



Obstructive Mechanical Mitral Valve Thrombosis: A Case Report

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Abstract

Although in the last decade transcatheter valves emerged as a new alternative in high risk patients, surgical valve replacement remains the gold standard for treatment of valvular heart disease in patients with low to intermediate surgical risk. Mechanic heart valve thrombosis is one of the most serious and deadly complications in patients submitted to valve replacement. Patients can be asymptomatic or present with severe heart failure and cardiogenic shock. Urgent surgery or fibrinolysis is currently the only options available when approaching symptomatic patients. However, there is scarce information regarding asymptomatic persistent disc obstruction after fibrinolytic therapy. We report a case of a young woman presenting with heart failure symptoms due to mechanic mitral valve thrombosis occurring after pregnancy with suboptimal anticoagulation. After fibrinolysis, symptomatic relief and hemodynamic stability were obtained, maintaining, however, valve disc obstruction. Adding antiplatelet therapy could be a viable option.

Keywords: Mechanic heart valve; Thrombosis; Fibrinolysis; Anticoagulation; Heart failure

Introduction

Mechanic Heart Valves (MHV) offer high quality hemodynamic performance with long term resilience but at the cost of the need for lifelong anticoagulation and its bleeding complications. Prosthetic Heart Valve (PHV) dysfunction can occur with MHV or with a biological prosthesis, resulting in impaired leaflet motion/coaptation, changes in effective prosthesis orifice area, increased transvalvular gradient/regurgitation and development of valve-related symptoms [1,2]. Of all the causes of PHV dysfunction, MHV thrombosis is one of the most serious [3,4].

Case Presentation

We report a case of an 18-year old female that was referred to our Cardiology appointment by her attending physician for a month evolving shortness of breath and ankle swelling after pregnancy. She has a past history of rheumatic mitral disease submitted to mitral valve replacement with a mechanical St. Jude number 27 Prosthetic Valve, being kept under enoxaparin in a sub-therapeutic dose (1 mg/Kg once daily) during pregnancy and after discharge.

At the Cardiology appointment, one month after discharge, there was no evidence of thromboembolic events, but a physical exam revealed heart rate 115 beats per minute, hypophonic prosthetic valve sounds and malleolar edema. Transthoracic Echocardiogram (TTE) revealed signs of prosthetic valve stenosis, due to obstruction of the posteromedial disc (Figure 1). Transesophageal Echocardiogram (TEE) confirmed the obstruction of the posteromedial disc, by a small, organized thrombus, in the atrial side of the prosthetic valve.

She was admitted to the Cardiology ward, and, given the preserved hemodynamic stability; she was treated with Unfractionated Heparin (UFH) with an activated thromboplastin time target range of 1.5 to 2.5 times the control value. In the third day of hospital admission, the patient developed signs of acute heart failure: heart rate 125 beats per minute, blood pressure 95/55 mmHg, respiratory rate 28 cycles per minute, peripheral oxygen saturation in room air 88% and lung rales.

After consulting the obstetric team, fibrinolysis with alteplase (10 mg + 90 mg) was performed; which elapsed without bleeding complications and with clinical and hemodynamic improvement. TTE after fibrinolysis showed a prosthetic valve mean diastolic gradient of 5 mmHg, persisting, however, disc hypomobility which was confirmed with fluoroscopy (Figure 2A). The patient was further treated with UFH and low dose (100 mg) of Acetylsalicylic Acid (ASA), superimposed with

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Table 1: Current guidelines regarding therapeutic strategies (Surgery vs. Fibrinolysis) on mechanic heart valve thrombosis.

