Diagnosis of the prosthetic heart valve pannus formation with real-time three-dimensional transoesophageal echocardiography

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Prosthetic heart valve obstruction (PHVO) caused by pannus formation is an uncommon but serious complication. Although two-dimensional transesophageal echocardiography (2D-TEE) is the method of choice in the evaluation of PHVO, visualization of pannus is almost impossible with 2D-TEE. While demonstrating the precise aetiology of PHVO is essential for guiding the therapy, either thrombolysis for valve thrombosis or surgery for pannus formation, more sophisticated imaging techniques are needed in patients with suspected pannus formation. We present real-time 3D-TEE imaging in a patient with mechanical mitral PHVO, clearly demonstrating pannus overgrowth.

Case presentation

A 42-year-old woman with a history of mitral valve replacement with bileaflet mechanical prosthesis ([St Jude Medical (SJM) valve, No: 25]) 7 years earlier presented with dyspnoea. Physical examination was unremarkable except for mildly muffled prosthetic valve sounds. Transthoracic echocardiography (TTE) and two-dimensional transesophageal echocardiography (2D-TEE) showed a severely increased mechanical mitral valve (MMV) gradients (mean transprosthetic gradient 26 mmHg) and decreased mitral valve area (1.1 cm²) (Figure 1A), without the restriction of valve motion and any detectable mass over MMV (Figure 1B) (Supplementary data online, Video S1). Real-time three-dimensional transesophageal echocardiography (RT-3D-TEE, Philips Medical Systems, Andover, MA, USA) successfully and clearly demonstrated a mass, suspected as pannus overgrowth, narrowing circumferentially the inflow and outflow aspects of the prosthesis by extending into both atrial and ventricular sides of the MMV (Figure 2A and B), (Supplementary data online, Video S2). The patient underwent redo-mitral valve replacement with SJM valve, no: 27. Previous SJM valve was covered with circumferential pannus involving both atrial and ventricular sides which were removed surgically (Figure 2C and D).

Discussion

Valve obstruction is one of the most serious complication associated with prosthetic heart valves (PHVs).1 Although thrombosis of the PHV remains as the most common underlying mechanism,1 pathological studies have suggested that pannus formation plays an important role in the mechanism of obstruction.2,3 Surgery is the only treatment option in patients with PHV obstruction associated with pannus formation. While recent evidence suggest that thrombolytic therapy must be considered the first-line treatment unless contraindicated in patients with PHV thrombosis,3–5 it is crucial to diagnose accurately the evidence of pannus overgrowth with reliable methods which are necessary to allow an appropriate selection of patients for either surgery or thrombolysis. Currently available diagnostic tools including TTE and 2D-TEE are insufficient to detect pannus formation, and detection rate is so poor that a preoperative diagnosis is almost impossible. RT-3D-TEE provides

Keywords

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unique visualization and better understanding of the relationship between cardiac structures than two-dimensional imaging, as well as accurate measurements of valvular and ventricular function. By the recent development of matrix array probes, RT-3D-TEE has been used to provide more precise diagnostic information for both native heart valves. More recently, several case series and case reports have been published regarding the use of RT-3D-TEE for the evaluation of PHVs, including MMV dehiscence and thrombosis and mechanical tricuspid valve thrombosis.

This patient having pannus overgrowth on MMV was successfully and accurately diagnosed with RT-3D-TEE, with surgical confirmation. RT-3D-TEE can be a useful technique for anatomic evaluation of PHV obstruction as a result of pannus overgrowth. The data regarding the diagnostic tools for pannus formation are novel and may provide a baseline for future prospective studies, is first to be reported.

Supplementary data

Supplementary data are available at European Journal of Echocardiography online.

Conflict of interest: none declared.

References