

CASE REPORT

INTERMEDIATE

CLINICAL CASE

Left-Sided Intracardiac Tumors in a Case of Widespread Vulvar Cancer



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ABSTRACT

Metastatic cardiac tumors associated with gynecological malignancies are rare. This report describes the case of stage-4 vulvar carcinoma that metastasized to the left ventricle of the heart. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2019;1:179-83) © 2019 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Metastatic tumors are the most common neoplasms of the heart, occurring 100 times more frequently than primary tumors (1). However, metastatic cardiac tumors associated with gynecological malignancies are rare. This report presents the case of a female with stage-4 vulvar cancer who presented with fatigue and was

found to have multiple intracardiac masses on the left side of the heart. To the best of the present authors' knowledge, this is the first recorded case of vulvar cancer with metastases to the left side of the heart.

HISTORY OF PRESENTATION

A 68-year-old white female presented with generalized fatigue and weakness worsening over 1 day. On physical examination, her blood pressure was 129/58 mm Hg, temperature was 99.2°F (33.3°C), and heart rate was 109 beats/min. Systemic examination was unremarkable. She denied fever, chills, chest pain, shortness of breath, dysuria, or loose stools. Electrocardiography demonstrated sinus tachycardia. Laboratory investigations were notable for normal troponin T (295 pg/ml) and a mildly elevated N-terminal pro-B-type natriuretic peptide (normal, <125 pg/ml) concentrations.

MEDICAL HISTORY

Her medical history was significant for anxiety, hypertension, squamous cell carcinoma of the vulva status post-partial radical vulvectomy, and

LEARNING OBJECTIVES

- Node-positive vulvar cancer has poor prognosis and is an indicator for high probability of local and distant metastases.
- Most common tumors of the heart are metastases, most frequently from lung, breast, and kidney.
- Cardiac metastases from vulvar cancer are rare and often present with nonspecific symptoms.
- Cardiac metastases are most commonly seen on the right side but can occur on the left; echocardiography is usually the initial test to evaluate cardiac tumors.
- Location, surface, associated features, and signs of invasion are some features which help to differentiate between primary and secondary tumors on echocardiography.

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ABBREVIATIONS AND ACRONYMS

CT = computed tomography
FDG-PET = fludeoxyglucose positron emission tomography
MRI = magnetic resonance imaging

hypercalcemia of malignancy that was being managed with bisphosphonates.

INVESTIGATIONS

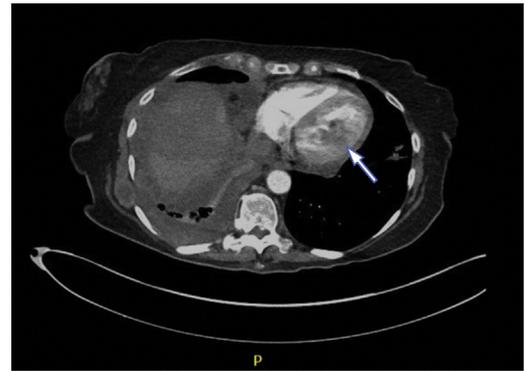
Chest computed tomography (CT) scans revealed a mass in the left ventricle (Figure 1), and a CT scan of the abdomen revealed a 2.6- × 2.1-cm left hepatic dome hypodense lesion. Earlier CT scans had not revealed the intracardiac mass.

A transthoracic echocardiogram was performed, which revealed 2 mobile masses in the left ventricle attached to the posteromedial papillary muscle and a moderate circumferential pericardial effusion. Left ventricular systolic function remained preserved despite the presence of the masses. Cardiac magnetic resonance imaging was not available, hence transesophageal echocardiography was pursued for further characterization of the mass. Transesophageal echocardiography revealed a large left ventricular mass, 2.5 × 1.1 cm, protruding into the left ventricular cavity along with a rounded mass in the left atrium and a small homogenous echo density in the left atrial appendage (Figures 2 to 6). The rounded left atrial mass was echo bright and the same consistency as the left ventricular mass; this was presumed to be another metastatic lesion. The homogeneous echodensities in the left atrial appendage were of soft tissue density but could not be differentiated from intracardiac thrombi by their echocardiographic appearance.