Guidelines	Valve Status	Patient Status	Recommendation	Class	Level of Evidence
ESC/EACTS 2017 [7]	Obstructive	Critically ill patient	Surgery	I	C
		Surgery not available	Fibrinolysis	IIa	C
		Prohibitive risk factors for surgery			
	Right sided valve				
	Non-obstructive	Persistent large (>10 mm) thrombus or complicated by thromboembolism	Surgery	IIa	C
Prohibitive risk factors for surgery		Fibrinolysis	IIa	C	
SHVD 2005 [9]	Obstructive	All patients independent of NYHA class	Fibrinolysis	I	B
		Failed fibrinolysis or contraindication	Surgery	I	B
	Non-obstructive	Small (<5 mm) thrombus that persist after 48 h of UFH	Fibrinolysis	IIa	C
		Big (>5 mm) thrombus			
		Critically ill patient			
Failed fibrinolysis	Surgery	IIa	C		
ACC/AHA 2014 (2017 revised) [6]	Obstructive	NYHA Class IV	Surgery	I	B-NR
		Large clot (>0.8 cm ²) Concomitant CAD in need of revascularization			
		Recurrent valve thrombosis Left atrial thrombus			
		Possible pannus physiopathology Contraindication to fibrinolysis			
	Obstructive	NYHA Class I-III	Fibrinolysis	I	B-NR
		Right sided valve			
		Small clot (<0.8 cm ²)			
		First episode of valve thrombosis			
Evident prosthetic thrombosis					
High surgical risk					
ACCP 2012 [8]	Obstructive	Large clot (≥ 0.8 cm ²)	Surgery	2	C
		Prohibitive risk factors for surgery	Fibrinolysis	2	C
		Small clot (<0.8 cm ²)			
		Right sided valve			

Legends: ACC/AHA: American College of Cardiology/American Heart Association; ACCP: American College of Chest Physicians; CAD: Coronary Artery Disease; ESC/EACTS: European Society of Cardiology/European Association for Cardio-Thoracic Surgery; NYHA: New York Heart Association; SHVD: Society of Heart Valve Disease; UHF: Unfractionated Heparin

Table 2: Current guidelines regarding fibrinolytic strategies in mechanic heart valve thrombosis.

Guidelines	Agent	Posology	Concomitant UFH	Comments
ESC/EACTS 2017 [7]	rt-PA	10 mg bolus +90 mg in 90 min	Yes	
	STK	1.500.000 U in 60 min	No	
SHVD 2005 [9]	rt-PA	10 mg bolus +90 mg in 90 min	Yes	Critically ill patients
	STK	250.000 U in 30 min +100.000 U/h	No	Stop at 72 h, disappearance of thrombosis by TEE, or until fibrinogen drops to zero
		500.000 U in 20 min +1.500.000 U over 10 h	No	
ACC/AHA 2014 (2017 revised) [6]	rt-PA	25 mg in 6 h	Yes	Up to 6 times, for a maximum dose of 150 mg

Legends: ACC/AHA: American College of Cardiology/American Heart Association; ACCP: American College of Chest Physicians; ESC/EACTS: European Society of Cardiology/European Association for Cardio-Thoracic Surgery; rt-PA: Alteplase; SHVD: Society of Heart Valve Disease; STK: Streptokinase; TEE: Transesophageal Echocardiography; UHF: Unfractionated Heparin

warfarin, with persistence of the disc hypomobility after 1 week of treatment.

The best strategic approach was discussed in Heart Team, regarding indications for re-fibrinolysis, surgery or hospital discharge with anticoagulation and ASA with close follow-up. The last option was the one pursued. She evolved in New York Heart Association functional class I with no recurrence of symptoms. TTE and fluoroscopy (Figure 2B) were performed 1 month after discharge,

showing normal mobility of the prosthetic valve.

Discussion

MHV thrombosis is a life threatening complication of patients with MHV and it's particularly prevalent in those with inadequate anticoagulation. Clinical manifestations can include symptoms directly related to the obstruction degree and/or due to embolic phenomena. Prompt TTE and TEE are essential for diagnosis and for determining the degree and cause of valve dysfunction. Cine

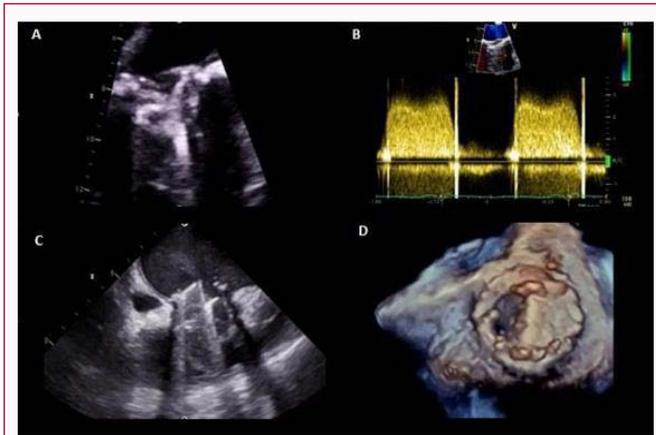


Figure 1: TTE Parasternal long-axis view- A) TTE image showing the posteromedial disc obstructed. B) Continuous wave Doppler showing elevated diastolic gradients. C) TEE two-chamber view showing an obstructed posteromedial disc. D) TEE 3D image of the mitral prosthesis showing the obstructed disc with an organized thrombus.

