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Case Report

A Case of Transmural Lipoma of the Right Atrium

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Abstract

Primary cardiac tumors are a relatively rare disease. About 75% of primary cardiac tumors are benign. The most common histological type is myxoma, followed by cardiac fibroma, lipoma, etc. We report a case of a 53-year-old female patient admitted to the hospital due to "repeated palpitations and tightness of breath for 5 years, worsened for 2 days." Preoperative transthoracic echocardiography revealed a hypoechoic mass approximately 3.1 cm x 3.0 cm in size within the right atrium, suggesting an intracardiac mass: nature? Chest computed tomography (CT) indicated a fat-density nodule within the right atrium, with a larger cross-sectional size of about 3.0 cm x 2.5 cm, suggesting a lipoma. The patient underwent excision of the right atrial mass under cardiopulmonary bypass. Intraoperative transesophageal echocardiography (TEE) revealed a mass within the right atrium, closely connected to the atrial wall, with no signs of tricuspid valve obstruction. Exploration during surgery revealed a yellow, smooth-surfaced mass approximately 3.0 cm x 3.0 cm in size, penetrating the right atrial wall, from which the mass and an additional 2mm margin of the right atrial wall were completely excised. A suitable-sized bovine pericardial patch was used to repair the defect in the right atrial wall. Postoperative TEE showed the disappearance of the right atrial mass. The postoperative pathological result indicated a lipoma. Cardiac lipoma is a rare benign primary cardiac tumor. The common sites of occurrence of this tumor are the right atrium, left ventricle, and pericardium. Based on their location, cardiac lipomas can be divided into three types: subepicardial, intramyocardial, and subendocardial lipomas, with subendocardial lipomas being the most common, accounting for over 50% of primary cardiac lipomas. Clinical symptoms largely depend on the size and growth location of the tumor, and it is generally believed that most cardiac lipomas are asymptomatic. Symptomatic lipomas can be treated with curative surgical excision. Transmural lipomas of the right atrium are relatively rare, and such lipomas may affect adjacent structures both inside and outside the atrial wall. Although the lipoma in this case did not significantly affect valve function or blood flow, the patient experienced repeated symptoms of palpitations and tightness of breath. Despite being a benign tumor, the lipoma in this case exhibited transmural growth within the right atrium, showing a certain degree of invasiveness, making surgical excision an effective treatment method.

Keywords

Right Atrium, Transmural, Lipoma

1. Introduction

Primary cardiac tumors are extremely rare, with autopsy reports indicating an incidence rate of 0.17% to 0.19% [1]. Approximately 75% of primary cardiac tumors are benign, with the most common histological type being myxoma,

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followed by cardiac fibroma, lipoma, rhabdomyoma, hemangioma, teratoma, papillary fibroelastoma, or cystic tumors of the atrioventricular nodal region [2]. Cardiac lipomas account for 2% to 8% of benign tumors, with autopsy reports showing a detection rate of <0.1% in the general population. Cardiac lipomas can originate from the endocardium, epicardium, myocardium, or pericardium, and can occur in any part of the heart, but the most common sites are the right atrium and left ventricle [3]. Based on their location, cardiac lipomas can be divided into three types: subepicardial, intramyocardial, and subendocardial lipomas, with subendocardial lipomas being the most common, accounting for over 50% of primary cardiac lipomas. Clinical symptoms largely depend on the size and growth location of the tumor, with most patients with cardiac lipomas being asymptomatic and the tumors usually being discovered incidentally during health examinations. Depending on the location and size of the lipoma, symptoms of compression or obstruction may occur, such as valvular dysfunction, congestive heart failure, and dyspnea [4, 5]. Larger cardiac lipomas can lead to complications such as ventricular outflow tract obstruction, electrical disturbances, embolism, or pericardial effusion. Symptomatic lipomas can be treated with curative surgical excision.

Cardiac lipoma is a rare primary benign cardiac tumor that can be divided into different types according to its location and microscopic appearance. Transmural right atrial lipoma is a relatively rare type. This type of lipoma may have a certain impact on adjacent structures both inside and outside the atrial wall. Although the lipoma in this case did not have a significant impact on valvular function or blood flow, the patient experienced recurrent symptoms of palpitations and tightness in the chest. Therefore, surgical treatment was considered an effective measure. Additionally, although the lipoma was benign, it exhibited transmural growth both inside and outside the right atrium, indicating a certain degree of invasiveness.

