

## Tumor Or Thrombus? The Role Of Cardiac Magnetic Resonance Imaging In Differentiating Left Atrial Mass In a Transplanted Heart: A Case Report

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### Abstract

An unknown mass in the left atrium can be challenging to differentiate, especially after previous heart transplant. A precise diagnosis is clinically crucial because of the therapeutic implications. CMR is an useful, non-invasive tool to distinguish intra-cardiac lesions, thereby enabling clinicians to initiate adequate therapy.

### Case Report

A 62-year-old male patient with a past medical history of myocarditis 6 years ago, resulting in highly reduced left and right ventricular function, received a biventricular assist device 8 months later as bridge to transplant. He was finally being transplanted two and a half years later. After transplantation the immunosuppressive medication included tacrolimus, mycophenolat and prednisolone. Due to leucopenia mycophenolat was changed to everolimus two years after transplantation. The patient was now seen for an annual routine check-up three and a half years after heart transplantation.

The patient was in good health without any sign of transplant rejection, infection or other pathologies.

The transthoracic echocardiographic (TTE) evaluation revealed a good left and right ventricular ejection fraction, no relevant valve pathologies. Strikingly, a left atrial (LA) mass was detected that had not been observed during routine echocardiography 12 month earlier.

Cardiac MRI (CMR) was performed and showed an inhomogenous tumor at the left atrial posterior wall on the transition to the left atrial roof with an isointens presentation in T1 and T2 imaging [Figure 1] and no enhancement on late gadolinium enhancement imaging. The mass resulted in a functional stenosis of the left inferior pulmonary vein [Figure 1]. The main differential diagnoses were a thrombus or a cardiac tumor (e.g. lymphoma due to immunosuppressive therapy or an atrial myxoma). Other but rather seldom alternatives were a rhabdomyoma or a fibroma. As the mass showed neither

perfusion on perfusion imaging nor contrast enhancement on late gadolinium enhancement images, a vascularized tumor seemed unlikely. Considering the CMR characteristics an atrial thrombus was considered to be the most likely diagnosis.

For further evaluation a CT scan of the thorax, abdomen and pelvis was performed, where no invasion of the structures surrounding the heart, nor enlarged lymph nodes were seen.

Anticoagulation with Rivaroxaban was initiated and switched to a Vitamin-K antagonist because no reduction in size could be demonstrated on follow-up echocardiography 1 month later.

After a total of three month of oral anticoagulation, CMR was repeated and revealed a significant reduction of the LA mass [Figure 2], supporting the initial diagnosis of a LA thrombus.

Multiple holter ECG could not confirm atrial fibrillation (AF). We considered two possible etiologies of the left atrial thrombus. The first is that the thrombus originates from the suture scar after heart transplantation and the second is a possible AF in the residual recipient left atrium with a total electrical isolation and therefore no propagation of the arrhythmia in the transplanted heart, which results in a decreased blood flow at the posterior wall of the LA.

