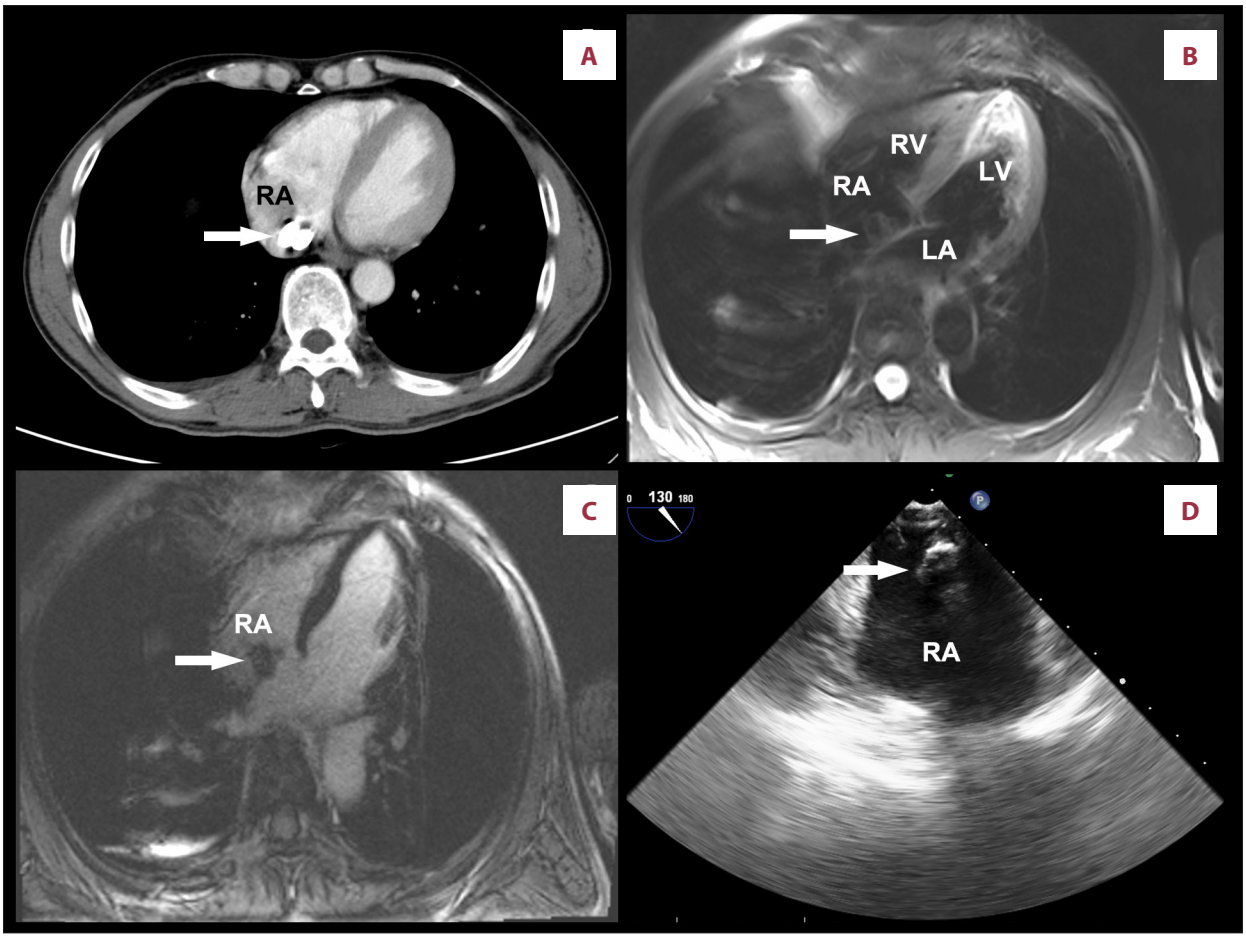

Figure 1. (**A**) Chest enhanced CT demonstrating an approximately 2-cm calcified mass in the right atrium (the arrow); (**B, C**) are T2 and T1 cardiac MRI images. The white arrows indicate the mass, which appeared to be broad-based with extension in the right atrium; (**D**) TEE demonstrating a hyperechoic 25×15 mm mobile mass, originating between the coronary sinus and inferior vena cava. RA – right atrium; LA – left atrium; RV – right ventricular; LV – left ventricular.

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Video 1. The asterisk demonstrates a hyperechoic 25×15 mm mobile mass in the right atrium.

After median sternotomy, cardiopulmonary bypass was instituted with an arterial cannula via the ascending aorta and a venous cannula via the right atrium and inferior vena cava. The right atrium was opened, followed by careful inspection and resection of the mass. The gross view showed a grey-white solid mass covered by dark-red thrombosis (Figure 2A, 2B) and the cross-sectional view showed calcification in the center. Interestingly, the microscopic view identified outer pink-stained laminar, hyaline connective tissue, and inner blue-stained loose calcification with a few trabecular structures of platelets (Figure 2C). The patient was fully recovered and discharged on the 7th postoperative day. At 1-year follow-up, transthoracic echography showed no further pathological changes.