DIFFERENTIAL DIAGNOSIS

The patient previously had a diagnosis of squamous cell carcinoma of the vulva 1 year prior to her current presentation, and she underwent partial radical vulvectomy with bilateral inguinofemoral lymphadenectomy. Three of 5 left inguinal nodes were positive for malignant cells, but margins were negative. She underwent adjuvant chemoradiation therapy with cisplatin, carboplatin, and paclitaxel and was followed regularly to check for recurrence. Follow-up chest CT scans performed 6 months prior to presentation had revealed multiple bilateral pulmonary nodules with worsening mediastinal and hilar adenopathy. Biopsy of a right middle lobe lung nodule revealed squamous cell cancer cells, consistent with prior vulvar tumor. Although differential diagnosis of such cardiac masses includes primary versus secondary cardiac tumors, in this patient, the intracardiac masses were presumed to be metastases secondary to the vulvar squamous cell carcinoma,

FIGURE 1 Computed Tomography of the Chest Revealing a Mass in the Left Ventricle



This chest CT with iodinated contrast revealed a lobulated mass in the left ventricle of soft tissue density (white arrow).

given the burden of metastatic disease and the positive lung nodule biopsy result.

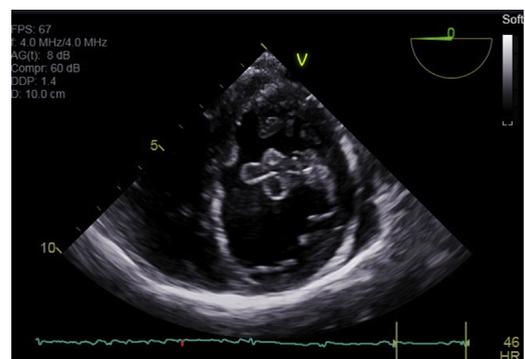
MANAGEMENT

Considering the extent of the patient's metastatic disease and poor functional status, surgical resection or biopsy of the cardiac masses was not considered.

FOLLOW-UP

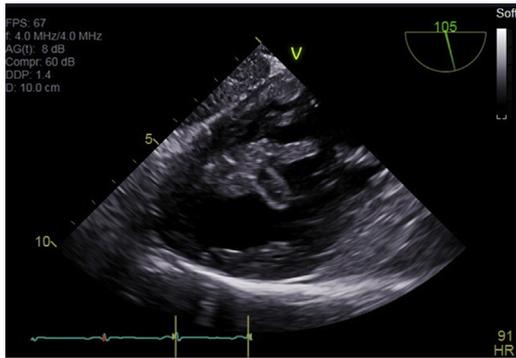
One week after the intracardiac tumor was discovered, the patient developed increasing confusion. Magnetic resonance imaging revealed multiple

FIGURE 2 Left Ventricular Mass Seen on a Transesophageal Echocardiogram



This image shows a multilobulated mobile echodensity seen in transgastric short axis view at 0 degrees. The mass is attached to the posteromedial papillary muscle.

FIGURE 3 Left Ventricular Mass Seen on a Transesophageal Echocardiogram



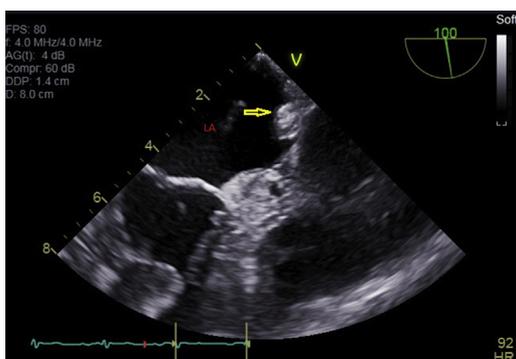
This image shows a multilobulated mobile mass with fingerlike projections attached to the posterolateral wall of the left ventricle by transesophageal echocardiogram in the transgastric long-axis view at 105 degrees.

intracranial metastases. The patient underwent whole-brain radiation therapy, but she continued to decline and passed away in the next few days.

DISCUSSION

Cardiac tumors are generally divided into primary tumors, which arise from the heart, and secondary tumors, which occur due to metastases (2). Most cardiac tumors are secondary in nature, whereas the incidence of primary tumors is as little as 0.02% (1).

FIGURE 4 Mass Seen in LA by Transesophageal Echocardiogram



In this image, a round echo-bright mass is seen attached to the wall of the left atrium (yellow arrow) by transesophageal echocardiography in the mid-esophageal 2-chamber view at 100 degrees. LA = left atrium.

Regardless of the type, cardiac tumors can present as thromboembolic episodes, heart failure, atrioventricular blocks, pericardial effusions, or even mild symptoms such as fatigue, syncope, night sweats, or weight loss. Cardiac symptoms are determined mainly by the location of the tumor (3). However, in most cases, cardiac signs can be overlooked as the clinical picture is often dominated by the presentation of the primary malignancy.

