Echocardiography remains the standard for the diagnostic evaluation of left ventricular tumors: A case report with anatomical correlation

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Abstract
Primary cardiac tumors are rare. Although the majority are benign, they may cause significant morbidity and mortality. Two-dimensional transthoracic echocardiography (2D-TTE) is the primary imaging modality for the diagnosis of cardiac tumors. New and more complex non-invasive imaging modalities, such as cardiac magnetic resonance (CMR), do not always provide an added value. This is illustrated in the presented case report of a papillary fibroelastoma (PFE).

Case report
A 78-year-old woman with known arterial hypertension was admitted for cerebellar stroke with acute gait disturbances and left limb ataxia. Her ECG showed sinus rhythm. The two-dimensional transthoracic echocardiography (2D-TTE) revealed an echo-dense, homogenous, round, pedunculated and highly mobile (diameter approximately 14 mm) structure attached to the apex of the left ventricle (Fig. 1). A finding consistent with a cardiac tumor.
Non-invasive imaging by cardiac magnetic resonance (CMR, 1.5 T, T1- and T2-weighted FFE gradient-echo and TSE sequences, fat-suppressed T2-weighted TSE sequence, black-blood imaging) did not contribute to further characterization of the tumor. However, a contrast echocardiography (SonoVue, Bracco SpA, Milano, Italy) showed absence of enhancement of the tumor as compared with the adjacent myocardium (Fig. 2), indicating a non-vascular, non-malignant tumor type PFE.\textsuperscript{1-4}

To avoid further systemic embolization, urgent cardiac surgery was performed. The mass was successfully excised (Fig. 3). The histopathological exam confirmed the diagnosis of a PFE (Fig. 4). The patient made an uncomplicated recovery.

Discussion

PFEs are rare endocardial tumors, predominantly affecting the cardiac valves. Although histologically avascular and benign, they may lead to significant morbidity and mortality due to embolization.\textsuperscript{1,2}

Two-dimensional echocardiography is considered the primary imaging modality for the diagnosis of cardiac masses.\textsuperscript{2-4} It not only detects the existence of the tumor, but also allows further characterization: size, location, surface characteristics, tumor attachment and mobility, and underlying heart disease. Myocardial contrast echocardiography provides additional information about the vascularity of cardiac masses and differentiates the neo-vascularization of malignancies from the avascularity of thrombi and the sparse vascularity of stromal tumors.\textsuperscript{3,4} CMR has been increasingly used in the evaluation of cardiac masses. The wide field of view, high contrast and spatial resolution, and multiplanar imaging capabilities should allow for demonstration and

Figure 2 Contrast echocardiography showing no enhancement of the cardiac mass.

Figure 1 Two-dimensional echocardiography showing a round, pedunculated tumor attached to the apex of the left ventricle.

Figure 3 Macroscopic appearance of the excised tumor.
localization of a mass, including any myocardial infiltration, pericardial involvement and/or extracardiac extension.5

In this report, we presented a case of PFE diagnosed by echocardiography, which could not be detected by CMR. This might be explained by the lower sensitivity of CMR for cardiac structures with a highly irregular motion related to the specificity of CMR image formation. In most CMR image sequences, only a few lines of the image are acquired during each heart beat. The final image is mathematically derived from these lines. Therefore, structures that do not move in a reproducible relation to the rest of the heart are blurred in the final reconstructed image. This report supports the claim that echocardiography remains the procedure of choice for the initial diagnosis and stratification of intra-cardiac tumors.

References