2. Case Presentation

A 53-year-old female patient was admitted to the hospital due to "recurrent palpitations and tightness in the chest for 5 years, worsening over the past 2 days." The patient had experienced palpitations and chest tightness without any obvious triggers five years prior, which worsened after physical activity. She occasionally experienced syncope but had no headaches, chest discomfort, cyanosis of the lips, clubbing of the fingers, squatting episodes, or nocturnal paroxysmal dyspnea and orthopnea. Two days prior to admission, the patient sought treatment at our hospital due to worsening symptoms of palpitations and chest tightness. Upon admission, physical examination revealed: a temperature of 36.7 ℃, pulse of 68 beats/minute, respiration of 16 breaths/minute, blood pressure of 133/92 mmHg, no abnormal protrusions in the precordial area, no enlargement of the cardiac silhouette, normal apical impulse located 0.5 cm inside the midclavicular line of the left fifth intercostal space, no abnormal protrusions or depressions, heart rate 68 beats/min, regular rhythm, and no pathological murmurs heard in any valvular auscultation areas. Electrocardiogram indicated: sinus rhythm with T wave changes. Transthoracic echocardiography showed a hypoechoic mass approximately 3.1 cm x 3.0 cm in size within the right atrium, with clear boundaries, relatively regular shape, certain mobility, and no significant blood flow signal within the mass. The tricuspid valve had unobstructed antegrade flow, Vmax=0.5 m/s, unobstructed flow in the superior and inferior vena cava, and normal left ventricular systolic function. A right atrial mass was considered: nature? Chest CT suggested a fat-density nodule within the right atrium, measuring approximately 3.0 cm x 2.5 cm in its largest transverse dimension, suggestive of a lipoma. (Figure 1A). Preoperative laboratory tests showed no significant abnormalities. The patient was scheduled for open-chest surgery with extracorporeal circulation for the excision of the right atrial mass. Intraoperative TEE examination revealed a mass in the right atrium with a broad base, closely connected to the right atrial wall, without signs of tricuspid valve obstruction (Figure 1B). Intraoperative exploration revealed a yellow, smooth-surfaced mass approximately 3.0 cm x 3.0 cm in size, penetrating the right atrial wall and protruding into the right atrium (Figure 1C). The mass and a 2 mm margin of the right atrial wall were completely excised (Figure 1D), and the defect in the right atrial wall was repaired with an appropriately sized bovine pericardial patch. Postoperative TEE showed the disappearance of the right atrial mass. Pathological examination of the excised right atrial mass revealed a gray-yellow tumor, measuring 3.7 cm x 3.2 cm x 2.3 cm, with a smooth surface, intact capsule, lobulated appearance, soft and greasy texture, with no gray-white areas or hemorrhagic necrosis observed on multiple sections, diagnosed as a lipoma. The patient was transferred to the general ward after a stay in the intensive care unit and was discharged 5 days postoperatively. Follow-up revealed no recurrence of the tumor or symptoms of palpitations and chest tightness.