fluoroscopy is an accessible and decent test inasmuch it can help diagnose obstructive MHV thrombosis as well as exclude it by confirming the presence or absence of decreased leaflet motion. It can also serve as a valuable test providing complementary information when other exams are inconclusive given the fact it has superior accuracy in detecting leaflet motion when compared with echocardiography [5].

The optimal management of patients with MHV thrombosis is controversial and there are significant discrepancies between the several published recommendations and guidelines [6-9]. Furthermore, to date, there are few randomized controlled trials on this subject and, henceforth, there is a lack of clear evidence regarding management and treatment.

There is, however, general agreement that obstructive MHV thrombosis should be treated aggressively [6,7] and many reports have failed to demonstrate the benefit of isolated anticoagulation in these patients [10-12]. Currently, there is also an intense debate regarding the best therapeutic approach when choosing between surgery and fibrinolysis. To date, there are no prospective randomized controlled trials comparing the two strategies and, henceforth, current recommendations are mostly extrapolated from case series with few hundreds of patients, with substantial differences in definitions, therapeutic regimens, and surgical experience. Two randomized controlled trials on this subject are currently ongoing. Table 1 summarizes the different recommendations available and proposed by the different societies.

Traditionally, surgery has been the treatment of choice for obstructive MHV thrombosis, with the fibrinolytic therapy emerging recently. Karthikeyan et al. [13] conducted a meta-analysis of seven observational studies that included a total of 598 patients and compared the two strategies regarding success and adverse events, specifically: death, major bleeding, stroke, and recurrent thrombosis. Overall success was significantly higher in patients submitted to urgent surgery. There were no significant differences regarding mortality. However, patients submitted to surgery had significantly fewer complications regarding major bleeding, stroke and recurrent thrombosis [13].

Although there is a tendency favoring a surgical approach,

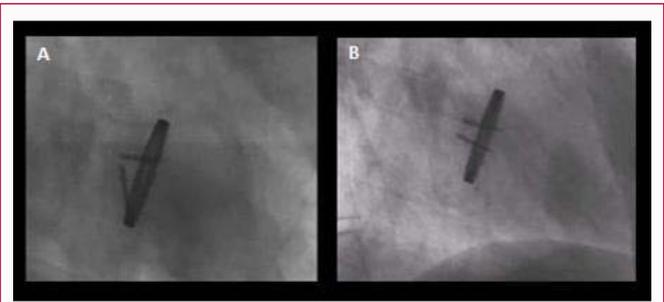


Figure 2: Fluoroscopy-A) Obstructed disc after fibrinolysis; B) Normal mobility of both discs after 30 days of warfarin.

thrombolysis remains a valid option in high-risk patients or when immediate surgery is not available. One major concern of fibrinolytic therapy is the absence of consensus regarding the best agent and its administration, which might explain the discrepancies regarding efficacy and safety (Table 2).

There is no direct scientific evidence regarding the reassessment of the target International Normalized Ratio (INR) after MHV thrombosis. We deem reasonable that if the patient was previously inadequately anticoagulated, target INR should remain unchanged and set accordingly to valve thrombogenicity and patient-related risk factors [6,7,14]. If the patient had adequate INR before MHV thrombosis, we speculate that target INR should be reset to avoid further events. Adding low-dose aspirin or, in the presence of high bleeding risk, implantation of a biological heart valve could be an option.

There is also a scarce of literature regarding the best strategy when the MHV hemodynamic parameters are considerably better, but there is still a restrictive disc motion. In some cases, as the one presented, the obstruction may resolve over time with oral anticoagulation.

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