A Curious Case of Raised Gradient Across Mitral Bioprosthetic Valve

Abstract

High Doppler valve gradient is generally suggestive of valve thrombosis. However, it should be corroborated with the finding of restricted leaflet movement to confirm the diagnosis. In the present case, abnormally high gradient was not associated with limited leaflet movements or any valve thrombus.

Keywords: Diastolic dysfunction, digoxin, transmitral gradient

A 52-year-old female patient presented with shortness of breath on mild exertion. She was diagnosed with rheumatic heart disease with severe mitral stenosis and severe tricuspid regurgitation. Transthoracic echocardiography was suggestive of critical mitral stenosis (mitral valve area 0.8 cm²). Mean gradient across mitral valve was 12 mm Hg and severe tricuspid regurgitation with pulmonary artery systolic pressure of around 65 mm Hg was observed. Left ventricular ejection fraction was 58% with no diastolic dysfunction. She had atrial fibrillation with controlled ventricular rate. Coronary angiography was normal. The patient underwent mitral valve replacement with bioprosthetic valve Epic 29 mm (St. Jude) and tricuspid valve repair. After the surgery, the patient was hemodynamically stable. Mean gradient across mitral prosthetic valve was 2 mm Hg with no paravalvular leak. Regurgitation across tricuspid valve was just trivial. Oral anticoagulant warfarin was started to maintain therapeutic anticoagulation range. Postoperatively, the patient started taking tablet digoxin 0.25 mg for atrial fibrillation as advised by her local physician. Few days after the surgery, the patient complained of breathlessness even after mild exertion. Transthoracic echocardiographically was performed, and it revealed a mean gradient of 13 mm Hg across the mitral prosthetic valve at a heart rate of 88/min [Figure 1]. Prosthetic mitral valve leaflets were functioning well [Video 1]. Moderate tricuspid regurgitation with peak velocity of 3.8 m/s was noted [Figure 2]. Left atrium was dilated, and average E/e’ ratio was 16 suggestive of Grade 3 diastolic dysfunction of the left ventricle. Left ventricular systolic function was good with left ventricular ejection fraction approximately 50% [Video 2].

High Doppler valve gradient is generally suggestive of valve thrombosis. However, it should be corroborated with the finding of restricted leaflet movement to confirm the diagnosis. In the present case, abnormally high gradient was not associated with limited leaflet movements or any valve thrombus. Incidence of bioprosthetic valve thrombosis is low.[1] There was no evidence of any valve thrombosis or valve degeneration echocardiographically. The patient was well anticoagulated. Sometimes, preserved mitral leaflets may cause elevated gradient across the prosthetic valve. However, thickened and calcified mitral apparatus was not spared in the present case. However, it is important to note that echocardiography indicated severe left ventricular diastolic dysfunction which could have increased the transmitral gradient. The patient was not having diastolic dysfunction preoperatively and in the immediate postoperative period. Chronic atrial fibrillation might have developed diastolic dysfunction. Atrial fibrillation is both a cause and consequence of heart failure (both in heart failure with reduced ejection fraction and preserved ejection fraction).[2] Moreover, the patient was on digoxin therapy postoperatively. Digoxin, by inhibiting Na-K-ATPase membrane pump, increases cytosolic Ca²⁺ concentrations.

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and thereby enhances myocardial contractility. Rapid restoration of this raised calcium to basal levels in early diastole can only ensure myocardial relaxation. Digoxin is not expected to facilitate relaxation as evidenced in several experimental studies\(^1,^4\) and did not offer beneficial effects in patients with diastolic failure as evidenced by the Ancillary Digitalis Investigation Group Trial.\(^5\) In the present case, raised transmitral gradient may be because of diastolic dysfunction probably due to atrial fibrillation and exaggerated by digoxin. The patient was decongested using loop diuretic. Digoxin was stopped, and beta blocker was started as rate control therapy for atrial fibrillation. The patient improved symptomatically.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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