

Cardiac Imaging

Thrombosis of a Mitral Mechanical Prosthesis

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A 70-year-old woman, with a metallic mitral valve prosthesis that had been implanted 8 years before because of stenosis, came to our department with extreme dyspnoea at rest, which had worsened progressively over 5 days. One week previously, the patient had stopped anticoagulant medication for unclear reasons.

On clinical examination, muffled heart sounds and rales up to the mid lung fields were noted, while the ECG revealed sinus tachycardia with left bundle branch block. Laboratory tests showed a sub-therapeutic international normalised ratio (INR: 1.5). The transthoracic echo examination that followed showed borderline left ventricular dimensions with mild impairment of overall contractility. On the Doppler recording of transmitral flow (Figure 1) the height of the E wave and the mean transvalvular pressure gradient were markedly elevated (3.4 m/s and 32 mmHg, respectively), both indicative of obstruction of the prosthesis. In addition, the deceleration slope of the E wave suggested a large pressure half time (PHT >220 ms).

A transoesophageal echo (TOE) examination was performed in order to further clarify the cause of the obstruction and to aid in planning the therapeutic approach. TOE confirmed the findings of the transthoracic Doppler study (Figure 2). In addition, it showed a stuck posterior hemidisc of the prosthesis, while the anterior leaflet demonstrated restricted motion due to thrombus on its atrial side (Figure 3). Dense spontaneous echo contrast was evident within the

left atrium, with a large thrombus (maximum diameter >20 mm) on its posterior wall (Figure 3), and thrombus within the left atrial appendage (Figure 4). The diagnosis of acute thrombosis of the prosthesis was established and immediate surgical treatment was decided upon. Under treatment with unfractionated heparin, the patient was transferred to the nearest cardiac surgery centre; however, she died during the operation.

Obstructive thrombosis of left-sided mechanical prostheses is a relatively rare complication (0.3-1.3% per patient-year)¹ and is more usually encountered in the mitral than in the aortic position.² Clinical suspicion of the condition arises when a patient with a mechanical valve and acute or subacute dyspnoea has inadequate anticoagulation. The echocardiographic diagnosis may be made directly from the transthoracic study when, in the case of mitral prostheses, the mean pressure gradient exceeds the pathognomonic level of 16 mmHg, with PHT >160 ms.³ In such cases, a transoesophageal study is indicated for the following reasons:

- Diagnostic, when the cause of the obstruction needs to be clarified: thrombosis of the prosthesis, coexistence of pannus, or stuck leaflet.
- Therapeutic, in the sense of further patient management. There are three options: surgery, thrombolysis, and intensification of anticoagulant treatment.

A number of conditions favour a surgical approach: obstructive thrombosis of

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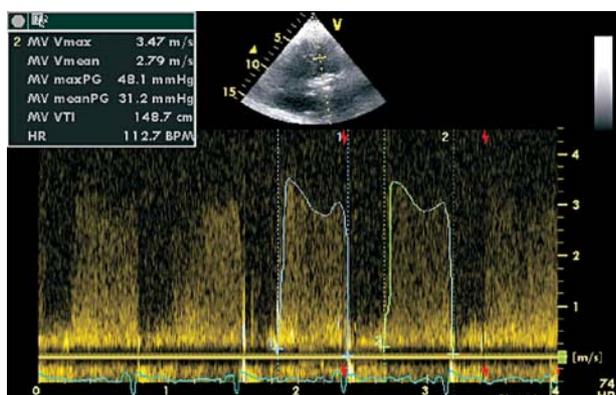


Figure 1. Transthoracic echocardiographic study: spectral mitral flow analysis, showing an elevated mean transmitral pressure gradient (~32 mmHg) and high peak velocity of the E wave, with a characteristically reduced deceleration slope, consistent with increased pressure half time.

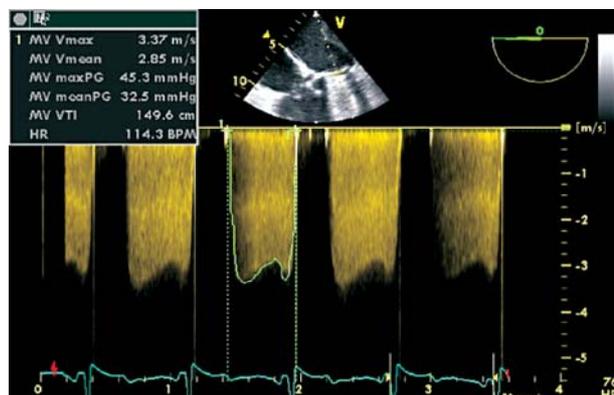


Figure 2. Transoesophageal 4-chamber view and Doppler study of flow through the mitral prosthesis, confirming the findings of the transthoracic study.

