

CASE REPORT

Apparent dysfunction of one leaflet of a bileaflet mitral valve prosthesis due to collection of blood behind left atrium following cox maze III procedure and mitral valve replacement

D. Ho¹, M. M Elahi², K. J. Zehr²

1. Division of Cardiovascular Anaesthesiology, Department of Anaesthesiology, Texas A & M Health Science Center, Scott & White Memorial Hospital, USA. 2. Division of Cardiothoracic Surgery, Department of Surgery, Texas A & M Health Science Center at Scott & White Memorial Hospital, TX, USA.

Correspondence: Maqsood Elahi. Address: Division of Cardiothoracic Surgery, Department of Surgery, Texas A & M Health Science Center, Scott & White Memorial Hospital, 2401 S. 31st Street Temple, TX, 76508, USA. Email: manzoor_elahi@hotmail.com.

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Abstract

Immediate postcardiotomy tamponade is a known surgical complication predominantly by ventricular compression due to accumulation of ongoing bleeding or clot within the pericardial space. Transeosophageal echocardiography (TEE) is a useful tool in understanding such acute pathology; especially when the clot behind the heart would cause mechanical distortion of the prosthetic valve leaflets in mitral position. The main aim here is to present intraoperative TEE comparison findings to rule out leaflet mechanical obstruction of prosthetic valve during cardiac tamponade, shortly after cut and sew Cox-Maze III procedure, mitral valve replacement and tricuspid valve repair.

Key words

Transeosophageal echocardiography, Mechanical valve, Bileaflet valve, Cardiac tamponade, Flow velocity, Left atrial bleed

1 Introduction

Immediate tamponade after surgery is a serious complication encountered due to ventricular compression. The main causes include continuing bleeding that leads to accumulation of clot within pericardial space. Intraoperative transeosophageal echocardiography (TEE) can be a useful tool in such settings. Therefore, we describe a case where intraoperative TEE comparison findings ruled out leaflet mechanical obstruction of prosthetic valve during cardiac tamponade and deteriorating hemodynamics post cut and sew Cox-Maze III procedure, mitral valve replacement and tricuspid valve repair.

2 Case report

A 47 years old man with history of poor rate controlled atrial fibrillation and moderately severe rheumatic mitral stenosis underwent cut & sew Cox Maze III procedure mitral valve replacement and tricuspid valve repair. A 31/33 ON-X (ON-X

life technologies Inc.) was used for mitral valve replacement. Preoperative TEE confirmed moderate to severe mitral stenosis. The posterior mitral leaflet was thickened and calcified with commissural fusion. There was an echolucency area in left atrial appendage and velocity < 20 cm/s consistent with a thrombus. The left atrium itself was moderately enlarged and left ventricular systolic function was estimated approximately 25%. The operation went uneventful with total cross-clamp and bypass time being 53 minutes and 105 minutes respectively. The coagulopathy was duly corrected with blood products based on 3 intraoperative thromboelastogram (TEGs) results, and patient was transferred to the ICU in a stable condition. However within 12 hours, ongoing chest tube output requiring additional blood products and declining cardiac output status warranted for re-exploration for suspected cardiac tamponade. Bedside Echo revealed posterior mediastinal collection. To a point of interest, it was also found that transmitral inflow velocity profile of side leaflets of mechanical valve showed a difference of 16% in peak velocity per midesophageal (ME) 4-chamber view with continuous wave Doppler (CWD) (see Figure 1). Patient went back to operating room and approximately 500 ml of blood clot situated posteriorly in the pericardium was evacuated. At this stage, a small arterial bleed from the left atrial suture line was spotted and rectified with 5/0 Prolene suture. Patient's hemodynamic status improved with immediate drop of 60% of inotropic requirements ($CO = 7$ L/min). Patient's systolic function also improved from an EF of 20% to 45% per TEE mid transgastric short axis view. After clot evacuation, transmitral inflow velocity profile of side leaflets of mechanical valve showed a difference of 2% in peak velocity per ME 4C view CWD (see Figures 2) when compared with higher peak velocity prior to clot evacuation (see Figure 1).

