Case report

Thrombolytic therapy in prosthetic valve thrombosis during early pregnancy

B.C. Srinivas¹, Nagaraja Moorthy^{2*}, Arora Kuldeep³, Harsha Jeevan³, Danalakshmi Chandrasekaran⁴, C.N. Manjunath⁵

¹Professor, ²Resident, ³Assistant Professor, ⁴Chief Echocardiographer, ⁵Director, Professor and Head, Department of Cardiology, Sri Jayadeva Institute of Cardiovascular Sciences and Research, Bengaluru.

KEYWORDS

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ABSTRACT

Regardless of the improvements in the design of prosthetic heart valves and the use of anticoagulation, systemic embolism and valve thrombosis remains the most dreaded complications of mechanical heart valve replacement. A course of thrombolytic therapy may be considered as a first-line therapy for prosthetic heart valve thrombosis. The safety of thrombolysis in early pregnancy is not known. We describe a primigravida with mitral valve replacement status presenting with acute prosthetic valve thrombosis and treated successfully with intravenous streptokinase.

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Introduction

Regardless of the improvements in the design of prosthetic heart valves and the use of anticoagulation, systemic embolism and valve thrombosis remain the most dreaded complications of mechanical heart valve replacement. The safety of thrombosis during pregnancy is not clear. Thrombosis of left-sided prosthetic valves is an uncommon yet a potentially serious complication. Thrombolytic therapy has been proposed as an alternative to surgical methods in treating this condition.

Case report

A 25-year-old woman, primigravida in first trimester of pregnancy (10 weeks) presented with history of progressive dyspnoea of 2 days duration. Her dyspnoea had progressed rapidly over 2 days to New York Heart Association (NYHA) class IV symptoms at admission. Her past medical records revealed that she had undergone percutaneous balloon mitral valvotomy at the age of 8 years and closed mitral valvotomy at the age 11 years for severe rheumatic mitral stenosis. At

19 years of age she underwent mitral valve replacement (MVR) for progressive dyspnoea and mitral valve restenosis. The mitral valve was replaced with St Jude bileaflet mechanical prosthetic valve. She was on regular oral anticoagulant (warfarin) with an acceptable international normalised ratio (INR). As soon as the pregnancy was anticipated, oral anticoagulant was switched over from warfarin to heparin. She was on regular follow-up with acceptable levels of anticoagulation (60–80 seconds aPTT [activated partial thromboplastin time]).

On admission, physical examination revealed tachypnoea (48 breaths/min) with tachycardia (158 beats/min) and arterial hypotension (70/50 mmHg). She had no neurological deficits. Breath sounds at lung bases were severely decreased with moist rales in the lower two-thirds bilaterally. Cardiovascular system examination showed raised jugular venous pulse with muffled prosthetic valve click with grade II mid-diastolic murmur at the apex.

Together with the clinical scenario and examination findings, clinical diagnosis of prosthetic mitral valve thrombosis with pulmonary oedema was made.

Electrocardiogram (ECG) revealed sinus tachycardia and chest radiography revealed mild cardiomegaly with interstitial pulmonary oedema. Blood analysis revealed haemoglobin of 10.2 g/dL. All other routine biochemical parameters were normal.

*Corresponding author.

E-mail address: drnagaraj_moorthy@yahoo.com

Figure 1 (A) Transthoracic echocardiogram showing turbulence across mitral valve prosthesis with large left atrial thrombus. (B) Continuous wave Doppler recording across prosthetic mitral valve (mean gradient 26.7 mmHg).

Figure 2 (A) Post-thrombolysis reduced turbulence across mitral valve prosthesis. (B) Post-thrombolysis continuous wave Doppler recording across prosthetic mitral valve showing significantly reduced gradient (mean gradient 6 mmHg).

On admission, transthoracic echocardiograms (TTEs) were performed which showed a normal left ventricular systolic function and a significantly enlarged left atrium (56 mm). The mechanical mitral valve prosthesis leaflet motion was restricted with turbulent flow (Figure 1A, Video 1, 2) and estimated mitral inflow mean gradient of 26.7 mmHg (Figure 1B). A large hyperechoic mass measuring $4.5 \times 4.0 \text{ cm}^2$ attached to valve and extending into the left atrium compatible with the recently formed thrombus was noted. The pulmonary artery systolic pressure was 82 mmHg. Besides, radiographic fluoroscopy also revealed a reduced opening of the mitral valve prosthesis.

