BMC Cardiovascular Disorders

CASE REPORT

Open Access

Strategies to rare primary cardiac lipomas in the left ventricle in a patient: case report

Wei Liu and Haisong Bu*

Abstract

Background: Primary cardiac tumors are rare in all age groups and are usually benign. Symptoms are usually related to tumor size, location, invasiveness, number, and growth rate. While histologically benign, cardiac arrest may be caused by blocked inflow or outflow or malignant ventricular arrhythmia. Surgical resection of left ventricular tumors, especially those involving the outflow tract, is challenging.

Case presentation: Herein, we present a rare case of an asymptomatic, 39-year-old woman who was referred to our cardiovascular department for a huge left ventricular cardiac mass incidentally discovered during the physical examination. Images showed a huge mass that quasi-circular low-density focus with a clear boundary and regular shape in the left ventricular cavity and fortunately had no significant effect on the peripheral valves and hemodynamics.

Conclusions: This illustrative report highlights the exact surgical management of a cardiac tumor depends largely on the site and extent of the mass. Mechanical compromise and not the neoplastic potential should be considered. A conservative approach and follow-up regularly are advocated to ensure that the patient gets the best diagnosis and treatment, however, surgery is indicated only for severely symptomatic patients with hemodynamic compromise.

Keywords: Cardiac tumors, Benign, Left ventricle, Image, Surgery

Background

Primary cardiac tumors are rare in all age groups and are usually benign [1]. Symptoms are usually related to tumor size, location, invasiveness, number, and growth rate [2, 3]. The general symptoms were tumor-related intracardiac obstruction, compression of extracardiac large vessels, distal embolism of tumor fragments or adherent thrombi, and local tumor infiltration [4]. Cardiac tumors are usually difficult to find in the early stage and have no obvious symptoms. Most of them are found in routine screening or physical examination. While histologically benign, cardiac arrest may be caused by blocked inflow or outflow or malignant ventricular arrhythmia [3]. The surgical treatment strategy of cardiac tumor mainly depends on the patient's symptoms and the location of the mass. Surgical resection of left ventricular tumors, especially those involving the outflow tract, is challenging [5]. However, partial resection and asymptomatic conservative treatment strategies have been paid more and more attention [3].

Case presentation

An asymptomatic, 39-year-old woman was referred to our cardiovascular department for a huge left ventricular cardiac tumor incidentally discovered during the physical examination. Occasional shortness of breath after activity was dictated. Physical examination revealed that the heart rate was 76 bpm with breathing 23 times/min. There were no other meaningful clinical manifestations. Echocardiography showed a huge mass in the left ventricle (approximately 30 mm × 35 mm) (Fig. 1A and B, arrows) that had no significant effect on the peripheral valves and hemodynamics. The diameters of the right

*Correspondence: buhaisong@csu.edu.cn

Department of Cardiovascular Surgery, Xiangya Hospital, Central South University, 87 Xiangya Road, Changsha 410008, Hunan, People's Republic of China

