Multimodality cardiac magnetic resonance imaging of cardiac mass

Imagerie par résonance magnétique multimodale d’une masse cardiaque

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Abbreviations

AVR aortic valve replacement
CABG coronary artery bypass graft
CT computed tomography
TTE transthoracic echocardiography

An 84-year-old man presented with a 1-month history of dyspnoea and constrictive chest pain on exertion, relieved by nitroglycerin administration. His main medical history included aortic valve replacement (AVR) with a bioprosthetic valve, coronary artery bypass graft (CABG) and post-transfusion chronic hepatitis C. Physical examination was normal except for a grade 2 ejection systolic murmur audible in the aortic area and bilateral leg oedema. Electrocardiogram demonstrated sinus rhythm at 75/min and T-wave inversion in the inferior leads. Moderately elevated troponin concentration was noted (0.79 µg/L). The patient was transferred to the intensive care unit with a preliminary diagnosis of acute coronary syndrome.

Transthoracic echocardiography (TTE) revealed a hyperechogenic and heterogeneous motionless mass infiltrating the lateral wall of the right ventricle and atrium (Fig. 1, Panel A, black arrow) without intracavitary extension. Left ventricular ejection fraction was normal.
Figure 1. Panel A. Transthoracic echocardiography revealing a hyperechogenic and heterogeneous motionless mass infiltrating the lateral wall of the right ventricle and atrium without intracavitary extension. Panel B. Cardiac magnetic resonance: T2-weighted black blood spin echo sequence confirming a tumor involving the right free wall of the heart, centred on the atrioventricular groove. Panel C. Cardiac magnetic resonance: fat suppressed T2-weighted black blood spin echo sequence showing an increased signal. Panel D. Cardiac magnetic resonance: first-pass perfusion imaging showing early enhancement. Panel E. Cardiac magnetic resonance: patchy delayed enhancement after gadolinium injection. Panel F. Cardiac CT showing right coronary artery encasement by the tumour. Panel G. CT guided biopsy of the tumour. Panel H. Microscopic view: diffuse large B-cell lymphoma.

Cardiac magnetic resonance imaging (Symphony, Syngo 1.5 T, Siemens, Erlangen, Germany) confirmed a tumor involving the right free wall of the heart, centred on the atrioventricular groove. The mass appeared slightly hyper-signal on T2-weighted black blood spin echo sequence (Fig. 1, Panel B) and the signal even increased after fat suppression (Fig. 1, Panel C). The right coronary artery was encased in the mass (Fig. 1, Panels B and C, black arrows) and a right pleural effusion was present. First-pass perfusion imaging (< 1 min) showed an early and substantial enhancement (Fig. 1, Panel D). Delayed inversion recovery sequences (fast gradient echo) were acquired 10 min after injection of contrast medium and showed a patchy late enhancement (Fig. 1, Panel E).

Cardiac and body multislice computed tomography (CT) were performed to evaluate the tumor extension (Lightspeed VCT 64d, General Electric, Milwaukee, WI, USA). The right coronary artery encasement by the tumour was confirmed, as were previously described atherosclerotic lesions (Fig. 1, Panel F, black arrows). CABG between the left internal mammary artery and left anterior descending artery was permeable. No significant lesion was found on the circumflex artery. Two secondary lesions were found in the liver but no hypertrophied lymph node was accessible to a percutaneous biopsy.

Considering the size and anterior location of the mass, and after a multidisciplinary discussion between the cardiologist, cardiac surgeon and interventional radiologist, a transthoracic CT-guided biopsy was decided.

The patient was placed in supine position. First enhanced chest CT was performed to locate the right coronary artery, the right marginal branch and the right internal thoracic vessels. A coaxial approach was used to avoid potential dissemination of the tumor. An 18-gauge outer stabilizing needle (Fig. 1, Panel G, white arrow) was inserted into an intercostal space in front of the mass, between the ster-
num and the right internal thoracic vessels. An automated biopsy gun was then inserted for tissue sampling and seven biopsies were carried out in different target zones. A subsequent thorax CT showed neither haematoma nor pericardial effusion.

All samples were sent to the pathology laboratory and the final diagnosis was a diffuse large B-cell lymphoma (Fig. 1, Panel H). Dedicated chemotherapy was introduced but failed to reduce the tumor volume on a TTE control. The patient died 10 months later.

This case illustrates the usefulness of multimodality, minimally invasive imaging approach for diagnosing a heart tumor. In this instance the patient was spared invasive high-risk cardiac surgery and coronary angiography. This was particularly significant for this 84-year-old patient with a previous history of AVR and CABG.

Conflict of interest

None.