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A Giant Right Atrial Myxoma Traverses through a Patent Foramen Ovale, Combined with Coronary Artery Bypass Grafting: A Case Report

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ABSTRACT

Cardiac myxoma is the most common primary heart tumor in adults, although it is rare and typically occurs in the left atrium. While this tumor is benign, immediate surgical resection is necessary due to the potential risks of embolism and stroke. We reported a rare case of a right atrial myxoma accompanied by a patent foramen ovale (PFO), pulmonary embolism, inferior vena cava (IVC) web, and coronary artery occlusion, for which the patient underwent surgery. The patient was a 66-year-old female with a history of percutaneous coronary intervention (PCI) two years prior. She arrived at the hospital experiencing severe dyspnea. Her heart rhythm was atrial fibrillation, and there was no report of polycythemia. Additionally, the patient's troponin I level was negative. Angiography was performed, confirming the presence of coronary artery disease (CAD). The echocardiography performed on the patient revealed a large atrial myxoma, along with a PFO and an IVC web. Following surgery, the patient was transferred to the ICU in stable condition. Postoperative histopathology confirmed the presence of a myxoma. A follow-up echocardiography showed that all of the patient's issues had been resolved, and the size of the right atrium had decreased. The patient was discharged after seven days. Due to multiple reported cases of cardiac myxoma after ablation, and considering our patient's history of PCI two years prior, it is advisable to conduct echocardiography following any cardiac intervention. Documenting medical history, and interventions performed on patients, along with their consequences, significantly contributes to the timely diagnosis and treatment of this disease.

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Introduction

Atrial myxoma is a rare cardiac tumor that can lead to serious complications, such as stroke and sudden death (1, 2). Although it is rarely associated with these problems and is typically benign, early surgical resection is necessary to prevent the complications of embolization (1).

Cardiac tumors represent 0.2% of all tumors found in humans (3). More than three-fourths of primary cardiac tumors are benign (4). This disease is more prevalent in women and occurs most frequently in the third and sixth decades of life (2). Cardiac myxomas can rarely without noticeable symptoms (5).

Approximately 75% of atrial myxomas occur in the left atrium, while 15-20% are

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found in the right atrium (6). In most cases, right atrial myxomas exhibit non-specific structural signs and laboratory abnormalities compared to their left atrial counterparts (6). Our knowledge of the diagnosis and clinical symptoms associated with right atrial myxoma is limited (7).

The diagnosis of cardiac myxoma can be confirmed based on imaging, clinical features, and histopathology. A definitive diagnosis, requires histopathological evaluation, including the positivity of endothelial cell markers (8).

According to various studies, the foramen ovale plays a crucial role in sustaining life during the embryonic period. However, a persistently patent foramen ovale (PFO) after birth has been linked to several pathological sequelae affecting systemic circulation (9). PFO is a distinct risk factor for the formation of microthrombus in the right atrial septum, which elevates the risk of stroke related to PFO (10). The presence of a PFO can be identified through advancements in transthoracic and transesophageal echocardiography (10).

Research on 312 cases of left and right atrial myxoma revealed that only two cases were linked to atrial septal defect (11).

Given the rarity and complexity of these conditions, we reported a rare case of a large right atrial myxoma accompanied by PFO and coronary artery disease. The patient had previously undergone percutaneous coronary intervention (PCI) two years ago, and no cardiac myxoma was detected during the echocardiography at that time. The patient is currently experiencing symptoms of progressive dyspnea. The patient underwent successful surgery and was discharged uneventfully. In this study, we examine the surgical treatment of PFO and right atrial myxoma in patients with coronary artery lesions.

Case Report

A 66-year-old female patient was admitted to our institute with dyspnea and atrial fibrillation (heart rate: 107 bpm), but no chest pain. Her symptoms were present for one month, The patient had a one-month history of dyspnea, which had worsened over the past three days. She had a history of PCI two years prior. Two years ago, echocardiography did not report atrial myxoma; the patient's ejection fraction (EF) was 55%.

polycythemia was not detected in blood investigations. In the patient's tests, the hemoglobin level was 11.7 g/dL, the hematocrit was 38.3%, and the platelet count was 280,000 per microliter. Qualitative troponin I was negative, and the remaining tests were normal. No neurological complications were observed during the clinical examination .

The patient underwent angiography and echocardiography, which revealed moderated discrete midpart stenosis in the left anterior descending (LAD) artery with good distal runoff, significant diffuse ostioprogximal stenosis in the diagonal artery with good distal runoff, and evidence of a huge right atrial myxoma. A large, elongated, irregular, hyperechoic, and multilobed mass (8.7cm × 5.4cm) occupied most of the right atrium. Part of the mass prolapses into the right ventricular through the tricuspid valve during diastole. A localized septal aneurysm was observed on the right atrial side, adjacent to a tunnel-shaped PFO. A portion of the mass passed through the interatrial septum (IAS) across the PFO, with a size of 1.65 cm × 0.85 cm at the left atrium (LA) end of the PFO, and the patient’s EF was reported 55%.

The patient's family’s history was negative for such conditions in parents or siblings.

Upon the patient's arrival, was standard monitored. A large intravenous (IV) line was established, and an arterial line was inserted into the left radial artery, following Allen's test. Arterial blood gas analysis revealed a SpO2 of 93% in room air and 100% in oxygen (via face mask).

