

MINI-FOCUS ISSUE: IMAGING

INTERMEDIATE

IMAGING VIGNETTE: CLINICAL VIGNETTE

A Rare Case of Testicular Teratoma Metastasizing to the Right Ventricle



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ABSTRACT

We describe a case of testicular teratoma with metastasis to the right ventricle. The mass nearly completely resolved with chemotherapy, obviating the need for upfront surgery. We review the workup of intracardiac metastatic tumors. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2021;3:117-9) © 2021 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/>).

A 22-year-old man with newly diagnosed germ cell tumor with primary in the left testicle presented with progressive dyspnea on exertion, palpitations, and presyncope. Electrocardiogram revealed sinus tachycardia, right axis deviation, and deep T-wave inversions throughout the precordial and inferior leads (Supplemental Figure 1). Transthoracic echocardiogram revealed an echogenic mass that filled nearly the entirety of the right ventricle (RV), extending from the tricuspid valve to just below the right ventricular outflow tract (RVOT), as well as a severely dilated right atrium (Figure 1A, Videos 1 and 2). Computed tomography pulmonary angiography demonstrated pulmonary embolism (PE) in the right lower lobe segmental and subsegmental branches. The combination of severe mechanical RVOT obstruction and secondary PE explained his shortness of breath. Left chamber sizes and left ventricular systolic function were normal, and there was no pericardial effusion. Cardiac magnetic resonance imaging (CMRI) revealed a multilobulated mass measuring 11.7×5.7 cm (Figure 1B). The mass was confined to the RV with no evidence of pericardial invasion. Relative to myocardial signal, T1-weighted (Figure 1C) and T2-weighted imaging (Figure 1D) demonstrated low signal and hyperintense signal, respectively. First-pass perfusion demonstrated significant dynamic contrast enhancement of the mass, suggesting significant vascularity (Video 3). There was also significant, homogeneous late gadolinium enhancement, which combined with perfusion findings suggested a highly vascularized cardiac metastasis (Figure 1E). No necrotic component was observed. Based on the size, location, and tissue characteristics of the mass, there was high suspicion for malignancy, and in the clinical context, metastasis was suspected.

Given high suspicion for germ cell tumor, oncology initiated him on BOP (bleomycin, vincristine, and cisplatin), BEP (bleomycin, etoposide, and cisplatin), and VIP (etoposide, ifosfamide, and cisplatin). Follow-up study 111 days after initial CMRI revealed marked reduction in the mass with only slight thickening of the lateral wall and papillary muscle (Figure 1F). He subsequently underwent retroperitoneal radical lymph node dissection and left radical orchiectomy, with pathology positive for residual teratoma. Follow-up positron