### Discussion

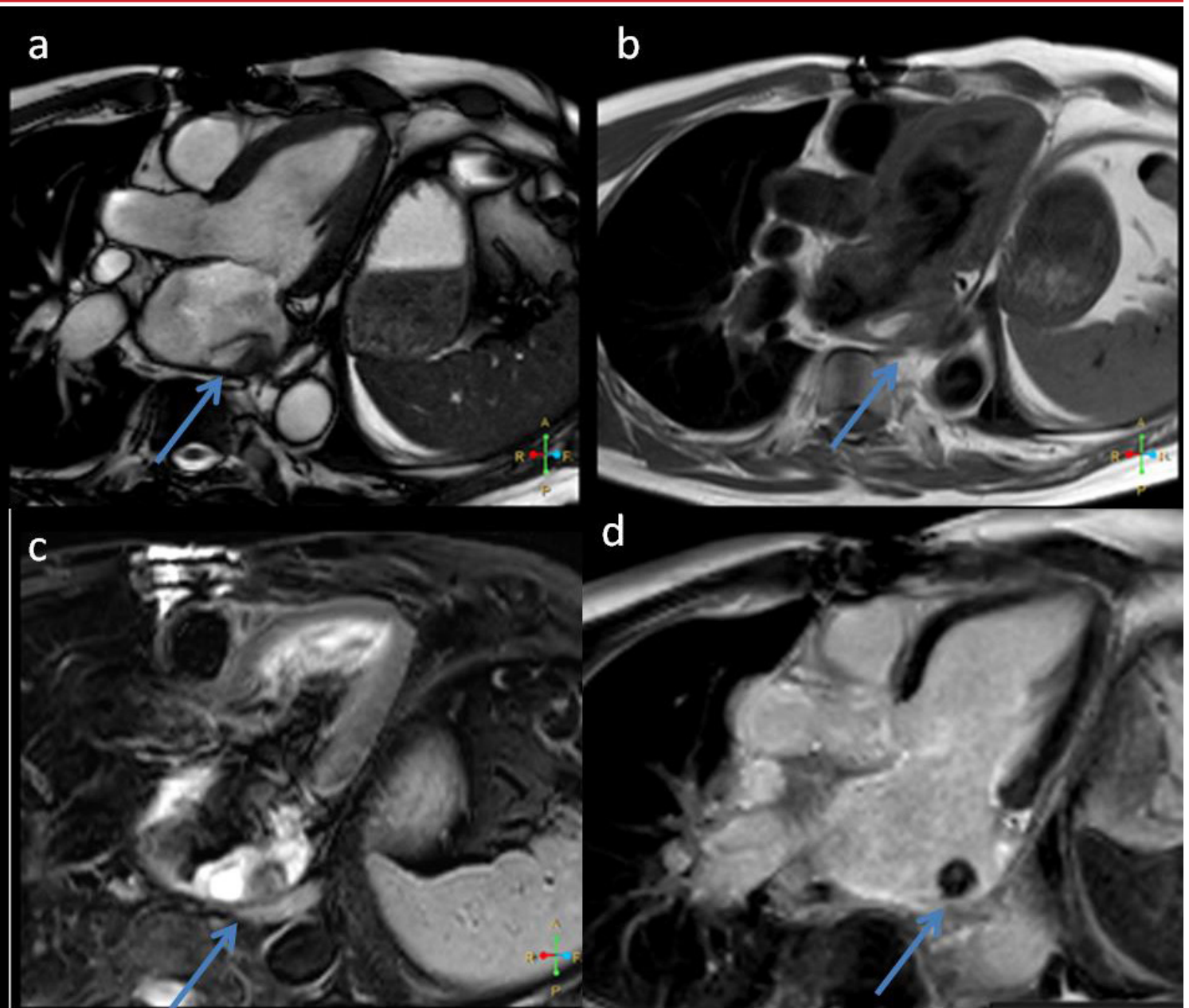
A left atrial thrombus is a major risk for systemic embolization. Most likely a LA thrombus occurs in the left atrial appendage under atrial fibrillation. If a LA thrombus is located at different site, differentiating it from a potential malignant tumor can be tricky and challenging. Previous studies have shown the value of CMR in examining intracardiac thrombus <sup>[1]</sup>, making this the reference imaging modality for differentiating intraatrial masses <sup>[2]</sup>. In the case presented here, CMR imaging was a helpful tool to differentiate the LA thrombus from other intracardiac tumors. Early gadolinium enhancement imaging would have complemented the diagnosis but unfortunately was not performed in this patient. This diagnosis

### Key Words

Magnetic Resonance Imaging, Cardiac Imaging, Left Atrial Mass, Heart Transplantation, Left Atrial Thrombus.

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**Figure 1:** Left atrial mass at the time of initial diagnosis (a-d). a, cine still frame; b T1-weighted turbo-spin echo; c, blackblood T2-weighted turbo-spin echo; d, late-gadolinium enhancement imaging.

resulted in the initiation of anticoagulation therapy and saved the patient from more invasive and potentially harmful diagnostic measures such as biopsy. The exact cause of the thrombus remains unclear. Data on length of anticoagulation therapy in these cases is lacking. We decided to continue oral anticoagulation indefinitely. Unfortunately it was not possible to rule out atrial fibrillation in the residual recipient left atrium. This is especially difficult as the suture scar provides a line of block which can constrain the atrial fibrillation to the posterior “old” atrial parts of the heart. Therefore atrial fibrillation can go missing from the ECG at rest which then only shows sinus rhythm of the transplanted heart.

