Contrast echocardiography as a useful additional diagnostic tool in evaluating a primary cardiac tumor


Department of Cardiology, Leiden University Medical Center, Albinusdreef 2, P.O. Box 9600, 2300 RC (or otherwise: Albinusdreef 2, 2333 ZA), Leiden, The Netherlands

Department of Infectious Diseases, Leiden University Medical Center, The Netherlands

Department of Radiology, Leiden University Medical Center, The Netherlands

Erasmus Medical Center, Rotterdam, The Netherlands

The current report describes a case of a primary cardiac lymphoma. For early and appropriate treatment of a cardiac mass it is not only important to determine its localization and extension but also to differentiate between malignant and benign lesions. This report demonstrates that not only transthoracic echocardiography but also the other different forms of echocardiography such as transesophageal echocardiography, as well as contrast and intracardiac echocardiography, are useful tools in the diagnostic workup of cardiac masses.


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Abstract The current report describes a case of a primary cardiac lymphoma. For early and appropriate treatment of a cardiac mass it is not only important to determine its localization and extension but also to differentiate between malignant and benign lesions. This report demonstrates that not only transthoracic echocardiography but also the other different forms of echocardiography such as transesophageal echocardiography, as well as contrast and intracardiac echocardiography, are useful tools in the diagnostic workup of cardiac masses.

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Case report

A 48-year-old man was referred to our hospital for further diagnostic evaluation of a right cardiac process discovered at a transabdominal ultrasound study performed in the referring hospital. The patient had a 3 weeks history of recurrent fever (up to 40 °C), night sweat and weight loss (9 kg in 3 weeks). Except for general discomfort, the patient had no cardiac complaints.

On physical examination there was a regular and equal pulse of 88 beats per minute with a blood pressure of 110/70 mmHg. Central venous pressure was normal. Auscultation of the heart and lungs revealed no abnormalities. Although the right
upper abdomen was slightly tender, the liver was not enlarged. No lymphadenopathy was present.

Laboratory analysis showed minimal abnormalities: an elevated ESR (120 mm/h), a slight normocytic anemia (hemoglobin concentration 7.0 mmol/L) and an elevated lactate dehydrogenase (748 U/L; normal <450 U/L). Chest X-ray was normal. The ECG showed a prolonged PR interval of 220 ms as the only abnormality.

Abdominal ultrasound did not show abnormalities in the abdominal cavity, but a solid, irregular thickening of the free wall of the right ventricle and right atrium and some pericardial effusion was noted.

Subsequently, transthoracic echocardiography (TTE) demonstrated a thickened free wall of the right ventricle with a lobulated, large, enhancing epicardial mass invading the right atrium and extending around the aortic root. There was also global pericardial effusion (Fig. 1A and B).

Contrast echocardiography was performed by intravenously administrating SonoVue® (Bracco Inc. Diagnostics; sulphur hexafluoride 8 μL/mL) with a single or two injections of 2–3 mL in the maximum dose of 5 mL per examination (Vivid 7 scanner 1.7 MHz, power = mechanical index 0.07). Contrast perfusion imaging showed partial perfusion of the cardiac mass (Fig. 1C and D). Transesophageal echocardiography (TEE) confirmed a large mass invading the right atrium and the free wall of the right ventricle, which extended to the aortic root. Multislice computed tomography (MSCT) of the thorax and abdomen confirmed the echocardiographic findings and ruled out lymphadenopathy and other masses (Fig. 2). A primary cardiac neoplastic process was suspected. With combined intracardiac echocardiography and fluoroscopic guidance, percutaneous intracardiac biopsy of the right atrium and right ventricle was performed (Fig. 3A).

Subsequent histopathological examination revealed the presence of a blastic lymphoid infiltrative tumor that was CD45, CD20 and BCL6 positive. Immunocytology suggested an intermediate/high grade B-cell non-Hodgkin lymphoma, most probably diffuse large-B-cell lymphoma. In situ hybridization

Figure 1  (A) Four-chamber view showing a thickened right ventricular (RV) free wall with a lobulated mass invading the RV and right atrium (RA). Pericardial effusion (PE) is present on the right side of the heart. (B) Parasternal short-axis view illustrating the cardiac mass in the right ventricle extending to the aortic root (AO = aortic valve, RA = right atrium, RVOT = right ventricular outflow tract). (C) Four-chamber view using contrast perfusion imaging showing partial perfusion of the cardiac mass invading the right atrium (RA) and ventricle (RV). (D) Parasternal short-axis contrast-enhanced image using contrast shows a large mass in the right ventricle extending to the aortic root with partial perfusion (AO = aorta, RVOT = right ventricle outflow tract, RA = right atrium).
for Epstein–Barr virus (EBV) RNA and immunostaining for human herpes virus 8 (HHV-8) were negative. Human immunodeficiency virus (HIV-1) infection was confirmed by ELISA and subsequent immunoblotting. HIV viral load was 25,400 copies/mL and the CD4 count was 123 cells/mm³, indicating severely impaired cellular immunity.

Chemotherapy treatment consisting of doxorubicin, vincristine, cyclophosphamide and prednisone was initiated. During the first course of treatment, a significant reduction of the tumor was observed.

**Figure 2** Multislice computed tomography showing a large mass which invades the right atrium (RA) and ventricular free wall (RV = right ventricle, * = tumor mass).

**Figure 3** (A) Intracardiac echocardiographic image of the right ventricle (RV) shows the tumor in the ventricle free wall and the biopsy catheter (bc) in place (TV = tricuspid valve). (B) Four-chamber view after 3 months of chemotherapy shows a significant reduction of the tumor in the free wall of the right ventricle (RV) (RA = right atrium). (C) Parasternal short-axis image shows an almost normal aspect of the right ventricular outflow tract (RVOT) after 3 months of therapy (AO = aorta, RA = right atrium). (D) Contrast echocardiography performed after 3 months of therapy confirms the resolution of the tumor (AO = aorta, RA = right atrium, RVOT = right ventricular outflow tract).
follow-up TTE during chemotherapy showed a significant reduction of the tumor mass. This report provides an example of how different forms of echocardiography (TTE, TEE, contrast echocardiography, intracardiac echocardiography) can be used to assist in a comprehensive evaluation of cardiac masses.

Conclusion

Different echocardiographic techniques have been demonstrated to be useful in comprehensive evaluation of cardiac masses. In particular, contrast echocardiography to assess perfusion is a useful technique to further evaluate cardiac tumors. Early differentiation is important for further diagnosis, treatment and prognosis. Intracardiac echocardiography on the other hand, may be useful in guiding tissue biopsy.

References

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