Posted on Authorea 7 Jun 2021 — The copyright holder is the author/funder. All rights reserved. No reuse without permission. — https://doi.org/10.22541/au.162307994.45927856/v1 — This a preprint and has not been peer reviewed. Data may be preliminary.

Giant Interatrial Septal Lipoma Filling with Right Atrium Causing Slight Symptoms: A Case Report

Mingxiang Chen[1], Fuping Li[1], Haitao Zhang[1], and Zhuyun Qin[1]

[1]Affiliation not available

June 7, 2021

Abstract

Cardiac lipoma is extremely rare. Here we presented a unique illustrative case of interatrial septal lipoma protruding into right atrial causing symptoms in a 54-year-old male. Echocardiogram and computed tomography showed a well-shaped, giant and fixed occupying located in interatrial septum and right atrium. The only manifestation was palpitation though the mass filled almost all atrium and compressed superior vena cava. The patient received resection of the large-sized lipoma sizing 87mm in diameter and weighing ˜1000g. Pathological exam demonstrated mature lipocytes and substantiated the diagnosis of lipoma. The patient did well postoperatively and symptoms were resolved.

Giant Interatrial Septal Lipoma Filling with Right Atrium Causing Slight Symptoms: A Case Report

Mingxiang Chen MD1, Fuping Li MD1, Haitao Zhang, MD2, Zhuyun Qin MD2, *

1Department of Cardiovascular Surgery, The Third Affiliated Hospital of Chongqing Medical University, Chongqing, China

2Adult Cardiac Surgical Intensive Care Unit, Fuwai hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China

*Correspondence: Zhuyun Qin, MD, Email: qinzhuyun@163.com

Abstract: Cardiac lipoma is extremely rare. Here we presented a unique illustrative case of interatrial septal lipoma protruding into right atrial causing symptoms in a 54-year-old male. Echocardiogram and computed tomography showed a well-shaped, giant and fixed occupying located in interatrial septum and right atrium. The only manifestation was palpitation though the mass filled almost all atrium and compressed superior vena cava. The patient received resection of the large-sized lipoma sizing 87mm in diameter and weighing ˜1000g. Pathological exam demonstrated mature lipocytes and substantiated the diagnosis of lipoma. The patient did well postoperatively, and symptoms were resolved.

Key words: cardiac tumor; cardiac lipoma; case report; literature review;

1. Introduction

Primary cardiac tumor is rare, the incidence is in a range of 1.38 to 30 per 100,000 people per year; among adult patients over 16 years old, benign tumors account for 80% of primary tumors and 21% of benign tumors are lipomas1. Patients with cardiac lipoma are usually asymptomatic and can sometimes present with various symptoms, such as heart failure, arrhythmias, cardiac compression and valvular obstruction. Embolization can also occur if the tumor is not well encapsulated2. Due to the low prevalence of cardiac lipoma, currently there is no according treatment guidelines. Patients with asymptomatic cardiac lipoma can be clinically observed and symptomatic patients usually accept tumorectomy. Here, we reported a unique case of an illustrative giant cardiac lipoma located in interatrial septum and protruded into right atrium

Posted on Authorea 7 Jun 2021 — The copyright holder is the author/funder. All rights reserved. No reuse without permission. — https://doi.org/10.22541/au.162307994.45927856/v1 — This a preprint and has not been peer reviewed. Data may be preliminary.

that caused symptoms and accepted surgery removal that evaded patching to reconstruct interatrial septum. The report was approved by the Ethics Committee of The Third Affiliated Hospital of Chongqing Medical University, and written informed consent was obtained from the individuals for the publication of any images or data included in this article. Clinical trial registration is not applicable for this report.