Cardiac metastases occur much more frequently than primary tumors and are usually a part of widespread malignancy. Solitary metastasis to the heart is uncommon. The most common tumors that metastasize to the heart are lung, breast, kidney, lymphoma, leukemia, and melanoma. Most common gynecological tumors metastasizing to the heart are from the uterus and ovary (1,4). Improved diagnostic tools and aggressive treatment therapies have helped to improve survival in cancer patients, which has led to an increase in frequency of diagnosing cardiac metastases. Malignant cells can reach the heart through blood, lymph, or direct extension. They can involve the pericardium, myocardium, or endocardium depending on the route and are most commonly seen on the right side of the heart (1,5). In this patient, the masses were on the left side of the heart.

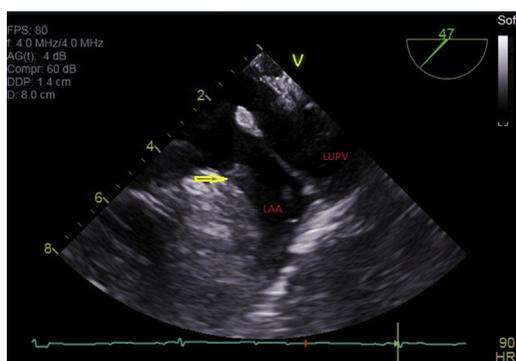
Vulvar cancers account for only 3% to 5% of all gynecological malignancies (6) and are most commonly seen in postmenopausal women. Squamous cell cancer, originating from the epidermal squamous cells, is the most common type of vulvar cancer. The most common presentation of vulvar cancer is pruritis. However, vulvar cancer can also present as vulvar pain, ulcer, discharge, or a lump (7,8). Although the most frequent recurrences for vulvar cancer are local, these tumor cells can spread to distant sites through the lymphatic or hematogenous route. In a prospective study done in Italy in 502 patients, Maggino et al. (6) recorded the incidence of recurrence to be 37.3%, 53.4% of which was local recurrence. The presence of inguinal lymph node metastases often predicts a higher chance of distant metastases and poor prognosis (9). Distant metastases from vulvar cancer are rare and occur late, with the most common sites being the pelvis, lung, and liver (9). Cases of vulvar cancer metastasizing to the heart are rare, and none have been recorded as having spread to the left side of the heart.

Two-dimensional echocardiography is usually the initial test of choice for evaluating and detecting cardiac tumors. Echocardiography can often provide precise information about the tumor size, location, shape, mobility, and associated features. In a study conducted by Nomoto et al. (10), 30 of 34 cases of

FIGURE 5 Small Homogeneous Echodensities Seen in the LAA by Transesophageal Echocardiography

Small homogeneous echodensities (**yellow arrows**) within the LAA (in the mid-esophageal aortic valve short-axis view at 29 degrees). These echodensities could be either tumor metastases or thrombi within the left atrial appendage. LAA = left atrial appendage; LUPV = left upper pulmonary vein.

metastatic cardiac tumors were accurately diagnosed by transthoracic echocardiography. The study reported that certain characteristics of tumors observed through an echocardiogram can help in identifying a tumor as primary or secondary (**Table 1**). Features include location (the epicardium is the most common site for secondary cardiac tumors and the endocardium is the least), surface (myxomas tend to have a smooth surface, often associated with thrombus,

FIGURE 6 Homogeneous Echodensity Seen in the LAA by Transesophageal Echocardiography

A rounded homogeneous echodensity (**yellow arrow**) is seen in the LAA by transesophageal echocardiography in the mid-esophageal view of the LAA at 71 degrees. The echodensity could be a tumor metastasis or a thrombus within the left atrial appendage. LAA = left atrial appendage; LUPV = left upper pulmonary vein.

TABLE 1 Echocardiographic Features of Cardiac Tumors That Favor Malignancy

Direct invasion of the heart
Massive pericardial effusion
Irregular mass
Location at tricuspid annulus (specific metastatic site for lymphoma)
Penetration of the great vessels (aorta, inferior vena cava, superior vena cava, and pulmonary veins)

whereas malignant tumors have an irregular surface), and presence of pericardial effusion and direct invasion of blood vessels or myocardial walls are some of the characteristics that help to distinguish between primary and secondary cardiac tumors (10,11).

Transesophageal echocardiography has superior diagnostic accuracy compared to transthoracic echocardiography, but it is an invasive procedure. CT and cardiac magnetic resonance (CMR) can help to accurately determine the size and extension of the tumor mass, and CMR is the gold standard for diagnosis of cardiac tumors. A fluorodeoxyglucose-labeled positron emission tomography (FDG-PET) scan can help to identify metabolically active lesions and, as such, is an effective tool for identifying malignant lesions (12). The combination of PET and CT is superior to either alone and can help in disease staging and identifying distant metastases.

