Metastatic Melanoma of the Right Ventricular Outflow Tract

as a Cause of Ventricular Tachycardia

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A 47-year-old woman with a history of melanoma metastatic to her stomach and esophagus presented with palpitations and shortness of breath. Her heart rate was 182 beats/min and her blood pressure was 124/54 mmHg. A new grade 3/6 systolic murmur was present over the left precordium. An electrocardiogram showed a wide QRS complex tachycardia with left bundle branch block, inferior axis, and ventriculoatrial dissociation compatible with a right ventricular outflow tract (RVOT) ventricular tachycardia (Fig. 1). She was cardioverted to sinus rhythm. After cardioversion, she displayed an rSR′ QRS morphology in lead V_1 and T-wave inversions, with a slow S-wave upstroke in the anterior precordial leads (V_1 and V_2) (Fig. 2). These findings are associated with right ventricular conduction delay and cardiomyopathy. She had no electrolyte abnormalities.

A nuclear stress test showed normal left ventricular function and perfusion. Imaging with both transthoracic echocardiography (Fig. 3) and cardiac magnetic resonance (CMR) (Fig. 4) revealed a mass infiltrating the RVOT. On both T1- and T2-weighted imaging, the mass had high signal intensity consistent with melanoma.[1,2] Unfortunately, the mass was inoperable, the patient was not a candidate for further chemotherapy, and she died one year later.

Comment

Malignant metastases to the heart are 20 to 40 times more frequent than primary cardiac tumors. At autopsy, 10% to 12% of cases of malignant neoplasms will have cardiac involvement.[1,2] Melanoma has a high rate of cardiac metastasis, typically via hematogenous spread. The most common sites of metastasis, in descending order, are the epicardium, the left ventricular free wall, and the ventricular septum. Presentations

Fig. 1 *The 12-lead electrocardiogram at presentation shows a wide QRS complex tachycardia with left bundle branch, inferior axis, and ventriculoatrial dissociation (arrows point to P waves).*

Fig. 2 *Post-cardioversion 12-lead electrocardiogram shows an rSR′ QRS morphology in lead V_1, as well as T-wave inversions and a slurred S-wave upstroke in the anterior precordial leads.*

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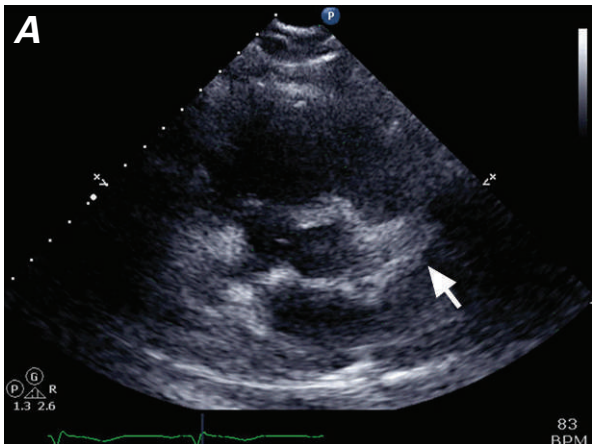