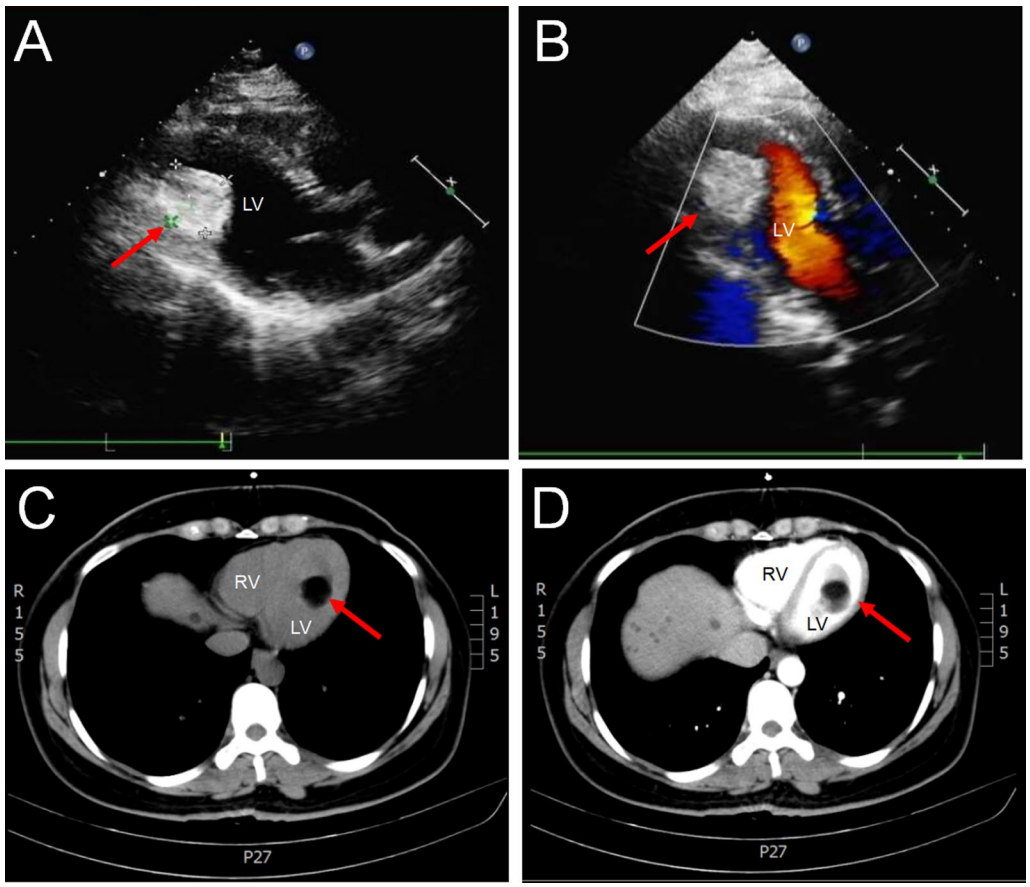

Fig. 1 Echocardiography revealed an echo-bright mass in the LV (**A**). Color-flow Doppler echocardiography showed no significant effect on the peripheral valves and hemodynamics (**B**). Cardiac computed tomography was performed and revealed a quasi-circular low-density focus with a clear boundary and regular shape in the LV (**C** and **D**). LV: left ventricle; RV: right ventricle

ventricle (RV), the left ventricle (LV), and left ventricular posterior wall (LVPW) were 15, 48, and 9, respectively. The left ventricular systolic function was normal with an ejection fraction of 62%. Cardiac computed tomography (CT) was performed and revealed a quasi-circular low-density focus with a clear boundary and regular shape in the left ventricular cavity (Fig. 1C and D, arrows). Cardiac magnetic resonance imaging (MRI) was also confirmed a no obvious enhancement lesion after perfusion in the LV with a clear boundary and exhibited a lipoma characteristic appearance (Fig. 2A–D, arrows). Based on the clinical symptoms and imaging results, our initial diagnosis was benign cardiac tumor: lipoma? Following communication with the patient, the patient refused surgical treatment and would perform conservative treatment strategies due to the lack of clinical symptoms support, the characteristics of lipoma disease and coupled with the heavy economic burden. The patient was followed up regularly. A MRI Brain should also be done in follow up to assess any occult embolization to cerebral microcirculation.

Discussion and conclusions

Primary cardiac tumors are rare disease, and 80% of it is histologically benign [6]. According to the autopsy series, the incidence fluctuated between 0.0017 and 0.28% [7]. Symptoms are usually related to tumor size, location, invasiveness, number, and growth rate [3]. If symptoms occur, they are usually nonspecific, such as heart murmur, arrhythmia, dyspnea, and congestive heart failure [8].

Echocardiography is the primary imaging technique for the evaluation of cardiac tumors. Tumor location, extent, and characteristics (single or multiple, intramuscular or intracavitary, solid or cystic) can be evaluated accurately and rapidly. Color-flow Doppler echocardiography is of great significance in evaluating the obstructive nature and hemodynamics of cardiac tumors [9]. Echocardiography has a strong sensitivity to intraluminal tumors, while other types may need to be combined with other detection methods [10]. Cardiac CT or MRI provides complementary information to echocardiography. MRI

