

An Overlooked Etiology of High-Gradient Aortic Prosthetic Valve: Subaortic Membrane

INTRODUCTION

Subaortic membrane (SM) is a relatively rare congenital heart disease in adulthood mostly detected in pediatric patients.¹ In this study, we report a case who underwent redo surgery due to a high-gradient prosthetic aortic valve but the cause was actually SM. The case we present emphasizes the vital importance of left ventricular outflow tract (LVOT) evaluation before redo aortic surgery and how complex the evaluation of a high-gradient aortic prosthetic valve is.

CASE REPORT

A 50-year-old female patient who had undergone 2 aortic valve surgery was admitted to the cardiology clinic in July 2020. In 2012, the patient had her first cardiac surgery due to severe rheumatic aortic stenosis, and in another center, she underwent Manouagian-type aortic root expansion and the valve was replaced with a 21-mm St. Jude mechanical prosthetic valve. Three years later, the echocardiographic examination revealed a high gradient in the mechanical aortic valve, and redo aortic valve replacement was performed. During surgery, the aortic valve had been repositioned and pannectomy had been performed for the pannus around the mechanical valve, which was seen as the source of the obstruction. After the second surgery, the patient's time in therapeutic range was above 65%, and the patient's complaints did not regress, and a similar gradient on the aortic mechanical valve was observed in the echocardiographic follow-ups over the years. She applied to the cardiology department of our hospital with the complaint of dyspnea in July 2020. Transesophageal echocardiography (TEE) was performed when Doppler echocardiography findings consistent with obstruction on the aortic valve were detected in transthoracic echocardiogram (Figure 1). In TEE, SM causing obstruction on the ventricular surface of the mechanical aortic valve was observed in the LVOT (Figure 2, Video 1). A high gradient (peak and mean of 97 mm Hg and 64 mm Hg, respectively) on the aortic valve was accompanied by an acceleration time of 109 ms and a dimensional velocity index of 0.26. Aortic prosthetic disc angle and movements were normal in fluoroscopic evaluation (Video 2). In cardiac computed tomography (CT) examination, the SM was detected (Figure 3) and aortic prosthetic disc angle and movements were observed normal (Video 3). Surgical intervention was decided by the heart team for high-gradient aortic valve associated with SM.

DISCUSSION

High gradient in aortic prosthetic valve is not always due to prosthetic valve dysfunction. First of all, all prosthetic valves have a higher gradient than the native valve depending on the model of the selected prosthetic valve and the patient's body surface area. Evaluation of prosthetic heart valve morphology and movement is the cornerstone in elucidating the cause of the high gradient. In the first step evaluation, TEE, especially in transgastric windows, gives information about the movement and function of aortic prosthetic valve leaflets. When leaflet movements and angles are evaluated with fluoroscopy, it provides a very reliable assessment of mechanical leaflet movement but does not provide information

CASE REPORT



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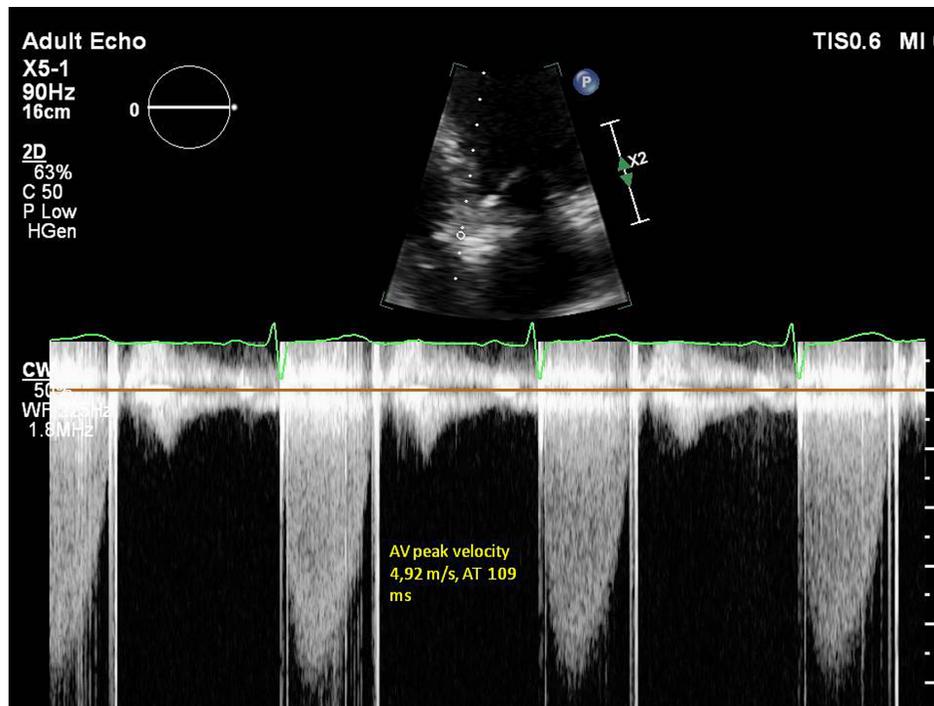


Figure 1. An apical 5 chamber view of 2-dimensional transthoracic echocardiography showing high-gradient aortic prosthetic valve. AV, aortic valve; AT, acceleration time.

about valve-related soft tissue. However, in the presence of obstruction, cardiac CT is helpful in distinguishing whether the lesion is pannus or thrombus.

