

CASE REPORT

ADVANCED

CLINICAL CASE

Encapsulated Calcified Hematoma Mimicking a Cardiac Tumor, Diagnosed 25 Years Post-Traumatic Injury



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ABSTRACT

A 45-year-old man presented with nonspecific symptoms caused by a mass compressing the right ventricle. Cardiac computed tomography accurately predicted the operative and pathologic appearance of the mass, and the final diagnosis of an encapsulated cardiac hematoma was confirmed by pathologic examination. This condition is infrequent and mimics a cardiac tumor. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2023;18:101917) © 2023 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

HISTORY OF PRESENTATION

We report a case of chest trauma resulting in calcified cardiac hematoma that was diagnosed 25 years post-injury. The patient recounted being attacked at age 20 years with a nail on a wooden 2×4 plank that penetrated his chest. The patient was not medically evaluated at the time of injury because of the unlikelihood of an acute injury. The patient began

experiencing symptoms at age 45 years, when he presented to the emergency department (ED) with extreme dizziness, lightheadedness, fatigue, and shortness of breath on exertion. The patient's vital signs were normal. Initial laboratory assessments revealed severe anemia, with a hemoglobin value of 5.0 g/dL. The patient was hemodynamically unstable, requiring 6 red blood cell transfusions. On further evaluation, computed tomography angiography (CTA) of the abdomen was performed, with an incidental finding of a calcified lesion compressing the right ventricle (RV). Multiorgan imaging ruled out gastrointestinal and hepatic causes of bleeding. After 2 months of searching for the cause of the severe anemia, the patient was referred to our cardiology clinic for cardiovascular evaluation. The patient presented with nonsignificant vital signs and was stable at our clinic (Cardiovascular Medical Group of Southern California, Beverly Hills, California, USA). Cardiac examination revealed gallop, third and fourth

LEARNING OBJECTIVES

- To comprehend the importance of thorough investigation or interrogation of a patient's medical and social history when considering idiopathic causes.
- To understand the use of multimodality cardiac imaging in identifying a cardiac hematoma by using comparative imaging before and after surgical resection of a mass.

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**ABBREVIATIONS
AND ACRONYMS****CMR** = cardiac magnetic resonance**CT** = computed tomography**CTA** = computed tomography angiography**ED** = emergency department**RV** = right ventricle

heart sounds (S_3 and S_4), and a systolic murmur. Extensive cardiac imaging was performed, including an echocardiogram, cardiac CTA, and cardiac magnetic resonance (CMR), which led to a final diagnosis of calcified cardiac hematoma.

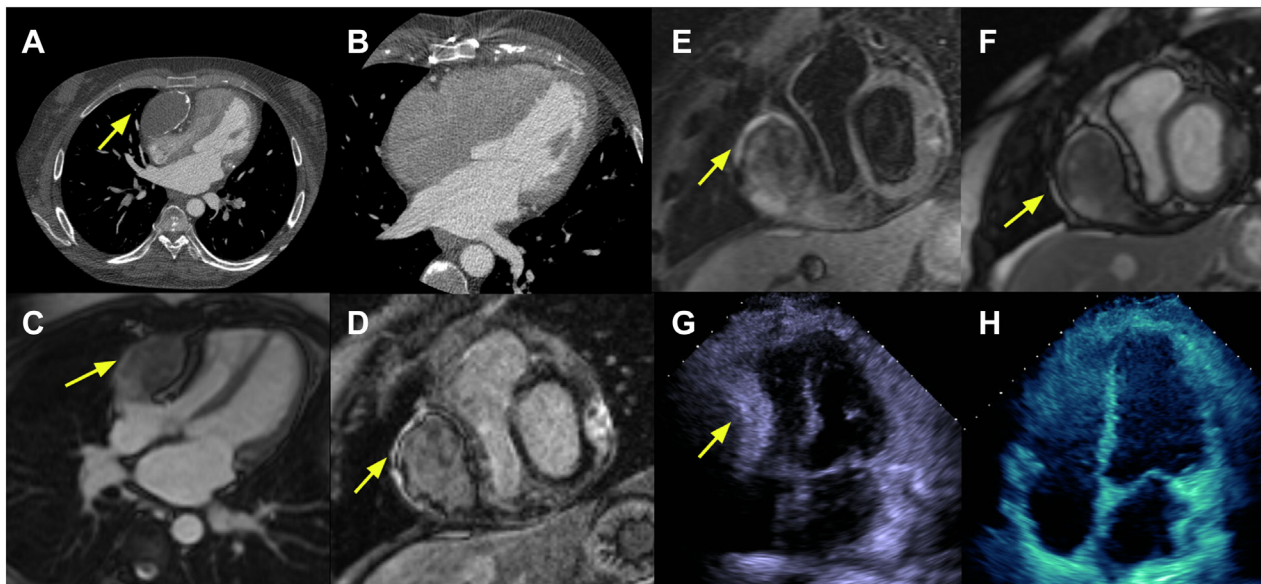
PAST MEDICAL HISTORY

The patient has a history of type 2 diabetes, hypothyroidism, and chronic kidney disease. At the time of ED admission, the patient was taking the following medications: levothyroxine, 125 μ g daily; linagliptin (Tradjenta), 5 mg daily; and metformin, 1,000 mg twice daily.

