Case Report

DOI: https://doi.org/10.47648/jswmc2026v16-1-32

Redo Mechanical Aortic Valve Replacement after Leaflet Immobility and Severe Transvalvular Gradient in a Longstanding Prosthesis: A Case Report

Chowdhury MAA[1], Ahmed I[2], Chowdhury MKH[3], *Salam W[4], Salam MU[5]

Abstract:

This article reports a case of a 46-year-old male with a history of mechanical aortic valve replacement for chronic rheumatic heart disease. After 20 years, he presented with progressive breathlessness. Transthoracic and transesophageal echocardiography revealed one prosthetic leaflet's severe transvalvular gradient and immobility. Redo aortic valve replacement (AVR) was performed using a femoro-femoral cardiopulmonary bypass approach to minimize the risk of cardiac avulsion. Intraoperatively, dense fibrous ingrowth around the prosthesis and leaflet dysfunction were confirmed. The patient underwent a successful redo of AVR with a mechanical valve. This case report highlights the importance of long-term surveillance in mechanical valve patients and the technical strategies that can minimize surgical risk during reoperation.

Received date: 19/08/2025

Accepted date: 19/11/2025

Key words: chronic rheumatic heart disease, aortic valve replacement, mechanical heart valve.

How to cite this article: Chowdhury MAA, Ahmed I, Chowdhury MKH, Salam W, Salam MU. Redo mechanical aortic valve replacement after leaflet immobility and server transvalvular gradient in a longstanding prosthesis: a case report. Journal of Sylhet Women's Medical College, 2026 January; 16(1):94-97. https://doi.org/10.47648/jswmc2026v16-1-32

JSWMC 2026 [16(01)] P: 94-97

Introduction:

Mechanical valves are known for their long-term durability and resistance to structural degeneration. However, complications such as pannus ingrowth, leaflet immobility and thrombus formation, may still occur even decades after implantation[1]. Redo aortic valve surgery is challenging due to dense adhesions and increased operative risks, particularly in the setting of prior mechanical valve implantation[2].

1. Dr. Muhammad Asif Ahsan Chowdhury, Assistant Registrar, Dept. of Cardiac Surgery, NICVD, Dhaka, Bangladesh
2. Dr. Imran Ahmed, Assistant Registrar, Dept. of Cardiac Surgery, NICVD, Dhaka, Bangladesh
3. Dr. Mohammad Kamrul Hasan Chowdhury, Assistant Registrar, Dept. of Cardiac Surgery, NICVD, Dhaka, Bangladesh
4. *Dr. Wahida Salam, Assistant Registrar, Dept. of Cardiac Surgery, NICVD, Dhaka, Bangladesh
5. Prof. Dr. Mahjuba Umme Salam, Head of Dept. of Medicine, SWMC, Sylhet, Bangladesh

Corresponding author: Dr. Wahida Salam,
Assistant Registrar, Dept. of Cardiac Surgery, NICVD, Dhaka, Bangladesh
Email- dr.wahida.salam@gmail.com

This case report describes a successful redo mechanical aortic valve replacement (AVR) in a patient with prosthetic leaflet immobility due to fibrous pannus, using a femoro-femoral cardiopulmonary bypass (CPB) strategy.

Case summary:

Presentation and History

A 46-year-old male underwent mechanical aortic valve replacement 20 years ago (in 2005), in the cardiac surgery department of the National Institute of Cardiovascular Disease (NICVD), Bangladesh, for chronic rheumatic heart disease with grade-III aortic regurgitation and grade-I mitral regurgitation. He remained asymptomatic for nearly two decades. Recently, he developed progressively worsening exertional breathlessness. He had a history of irregular intake of oral warfarin for the previous month. There was no history of fever or infection. On admission, his INR was sub-therapeutic. Physical examination revealed a soft systolic murmur over the aortic area radiating to the neck. Oxygen saturation was 97% on room air, and blood pressure was stable.

ISSN: 2708-2857 (P), 2710-0405 (O)
2026 Jan; Volume 16; Issue 01

Investigations

Preoperative chest X-ray was unremarkable with mere radiological evidence of previous sternotomy wires (Figure 1). Transthoracic echocardiography (TTE) shows malfunctioning prosthetic aortic valve with one leaflet stugged in closed position with the other leaflet functioning poorly; producing both severe transvalvular gradient and moderate aortic regurgitation (Figure 2). There was moderate mitral regurgitation, likely secondary to elevated left ventricular filling pressures. All chambers were normal in dimensions except for a dilated left atrium and moderate left ventricular hypertrophy (Table 1). No vegetation or thrombus was seen by echocardiography and fluoroscopy.

