We present two cases involving elevated gradients across mechanical cardiac valves. Provided images show decreased disc mobility and eventual operative findings. A brief discussion underlines the importance of recognizing pannus as a common aetiology for valve dysfunction.

**Keywords**

Pannus • Valvular heart disease • Echocardiography • Cardiovascular surgery • Valvular disease

**Case report**

The treatment of mechanical valve obstruction hinges on the aetiology of dysfunction. We present two cases with similar aetiologies but different echocardiographic appearances.

**Case 1**

A 76-year-old woman, who received a 27-mm ATS mechanical mitral valve prosthesis (Medtronic Inc., Minneapolis, MN) for severe regurgitation 10 years ago, developed acute-on-chronic dyspnoea with exertion over 6 weeks. Warfarin therapy had provided uniformly therapeutic anticoagulation for years. A transoesophageal echocardiogram (TEE) showed an elevated mean gradient of 13 mmHg across the valve (Figure 1). The more posterior disc was limited in mobility, and color Doppler imaging showed almost all flow occurring through the orifice of the more anterior disc (Figure 2; see Supplementary data online, Videos S1–S3). There was also a suggestion of thrombus overlying the left atrial aspect of the affected disc. Five years prior to the current presentation, the valve had an elevated mean gradient of 13 mmHg while the patient was in a resting sedated state with a heart rate of 68 bpm.

![Figure 1](https://example.com/image1.png) 

**Figure 1** Continuous-wave Doppler interrogation of the mechanical mitral valve during transoesophageal echocardiography shows a mean gradient of 13 mmHg while the patient was in a resting sedated state with a heart rate of 68 bpm.
of 8 mmHg with less prominent limitations in mobility of the posterior disc.

Given the unilateral and gradual progression of her disease, pannus was suspected as opposed to isolated acute thrombosis. Thrombotic material was found overlying the left atrial side of the valve, and fibrous pannus was found overlying both sides of the valve at surgery (Figure 3; see Supplementary data online, Figures S1 and S2).

**Case 2**

A 56-year-old woman had four episodes of syncope over 2 months and noted increased shortness of breath while walking her dog. She received a 20-mm ATS mechanical aortic valve prosthesis (Medtronic Inc.) for severe aortic stenosis 7 years ago. She was compliant with warfarin therapy but did have a period of subtherapeutic values during noncardiac surgery 8 months prior. Transthoracic echocardiography demonstrated a peak gradient of >100 mmHg across the valve and mean gradients >50 mmHg (Figure 4). TEE revealed limited mobility of both discs with two turbulent, high-velocity forward jets coming from the peripheries of the valve (Figure 5; see Supplementary data online, Videos S4 and S5).

**Figure 2** As blood flows from the left atrium (LA) into the left ventricle (LV) during diastole, the posterior disc has limited excursion (A). Two-dimensional Doppler imaging in the same view shows that almost all diastolic flow occurs through the anterior disc orifice (B).

**Figure 3** The excised mechanical valve had fibrous pannus overlying its ventricular aspect. The left atrial aspect had a combination of thrombotic material and fibrous pannus (see Supplementary data online, Figures S1 and S2).

**Figure 4** Continuous-wave Doppler interrogation of the mechanical aortic valve during transthoracic echocardiography shows peak and mean gradients of >100 and >50 mmHg, respectively.
Five years prior to the current presentation, both discs had limited mobility with an elevated mean gradient of 34 mmHg. Again, pannus was suspected as the most likely underlying pathology; there was no improvement on high-dose intravenous heparin infusion during warfarin discontinuation. At surgery, a rim of subvalvular fibrous pannus (Figure 6) was found, limiting disc excursion by preventing the central portion of the discs from swinging downward during systole.

Discussion

Pannus is somewhat less common than thrombosis in mechanical valve obstruction, but should be strongly suspected when findings and symptoms have progressed over years in patients compliant with anticoagulation. Both cases demonstrate the importance of routine echocardiographic follow-up after valve surgery. The incremental increase in gradient and limited mobility over years raised the suspicion of pannus in both cases. The first case also illustrates that thrombotic material is commonly found on valves limited by pannus. Some of the relative clinical and echocardiographic differences that may help differentiate pannus from thrombus as the primary aetiology of mechanical valve obstruction are listed in Table 1. This is pertinent as more centres are using thrombolysis for suspected mechanical valve thrombosis.

Table 1  Relative clinical and echocardiographic differences between thrombosis and pannus as primary aetiologies for mechanical valve obstruction

<table>
<thead>
<tr>
<th>Aetiology</th>
<th>Duration of symptoms</th>
<th>Time from valve implant</th>
<th>Anticoagulation status</th>
<th>Echodensity and appearance of mass on TEE (if present)</th>
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<tbody>
<tr>
<td>Primary thrombosis</td>
<td>Shorter (often &lt;1 month)</td>
<td>Anytime</td>
<td>Often found to have INR &lt;2.5 at presentation</td>
<td>Longer and less echodense</td>
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<tr>
<td>Primary pannus aetiology with or without thrombosis</td>
<td>Longer</td>
<td>Usually &gt;5 years; although exceptions exist</td>
<td>Less likely to have subtherapeutic INR values</td>
<td>Shorter and more echodense (videointensity &gt;0.7)</td>
</tr>
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INR, international normalized ratio; TEE, transoesophageal echocardiography.
thrombolysis in these two patients would have placed them at unnecessary risk for embolic and haemorrhagic events.

**Supplementary data**

Supplementary data are available at *European Journal of Echocardiography* online.

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**References**
