Tissue Characterization of a Suspected Aortic Valve Fibroelastoma With Cardiac Magnetic Resonance Imaging

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A previously healthy 29-year-old woman complaining of atypical chest pain was referred to our hospital. No cardiovascular risk factors were present. Resting ECG demonstrated normal sinus rhythm, and an exercise ECG during full workload was inconspicuous. Routine transthoracic echocardiography revealed a small lesion protruding from the aortic side of the aortic valve (Figure 1, Data Supplement Movie I) that was suggestive of a primary cardiac valve tumor. In such a case, differential diagnosis consists of tumor, thrombus, or vegetation and usually relies on clinical presentation or localization of the structure alone. Consequently, cardiac magnetic resonance (CMR) imaging was attempted for tissue characterization.

On T1- and T2-weighted CMR images, a structure with homogeneous signal intensity identical to fibrous valve tissue was detected; fat suppression ruled out the presence of fatty lesion components (Figure 2). During dynamic, contrast-enhanced first-pass perfusion imaging, no increase in signal intensity was noted (Data Supplement Movie III), whereas on delayed-enhancement imaging, a distinct signal intensity increase was documented (Figure 2). Thus, the findings of CMR tissue characterization of the lesion corroborated the diagnosis of an aortic valve fibroelastoma.

Fibroelastoma is believed to be the most common primary tumor of cardiac valves, though the reported incidence in autopsy studies is rather low. Most papillary fibroelastomas affect the left-sided valves without any preference for sex or age. Concomitant valvular dysfunction is distinctly uncommon. Fibroelastomas are easily detected on echocardiography but are difficult to visualize with CMR: Their small size and rapid, extensive movement render adequate CMR imaging extremely difficult, particularly during spin-echo sequences that are needed for texture characterization. Consequently, existing CMR reports generally describe a fibroelastoma as a hypointense mobile mass on cine gradient imaging only.

In the present case, the high diagnostic image quality of all spin-echo sequences was achieved by freezing of cardiac and valve motion: The aortic valve rest period was determined from a cine sequence with a high temporal resolution (50 phases per cardiac cycle; Data Supplement Movie II). Subsequently, spin-echo data acquisition was restricted to the rest period duration, thereby achieving an almost complete motion freezing of the valve and its lesion. With this approach, a dedicated CMR protocol consisting of all essential components for comprehensive tissue characterization could be completed, ie, T1- and T2-weighted black-blood imaging, contrast-enhanced first-pass perfusion, and delayed-enhancement imaging (inversion delay 220 ms, trigger delay 560 ms, and heart rate 82 bpm).

Because the risk of thromboembolic events is ∼6% in asymptomatic patients with an incidental finding of fibroelastoma, surgical removal of the fibroelastoma is usually recommended; however, our young patient declined to undergo surgical resection. Thus, anticoagulation therapy was advised, and echocardiographic control examinations at regular short-term intervals were scheduled.

Disclosures

None.

References

Figure 1. A, Transthoracic echocardiography detected a small, globular mass (7\times7 \text{ mm}, arrow) attached to the right coronary cusp of the aortic valve (left: parasternal long-axis view; right: parasternal short-axis view). B, Similarly, CMR cine imaging demonstrated a hypointense mass (arrow) and was used for the assessment of its relative standstill period during the cardiac cycle (left: 3-chamber view; right: short-axis view of the aortic valve). LA indicates left atrium; LV, left ventricle; RA, right atrium; and RV, right ventricle.

Figure 2. Top: T1-weighted images without and with fat suppression (SPIR; spectral presaturation with inversion recovery) and T2-weighted images of the tumor (7\times8 \text{ mm}, arrow) with a signal intensity identical to fibrous valve tissue. Bottom: Contrast-enhanced first-pass perfusion imaging proved the absence of a signal intensity increase, and delayed-enhancement imaging (DE) clearly depicted the contrast uptake of the tumor (arrow). RV indicates right ventricle; RA, right atrium; and LA, left atrium.
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