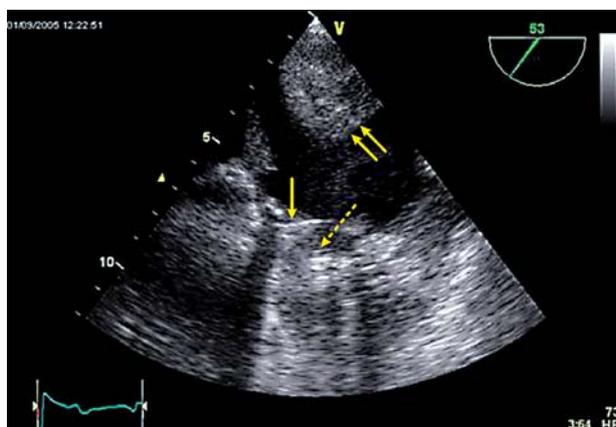


Figure 3. The posterior hemidisc of the prosthesis appears stuck (solid arrow), while the anterior is partially open (dotted arrow). In addition, there is a large thrombus (double arrow) on the posterior wall/roof of the left atrium.

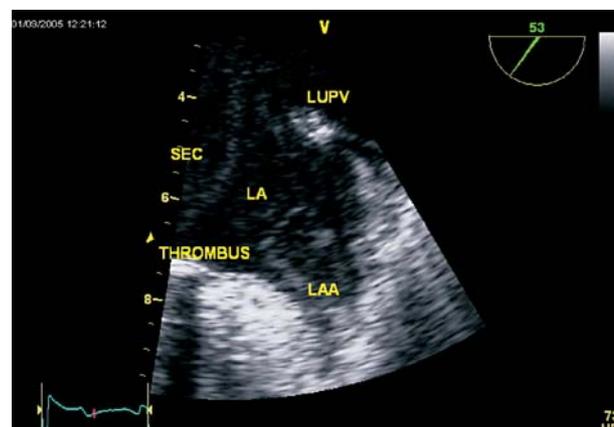


Figure 4. Transoesophageal study: focus on the left atrial appendage (LAA), within which a thrombus can be seen. LA – left atrium; LUPV – left upper pulmonary vein; SEC – spontaneous echo contrast.

a left-sided prosthesis, patient's relatively stable clinical condition (NYHA <IV, otherwise operative mortality risk is increased), large thrombus size (>0.8 cm², as this has been associated with a high embolic risk in the case of thrombolysis), and the co-existence of pannus.¹ In our case, the first three conditions were present, making the choice of surgical treatment preferable. The presence of pannus could not be excluded, although the acute development of the symptomatology in the setting of poor anticoagulation counted against it.⁴

In published cases of thrombosis of prosthetic mitral valves, small thrombi are usually encountered on the atrial side of the prosthesis, following a long period of sub-therapeutic or widely varying INR levels. However, in the present case, apart from the thrombi in con-

tact with the prosthesis, a large thrombus (estimated area >15 cm²) was also found at the roof of the left atrium, an unusual finding, but one of great clinical significance since it rendered the administration of thrombolysis inappropriate. Furthermore, the duration of the reported abstinence from anticoagulation treatment was strikingly short in relation to the remarkable thrombus load. This creates the suspicion that even under treatment the patient was poorly anticoagulated (the last reported INR was measured 2 months before her admission and equalled 2.6). Finally, fulminant thrombosis of a prosthetic valve has been described in the setting of inflammation/sepsis or malignancy.⁵ These factors tend to create a particularly thrombogenic environment but were absent in the case presented here, at least on the basis of clinical and laboratory findings.

In conclusion, thrombosis of a mechanical prosthesis in the mitral position is an emergency condition, which can be diagnosed by transthoracic echocardiography in combination with clinical information (mainly recent-onset symptoms and low INR). Transmitral flow can provide clear diagnostic data, in the form of an elevated mean pressure gradient combined with a high PHT. It is rare for the former to be found as high as it was in the present case. Further management of the patient often requires a transoesophageal study, aimed firstly at the precise localisation of the thrombus and the determination of its size, and secondly at the possible coexistence of pannus; both factors play a pivotal role in the final decision regarding surgical or medical treatment.

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