Apart from an invasive electrophysiological study, esophageal ECG could be an option to further investigate this possibility.

### References

1. Srichai Monvadi B, JunorChelif, RodriguezL Leonardo, StillmanArthur E,

GrimmRichard A, LieberMichael L, WeaverJoan A, SmediraNicholas G, WhiteRichard D. Clinical, imaging, and pathological characteristics of left ventricular thrombus: a comparison of contrast-enhanced magnetic resonance imaging, transthoracic echocardiography, and transesophageal echocardiography with surgical or pathological validation. *Am. Heart J.* 2006;152 (1):75–84.

2. Hoey E T D, MankadK, PuppalaS, GopalanD, SivananthanM U. MRI and CT appearances of cardiac tumours in adults. *Clin Radiol.* 2009;64 (12):1214–30.

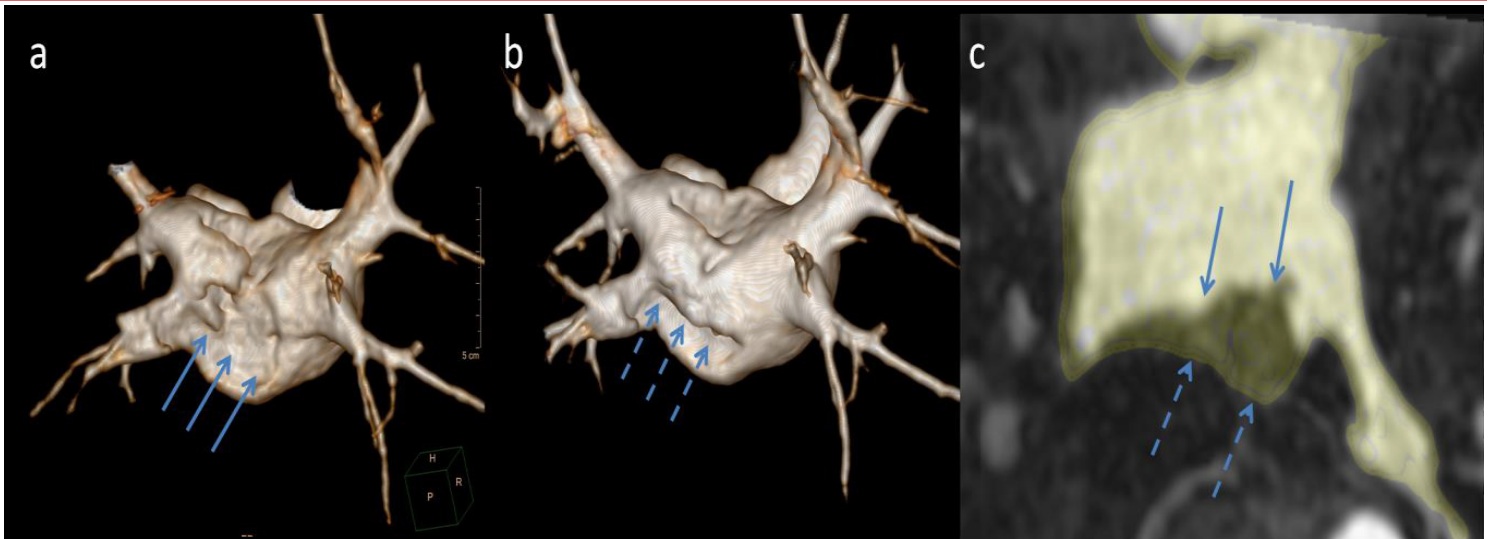


Figure 2:

Three-dimensional surface rendering of MR angiographic datasets at the time of initial diagnosis(a) after three months of oral anticoagulation with warfarin (b) and the merged image before and after oral anticoagulation(c); note the significant thrombus size reduction of the cardiac mass depicted as an impression of the contrast-agent filled left atrium (continuous arrows: before oral anticoagulation and dotted arrows after oral anticoagulation).