Figure 1: Chest X-ray P/A (a) and lateral (b) view showing sternal wires (arrows) and cardiomegaly

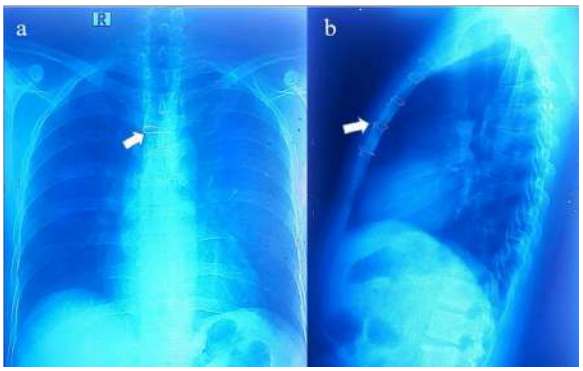


Figure 2: Preoperative transthoracic echocardiography- (a) 2D- M mode at aortic valve level (b) Color Doppler echo

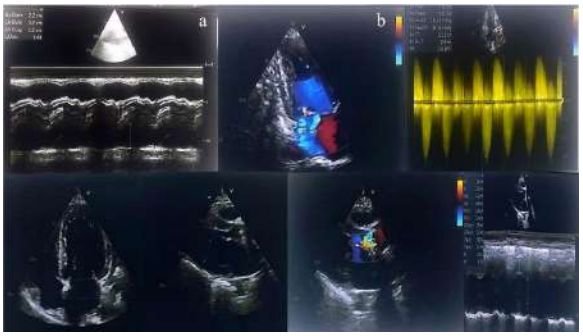


Table 1: Summary of findings of transthoracic echocardiogram

Echocardiographic approach	Parameter	Finding	Remarks
M-mode Echo with measurement overlay	Aortic (Ao) valve diameter	2.2 cm	Normal
	Left atrial diameter	3.2 cm	Normal
	Aortic Valve Cusp Separation	1.5 cm	Reduced
	LA/Ao Ratio	1.48	Elevated
Color Doppler	Turbulent jet across aortic valve se en with aliasing		Aortic stenosis
	AV Vmax	5.82 m/s	Severely elevated
CW Doppler across Aortic Valve	AV mean gradient	115.5 mmHg	Severe aortic stenosis
	AV peak gradient	135.6 mmHg	Severe aortic stenosis
	Aortic Valve Velocity Time Integral	122.5 cm	Markedly elevated
	Aortic Valve Ejection Time	255 ms	Normal
M-mode – LV Function Assessment	LVIDd (Diastolic Diameter)	4.9 cm	Normal
	LVIDs (Systolic Diameter)	3.3 cm	Preserved
	Fractional Shortening (FS)	32%	Normal
	Systolic function EF (Teich):	57%	Normal
	RWT (Relative Wall Thickness)	0.75	Concentric LV hypertrophy

Surgical Procedures and Intraoperative Findings

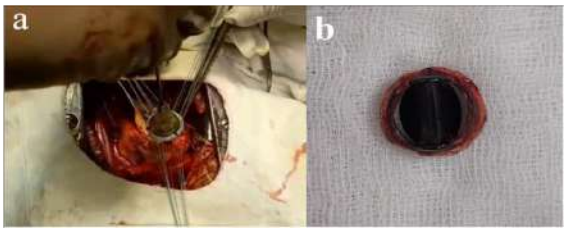
Given the risk of dense adhesions and potential injury to cardiac structures, a femoro-femoral CardioPulmonary Bypass (CPB) was established prior to sternotomy to allow decompression and reduce the risk of iatrogenic heart or great vessel avulsion accordingly. For the same purpose, a specially designed sternal re-entry oscillating saw was used for sternotomy (Figure 3a). Minimal adhesiolysis was performed, focusing only on exposing the ascending aorta and the right side of the heart. After aortotomy, the prosthesis was found densely encased in fibrous pannus tissue, with one of the leaflets completely immobile, consistent with preoperative TEE findings (Figure 3b).

Figure 3: (a) Previous sternal wires were cut and held with kochers forceps before sternotomy (b) One of the prosthetic valve leaflet was stugged due to tissue impingement

Meticulous and gentle dissection was carried out to avoid aortic injury. In areas of dense adhesion, surrounding tissue impregnated with previous valve collar portions, pledgets, or suture fragments was intentionally left in situ to prevent damage. A 21 mm mechanical valve (same size as the previous) was successfully implanted to ensure adequate cardiac output (Figure 4).

Ischemic time was 107 minutes, and total CPB time was 189 minutes. On rewarming and return of contractility, prosthetic aortic valve functioning status was reassured with the help of TEE. Also, mitral regurgitation was found reduced from moderate to trivial, measured by TEE, suggesting functional secondary MR due to prior elevated LV pressure. So it was rational to avoid any surgical procedure on that native mitral valve.

