

# Right Atrial Blood Cyst Incidentally Detected by Computed Tomography for Metastatic Breast Cancer in an Adult Female Patient: A Case Report

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## Abstract

Cardiac blood cysts are benign congenital cardiovascular tumors that are rare in adults. A 70-year-old woman who underwent left mastectomy for left breast cancer 9 years ago was referred to our institution for a right atrial mass that measured 35 × 30 mm and was detected incidentally by computed tomography for metastatic breast cancer and transthoracic echocardiography. The mass was attached to the interatrial septum by a stalk. Although it was asymptomatic, surgical resection was performed because of the risk of pulmonary embolism. The mass contained blood, and histopathological findings were suggestive of a blood cyst. We described a rare case of a right atrial blood cyst incidentally found during evaluation for metastatic breast cancer in a woman.

## Keywords

Blood Cysts, Cardiac Tumors, Extracorporeal Circulation

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## 1. Introduction

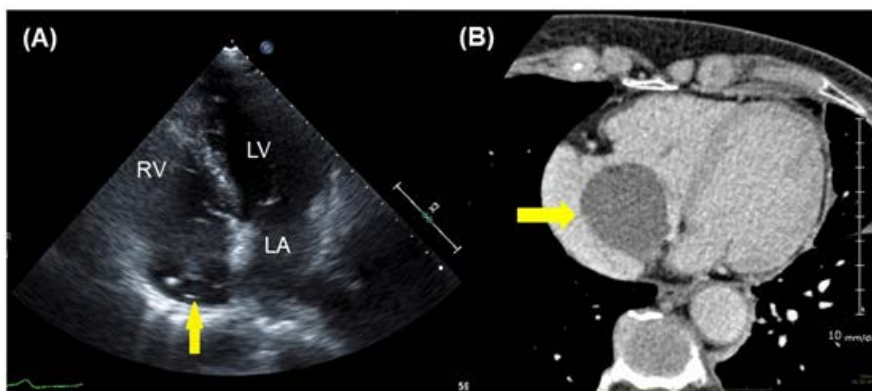
Cardiac blood cysts are congenital cardiovascular tumors that were first reported by Elasser in 1844 [1]. Cardiac blood cysts are often found during autopsies of neonates and fetuses, but they are exceedingly rare in adults [1] [2] [3]. Most blood cysts usually regress by the age of 6 months [2]; therefore, they are rarely seen among infants older than 2 years [1]. They are associated with syncope,

sudden death, embolism and valvular dysfunction, but can be clinically silent and are often detected incidentally [4]. We described a rare case of a right atrial blood cyst incidentally found during evaluation for metastatic breast cancer in an adult female patient.

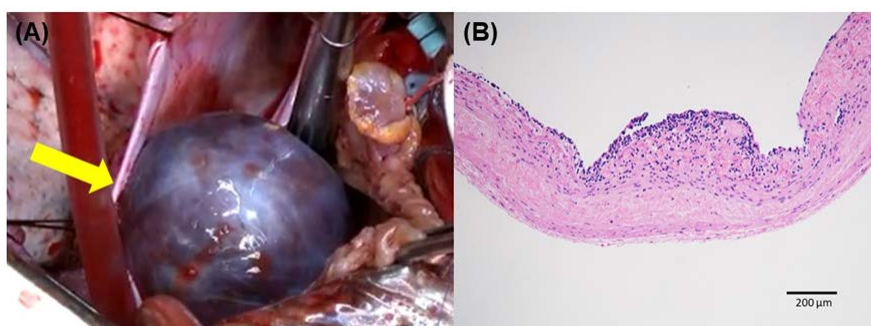
## 2. Case Report

A 70-year-old woman who underwent left mastectomy for breast cancer 9 years ago presented to her general practitioner with a 7-month history of coarse crackles and a 2-week history of dyspnea. Computed Tomography (CT) revealed left pleural effusion and multiple liver tumors; cytological examination of the pleural fluid confirmed metastatic breast cancer. In addition, a mass measuring 35 × 30 mm in the right atrium was detected by CT and transthoracic echocardiography. Subsequently, she was referred to us for further management of this mass. The physical examination performed at our center revealed no abnormal heart or respiratory sounds. There were no signs of heart failure such as jugular vein distention or limb edema. Laboratory investigations were normal except for mild liver dysfunction (aspartate transaminase level 38 U/L, alanine transaminase level 24 U/L). Brain natriuretic peptide level was 55.0 pg/mL. Chest roentgenogram showed no cardiomegaly, but left pleural effusion, which was thought to be secondary to her malignancy, was observed. Electrocardiography showed normal sinus rhythm with non-specific ST segments and T-wave changes. Transthoracic echocardiography demonstrated a mobile hypoechoic mass that measured 35 × 33 mm and was attached to the atrial septum (**Figure 1(A)**). CT further revealed that the mass was oval-shaped with a stalk attached to the atrial septum; the borders of the mass were smooth, and it had no contrast effect (**Figure 1(B)**). The mass was hypointense- to isointense on fat suppression T1-weighted magnetic resonance imaging (MRI) and hypointense- to hyperintense on T2-weighted MRI. CT and MRI revealed multiple bone, liver, and lymph node metastases, as well as bilateral pulmonary metastases due to breast cancer. At this time, the differential diagnoses of the mass included a blood cyst, thrombus, myxoma, other primary cardiac tumors, and cardiac metastasis caused by breast cancer; however, we were unable to establish a preoperative diagnosis. As the patient's general condition was stable and her prognosis with pharmacotherapy was expected to be more than a year, we planned surgical resection given that the atrial mass carried a risk of pulmonary embolism.