DIFFERENTIAL DIAGNOSIS

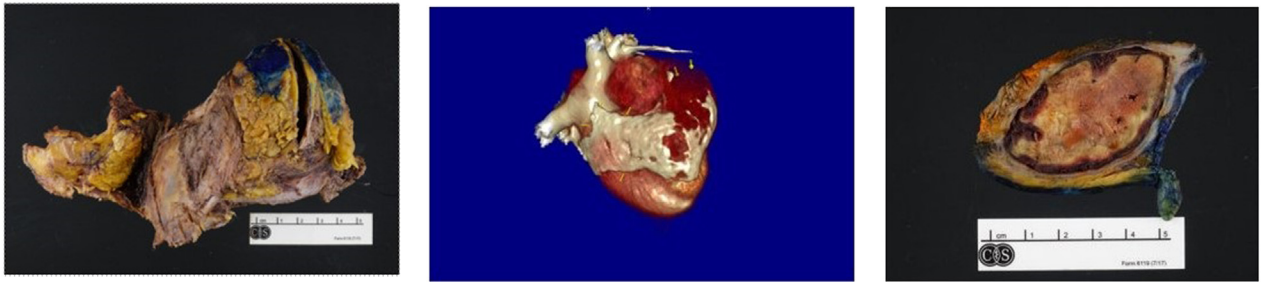
Multimodality imaging is crucial for the differential diagnosis of a cardiac mass because each modality—echocardiogram, computed tomography (CT), and CMR—highlights differentiating characteristics.¹ Pericardial hematomas are rare findings, but they

have key features such as the following: an attenuation >60 HU that decreases over time; no contrast enhancement during cardiac CTA; a gelatinous-like appearance of fine-speckle echo, with distinct margins from the surrounding structure between the pericardial layers; and, as the mass becomes denser over time, an appearance that is more difficult to distinguish from a solid mass.¹ In our case, the 25-year-old mass was visualized during echocardiography as a cystic mass with significant hemodynamic compromise. Cardiac CTA depicted the calcified mass with a tumor volume of 182 mL with an average Hounsfield unit value of 80, and the delayed imaging did not take up contrast material (Figure 1A). The cardiac CTA differential diagnoses included the following: post-cardiac surgery pericardial cyst with calcified capsule; hematoma of congenital, inflammatory, or traumatic origin; the possibility of inflammatory pericarditis secondary to a bacterial infection such as tuberculosis or echinococcosis; and neoplasm, including cardiac tumor. The CMR differential diagnosis included angiosarcoma, synovial sarcoma, and hematoma.

FIGURE 1 Multimodality Comparative Imaging

Echocardiography, cardiac magnetic resonance, and cardiac computed tomography angiography were performed, and with each modality the mass was visualized. The **yellow arrows** highlight the well-defined, encapsulated calcified capsule compressing the right atrium and the right ventricle. **(A)** Axial cardiac computed tomography angiography imaging before surgical resection of the hematoma. **(B)** Normal axial cardiac computed tomography angiography image post-surgical intervention. **(C)** Cine cardiac magnetic resonance echo image demonstrating compression of the right ventricle. **(D)** Short-axis cardiac magnetic resonance image demonstrating heterogeneous late gadolinium enhancement. **(E)** T_1 -weighted short-axis image on cardiac magnetic resonance. **(F)** Short-axis cine cardiac magnetic resonance echo image with mass visualization. **(G)** Transthoracic echocardiogram of hematoma-induced right ventricular compression and significant hemodynamic compromise before surgical resection. **(H)** Transthoracic echocardiogram after surgical intervention.

FIGURE 2 Gross Pathologic Imaging



(Left) Gross pathologic imaging depicts the hematoma reflective of the **(middle)** cardiac computed tomography angiography remodeling of the tumor in [Video 1](#). **(Right)** The third pathologic image is a sagittal view of the mass, demonstrating 25 years of calcification after an initial penetrating trauma.

INVESTIGATIONS

CMR showed a large, heterogenous pericardial mass arising from the right atrioventricular groove, extending below the RV, but not involving the RV. There was compression of the right ventricular free wall without ventricular interdependence on real-time cine imaging. The findings were concerning for neoplasm ([Figures 1C to 1F](#)). Echocardiography confirmed findings suggestive of hemodynamic compromise and noted that the pericardium was calcified inferiorly ([Figure 1G](#)). Cardiac CTA confirmed a pericardial lesion compressing the RV and not separate from the right appendage with dense peripheral calcification and irregular nodular enhancement suggestive of neoplasm and chronic hemorrhage ([Video 1](#)). CT images were reconstructed to show hematoma distribution ([Video 1](#)), illustrating compression of the RV and right coronary artery. Cardiac CT obviated the need for invasive angiography and characterized the spatial relationships precisely for surgical planning.