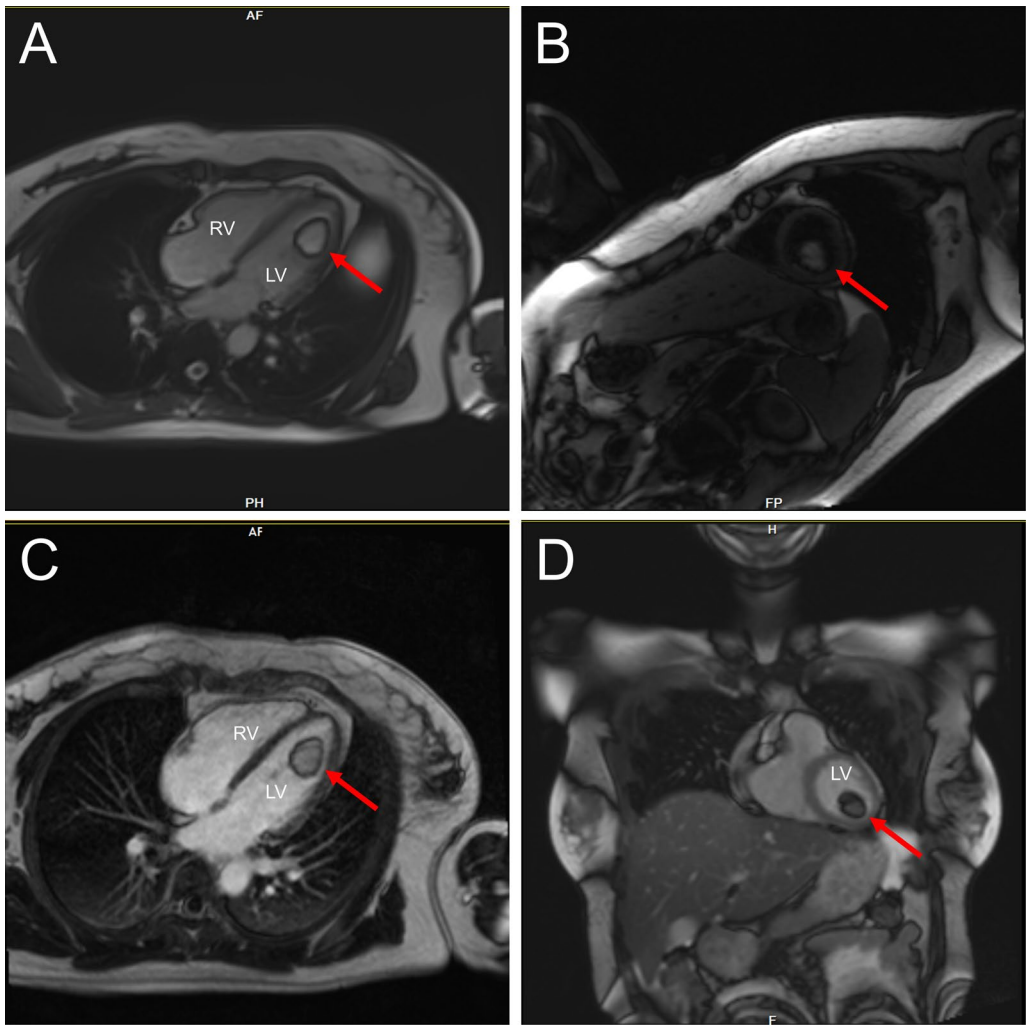

Fig. 2 Magnetic resonance imaging confirmed a huge low signal non-enhancing lesions in the LV with a clear boundary and no obvious enhancement after perfusion (**A**–**D**). LV: left ventricle; RV: right ventricle

helps to elucidate the relationship of the tumor to the normal myocardium and the great vessels [11]. It can not only provide information about tumor location, size and boundary, but also identify some tumor tissue types, such as lipoma, to enhance its value as a non-invasive diagnostic tool [12]. This feature is particularly valuable in planning the extent and feasibility of tumor resection.

Although the surgical treatment strategy of cardiac tumor mainly depends on the patient's symptoms and the location of the mass, some general comments regarding surgical resection are appropriate. Surgical resection of left ventricular tumors, especially those involving the outflow tract, is challenging [5]. In the interest of avoiding a left ventriculotomy, some tumors may be excised via a retrograde technique involving an aortotomy and retraction of the aortic valve leaflets. Ross operation is mainly applicable to the left ventricular outflow tract and aortic valve involvement [13]. Benign cardiac tumors are non-invasive, so we should focus on mechanical injury and reduce the concern of tumor potential [14]. Rhabdomyomas are the most common tumor type, and most patients have spontaneous regression [15].Therefore, a conservative approach is advocated to allow the tumor to regress, and surgery is indicated only for severely symptomatic patients with hemodynamic compromise or patients with refractory dysrhythmias [16].

For heart tumors, surgeons usually try to remove them completely. Some doctors even indicate that the primary surgical goal should be to remove the tumor as radically as possible and remove any potential obstacles in any case [17]. Extensive myocardial involvement of the tumor or its proximity to critical structures (e.g., coronary

arteries or valves) may preclude complete excision. However, partial resection can also achieve satisfactory surgical results [3]. Thus, total resection of the tumor is not the only therapeutic aim, and it is more important to maintain good cardiac function, such as partial resection and conservative approach [14].

This illustrative report highlights cardiac lipomas are rare and histologically benign, and they have a high propensity to cause obstruction, arrhythmias or cardiac arrest. However, the exact surgical management of a cardiac tumor depends largely on the site and extent of the mass. Mechanical compromise and not the neoplastic potential should be considered. A conservative approach and follow-up regularly are advocated to ensure that the patient gets the best diagnosis and treatment, however, surgery is indicated only for severely symptomatic patients with hemodynamic compromise.

Abbreviations
RV: Right ventricle; LV: Left ventricle; LVPW: Left ventricular posterior wall; CT: Computed tomography; MRI: Magnetic resonance imaging.

Acknowledgements
We thank all patients and their parents for participating in this study.

