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Spontaneous right atrial rupture caused by a papillary fibroelastoma: a case report

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Abstract

Background Spontaneous rupture of the right atrium is an extremely rare event, most commonly associated with trauma, infarction, or malignant infiltration. Papillary fibroelastoma is a benign cardiac tumor typically involving valvular surfaces and has not been previously reported as a cause of atrial wall rupture.

Case presentation We describe a 53-year-old woman presenting with sudden hemodynamic collapse due to massive pericardial effusion. Computed tomography revealed hemopericardium without evidence of aortic or coronary rupture. Emergency surgery identified active bleeding from the right atrial free wall, with a friable nodular lesion in direct continuity with the rupture site. Histologic appearance and gross morphology were consistent with papillary fibroelastoma. The patient recovered uneventfully after surgical repair.

Conclusions This case highlights an unprecedented presentation of papillary fibroelastoma causing spontaneous right atrial rupture. Prompt imaging and surgical exploration are essential for diagnosis and management of unexplained cardiac tamponade.

Keywords Fibroelastoma, Cardiac ramponade, Atrial rupture, Pericardial effusion, Cardiac tumor, Emergency surgery

Background

Papillary fibroelastomas (PFEs) are rare benign cardiac tumors that account for approximately 8–10% of primary cardiac neoplasms [1]. They most frequently originate from valvular endocardium, particularly the aortic and mitral valves, whereas non-valvular PFEs involving the atrial or ventricular walls are uncommon [2, 3]. These tumors are usually asymptomatic and incidentally detected during cardiac imaging or surgery. Nevertheless, they can lead to embolic events, valvular obstruction, or arrhythmias depending on their size and mobility [1, 2].

To our knowledge, spontaneous cardiac rupture secondary to a papillary fibroelastoma has not been previously reported. We describe a unique case of spontaneous right-atrial rupture caused by a papillary fibroelastoma, emphasizing the diagnostic value of multimodality imaging and the importance of prompt surgical management.

Case presentation

A 53-year-old woman with no significant past medical history presented to the emergency department after a sudden episode of loss of consciousness. She denied trauma, recent infection, or cardiovascular disease. On arrival, she was hypotensive (blood pressure 80/50 mm Hg) and tachycardic, with mild jugular venous distension but no murmurs or peripheral edema. Electrocardiography showed low-voltage QRS complexes without ischemic changes.

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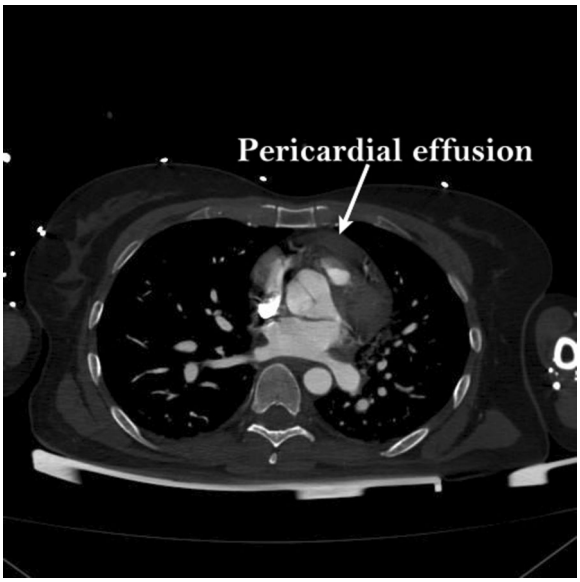

Fig. 1 Preoperative computed tomography findings. Axial computed tomography (CT) image showing a large circumferential pericardial effusion with dense, high-attenuation material (arrow) consistent with hemopericardium