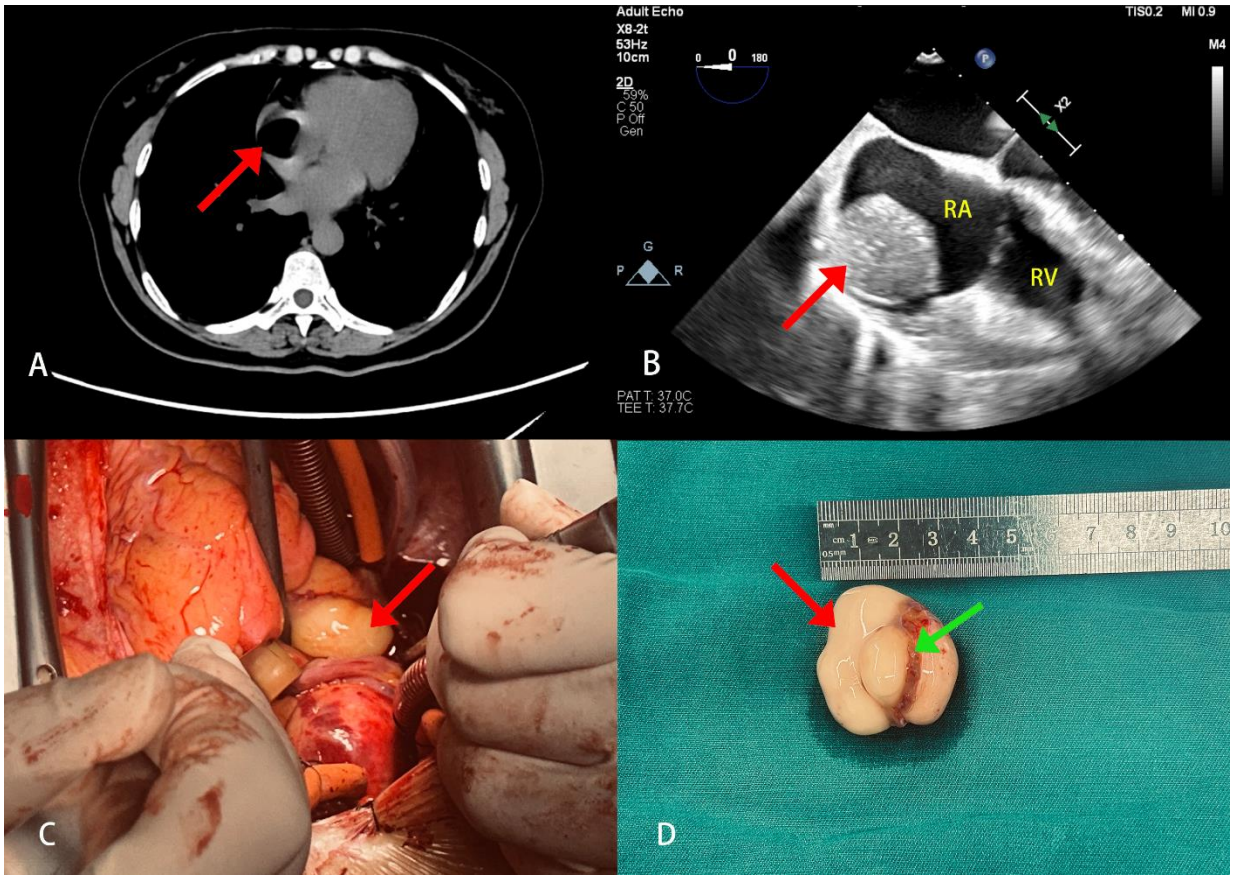

Figure 1. *A: Chest CT indicates a fat-density nodule within the right atrium, measuring approximately 3.0 cm x 2.5 cm in size (red arrow); B: TEE reveals a mass in the right atrium with a broad base, closely connected to the right atrial wall, without signs of tricuspid valve obstruction (red arrow); C: Intraoperative exploration identified a yellow, smooth-surfaced mass approximately 3.0 cm x 3.0 cm in size, penetrating the right atrial wall and protruding into the right atrium (red arrow); D: The completely excised right atrial mass (red arrow) and a portion of the right atrial wall (green arrow). RA, right atrium; RV, right ventricle.*

3. Discussion

Primary cardiac tumors are rare diseases, with an overall incidence of <0.33%, accounting for 5% of all cardiac tumors, while secondary tumors (cardiac metastases) account for 95%. Symptoms are nonspecific and can mimic many other cardiac diseases. This makes the diagnosis of cardiac tumors extremely challenging [2]. More than three-quarters of primary cardiac tumors are benign, with myxomas and rhabdomyoma being the most common cardiac tumors in adults and children, respectively [6]. Cardiac lipomas are rare benign encapsulated tumors. Lipomas are defined as mesenchymal tumors visible in locations where adipose tissue normally exists. Lipomas can be divided into two types: one is the slowly growing subcutaneous lipoma, and the other is the intramuscular lipoma, also known as deep lipoma, which is a type of ectopic lipoma that often occurs in the muscular tissue of the upper and lower limbs. Primary cardiac lipomas are very rare among primary cardiac tumors, accounting for 2%-8% of all benign cardiac tumors [7]. The pathogenesis of cardiac lipomas is thought to be related to fat metabolism disorders, typically presenting as benign tumors with an intact capsule containing typical mature adipocytes, similar to lipomas that occur in other parts of the body. Cardiac lipomas can originate from the endocardium, epicardium, myocardium, or pericardium, and can occur in any part of the heart, but the most common locations are the right atrium and left ventricle [3]. Cardiac lipomas include lipomas, lipomatous hypertrophy of the interatrial septum (LHIS), and intramyocardial lipomas [8]. Based on their histological appearance, cardiac lipomas can be classified into three types: solitary lipomas, intramyocardial lipomas, and special types of lipomas (including atrioventricular valve lipomatous hamartomas and lipomatous hypertrophy of the interatrial septum). According to their location, cardiac lipomas can be classified into three types: subepicardial lipomas, intramyocardial lipomas, and subendocardial lipomas, with subendocardial lipomas having the highest incidence, accounting for more than 50% of primary cardiac lipomas. Lipomas located within the myocardium are usually smaller and have a complete capsule, occasionally growing on the mitral or tricuspid valves, while those located in the pericardium can exceed 10 cm in diameter. The common age of onset is 40-60 years [9].