MANAGEMENT

The patient was referred to cardiothoracic surgery and was recommended for surgical mass resection 3 months after initial presentation of symptoms. The operative note states that the pericardium was fused to the heart on opening the chest and the mass was obvious on entry. There was also extensive pericarditis. The procedure used total cardiopulmonary bypass to empty the heart first as much as possible before dissecting and removing the calcified mass. The resection was clean, and the procedure was well tolerated without any intraoperative complications. The patient was transferred to the surgical intensive care unit in stable condition. Pathologic examination

reported fragments of myocardium with associated well-encapsulated and focally calcified hematoma with evidence of recanalization. There were no malignant cells identified within the microscopic findings ([Figure 2](#)). The patient was referred for cardiac rehabilitation after 1 week and continued exercise rehabilitation for 4 months post-surgery, with full resolution of symptoms.

DISCUSSION

Encapsulated cardiac hematoma should be considered whenever a cardiac mass is found in a patient with a history of trauma. Patients presenting with a cardiac mass may experience dyspnea and palpitations, yet dyspnea was the only common symptom discovered in our case. In 2012, a similar case was reported in a 36-year-old man with a history of blunt chest trauma, although the timing between the trauma and the final diagnosis was 11 months, and the patient was asymptomatic.² A comprehensive evaluation is necessary to rule out differential diagnoses of a cardiac mass, including malignant and benign tumors. Chest trauma can cause pericardial hematoma and extracardiac hematoma,³ which can calcify over time. Cardiovascular manifestations of hematoma include heart failure and arrhythmia,⁴ and a hematoma may lead to a fatal result because of compression. The risks of cardiac hematoma include anemia, heart failure,^{3,4} and death, if the condition is not treated appropriately. The time from the point of injury to surgery can vary from 3 to 40 years.^{3,5} Thorough cardiac imaging is essential for proper diagnosis of the mass. Cardiac masses such as cysts, hematomas, and neoplasms have key features viewed on imaging that distinguish them from each other. Pericardial

cysts are the most common cardiac masses and manifest as echolucent lesions from the cardiophrenic angle.¹ Cardiac hematomas have a gel-like appearance of fine speckle echo with distinct margins from surface structure between the pericardial layers.¹ Cardiac neoplasms appear echo dense, like chronic hematomas, and they manifest with pericardial thickening and pericardial effusion.¹ Each of these masses is visualized using multimodality cardiac imaging. Cardiac hematomas are best visualized through CT and CMR because these modalities provide more identification of the pericardium and more detailed anatomical characteristics of the mass.¹ Echocardiography is a good source of first-line imaging because it has minimal risk for the patient, and further imaging can be ordered later (Figures 1G and 1H).

The progression of various cardiac imaging modalities is helpful for comparison, but in our case cardiac CT was superior in identifying the mass with key characteristics and the structural dynamic features of the mass within the heart.

FOLLOW-UP

After surgical intervention, repeat echocardiogram and cardiac CTA were performed 8 months later. This imaging showed the removal of the anterior mass

previously visualized and no disease or injury to the heart (Figure 1B).

CONCLUSIONS

Encapsulated calcified hematoma is an infrequent diagnosis when considering a cardiac mass. Multimodality cardiac imaging is useful to diagnose the type of mass properly before surgical pathologic evaluation. Using various imaging modalities is beneficial to the plan of care and presurgical planning. The cardiac CTA imaging in our case accurately depicted a cardiac hematoma before resection of the mass. The initial symptoms of our patient were nonspecific; therefore, comprehensive imaging was essential to the proper diagnosis of the encapsulated calcified cardiac hematoma.

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REFERENCES

1. Saboe A, Sanjaya F, Soeriadi REA, et al. Multiple pericardial hematomas: a case report and mini-review in multimodality imaging. *BMC Med Imaging*. 2021;21(1):85.
2. Martín M, Santamarta E, Corros C, Benito EM, León D, Saiz A. Pericardial hematoma after blunt chest trauma. *Rev Port Cardiol*. 2012;31(9):623-624.
3. Manhas AH, Martin RT, Reul GJ, Stainback RF. Heart failure due to a post-traumatic calcified pericardial hematoma. *Texas Hear Inst J*. 2008;35(3):345-348.
4. Hashimoto K, Keshavjee S. Heart failure caused by old hematoma. *Am J Respir Crit Care Med*. 2016;193(2):e3-e4.
5. Brown DL, Ivey TD. Giant organized pericardial hematoma producing constrictive pericarditis: a case report and review of the literature. *J Trauma*. 1996;41(3):558-560.

KEY WORDS cardiac mass, cardiac CT, cardiac tumor, case report CMR, hematoma

APPENDIX For a supplemental video, please see the online version of this paper.