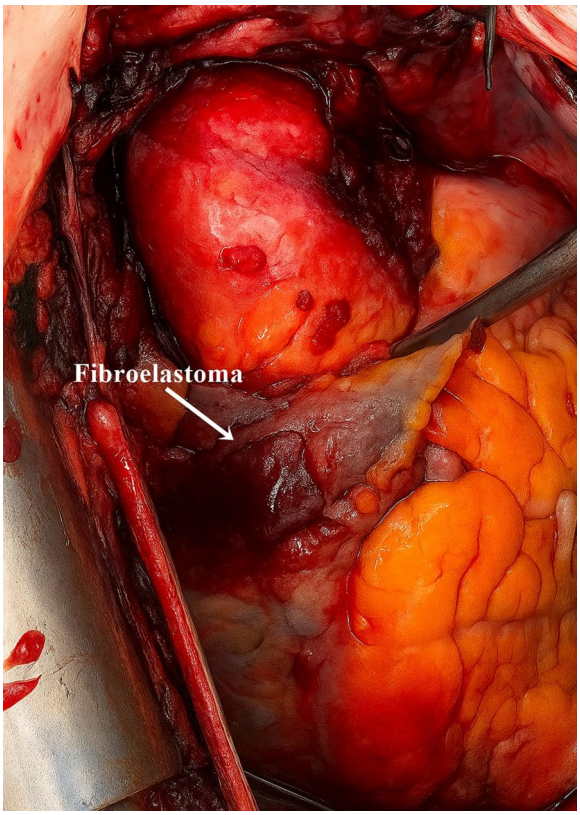

Fig. 2 Intraoperative findings. Intraoperative view demonstrating active bleeding from the free wall of the right atrium. A friable, nodular lesion (arrow) is seen in direct continuity with the endocardial surface at the rupture site, with surrounding hemorrhage and erosion of the atrial wall, confirming the fibroelastoma as the structural cause of rupture

The differential diagnosis included aortic dissection, pulmonary embolism, myocardial rupture, and pericardial tamponade secondary to pericarditis or neoplasm. Urgent transthoracic echocardiography revealed a large circumferential pericardial effusion with right-atrial collapse.

After transient improvement following resuscitation, contrast-enhanced chest computed tomography (CT) confirmed a large pericardial effusion with high-attenuation material consistent with hemopericardium (Fig. 1). A focal area of wall thinning at the right-atrial free wall near the appendage raised suspicion for contained rupture. An intraoperative video (Video 1) demonstrates the friable mass in continuity with the right atrial wall and active bleeding at the rupture site.

Due to persistent hemodynamic instability, the patient underwent emergency surgical exploration via median sternotomy. A large quantity of hemorrhagic fluid was evacuated, and active bleeding was observed from the right-atrial free wall, where a friable 1-cm nodular lesion was in continuity with the endocardium (Fig. 2). The lesion was located at the right atrial appendage and was clearly distant from the cavo-atrial junction and the sinoatrial node region. Macroscopically, the lesion appeared to have chronically eroded the atrial wall, resulting in focal thinning and subsequent rupture. The papillary fibroelastoma and adjacent friable tissue were excised, and the defect was closed with a purse-string suture. Post-operative CT showed successful repair with no residual effusion.

Histopathological analysis demonstrated frond-like fibroelastic tissue lined by endothelium, consistent with the papillary fibroelastoma. The patient recovered uneventfully and remained asymptomatic at 6-month follow-up, with normal echocardiographic findings.

Discussion

This report describes an unprecedented presentation of papillary fibroelastoma, the spontaneous rupture of the right atrium resulting in acute cardiac tamponade. While papillary fibroelastomas are generally regarded as benign cardiac tumors associated with embolic or valvular complications, their involvement in structural cardiac rupture has not been previously reported. This case therefore expands the known clinical spectrum of non-valvular papillary fibroelastomas and highlights a rare but potentially fatal mechanism of presentation that

requires prompt recognition and emergency surgical management.

PFEs account for approximately 8–10% of primary cardiac neoplasms and most commonly arise from valvular endocardium, particularly the aortic and mitral valves [1, 2]. Although often considered indolent, PFEs may cause clinically relevant complications depending on their size, mobility, and anatomical location. Embolic events, valvular dysfunction, and arrhythmias represent the most frequently reported manifestations [1, 2]. In contrast, spontaneous rupture of a cardiac chamber is an exceedingly rare and life-threatening event, classically associated with trauma, myocardial infarction, or malignant cardiac tumors. The coexistence of these two entities in the present case represents a unique and previously undescribed clinical scenario.

Non-valvular PFEs are uncommon and have been reported in atypical locations such as the atrial or ventricular walls, papillary muscles, and chordae tendineae [3, 6, 7]. These lesions pose a particular diagnostic challenge, as they are often small, sessile, and less mobile than valvular PFEs, reducing their detectability on routine transthoracic echocardiography. In large series, the majority of PFEs are diagnosed incidentally or following embolic events, with atrial wall involvement representing a minority of cases [1, 2]. Previously reported atrial PFEs have predominantly presented with arrhythmias or embolization, without evidence of structural atrial wall disruption [6, 7]. The present case demonstrates that non-valvular PFEs may also lead to severe mechanical complications, even in the absence of traditional cardiovascular risk factors.