Discussion

Primary intracardiac tumors, including benign and malignant ones, are rare, representing only 0.2% of all tumors. Atrial myxomas are the most common primary intracardiac tumor in adults, accounting for approximate 20–30% [6], and only 15–20% of cardiac myxomas are located in the right atrium [7]. Lipomas are the second most common benign cardiac tumor after myxomas [8]. However, the microscopic characteristics of myxomas and lipomas are a myxoid matrix rich in mucopolysaccharides with eosinophilic polygonal cells and adipose cells, respectively [1,8]. Our pathological findings did not show any cellular elements, and only hyaline connective tissue, fibrin and calcification were identified. Recently, CAT of the heart, which is a non-neoplastic cardiac mass, has attracted much research attention [9]. However, the exact etiology of cardiac CAT is still unknown. Pathological features of cardiac CAT include calcification and eosinophilic amorphous material in dense collagenous fibrous tissue [10]. Our histological study found similar characteristics, which helped us to diagnose cardiac CAT.

It is reported that cardiac CAT is related to the end-stage renal disease and dysfunction of calcium-phosphorus metabolism [11,12]. In the present case, we reviewed the medical history and found no chronic renal failure. However, due to hypertension, the patient had been taking thiazines for many years to control blood pressure, and blood test showed slight elevation of calcium. Therefore, dysfunction of calcium-phosphorus metabolism may have existed in this patient, which might have partially contributed to the formation of CAT.

Patients with cardiac CAT usually present many symptoms due to obstruction or embolization of calcified fragments, such as shortness of breath, syncope, central retinal arterial occlusion, and recurrent ventricular arrhythmia [13]. Intriguingly, in our case, the patient only showed chronic cough and occasional dizziness. More importantly, we found a large fresh thrombus covering the CAT, which could have caused severe complications if it had dropped into the circulation. Therefore, when patients present symptomatic and asymptomatic cardiac CAT, our experience recommends surgical intervention. However, cardiac CAT is potentially recurrent if the resection is not complete [14]. Our patient is still free of cardiac CAT 1 year after complete surgical excision.

Due to the variable prognoses of intracardiac masses, preoperative diagnosis is important. TEE and CT scans can be used for diagnosis and to provide further information on the location and morphology of the mass [15]. However, other chronic intracardiac calcified masses may be difficult to diagnose [4].

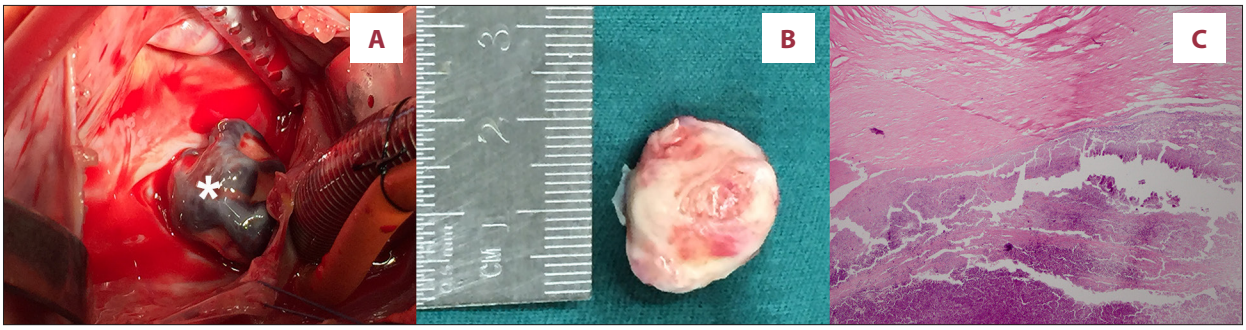

Figure 2. (**A**) The asterisk shows a grey-white solid mass located between the coronary sinus and inferior vena cava, and covered by dark-red thrombosis; (**B**) The resected tumor; (**C**) Histological examination at magnification 100× demonstrated hyaline connective tissue and inner blue-stained loose calcification with a few trabecular structures of platelets.

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The common differential diagnoses of cardiac CAT are cardiac myxomas, lipomas, and fibromas. It is not easy to exclude various possibilities and diagnose cardiac CAT relying only on clinical or single radiography [5]. In our case, we used cardiac echography, CT scan, and MRI to preoperatively evaluate the mass. Due to the importance of complete excision, cardiac MRI can also help preoperatively determine the surgical procedures and evaluate the complexity of surgery.

There are 4 special points in our case report. First, the patient presented no severe symptoms, which is rare. Second, multimodality evaluation for the intracardiac tumor is necessary. Thirdly, we found a large fresh thrombus covering the tumor, which could have caused severe complications if it dropped. Fourth, many studies reported that cardiac CAT is related to end-stage renal disease and dysfunction of calcium-phosphorus metabolism. In our case, the patient had taken thiazines for long time, leading to calcium metabolism which might have partially contributed to the formation of the CAT. Above all, the present case report provides new information about the mechanism, early evaluation, and treatment.

Conclusions

We reported a rare case of cardiac CAT. Multi-modality images were used to evaluate it and surgical intervention was applied. We shared our experience with diagnosis and treatment of cardiac CAT. After the benign nature of the cardiac mass is determined, further CMRI should be used to evaluate surgical procedures to reduce complications and recurrence of cardiac CAT. Additionally, early surgery is recommended due to the formation of thrombus after the presence of the cardiac CAT is determined.

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Conflict of interest

None.

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