General anesthesia was induced using midazolam, fentanyl, cisatracurium, and etomidate. She was intubated, and the tidal volume was set at 400 mL with a ventilatory rate of 12 breaths per minute by an anesthesiologist. The central venous (CV) line was inserted from the right internal jugular vein.

A Median sternotomy was performed. Cardiopulmonary bypass (CPB) was established after cannulation of the ascending aorta, superior Vena cava (SVC), and inferior vena cava (IVC). The aorta was

cross-clamped following the infusion of cold blood cardioplegia, resulting in cardiac arrest.

First, an aortocoronary saphenous vein graft to the left anterior descending artery was performed. Upon opening the right atrium (RA), the right atrial myxoma was observed to have prolapsed into the LA through the PFO. Additionally, a large thrombus and an IVC web were identified in the right atrium. The right atrial myxoma, the IVC web, and the thrombosis were successfully resected (Figure 1), and the PFO was closed. The clots in the pulmonary artery were also resected (Figure 2), revealing that the cause of the pulmonary embolism was a thrombosis located in the right atrium.

After rewarming, the aortic clamp was removed and the patient was weaned off CPB. The sternum was closed, and an intra-aortic balloon pump (IABP) was installed. The patient was transferred to the intensive care unit (ICU) in a hemodynamically stable condition while receiving a low dose of epinephrine. After the operation, the patient's rhythm remained atrial fibrillation.

The pathology sample was sent for analysis, and the diagnosis of cardiac myxoma was confirmed by histopathology. Macroscopically, the sample consists of numerous browns, cream-colored pieces with a soft consistency, weighing 75 grams and measuring 1.5cm × 7 cm × 9 cm. Microscopically, the sample showed spindle and polygonal cells in a myxoid stroma with some necrotic and hyalinized fibrous tissue foci.

The IABP was removed after one day. Echocardiography performed six days postoperatively showed an ejection fraction in the patient was 40%, with no detectable mass in the RA or LA. The IVC size was normal (diameter: 1.4 cm) with > 50% respiratory collapse. After the operation, the volume of the right atrium decreased from 116 cubic centimeters to 52 cubic centimeters, while its area decreased from 29 square centimeters to 18 square centimeters. Conversely, the volume of the atrium decreased, but its area increased.

NO postoperative neurological complications were observed. The patient was discharged uneventfully after seven days.

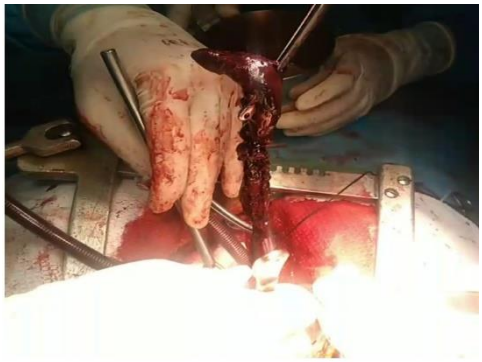

Figure 1. The thrombosis in the right atrium.

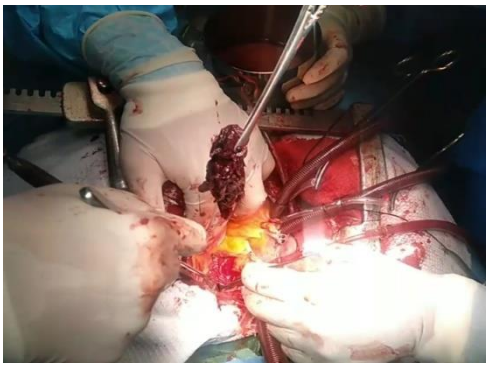

Figure 2. The clot in the pulmonary artery.

Discussion

According to the studies conducted, only a few atrial myxomas have been observed in patients with a PFO (11).

Our study summarizes the right atrial myxoma associated with IVC web, PFO, pulmonary embolism, and CAD, contributing to the existing knowledge on diagnosing and treating this rare cardiac tumor. According to other studies the PFO may have caused RA thrombosis, which led to pulmonary embolism (10).

Given that most of our knowledge about right atrial myxoma is limited to case reports, detailing these patients along with their medical history and symptoms can aid in timely diagnosis and treatment.

Dyspnea is the most common symptom of atrial myxoma, as noted in other studies (12). The development of cardiac myxomas and tissue injury may be interconnected, as several cases of cardiac myxomas occurring after catheter ablation have been reported (13). Our patient had a history of PCI within the past two years; however, no atrial myxoma was detected in the echocardiography from two years ago. Given the potential relationship between these

conditions, patients should undergo regular echocardiography following invasive cardiac interventions.

Single large atrial myxomas with ASD and PFO can be mistakenly diagnosed as bilateral atrial myxomas (14). Echocardiography is crucial for accurately identifying the location and size of cardiac myxoma (2,14). On imaging, distinguishing between a myxoma and a thrombus can sometimes be challenging. Histopathological analysis can help resolve these uncertainties (15).

The management of vital signs and intraoperative anesthesia in these patients is crucial (12).

This case report emphasizes the significance of timely diagnosis and multidisciplinary management of complex cardiac myxomas.

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