The clinical symptoms of cardiac lipomas largely depend

on the size of the tumor and its location. Lipomas generally remain asymptomatic unless they are located in the visceral or parietal pericardium and are large enough to compress the heart, causing obstructed blood flow. When the tumor invades the cardiac or pericardial cavities leading to blood flow obstruction, valve dysfunction, or compression of the heart and the major vessels connected to it, symptoms such as palpitations, panic, chest tightness, shortness of breath, suffocation, dizziness, cough, and chest pain may occur [10]. Additionally, infiltrative lipomas, due to their involvement in the cardiac conduction system, can lead to arrhythmias such as premature contractions, atrial fibrillation, and ventricular tachycardia [11]. It is generally believed that most cardiac lipomas are asymptomatic, and symptomatic lipomas can be treated with curative surgical excision [12]. With advances in diagnostic tools and therapeutic techniques, the detection and diagnosis of cardiac lipomas have improved, leading to an increase in cases with atypical presentations [13].

The diagnostic modalities for cardiac lipomas include echocardiography, CT, and magnetic resonance imaging (MRI) examinations, with histopathological examination being the gold standard for diagnosing cardiac lipomas. Echocardiography is the preferred initial examination [14]. Echocardiographic examination is simple and convenient, commonly used for the initial diagnostic assessment of cardiac lipomas. Echocardiography can depict various characteristics of cardiac masses, including the texture, size, shape, location, attachment site, mobility, and presence of secondary hemorrhage, as well as evaluate the hemodynamic changes and valvular function alterations caused by the cardiac mass. However, the appearance of cardiac lipomas on echocardiography is typically atypical, with features such as low mobility, localized lesions, and homogeneous echogenic masses, generally without calcification. These characteristics can help differentiate cardiac lipomas from intracardiac thrombi, endocarditis vegetations, other primary tumors, and metastatic tumors. When transthoracic echocardiographic imaging is suboptimal or unclear, TEE can be performed, which may reveal smaller lesions within the cardiac structure, clarify the extent of cardiac masses, and allow for percutaneous biopsy of the mass. Echocardiography, CT, and MRI can all achieve diagnostic objectives, with MRI being considered more authoritative [15]. Currently, there is no uniform treatment approach for cardiac lipomas. It is generally believed that surgical intervention is advisable for symptomatic cases to alleviate symptoms and prevent disease progression, while there is no consensus on the treatment of asymptomatic patients.

The patient in this case presents with a relatively rare transmural right atrial lipoma, a type of lipoma that may affect the structures adjacent to both the interior and exterior of the atrial wall. Although the lipoma did not significantly impact valve function or blood flow in this case, the patient experienced recurrent symptoms of palpitations and tightness in the chest, making surgical treatment an effective intervention. Despite being a benign tumor, this lipoma exhibited transmural growth within and outside the right atrium, showing certain invasive characteristics. Preoperative transthoracic echocardiography and chest CT scans have certain limitations and can not provide a definitive diagnosis. The combination with magnetic resonance imaging would offer more advantages, while intraoperative TEE could more clearly define the extent of the cardiac mass. Histopathological examination remains the gold standard for diagnosing cardiac lipomas.

4. Conclusion

Primary cardiac tumors are rare, with cardiac lipomas being even more uncommon among them. Transmural right atrial lipomas represent an even rarer subtype of cardiac lipomas. Due to their trans-atrial wall growth, exhibiting transmurality within and outside the right atrium, and possessing a certain degree of invasiveness, these lipomas may affect structures adjacent to both the interior and exterior of the atrial wall. Surgical treatment should be actively pursued for symptomatic cardiac lipomas. We report a rare case of a transmural right atrial lipoma. Although the lipoma did not impact the surrounding valves, vessels, and other structures, the patient's symptoms of palpitations and chest tightness were significant, leading to a favorable prognosis following surgical intervention.

Abbreviations

CT	Computed Tomography
TEE	Transesophageal Echocardiography
RA	Right Atrium
RV	Right Ventricle
LHIS	Lipomatous Hypertrophy of the Interatrial Septum
MRI	Magnetic Resonance Imaging

Author Contributions

Lin Song: Conceptualization, Data curation, Writing – original draft

Xuejie Li: Supervision, Visualization, Writing – review & editing

Conflict of Interests

The authors declare no conflicts of interest.

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