2. Case Report

A 54-year-old East Asian male patient was admitted to the local hospital with chief complaint of recurrent spontaneous paroxysmal palpitation for 1 year, this symptom became more frequent for 1 month. No aberrant signs found on physical examination. Patient's NT-proBNP was 493.30 pg/ml (normal range: 0-125 pg/ml). The cardiac function of the patient was class I on NYHA classification. The rhythm was sinus on electrocardiogram (ECG). Echocardiogram presented an ovoid mass located in the right atrium and tightly attached to the interatrial septum. The border of the mass was clear except the adherent part (Figure 1A, 1B). Left ventricular ejection fraction was 58%. Coronary computed tomography angiography (CTA) revealed a large mass within the interatrial septum and right atrium, taking up almost all the roof of the right atrium and constricting the superior vena cava (SVC). The upper part of the mass surrounded the aortic root. The size of the mass was 58mm×87mm×52mm and the density was distinctly lower than the peripheral tissues (Figure 1C). The patient was then diagnosed as cardiac lipoma and received surgery through a median sternotomy under cardiopulmonary bypass. An ovoid, yellowish and brownish mass was exposed between right auricle and SVC after opening patient's pericardium (Figure 2A). The mass was well-capsulated, vessel free and connected with interatrial septum. Through right atrial atriotomy, a firm, lipoid change of the interatrial septum was presented. Fossa ovalis was absent; tricuspid valve and coronary sinus were free from affected. The sessile tumor en bloc sizing 87mm in diameter was isolated gradually by elongating the incision to the roof of the right atrium (Figure 2B, 2C). Interatrial septum was reconstructed by barely suturing and there was no incidence occurred during surgery. Mass sample was performed with hematoxylin-eosin (HE) staining. Adipocytes and myocardial tissue were intersected under a light scope (Figure 3A). The patient did well postoperatively, though there was an intermittent palpitation, the symptom was obviously relieved. Postoperative CT revealed no anomaly (Figure 3B). Frequent ventricular premature beats were found on postoperative ECG when the patient suffering palpitation (Figure 3C). The patient complaint no other discomfort during the next 8 days of in-hospital follow-up and eventually discharged. Patient remained asymptomatic on the follow-up of next 15 month.

3. Discussion

Cardiac lipomas mostly occur in an age group of 40-60 years old3. Patients with cardiac lipoma are usually asymptomatic, thus the tumor is often found incidentally during imaging check or autopsy4. Symptoms caused by cardiac lipoma depends on its size and location. In this reported case, the only clinical manifestation of the patient was palpitation. Adipocyte infiltration in myocardium attributes to perturbation of myocardial conductivity and leads to arrhythmia5. Although the preoperative ECG of this patient was normal, postoperative ECG revealed frequent ventricular premature beats, alongside with the HE staining result that mature fat cells and myocardial cells are crossing, indicating that patient's preoperative palpitation was probably caused by adipocytes causing related arrhythmia. The mechanisms of adipocytes disturb cardiac conductivity is so far poorly elucidated and still in progress of research. Mitochondrial dysfunction, autonomic dysfunction, autophagy, oxidative stress, mitophagy and myocardial death may all play vital roles in inducing aberrant signals6.

Cardiac lipoma accounts for 5% of primary cardiac tumors, it develops from mesoderm and arise subendocardially, subepicardially and myocardially7. Among these origins, lipomas of subendocardial and subepicardial origin are encapsulated and partially encapsulated as for myocardial origin. Cardiac lipoma can occur anywhere in the heart, of which interatrial septum is the most common position8. In this case, lipoma at the right atrium was well-enclosed, while in the interatrial septal area, no capsule was presented. It baffled the surgeons, however, whether the origin of cardiac lipoma in this case was arising from interatrial septum and protruding to atrium or arising from epicardium and infiltrating to interatrial septum.

Posted on Authorea 7 Jun 2021 — The copyright holder is the author/funder. All rights reserved. No reuse without permission. — https://doi.org/10.22541/au.162307994.45927856/v1 — This a preprint and has not been peer reviewed. Data may be preliminary.

Because of the location and the traits of lipoma, interatrial septal lipoma is usually differentiated with lipomatous hypertrophy in interatrial septum (LHIAS). LHIAS and interatrial septal lipoma are both benign lipomatous changes in heart, consisting of mature fat cells. LHIAS, occurring in 2% of populations, is interspersed lipocytes grow within interatrial septum and make it thicker than 2cm, the fossa ovalis is usually spared1. Of note, differing from lipoma, LHIAS is unencapsulated and presents a typical dumbbell shape on CT scan9.