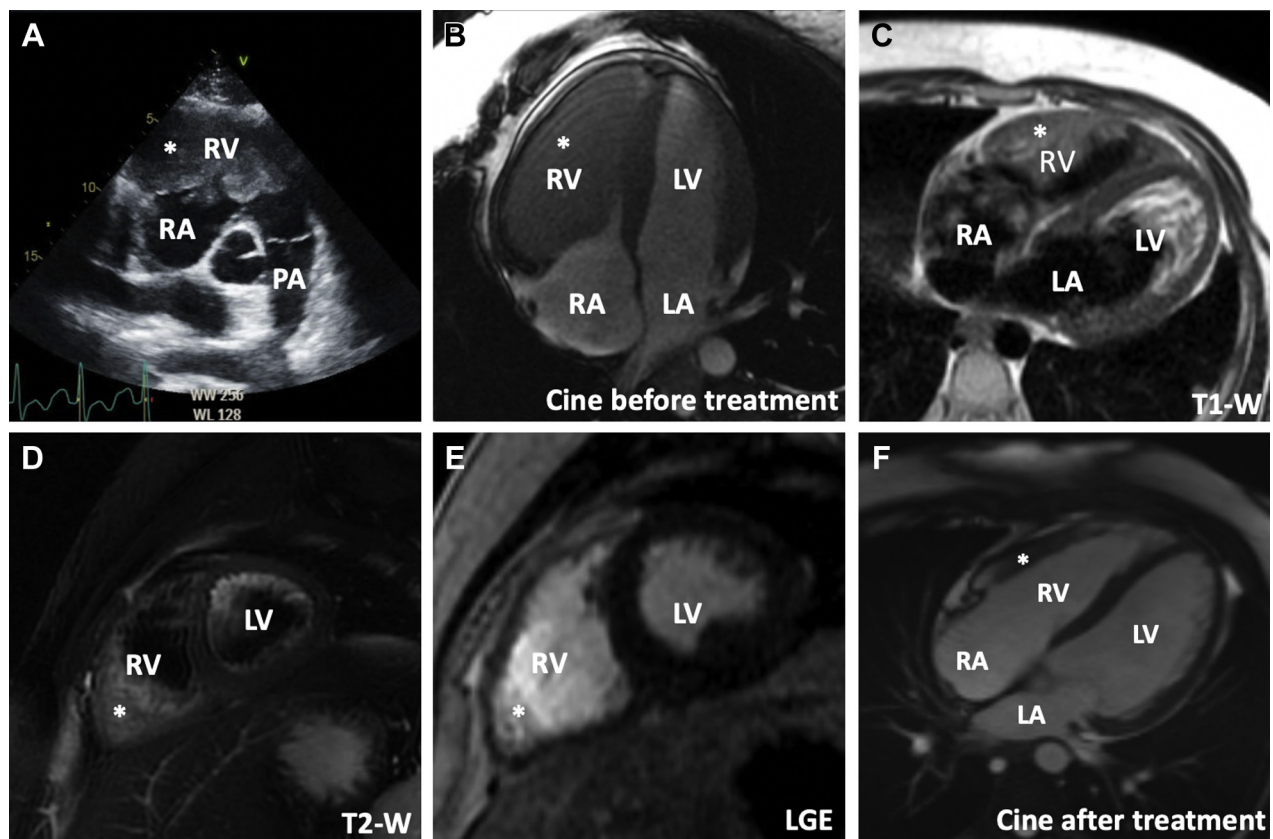
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**ABBREVIATIONS
AND ACRONYMS****CMRI** = cardiac magnetic resonance imaging**PE** = pulmonary embolism**RV** = right ventricle**RVOT** = right ventricular outflow tract

emission tomography/computed tomography scans have shown no signs of active germ cell tumor. He continues to follow closely with his oncologist for surveillance.

CMRI has emerged as a powerful tool in the evaluation of cardiac metastases. Features arguing for a malignant tumor include larger size (especially larger than 5 cm in diameter), irregular borders, invasion of adjacent tissue planes, the presence of multiple lesions in and outside the heart, and associated pericardial or pulmonary disease (such as effusions or masses). Metastatic lesions tend to have low signal intensity on T1-weighted images and high signal intensity on T2-weighted images, with the notable exception of metastatic melanoma, which tends to have high signal intensity on T1-weighted images owing to the presence of melanin pigment. Contrast material uptake tends to be heterogeneous. In contrast, benign tumors tend to be smaller in size, have better defined and smoother borders, not invade tissue planes, and lack associated pericardial or pleural disease. Thrombus can be distinguished from tumors by location (it most commonly occurs in the left atrium), hypointense signaling on T1- and T2-weighted imaging (unless it is acute, in which case it is often intermediate to hyperintense), and lack of perfusion uptake or enhancement with contrast owing to lack of vascularity (1,2).

FIGURE 1 Cardiac Imaging Before and After Treatment

(A) Transthoracic echocardiogram parasternal image of the RVOT showing right ventricular obstruction. (B) Cine CMRI of mass before treatment. (C) T1-weighted CMRI of mass. (D) T2-weighted CMRI of mass. (E) Late gadolinium enhancement of mass. (F) Cine CMRI of mass following treatment, 111 days after presentation. The asterisk indicates a cardiac mass. LA = left atrium; LV = left ventricle; RA = right atrium; RV = right ventricle; T1-W = T-1 weighted; T2-W = T2-weighted.

AUTHOR DISCLOSURES


The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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KEY WORDS cardiac magnetic resonance imaging, cardiac metastasis, right ventricle

 **APPENDIX** For a supplemental figure and videos, please see the online version of this paper.