Figure 4: (a) Implantation of new valve prosthesis (b) Resected valve prosthesis



Discussion:

Mechanical prosthetic valves are durable and commonly used in younger patients requiring valve replacement. However, they are not without long-term complications. Structural valve dysfunction, though rare in mechanical valves, can occur due to pannus formation, thrombus, or fibrous ingrowth, leading to leaflet immobility and obstructive hemodynamics.[3,4] In this case, pannus overgrowth resulted in mechanical leaflet immobility, leading to high transvalvular gradient and regurgitation. The use of femoro-femoral CPB was critical to safely access the aorta and minimize the risk of iatrogenic injury during resternotomy. This technique is being increasingly advocated in reoperative cardiac surgeries with significant adhesions.[2] The benefit of using oscillating saw was safer sternotomy than other regular sternotomy saw. The oscillating saw reduces the risk of right ventricular or graft injury compared to reciprocating saws.[5]

Fibrous pannus ingrowth which is a known cause of late prosthetic dysfunction, often presents insidiously.[6] Unlike thrombus, pannus is typically non-resolving and requires surgical intervention.[7]The echocardiographic findings of elevated gradients and immobile leaflet raised the suspicion of structural dysfunction, which was confirmed intraoperatively. Importantly, the mitral regurgitation improvement postoperatively suggests that it was functional, secondary to elevated leftsided pressures rather than structural valve pathology. This reinforces the role of detailed intraoperative TEE guiding surgical decision-making.[8]

Redo cardiac surgery carries significantly higher risk due to adhesions, distorted anatomy, and potential for cardiac injury during re-entry. In this case, the femoro-femoral cardiopulmonary bypass approach was strategically used to establish extracorporeal circulation before sternotomy, thereby reducing the risk of cardiac avulsion or injury- a serious concern in reoperative settings.[9] The successful outcome in this case underscores several key considerations- the need for vigilant long term follow-up of patients with mechanical valves, the importance of differentiating between pannus and thrombus as causes of valve dysfunction, and the role of tailored surgical strategies to mitigate operative risk. This case also reinforces that while mechanical valves are highly durable, they are not immune to late complications. Early recognition of symptoms and prompt evaluation using echocardiography are vital to prevent adverse outcomes. Furthermore, surgical planning in redo AVR must incorporate techniques such as peripheral cannulation when appropriate, to enhance procedural safety.[10]

Conclusion:

This case underscores the potential for mechanical valve dysfunction even decades after implantation and the importance of vigilant long-term follow-up. Redo AVR, although technically demanding, can be performed success using strategic approaches such as femoral CPB, usage of oscillating saw and limited dissection. Functional MR may improve following correction of primary valve pathology.

References

1. Pibarot P, Dumesnil JG. Prosthetic heart valves: selection of the optimal prosthesis and long-term management. Circulation. 2009;119(7):1034–48.
2. François K, De Backer L, Martens T, Philipsen T, Van Belleghem Y, et al. Repeat aortic valve surgery: contemporary outcomes and risk stratification. Interact Cardiovasc Thorac Surg. 2021 Jan 22;32(2):213-21. doi: 10.1093/icvts/ivaa257.
3. Edmunds LH Jr. Thrombotic and bleeding complications of prosthetic heart valves. Ann Thorac Surg. 1987 Oct;44(4):430-45. doi: 10.1016/s0003-4975(10)63816-7.
4. Hori D, Yamaguchi A. [Redo Aortic Valve Replacement]. Kyobu Geka. 2021 Sep;74(10):740-5. Japanese.
5. Choi CH, Cao K, Malaver D, Kincaid EH, Lata A, et al. Redo-aortic valve replacement in prior stentless prosthetic aortic valves: Transcatheter versus surgical approach. Catheter Cardiovasc Interv. 2022 Jan 1;99(1):181-92. doi: 10.1002/ccd.29921.
6. Soumoulou JB, Cianciulli TF, Zappi A, Cozzarin A, Saccheri MC, et al. Limitations of multimodality imaging in the diagnosis of pannus formation in prosthetic aortic valve and review of the literature. World J Cardiol. 2015 Apr 26;7(4):224-9. doi: 10.4330/wjc.v7.i4.224.
7. Boavida J, Ruud E, Ashraf H. Prosthetic Mechanical Aortic Valve Thrombosis. JAMA Cardiol. 2022 Sep 1;7(9):e221951. doi: 10.1001/jamacardio.2022.1951.
8. Onishi T, Sengoku K, Ichibori Y, Mizote I, Maeda K, et al. The role of echocardiography in transcatheter aortic valve implantation. Cardiovasc Diagn Ther. 2018 Feb;8(1):3-17. doi: 10.21037/cdt.2018.01.06.
9. Paparella D, De Santis A. Minimally invasive redo aortic valve replacement with a sutureless valve implant. Multimed Man Cardiothorac Surg. 2021 Mar 2;2021. doi: 10.1510/mmcts.2021.008.
10. Dokollari A, Torregrossa G, Sicouri S, Cameli M, Mandoli GE, et al. Long-term prognosis in patients undergoing redo-isolated aortic valve replacement. Future Cardiol. 2023 Nov;19(14):685-94. doi: 10.2217/fca-2023-0050.