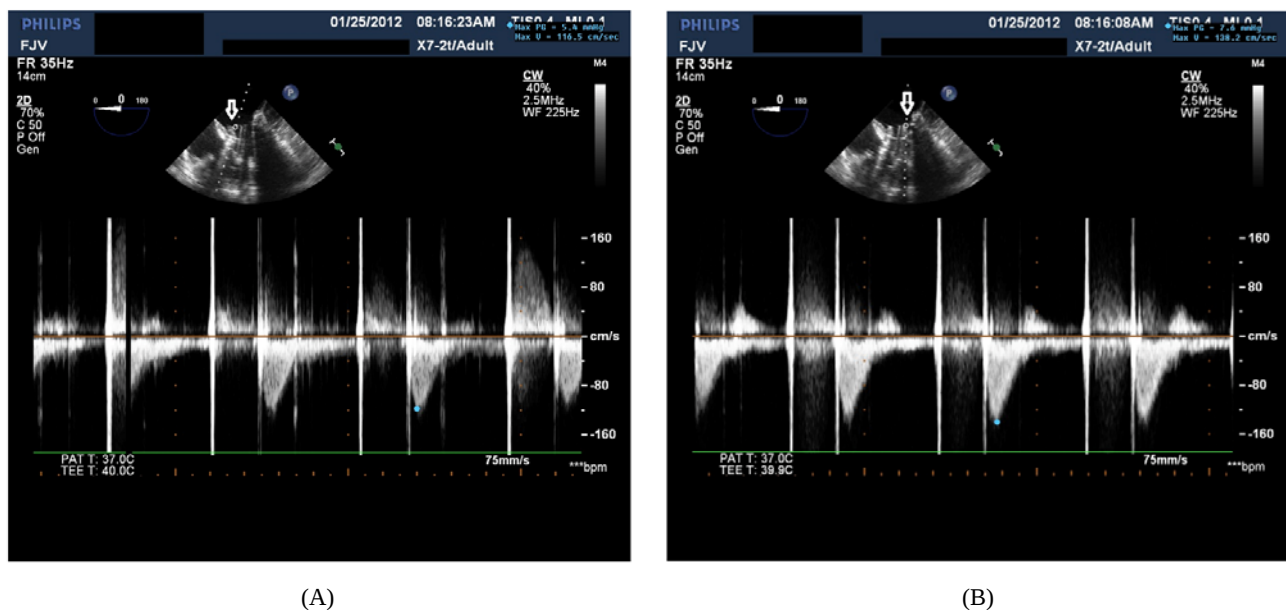


Figure 1. (A) TEE midesophageal 4 chamber view with continuous wave Doppler. Transmitral inflow peak velocity of the patient's right leaflet side stream (white arrow) prior to clot removal is 116.5 cm/s (B) TEE midesophageal 4 chamber view with continuous wave Doppler. Transmitral inflow peak velocity of the patient's left leaflet side stream (white arrow) prior to clot removal is 138.2 cm/s.

3 Discussion

This case reports that (1) cardiac tamponade event is caused by local ventricular compression from thrombus post cardiac surgery¹ and (2) addresses as to how TEE differentiated primary abnormality of valve function from abnormality secondary to temponade. We have observed that temponade produced apparent dysfunction of one leaflet of bileaflet mitral valve prosthesis. Appearance of valve dysfunction on TEE prior to reexploration normalized after relief of temponade. The interesting feature of our case is that temponade can produce temporary dysfunction of one leaflet of a bileaflet mitral valve prosthesis. From surgical perspective, we identified posterior pericardial clot in the vicinity of resected left atrial appendage suture line which exerted its local tamponade effect by compressing the area of implanted

mitral valve apparatus and prevented one leaflet from proper alignment and function^[1-4]. We believe that the clot at that particular location would have pushed the atria upward and behind, thus resulting in compression of the pulmonary vein, and decreasing the pulmonary venous return and left atrium preload^[4].