The patient underwent right thoracotomy using the fourth interspace approach because of sternum metastasis. Cannulation was performed through the right femoral artery and right femoral vein, and cardiopulmonary bypass was started. Cannulation through the superior vena cava was performed later. Following aortic cross-clamping, cardiac arrest was induced with antegrade cold cardioplegia through the aortic root. After atriotomy, a mass arising from the inferior border of the atrial septum with a short stalk was observed in the right atrium (**Figure 2(A)**). We tried to perform en-bloc resection of the mass with the stalk; however, the mass burst during the removal, and bloody contents



**Figure 1.** Transthoracic echocardiography showing a mobile hypoechoic mass measuring 35 × 33 mm and attached to the atrial septum (A). Computed tomography scan showing an oval mass measuring 40 × 35 mm with a stalk attached to the atrial septum and no contrast effect (B).



**Figure 2.** A mass arising from the inferior border of the atrial septum with a short stalk in the right atrium (A). A histological image (hematoxylin and eosin staining) showing a cyst wall consisting of fibrocellular tissue and smooth muscle cell layers with elastic fibers (B).

emerged from it. A blank capsule and the superficial layer of the atrial septum where the stalk was attached were resected, and the small defect on the atrial septum was repaired with a 4 - 0 monofilament suture. Histopathological examination of the mass revealed a capsule consisting of fibrocellular tissue and smooth muscle cell layers with elastic fibers. Endothelial lining was observed on the inner and outer surfaces (**Figure 2(B)**). These findings were suggestive of a blood cyst.

The patient's postoperative course was uneventful. She was transferred to the department of medical oncology of our hospital for the treatment of breast cancer on Day 12 after surgery, and started chemotherapy on Day 18 after surgery. After 4 months of follow-up, no cancer progression has been detected.

### 3. Discussion

Blood cysts are often found incidentally during autopsy in up to 50% of cardiac valves of infants younger than 2 months of age [1]. They are often less than 1 mm in size, and have been reported to involve the mitral, tricuspid, aortic, and

pulmonary valves, as well as the right atrium, right ventricle, and left ventricle [2]. In cases of large cysts, the reported complications include left ventricular outflow tract obstruction, valve dysfunction, ventricular dysfunction, and occlusion of a coronary artery, depending on the site of the tumor [2]. The exact origin of blood cysts is not well-understood. However, three hypotheses have been proposed: 1) blood cysts are formed by the entrapment and compression of blood in crevices that later become sealed off; 2) they arise from heteroplastic changes of the primitive pericardial mesothelial tissue; and 3) hypoxia, inflammation, and bleeding diathesis lead to the formation of these cysts [1] [2].

In the present case, a blood cyst was found incidentally as an atrial mass arising from the atrial septum. The echocardiographic characteristics of blood cysts include echo-free space surrounded by a thin wall, and isointense and hyperintense signals instead of the normal myocardium on T1 and T2 sequences, respectively [3]. Retrospectively, we believe that if we had considered these characteristics sufficiently, we might have been able to make a preoperative diagnosis in this case.

Although symptomatic cardiac blood cysts should be resected, no general consensus has been established regarding the optimal management of asymptomatic blood cysts [3]. Romano *et al.* chose a conservative approach with serial imaging for an asymptomatic blood cyst attached to the posteromedial papillary muscle and mitral subvalvular apparatus [5]. Although regular follow-up by echocardiography has been proposed for asymptomatic blood cysts [2], we decided that surgical resection was necessary for our patient for the following reasons: 1) we did not establish a definitive diagnosis, and 2) the large mass carried the risk of pulmonary embolism. We propose that the therapeutic decision for asymptomatic blood cysts should consider the location, size, and mobility of the cyst, as well as relevant cardiac co-morbidities and the findings of multiple imaging modalities [3].

Extracorporeal circulation in cancer patients may carry a risk of tumor dissemination and affect the immune system [6]. Although there is no significant difference in prognosis between healthy people and patients with cancer who undergo cardiac surgery with extracorporeal circulation in a retrospective study [7], the tumor risk associated with extracorporeal circulation in patients with cancer is arguable.

#### **4. Conclusion**

We described our experience with an atrial mass that was found incidentally during the evaluation for metastatic breast cancer in an adult female patient. Histopathological findings suggested an atrial blood cyst. Although the mass was asymptomatic, we resected it considering its size and the possibility of pulmonary embolism. Although asymptomatic blood cysts can be followed up regularly with echocardiography, therapeutic decisions including surgical resection should be made in consideration of the blood cysts' anatomical and clinical features.

## Consent

Written consent was obtained from the patient for the publication of this article.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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