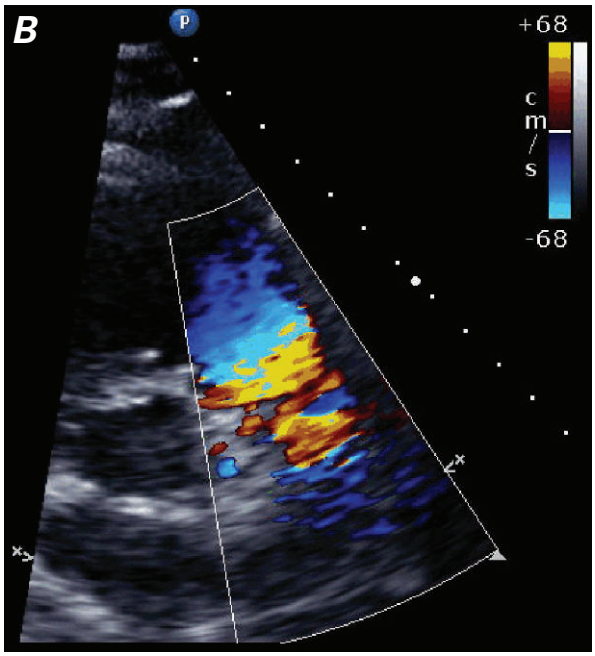
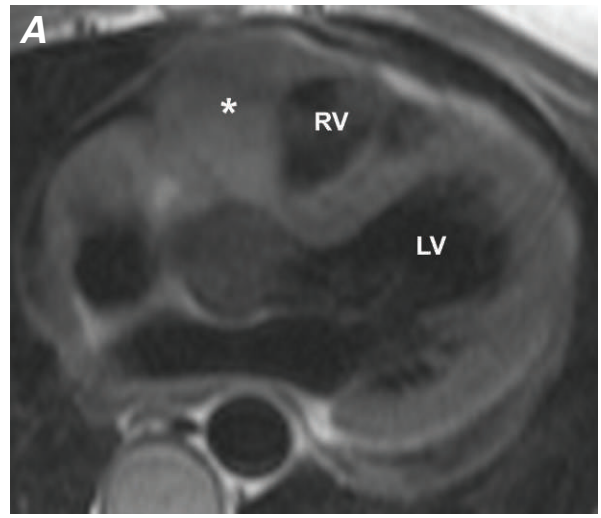


Fig. 3 ***A****) Transthoracic echocardiogram (basal short-axis view) shows a mass infiltrating the right ventricular outflow tract (arrow).* ***B****) Color-flow Doppler mode at the same location shows turbulent flow in the right ventricular outflow tract as a result of the mass.*

Supplemental motion images are available for Figure 3A and Figure 3B.

include pericarditis, pericardial effusion and tamponade, cardiomegaly, and arrhythmia.[3] Echocardiography, computed tomography, positron emission tomography, and CMR can identify cardiac metastases.[4] Cardiac magnetic resonance is particularly useful because of its ability to provide tissue characterization and identify the mass. Malignant tumors generally have low signal intensity on T1-weighted imaging and high signal intensity on T2-weighted imaging, with varying degrees of contrast enhancement. The only exception is metastatic melanoma, which can be bright on both T1- and T2-weighted imaging because of the presence of paramagnetic melanin acting as a contrast agent.[1,2,5]



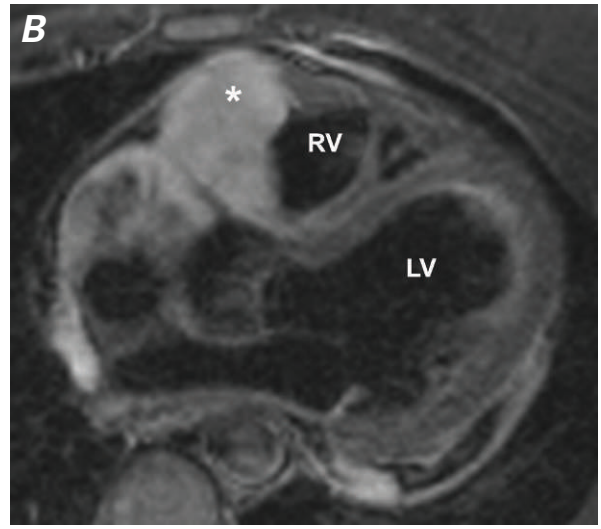


Fig. 4 *Cardiac magnetic resonance image shows a mass in the right ventricular outflow tract (*) with high signal intensity on both* ***A****) T1-weighted and* ***B****) T2-weighted imaging.*

LV = left ventricle; RV = right ventricle

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