Vulvar cancer with distant metastases has very poor prognosis, and treatment is usually palliative. Solitary tumors of the heart can be removed surgically, but the surgical outcome depends on the characteristics of the tumor and the overall clinical picture.

The major limitation of the present case was the inability to obtain pathologic confirmation that the cardiac masses were metastatic in origin. Due to the widespread nature of the disease and poor prognosis, the authors believed that this would not change management. However, the features of the mass on the echocardiogram (direct invasion of the left ventricle and a highly irregular mass) and the presence of multiple masses in 2 different chambers of the heart are most consistent with metastatic spread.

Currently, yearly chest radiography is indicated in patients with node-positive vulvar cancer, as the chances of metastatic spread to the lungs is reasonably common. Metastatic spread of vulvar cancer to the heart is rare yet observed. Three other case reports have documented the spread of squamous cell cancer of vulva metastasizing to the heart (13-15). Because the symptoms of cardiac metastases can be nonspecific and may be completely masked by the primary malignancy, it is important to keep a high index of suspicion in patients with vulvar cancer and

node-positive tumor who present with cardiopulmonary symptoms.

CONCLUSIONS

Cardiac metastases are the most common neoplasms of the heart. Although gynecological malignancies do not frequently metastasize to the heart, there have been occurrences. Echocardiography of the heart is usually the initial diagnostic test, and it has good sensitivity. CMR and PET can be used to further evaluate and understand the characteristics of such

tumors. Treatment is usually palliative; however, surgical options can be considered in specific cases. Location of the tumor, size, and overall prognosis of the case are some factors to be considered while deciding on the optimal treatment option.

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REFERENCES

1. Reynen K, Köckeritz U, Strasser RH. Metastases to the heart. *Ann Oncol* 2004;15:375-81.
2. Hilal T, Anthony LB, Sorrell VL. Unexpected cardiac masses. *JAMA Oncol* 2015;1:1343-4.
3. Hoffmeier A, Sindermann JR, Scheld HH, Martens S. Cardiac Tumors—diagnosis and surgical treatment. *Dtsch Arztebl Int* 2014;111:205-11.
4. Bussani R, De-Giorgio F, Abbate A, Silvestri F. Cardiac metastases. *J Clin Pathol* 2007;60:27-34.
5. Cheruvu B, Cheruvu P, Boyars M. An unusual case of metastasis to the left side of the heart: a case report. *J Med Case Rep* 2011;5:23.
6. Maggino T, Landoni F, Sartori E, et al. Patterns of recurrence in patients with squamous cell carcinoma of the vulva. *Cancer* 2000;89:116-22.
7. Alkatout I, Schubert M, Garbrecht N, et al. Vulvar cancer: epidemiology, clinical presentation, and management options. *Int J Womens Health* 2015;7:305-13.
8. Rogers LJ, Cuello MA. Cancer of the vulva. *Int J Gynaecol Obstet Off Organ Int Fed Gynaecol Obstet* 2018;143 Suppl 2:4-13.
9. Prieske K, Haeringer N, Grimm D, et al. Patterns of distant metastases in vulvar cancer. *Gynecol Oncol* 2016;142:427-34.
10. Nomoto N, Tani T, Konda T, et al. Primary and metastatic cardiac tumors: echocardiographic diagnosis, treatment and prognosis in a 15-years single center study. *J Cardiothorac Surg* 2017;12:103.
11. DeLoach JF, Haynes JW. Secondary tumors of heart and pericardium: review of the subject and report of one hundred thirty-seven cases. *AMA Arch Intern Med* 1953;91:224-49.
12. Kapoor K, Evans MC, Shkullaku M, Schillinger R, White CS, Roque DM. Biventricular metastatic invasion from cervical squamous cell carcinoma. *Case Rep* 2016;2016:bcr2016214931.
13. Jafri SIM, Ali N, Farhat S, Malik F, Shahin M. The tell-tale heart: a case of recurrent vulvar carcinoma with cardiac metastasis and review of literature. *Gynecol Oncol Rep* 2017;21:20-3.
14. Hanbury WJ. Secondary tumours of the heart. *Br J Cancer* 1960;14:23-7.
15. Htoo MM, Nanton MA. Complete heart block due to disseminated vulvar carcinoma. *Br Heart J* 1973;35:1211-3.

KEY WORDS cardiac metastasis, cardiac tumors, vulvar carcinoma