The mechanism of atrial rupture in this patient is most consistent with chronic mechanical erosion rather than infiltrative tumor growth. Intraoperative findings revealed a friable lesion in direct continuity with the rupture site, associated with localized thinning of the atrial wall. Histopathological examination confirmed the benign nature of the tumor, showing the characteristic frond-like fibroelastic architecture lined by endothelium and no features of malignancy or invasive behavior. These findings support the hypothesis that repetitive mechanical stress exerted by the fibroelastoma on the thin-walled right atrial appendage led to progressive erosion and weakening of the atrial wall, ultimately resulting in perforation. This pathophysiological mechanism is fundamentally different from that observed in malignant cardiac tumors, where rupture is driven by infiltrative growth, necrosis, and extensive tissue destruction.

Spontaneous right atrial rupture has been described in association with primary malignant cardiac tumors, particularly angiosarcoma, as well as in cases of atrial infarction or blunt trauma [4, 5]. Angiosarcomas typically present as rapidly progressive, infiltrative masses with widespread local destruction and poor prognosis, features that were absent in the present case. Similarly, atrial infarction leading to rupture is usually associated with coronary artery disease, ischemic electrocardiographic changes, or elevated cardiac biomarkers [5]. None of these findings were observed in our patient, and preoperative imaging excluded aortic or coronary rupture. Moreover, the anatomical location of the lesion—confined to the right atrial appendage and distant from the sinoatrial node and cavo-atrial junction—further supports a localized, tumor-related mechanism rather than a global ischemic or traumatic process.

From a surgical perspective, prompt exploration was essential and lifesaving. Although the lesion had already caused significant atrial wall erosion at presentation, surgical excision in an emergency setting was both diagnostic and curative. The decision to excise the lesion together with adjacent friable tissue and to close the defect using a purse-string suture was guided by the localized nature of the rupture and the absence of extensive atrial wall involvement. In this context, purse-string closure allowed rapid and effective hemostasis while preserving atrial geometry. Alternative repair strategies, such as patch augmentation, may be appropriate in cases of larger defects or more diffuse tissue fragility; however, they were not required in this case. Careful inspection of the excision margins revealed no residual tumor tissue, minimizing the risk of embolization or recurrence.

This case also has important implications for postoperative management and follow-up. Although PFEs are benign and recurrence after complete excision is rare, non-valvular lesions may warrant closer surveillance due to their atypical behavior. In patients presenting with unexplained pericardial effusion or cardiac tamponade—particularly in the absence of trauma or myocardial infarction—cardiac tumors, including PFEs, should be considered in the differential diagnosis. Multimodality imaging plays a crucial role in the diagnostic work-up, although small non-valvular lesions may escape detection preoperatively, as occurred in this case. Follow-up echocardiography is recommended to assess for recurrence or residual structural abnormalities, and long-term surveillance should be individualized based on tumor location and surgical findings.

In conclusion, this report documents a previously unrecognized and potentially fatal complication of papillary fibroelastoma. While PFEs are typically regarded as benign and low-risk tumors, this case demonstrates that non-valvular PFEs may cause progressive atrial wall erosion leading to spontaneous rupture and cardiac

tamponade. Awareness of this rare presentation, together with early recognition and prompt surgical intervention, is essential to ensure optimal patient outcomes.

Conclusions

This report describes the first documented case of spontaneous right-atrial rupture caused by a papillary fibroelastoma. Although PFEs are benign and usually asymptomatic, they can occasionally lead to catastrophic structural complications. Rapid multimodality imaging and prompt surgical intervention were essential for diagnosis, definitive treatment, and survival. Clinicians should consider cardiac tumors, including papillary fibroelastoma, in the differential diagnosis of unexplained pericardial effusion or cardiac tamponade, particularly in the absence of trauma or myocardial infarction.

Abbreviations

PFE Papillary fibroelastoma
CT Computed tomography

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s43057-026-00185-5.

Additional file 1: Video 1. Intraoperative findings. Short intraoperative video showing active bleeding from the right atrial free wall. A friable nodular mass is seen in direct continuity with the endocardial surface at the rupture site, confirming the fibroelastoma as the cause of wall rupture.

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Authors' contributions

AB performed the surgery and was responsible for intraoperative management. EC drafted the initial version of the manuscript and collected clinical data. MV critically revised the manuscript, added imaging and video materials, and finalized the submission. GG, GDG, FM, and EG contributed to case review, discussion, and critical revision of the final version. All authors read and approved the final manuscript.

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Data availability

All data generated or analyzed during this study are included in this published article and its supplementary files.

Declarations

Ethics approval and consent to participate

Written informed consent was obtained from the patient for publication of this case report and accompanying images. Institutional review board approval was waived for this single-case report in accordance with local regulations.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images and video.

Competing interests

The authors declare that they have no competing interests.

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