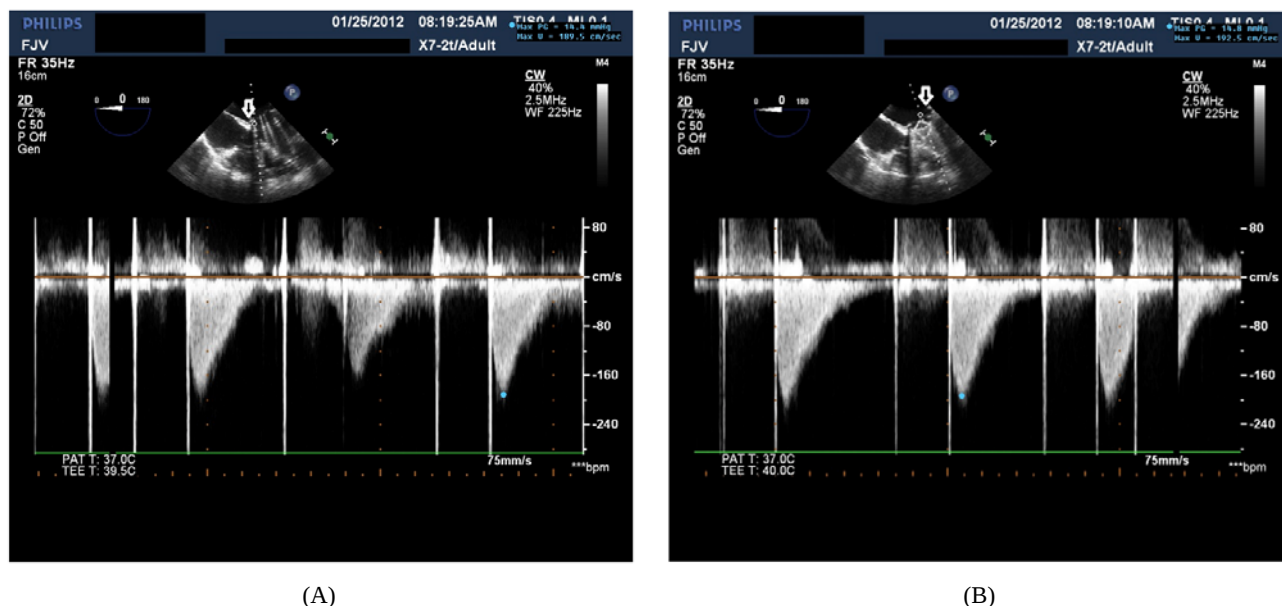


Figure 2. (A) TEE midesophageal 4 chamber view with continuous wave Doppler. Transmitral inflow peak velocity of the patient's right leaflet side stream (white arrow) after clot removal is 189.5 cm/s. (B) TEE midesophageal 4 chamber view with continuous wave Doppler. Transmitral inflow peak velocity of the patient's left leaflet side stream (white arrow) after clot removal is 192.5 cm/s.

4 Conclusion

In conclusion we demonstrated that using TEE transmitral inflow velocity profile to measure and compare peak velocities from the side streams of a mechanical bileaflet valve in mitral position is a quick, safe, accurate, and practical approach to rule out newly implanted valve dysfunction in the settings of postcardiotomy tamponade. As described in this case report, our initial impression was a possible diagnosis of prosthetic mitral valve dysfunction with right mechanical leaflet abnormal motion. However, after heart manipulation and clot evacuation releasing the tamponade, mitral valve function return to normal with both leaflets' opening equally and flow demonstrated by TEE. The significant added cost of time, equipment, and labor from using cinefluoroscopy traditionally to delineate a mechanical prosthetic valve malfunction especially during this emergency procedure was hence unnecessarily avoided.

Reference

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