Though the etiology of cardiac lipoma is under investigation, genetical change can be strongly related. The rearrangements of two gene members of high-motility group family, HMGA1 (formerly HMGIY,6p21) and HMGA2 (formerly HMGI-C, 12q14) have been demonstrated involving in the pathogenesis of 65% soft tissue lipomas10. Moreover, amplification of MDM2 and/or CPM, derived from chromosome 12q13-15, are also implicated in lipomatous change11. Nevertheless, in one study, HMGA2 rearrangement was found in 42% cardiac lipomas and in 43% LHIAS cases while no HMGA1 rearrangement and MDM2/CPM amplification were demonstrated in either lipomas or LHIAS4. Therefore, genetical screening can be performed for strengthening the diagnosis and may also be an effective prevention and treatment of cardiac lipoma in the future.

The scarcity of cardiac lipomas brings no treatment guideline at present. In this reported case, resection was inevitable. SVC was deformed by the tumor, though no symptoms of obstruction were shown, further growth of the mass could have led to potential SVC obstruction syndrome and venal thrombus formation. Even if lipoma is benign, it can expand in size and oppress the heart, shrinking the volume of cardiac chambers and impairing the heart function, which can be fatal to patients. Furthermore, due to part of this lipoma was not encapsulated, fat liquefaction can also occur and subsequently cause fat embolism. The surgical option can decide the outcome of patients with cardiac tumors. Naseerullah FS et al.12 reported a large cardiac lipoma case with surgery removal and reconstruction of atrial septum and roof of right atrium using patch. No patch, however, was used in our case in order to avoid risk of thrombogenesis and other unpredictable symptoms like arrhythmias. Surgery provides 95% cure of cardiac benign tumor12, however, surgeons should take the surgery option into consideration so that potential hazards get evitable on patients.

Acknowledgment

All authors thank Ruoxi Sun for her assistance on providing information about CT reading.

Disclosure Statement

The authors report no conflict of interest regarding the content.

References

1. Poterucha TJ, Kochav J, O'Connor DS, Rosner GF. Cardiac Tumors: Clinical Presentation, Diagnosis, and Management. Curr Treat Options Oncol. 2019;20(8):66.

2. Rainer WG, Bailey DJ, Hollis HW, Jr. Giant Cardiac Lipoma: Refined Hypothesis Proposes Invagination from Extracardiac to Intracardiac Sites. Tex Heart Inst J. 2016;43(5):461-464.

3. Ismail I, Al-Khafaji K, Mutyala M, et al. Cardiac lipoma. J Community Hosp Intern Med Perspect. 2015;5(5):28449.

4. Bois MC, Bois JP, Anavekar NS, Oliveira AM, Maleszewski JJ. Benign lipomatous masses of the heart: a comprehensive series of 47 cases with cytogenetic evaluation. Hum Pathol. 2014;45(9):1859-1865.

5. Wong CX, Ganesan AN, Selvanayagam JB. Epicardial fat and atrial fibrillation: current evidence, potential mechanisms, clinical implications, and future directions. Eur Heart J. 2017;38(17):1294-1302.

6. Pabon MA, Manocha K, Cheung JW, Lo JC. Linking Arrhythmias and Adipocytes: Insights, Mechanisms, and Future Directions. Front Physiol. 2018;9:1752.

Posted on Authorea 7 Jun 2021 — The copyright holder is the author/funder. All rights reserved. No reuse without permission. — https://doi.org/10.22541/au.162307994.45927856/v1 — This a preprint and has not been peer reviewed. Data may be preliminary.

7. Puvaneswary M, Edwards JR, Bastian BC, Khatri SK. Pericardial lipoma: ultrasound, computed tomography and magnetic resonance imaging findings. Australas Radiol. 2000;44(3):321-324.

8. Monti L, Scardino C, Nardi B, Balzarini L. Lipoma of the interventricular septum. Eur Heart J. 2015;36(44):3073.

9. Hudzik B, Filipiak K, Zembala M, et al. Lipomatous hypertrophy of the interatrial septum: a rare cause of right ventricular impairment. J Card Surg. 2010;25(2):171-174.

10. Rodriguez FJ, Erickson-Johnson MR, Scheithauer BW, Spinner RJ, Oliveira AM. HMGA2 rearrangements are rare in benign lipomatous lesions of the nervous system. Acta Neuropathol. 2008;116(3):337-338.

