

## Imaging of pannus formation in patients with mechanical heart valves

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### Abstract

Patient-prosthesis mismatch (PPM) should be recognized in patients with elevated transprosthetic gradients but without leaflet immobility, since the treatment strategy may differ in either etiology. However, thrombus and/or pannus formation should be excluded before a diagnosis of PPM is made. Particularly, pannus formation may not be diagnosed with 2-dimensional transesophageal

echocardiography. Electrocardiographically gated 64-section multidetector computed tomography (MDCT) may be a promising tool in diagnosing or excluding pannus formation. Our report underlines the utility of MDCT in this regard and also emphasizes the importance of recognition of PPM as a differential diagnosis in such patients.

**Key words:** Multidetector computed tomography; Pannus formation; Patient prosthesis mismatch; Prosthetic heart valves; Transesophageal echocardiography

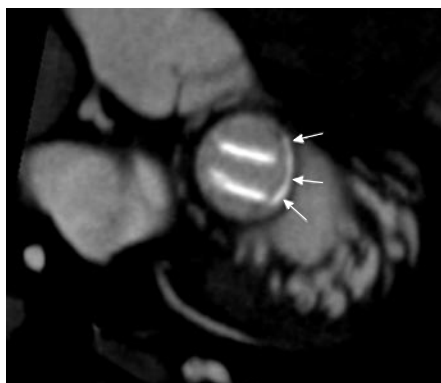
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**Core tip:** Elevated transprosthetic gradients may be caused by pannus and/or thrombus formation or patient prosthesis mismatch (PPM). The differentiation between these three diagnoses is essential since the treatment strategy may differ in either etiology. Our report emphasizes the usefulness of cardiac multidetector computerized tomography in cases with suspected pannus formation which may not be diagnosed without surgical confirmation. Moreover, we underline the importance of recognizing PPM which may easily be overlooked in patients with elevated transprosthetic gradients. Indeed, pannus, thrombus or any other masses as the cause of prosthetic dysfunction should be ruled out for a diagnosis of PPM.

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### TO THE EDITOR

We would like to comment on the recent article by Soumoulou *et al*<sup>[1]</sup> which reports a case of obstructed



**Figure 1** Pannus formation visualized as a high-attenuated periprosthetic mass.

prosthetic aortic valve caused by pannus formation, in which a preoperative definitive diagnosis could not be made by multiple imaging methods. We appreciate the authors since they emphasize the importance of clinical suspicion along with using multimodality imaging in recognizing this infrequent but serious complication of valve replacement surgery. However, two major issues remain to be addressed.

The differential diagnosis of a patient with elevated transprosthetic gradients should include not only pannus formation and thrombosis, but also patient prosthesis mismatch (PPM), since the treatment strategy may differ in either etiology. In the reported case, since there was no identifiable mass on transesophageal echocardiography (TEE) and no limited excursion of prosthetic leaflets, PPM had to be recognized before the decision of re-operation. Because, if the patient had had PPM, improvement of transprosthetic gradients after re-operation would have been unlikely. Although the prosthetic valve size (#23 St. Jude) is not small and there is no information regarding the patient's body surface area, PPM can not be excluded unless the presence of a periprosthetic mass (pannus or thrombus) is precisely excluded. Real-time 3-dimensional TEE may be a promising tool as previously reported<sup>[2]</sup>. Although thrombus can be excluded by TEE, pannus may not be diagnosed in most of the cases. We have previously demonstrated that pannus formation may be visualized as a high-attenuated periprosthetic mass (Figure 1) and

thrombus can be demonstrated as a low attenuated periprosthetic mass on electrocardiographically gated 64-section multidetector cardiac computed tomography (MDCT)<sup>[3-6]</sup>. Although the authors mention the use of cardiac computed tomography pre-operatively, there is no information regarding the slice number of the MDCT, use of intravenous contrast agent, electrocardiographic gating during the scan. Hence, without appropriate use of cardiac MDCT, pannus or thrombus may not be visualized. Fortunately, pannus formation was diagnosed peri-operatively in the current case, and the patient was successfully re-replaced with another mechanical prosthesis.

Clinicians should be cognizant of PPM, when evaluating a patient with elevated transprosthetic gradients but without leaflet blockade. Thrombus can readily be excluded with TEE but, pannus visualization may require more sophisticated imaging with MDCT in addition to TEE.

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