Subaortic membrane typically develops in the first decade of life and may be associated with other congenital defects such as bicuspid aortic valve (23% of SM patients), ventricular septal defect (37%), and Shone’s complex.² Classically, SM is

suspected in the presence of a high gradient in the aortic valve with normal valve opening. The records of our patient’s TEE findings before the first operation could not be reached. However, the failure of regression of left ventricular hypertrophy, in echocardiographic examinations after aortic surgery, may also suggest SM. In the pre-operative evaluation of our patient’s second surgery, it was learned that pannus was believed to be the cause of the high-grade prosthetic valve, and the operation decision was made. When evaluated on the basis of the past information, the possibility of developing obstructive pannus in a short time like 3 years was low,

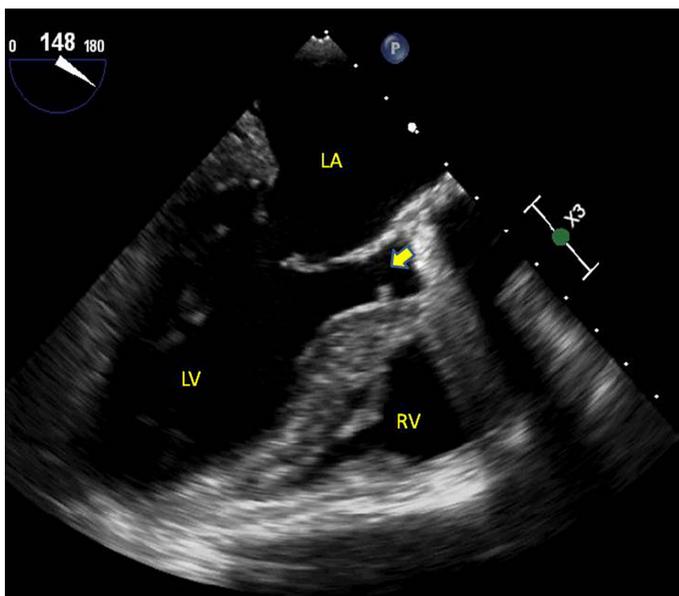


Figure 2. Transesophageal echocardiography mid-esophageal atrioventricular long-axis view showing subaortic membrane (arrow). LA, Left atrium; LV, left ventricle; RV, right ventricle.

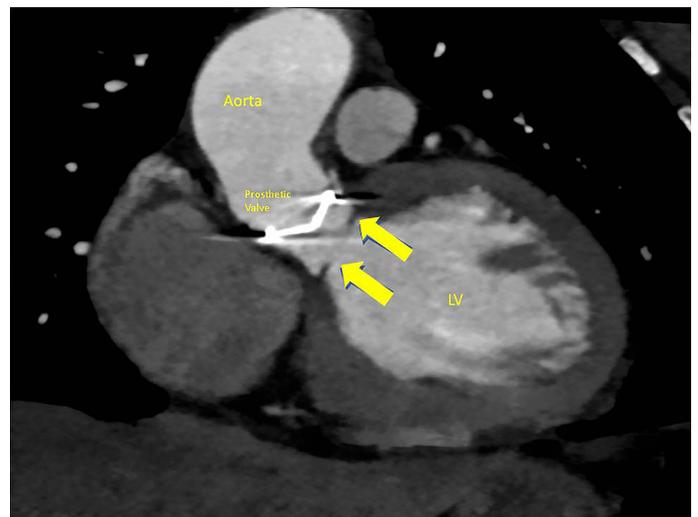


Figure 3. The cardiac computed tomography shows the subaortic membrane (arrows) in left ventricular outflow tract. LV, left ventricle.

perhaps a different etiological factor could be suspected as the cause of the high gradient prosthetic valve.

CONCLUSION

In our case, the incomplete LVOT evaluation led to a late diagnosis of SM and was overlooked even in redo surgeries. Multiple imaging methods are very important in the evaluation of aortic valve morphology and LVOT. Our aim is that the LVOT should be evaluated in addition to possible obstructive causes, and the SM should be kept in mind when a high-gradient prosthesis valve is detected.

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Video 1: Transesophageal echocardiographic mid-esophageal aortic valve long-axis view showing subaortic membrane in LVOT causing obstruction on the ventricular surface of the

mechanical aortic valve. Obstruction is observed at the subaortic membrane level by color Doppler echocardiography. LV, left ventricle; LA, left atrium; RV, right ventricle; LVOT, left ventricular outflow tract.

Video 2: Fluoroscopy shows normal aortic prosthetic disc angle and movements.

Video 3: Cardiac computed tomography shows normal aortic prosthetic disc movements and subaortic membrane in left ventricular outflow tract. LV, left ventricle.

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