Expecting the unexpected: right atrial mass in a transplant patient

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Abstract

We present a 71-year-old male, who had had a heart transplantation 24 years prior, who came to our clinic with a low-grade fever and a new II/VI holosystolic murmur. Echocardiography showed a large mass in the right atrium with attachment near the junction of the right atrium and superior vena cava. The patient was taken to the operating room for resection of the mass. Microscopic evaluation was consistent with thrombus. Differential diagnosis of cardiac masses after cardiac transplant includes tumour, thrombus, and vegetation. Final diagnosis can be challenging; multimodality imaging and biopsy or resection often are required for final diagnosis.

Keywords Transplantation; Echocardiography; Atrium

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Introduction

There are three major categories of cardiac masses after cardiac transplantation: tumour, thrombus, and vegetation. Infective endocarditis should always be considered in the differential diagnosis of cardiac masses after transplantation, especially in the right clinical setting, because transplant patients are immunosuppressed. In asymptomatic patients, thrombus or tumour are more probable; however, differentiating between types of masses can be challenging. We present a case of a cardiac mass with a challenging diagnosis in a 71-year-old male post orthotopic heart transplantation requiring multimodality imaging and surgical resection to arrive at the final diagnosis.

Case report

A 71-year-old man presented to his cardiologist with two weeks’ history of night sweats and chills. His medical history was significant for orthotopic heart transplantation 24 years earlier for refractory congestive heart failure in the setting of idiopathic dilated cardiomyopathy. His immunosuppression regimen at the time of presentation was sirolimus, cyclosporine, and prednisone. He had developed coronary artery vasculopathy, end-stage renal disease on dialysis, hypertension, and hyperlipidemia in the 24 years since transplantation. He had been treated for localized prostate cancer 10 years earlier and was in remission. The last transthoracic echocardiogram (TTE), 4 months prior, showed a normally functioning graft and no significant valvular disease. Of note, 2 months prior to clinical presentation he had undergone left and right heart catheterization and been noted to have occlusive disease in the left anterior descending artery with subsequent percutaneous coronary intervention and drug-eluting stent placement.

On presentation, he had a low-grade fever (99.5 degrees Fahrenheit), a blood pressure of 135/73 mm Hg, and a heart rate of 87 beats per minute. The physical examination revealed II/VI holosystolic murmur at the left sternal border. His white blood cell count was mildly elevated at 11.4 K/mcL, and he had normocytic anaemia with haemoglobin of 9.7 g/dL, a platelet count of 172 K/mcL, and a serum creatinine level of 8.21 mg/dL. An electrocardiogram showed normal sinus rhythm with right bundle branch block.

TTE was ordered on physical examination to evaluate the new murmur and rule out possible endocarditis. It demonstrated normal biventricular systolic function and no significant valvular abnormalities. Right ventricular systolic pressure was 33.4 mm Hg, e’ septal velocity 8.39 cm/s, and...
e' lateral velocity 13.16 cm/s consistent with no pulmonary hypertension and normal diastolic parameters. On four-chamber apical view, a large echodensity not seen on the echocardiogram performed 4 months earlier was noted in the right atrium (RA) (Figure 1, Movie S1). Transesophageal echocardiography (TEE) was performed for better evaluation of the mass and showed a 5.3 × 4.7 cm echodensity in the RA with attachment near the junction of the RA and superior vena cava (SVC) (Figure 2, Movie S2). Three-dimensional (3D) imaging showed a spherical echodensity with a heterogenic, almost ‘honeycomb,’ appearance within the mass (Figure 3, Movie S3), which appeared ‘hollow’ inside. Computed tomography was done for better evaluation of the mass (Figure 4). Given the presumed diagnosis of endocarditis in light of fevers and immunosuppression, the workup for infection included blood cultures, a urine culture, Aspergillus galactomannan, and cytomegalovirus, all of which were negative.

Given the size of the mass, cardiothoracic surgery was consulted, and the patient was taken to the operating room for surgical resection and definitive diagnosis. Upon opening the RA, a large mass was noted in the right atrium. The tissue

Figure 1 Transthoracic echocardiogram: apical four-chamber view with focus on the right atrium.

Figure 2 Transesophageal echocardiogram: 5.3 × 4.7 cm echodensity in the right atrium.

Figure 3 Transesophageal echocardiogram: three-dimensional view of the right atrial mass.