11. Erickson-Johnson MR, Seys AR, Roth CW, et al. Carboxypeptidase M: a biomarker for the discrimination of well-differentiated liposarcoma from lipoma. Mod Pathol. 2009;22(12):1541-1547.

12. Naseerullah FS, Javaiya H, Murthy A. Cardiac Lipoma: An Uncharacteristically Large Intra-Atrial Mass Causing Symptoms. Case Rep Cardiol. 2018;2018:3531982.

figures/Figure-1/Figure-1-eps-converted-to.pdf

Posted on Authorea 7 Jun 2021 — The copyright holder is the author/funder. All rights reserved. No reuse without permission. — https://doi.org/10.22541/au.162307994.45927856/v1 — This a preprint and has not been peer reviewed. Data may be preliminary.

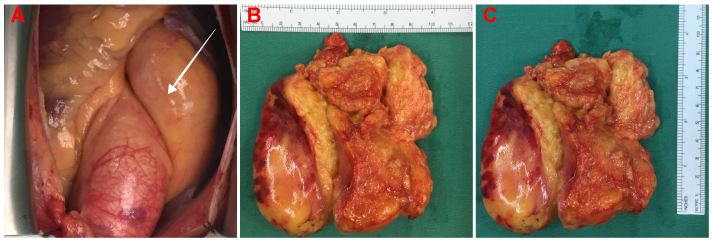
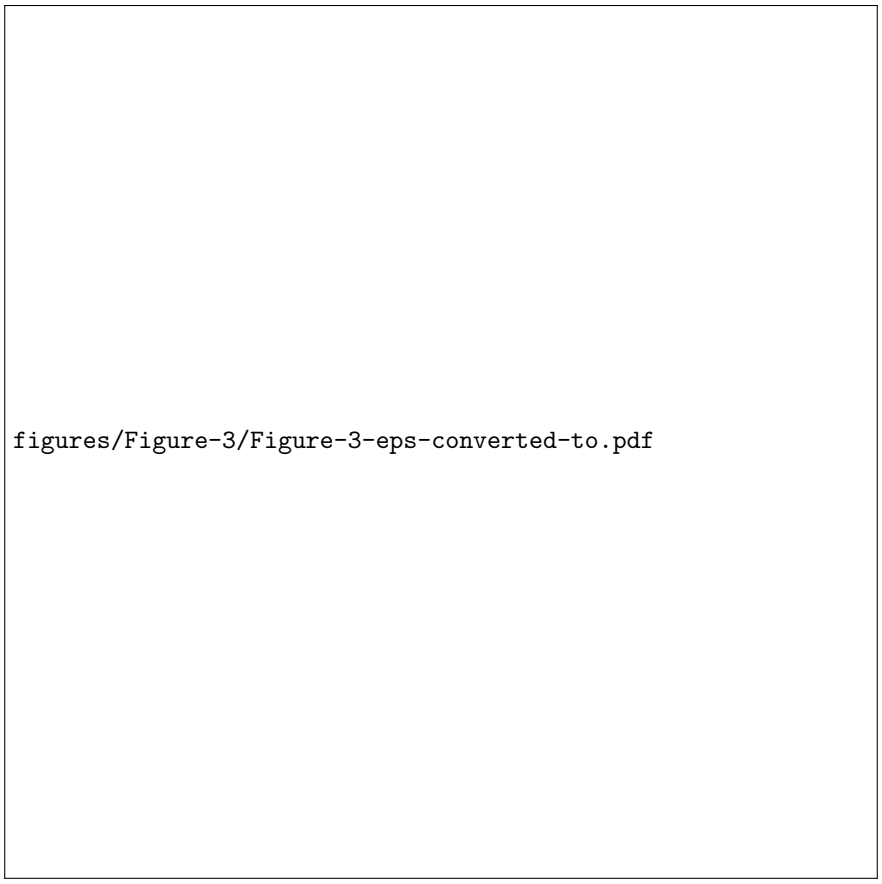


Figure 2 Surgical views of lipoma. A, The view of lipoma (arrow) during operation; B,C, Gross view of resected lipoma specimen.



Posted on Authorea 7 Jun 2021 — The copyright holder is the author/funder. All rights reserved. No reuse without permission. — https://doi.org/10.22541/au.162307994.45927856/v1 — This a preprint and has not been peer reviewed. Data may be preliminary.