Author contributions
HB and WL conceived and designed the study and drafted the manuscript. HB and WL collected the data. WL was involved in data cleaning and verification. HB and WL analyzed the data and critically revised manuscript. All authors were involved in the final draft of the manuscript. All authors read and approved the final manuscript.

Funding
This work was supported by the Natural Science Foundation of Hunan Province (2022JJ40765) and Natural Science Foundation of Changsha City, China (kq2202366). The funders had no role in study design, data collection, and analysis, decision to publish, or preparation of the manuscript.

Availability of data and materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
Written informed consent was obtained from the patient to the use of her all the related images and information for scientific purposes. The study was approved by the Ethics Committee of Xiangya Hospital of Central South University, Changsha, China.

Consent to publish
Written informed consent was obtained from the patient for publication of this research and any accompanying images and videos. A copy of the written consent is available for review by the Editor of this journal.

Competing interests
The authors declare that they have no competing interests.

Received: 28 December 2021 Accepted: 4 July 2022
Published online: 15 July 2022

References
1. Careddu L, Oppido G, Petridis FD, Liberi R, Ragni L, Pacini D, Pace Napoleone C, Angeli E, Gargiulo G. Primary cardiac tumours in the paediatric population. Multimed Man Cardiothorac Surg. 2013;2013:mmt013.
2. Pinede L, Duhaut P, Loire R. Clinical presentation of left atrial cardiac myxoma. A series of 112 consecutive cases. Medicine (Baltimore). 2001;80(3):159–72.
3. Bu H, Gong Y, Xie L. Partial Resection of a Huge Left Ventricle Cardiac Fibroma in an Asymptomatic Child. Ann Thorac Surg. 2019;108(6):e393–5.
4. Huang Z, Sun L, Du M, Ruan Y, Wang H. Primary cardiac valve tumors: early and late results of surgical treatment in 10 patients. Ann Thorac Surg. 2003;76(5):1609–13.
5. Black MD, Kadletz M, Smallhorn JF, Freedom RM. Cardiac rhabdomyomas and obstructive left heart disease: histologically but not functionally benign. Ann Thorac Surg. 1998;65(5):1388–90.
6. Elbardissi AW, Dearani JA, Daly RC, Mullany CJ, Orszulak TA, Puga FJ, Schaff HV. Survival after resection of primary cardiac tumors: a 48-year experience. Circulation. 2008;118(14 Suppl):S7-15.
7. Silverman NA. Primary cardiac tumors. Ann Surg. 1980;191(2):127–38.
8. Verhaaren HA, Vanakker O, De Wolf D, Suys B, Francois K, Matthys D. Left ventricular outflow obstruction in rhabdomyoma of infancy: meta-analysis of the literature. J Pediatr. 2003;143(2):258–63.
9. Padalino MA, Basso C, Milanesi O, Vida VL, Moreolo GS, Thiene G, Stellin G. Surgically treated primary cardiac tumors in early infancy and childhood. J Thorac Cardiovasc Surg. 2005;129(6):1358–63.
10. Perchinsky MJ, Lichtenstein SV, Tyers GF. Primary cardiac tumors: forty years' experience with 71 patients. Cancer. 1997;79(9):1809–15.
11. Bouton S, Yang A, McCrindle BW, Kidd L, McVeigh ER, Zerhouni EA. Differentiation of tumor from viable myocardium using cardiac tagging with MR imaging. J Comput Assist Tomogr. 1991;15(4):676–8.
12. King SJ, Smallhorn JF, Burrows PE. Epicardial lipoma: imaging findings. AJR Am J Roentgenol. 1993;160(2):261–2.
13. Giamberti A, Giannico S, Squitieri C, Iorio FS, Amodeo A, Carotti A, Picardo S, Marcelletti C. Neonatal pulmonary autograft implantation for cardiac tumor involving aortic valve. Ann Thorac Surg. 1995;59(5):1219–21.
14. Bertolini P, Meisner H, Paek SU, Sebening F. Special considerations on primary cardiac tumors in infancy and childhood. Thorac Cardiovasc Surg. 1990;38(Suppl 2):164–7.
15. Farooki ZQ, Ross RD, Paridon SM, Humes RA, Karpawich PP, Pinsky WW. Spontaneous regression of cardiac rhabdomyoma. Am J Cardiol. 1991;67(9):897–9.
16. Smythe JF, Dyck JD, Smallhorn JF, Freedom RM. Natural history of cardiac rhabdomyoma in infancy and childhood. Am J Cardiol. 1990;66(17):1247–9.
17. Ceithaml EL, Midgley FM, Perry LW, Dullum MK. Intramural ventricular fibroma in infancy: survival after partial excision in 2 patients. Ann Thorac Surg. 1990;50(3):471–2.

Publisher's Note