Figure 4 Computed tomography: 5.5 × 5.0 × 4.7 cm mass in the right atrium.
was quite friable and cavitary (Figure 5). The attachment site, at the SVC/RA junction, appeared to be at a region of previous suture line for heart transplant. The mass was excised uneventfully. The patient recovered fully and was discharged five days after surgery.

Gross description of the specimen revealed a 5.7 × 5.5 × 5.5 cm aggregate of grey to brown, soft, rubbery tissues with a similar honeycomb appearance as visualized on 3D TEE (Figure 5). Sectioning revealed soft, grey-brown, rubbery surfaces. Microscopic description showed a thrombus with areas of red cells and white areas (consistent with platelets/lines of Zahn), consistent with a thrombus with moderate acute inflammation (Figures 6). No bacteria, yeast, or fungal forms were identified by special stains. No atypia or malignancy was identified.

Discussion

There are three major categories of cardiac masses entertained in patients post heart transplantation: tumour (primary or secondary), thrombus, or vegetation. Thrombus should be considered when masses form at suture lines or on foreign objects, are not solid in appearance but rather ‘hollow inside,’ and when they develop in a relatively short time period, as with this patient. Lower-flow states (such as low cardiac output in the setting of coronary artery vasculopathy and enlarged atria with bi-atrial anastomotic technique in this patient) and endothelial injury (such as injury induced by recent right heart catheterization in this patient) are postulated as risk factors for developing thrombus. These two factors, together with a hypercoaguable state, are collectively called Virchow’s triad. A thrombus mimicking a tumour has been described in heart transplantation patients in case reports. Additional theories include the development of low-flow states secondary to restrictive physiology and advanced diastolic dysfunction, which has been reported in transplant patients. Endocarditis, more common in transplant patients than the general population because of suppression of cell-mediated immunity and more frequent catheter use and endomyocardial biopsies, should always be considered, especially in the appropriate clinical setting, including fever and leukocytosis. The major pathogenic mechanism of infective endocarditis after cardiac transplantation appears to be antecedent bacteremia. The most common pathogen is *Staphylococcus aureus* followed by *Aspergillus fumigatus*. The prognosis of post-cardiac transplantation infective endocarditis is very poor.

Primary cardiac tumours are rare compared with metastatic cardiac tumours, and mostly benign. Even though malignant cardiac tumours occur more frequently in heart transplant patients than the general population, reports of primary cardiac malignancies are limited to individual case reports. The most common cardiac tumour after cardiac transplant reported in literature is myxoma.

The differential for a right atrial mass in heart transplant patients is large. Most large atrial masses in heart transplant patients, who are chronically immunosuppressed and at risk for endocarditis and malignancy, should be considered for resection to avoid both mass effect and embolization, as well as for definitive diagnosis.

Supporting information

Supporting information is available at ESC Heart Failure online.

**Movie S1.** Transthoracic echocardiogram apical four-chamber view zoomed on right atrium.

**Movie S2.** Transesophageal echocardiogram with a 5.3 × 4.7 cm echodensity in the right atrium.

**Movie S3.** Transesophageal three-dimensional imaging of the right atrial mass.
Conflict of interest

All authors declare that they have no conflict of interest.

References

1. Baumwol J, Delgado DH, Cusimano RJ, Rao V, Kozusko S, Butany J, Ross HJ. Atrial masses post cardiac transplantation: diagnostic and treatment dilemmas. *Am J Transplant* 2012; 12: 2237–2241.
2. Riberi A, Ambrosi P, Habib G, Kreitmann B, Yao JG, Gaudart J, Ghez O, Metras D. Systemic embolism: a serious complication after cardiac transplantation avoidable by bicaval technique. *Eur J Cardiothorac Surg* 2001; 19: 307–311; discussion 311–312.
3. Dunst KM, Antretter H, Huemer GM, Poelzl G, Laufer G. Left atrial thrombus mistaken as a tumor after heart transplantation. *Thorac Cardiovasc Surg* 2003; 51: 347–350.
4. Sherman-Weber S, Axelrod P, Suh B, Rubin S, Beltramo D, Manacchio J, Furukawa S, Weber T, Eisen H, Samuel R. Infective endocarditis following orthotopic heart transplantation: 10 cases and a review of the literature. *Transpl Infect Dis* 2004; 6: 165–170.
5. Bruce CJ. Cardiac tumours: diagnosis and management. *Heart* 2011; 97: 151–160.