Due to the patient's poor clinical status, the decision for acute thrombolytic treatment versus immediate valve surgery was made in agreement with our cardiac surgeons. The patient's informed consent was obtained. Thrombolytic therapy was considered using streptokinase with 250,000 IU over 30 minutes infusion and 100,000 IU/hr infusion was continued for the next 24 hours. The other supportive measures like inotropic and diuretic support were instituted. Immediately at the end of the thrombolytic infusion, the patient's clinical status improved significantly. The repeat echocardiography after 24 hours showed gained opening of mitral valve disc prosthesis with significantly reduced gradient across the mitral valve (Figure 2A). The repeat mean inflow gradient across the mitral valve was 6 mmHg (Figure 2B). There was clearance of left atrial thrombus. Thereafter, anticoagulation using unfractionated heparin with strict monitoring of aPTT values was performed. During the second trimester of

pregnancy heparin was switched over to warfarin with frequent monitoring of INR. Foetal well-being was monitored at frequent intervals throughout the pregnancy with foetal echocardiography. A week prior to delivery, warfarin was again changed over to unfractionated heparin. She gave birth to a full-term normal male baby through vaginal delivery. The baby was apparently healthy with no congenital defects. At 1 year follow-up both baby and mother are healthy.

Discussion

The most dreaded complications following mechanical prosthetic valve replacement are dehiscence/disruption/dysfunction, infection, embolism, and thrombosis. Thrombosis of a mechanical prosthetic valve is a particularly pernicious complication because it is often associated with embolism and/or life-threatening deterioration in the patient's clinical status.¹ Thrombotic prosthetic valve occlusion is an uncommon but a serious complication that has been reported to occur in 0.5–8% of the left-sided mechanical prosthetic valves and in up to 20% of tricuspid prostheses.^{2–4}

Lengyel and Laszlo concluded that anticoagulation was inadequate in 82% of patients with prosthetic valve thrombosis.⁵ It is believed that pregnancy-related changes exaggerate the blood coagulation reaction in mothers, which leaves them more vulnerable to thrombosis. Therefore, a more strict control of anticoagulation therapy is necessary for those patients who have used a mechanical valve.

In general, prosthetic valve thrombosis (PVT) develops more frequently at the mitral valve position than at the aortic valve position. This tendency is more exacerbated by pregnancy. There is limited data available on the safety of thrombolysis for PVT during pregnancy.⁶

Prosthetic valve thrombosis should be kept in mind for patients with a history of new or worsening symptoms. The clinical presentation of PVT may vary from dyspnoea, embolic events, and symptoms of cardiac insufficiency, to cardiogenic shock and pulmonary oedema.

The differentiation between pannus and thrombus formation as the underlying aetiology of valve dysfunction is essential. Doppler echocardiography is currently the non-invasive method of choice for evaluating prosthetic valve function; however, it cannot provide any further information concerning the nature of the obstruction. Transoesophageal echocardiogram (TEE) has been shown to have a diagnostic accuracy superior to that of TTE.⁷

The ideal management of PVT is still controversial. According to American Heart Association (AHA) recommendations, surgery is the preferred treatment for left-sided PVT.⁸ Many authors recommend against using thrombolytic therapy (TT) in patients with left heart prostheses, as it carries a high-risk of precipitating cerebral or peripheral embolism and the rethrombosis rate is higher.⁹

Fibrinolytic therapy has emerged as a promising alternative to surgery, particularly in critically ill patients. Success rates ranging from 75% to 88% have been described.¹⁰ In a review of 200 articles on thrombolysis in PVT of left chambers, Lengyel et al. found an initial success rate of 82%, with a thromboembolism rate of 12% and mortality rate of 10%.¹¹

Pregnancy due to its physiological changes is a procoagulant state. The rate of cardiac valve prosthesis thrombosis, deep venous thrombosis, and pulmonary embolism are all increased. Thrombolytic therapy with tissue plasminogen activator (rt-PA) is an approved therapy for ischaemic stroke, myocardial infarction, pulmonary embolism, and thrombosis of cardiac valve prosthesis. However, there are no data available from randomised controlled trials in pregnant patients.

The safety of thrombolytic therapy in pregnancy is still not known. However, permanent sequelae have not been observed in children born after maternal thrombolytic therapy or in fetuses aborted for reasons unrelated to thrombolytic therapy.¹² The complication rate of thrombolytic treatment does not seem higher in pregnant women than in the non-pregnant population, and complications occur mostly when thrombolytic therapy is administered intrapartum and if given concomitantly with heparin or oral anticoagulants.¹³

Our patient having developed PVT in spite of satisfactory anticoagulation level may be precipitated by the hypercoagulable state of pregnancy. She received successful thrombolysis with streptokinase and had a normal delivery at full-term.

Conclusion

Left-sided PVT is potentially a life-threatening medical emergency. Since, pregnancy is a prothrombotic state more strict control of anticoagulation therapy and frequent monitoring is necessary for those patients who have used a mechanical valve. Thrombolytic therapy can be a safe alternative to surgery even during pregnancy.

Conflict of interest

None.

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