



## Case Report

### Successful Thrombolysis of Aortic Prosthetic Valve Thrombosis during First Trimester of Pregnancy

Anand Shukla, Abhishek Pravinbhai Raval<sup>¶</sup>, Ronak Shah

U N Mehta Institute of Cardiology and Research Centre, B J Medical College, Ahmedabad, India

(Received 16 February 2014 and accepted 18 April 2014)

**ABSTRACT:** Prosthetic heart valve thrombosis during pregnancy is life-threatening. Standard surgical treatment using cardiopulmonary bypass carries high maternal and fetal complications. Here we report a case of an antenatal female in first trimester with aortic prosthetic valve thrombosis (PVT), who was successfully thrombolysed with streptokinase with no complication to mother or fetus. The aim was to justify the usefulness of thrombolysis as a treatment option for prosthetic valve thrombosis in antenatal patients. A 35-year-old female patient presented in the first trimester of pregnancy with PVT at aortic position. After due consent, thrombolysis was undertaken with streptokinase. During the hospital course, she was followed clinically and with echocardiography. She symptomatically improved with thrombolysis. Transthoracic echocardiography showed complete resolution of thrombus. Peak trans-aortic velocity improved from 5.5 m/s to 3.7 m/s. She delivered a normal baby uneventfully in follow up at full term of pregnancy with no complications. Fibrinolytic therapy for mechanical valve thrombosis is a reasonable alternative to surgery in first trimester of pregnancy.

**KEY WORDS:** *Prosthetic valve thrombosis; Echocardiography; Streptokinase; Thrombolysis; Fetus*

#### INTRODUCTION

Prosthetic heart valve thrombosis during pregnancy is a life-threatening complication.<sup>1,2</sup> Standard surgical treatment of clot removal with or without valve replacement using cardiopulmonary bypass carries high maternal and especially fetal mortality.<sup>1,2</sup> There are several case reports of prosthetic valve thrombosis (PVT), thrombolysed in mid-trimester. Here we report a case of an antenatal female in first trimester with aortic prosthetic thrombosis, who was successfully thrombolysed with streptokinase with no complication to mother or fetus.

#### CASE DETAILS

A 35-year-old female patient, with two months pregnancy and history of aortic valve replacement

(AVR), three years back, was admitted to our institute with dyspnoea on exertion- New York Heart Association (NYHA) class III for one week, which worsened to class IV dyspnoea for two days. She had two uneventful pregnancies (delivered at full term) before AVR. She underwent AVR three years before due to thick calcific trileaflet aortic valve with severe aortic stenosis (peak systolic gradient - 125 mmHg, mean gradient - 77 mmHg and peak velocity - 5.6 m/s), moderate aortic regurgitation (Aortic regurgitation pressure half time (ARPH) - 300 ms) with preserved left ventricular (LV) systolic function. AVR was done with TTK Chitra 17 M metallic prosthetic valve (TTK HEALTH CARE LTD, Chennai, India), with peak gradient - 32 mmHg, mean gradient - 11 mmHg and peak velocity - 2.3 m/s on postoperative echocardiography. At this time she was admitted with two months of pregnancy and was inadvertently off anticoagulants for 2 - 2.5 months. On admission, she had tachycardia (heart rate - 108 bpm) and blood pressure was 100/60 mmHg. Closing click of the prosthesis was inaudible in the aortic area. There was an ejection systolic murmur

<sup>¶</sup>Correspondence at: Resident Doctor, U N Mehta Institute of Cardiology and Research Centre, B J Medical College, Ahmedabad - 380016, Gujrat, India; Email: [docabs4u@gmail.com](mailto:docabs4u@gmail.com)

of grade III/VI in the aortic area. On admission, her international normalised ratio (INR) was 1.18. Echocardiography showed aortic PVT with non-visibility of opening and closing movements of the

aortic prosthesis, no visible pannus and increased trans-aortic gradient (peak gradient - 122 mmHg, mean gradient - 75 mmHg, peak velocity - 5.5 m/s) (Figure 1). LV systolic function was normal.

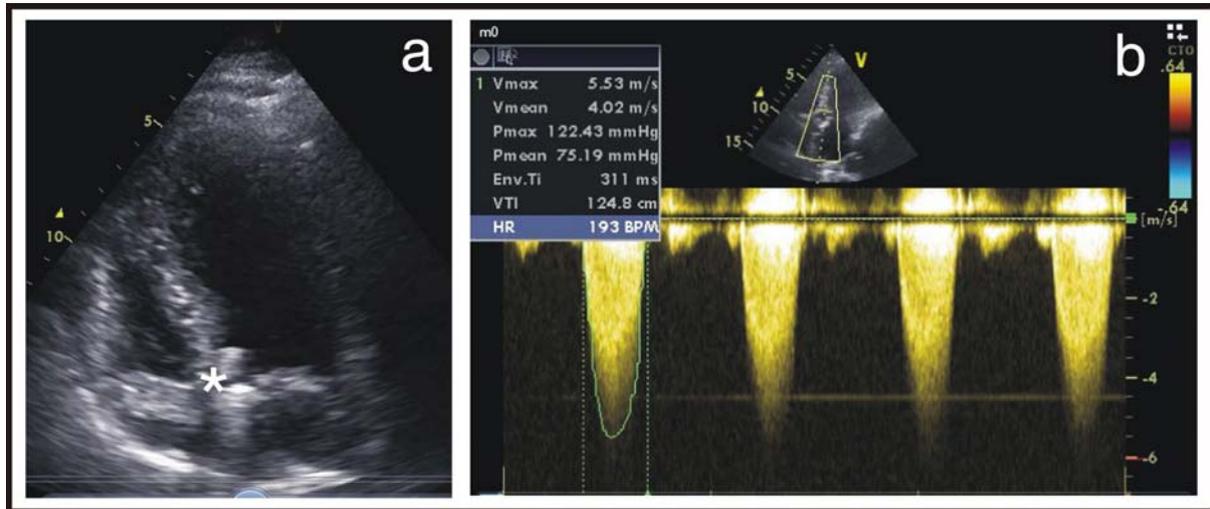


Figure 1: a- Two dimensional echocardiographic apical 4-chamber view showing aortic PVT(\*); b- Continuous wave Doppler signals showing LV out flow obstruction due to aortic PVT

Risks and benefits of thrombolysis vs. surgery were explained to the patient and relatives and the option of thrombolysis was chosen. Informed and written consent of fetomaternal morbidity and mortality was obtained. Thrombolysis was done with Streptokinase 2.5 LAU bolus followed by 1 LAU/hr.<sup>3,4</sup> After 24 hrs, she was symptomatically better and the click of aortic prosthesis reappeared. Echocardiography was showed well functioning aortic valvular prosthesis. Thrombolysis was stopped and heparin infusion was started. Fetal ultrasonogram after 48 hours showed single live

intrauterine fetus with proper visualisation of fetal pole and yolk sac, presence of fetal cardiac activity and adequacy of amniotic fluid. On the fifth day aortic peak instantaneous gradient was 54.94 mmHg, mean gradient was 34.97 mmHg and maximum velocity was 3.7 m/s (Figure 2). The patient was discharged in clinically and hemodynamically stable condition and anticoagulation coverage with heparin was advised.<sup>4-6</sup> She delivered a normal baby uneventfully in follow up at full term of pregnancy with no complications.

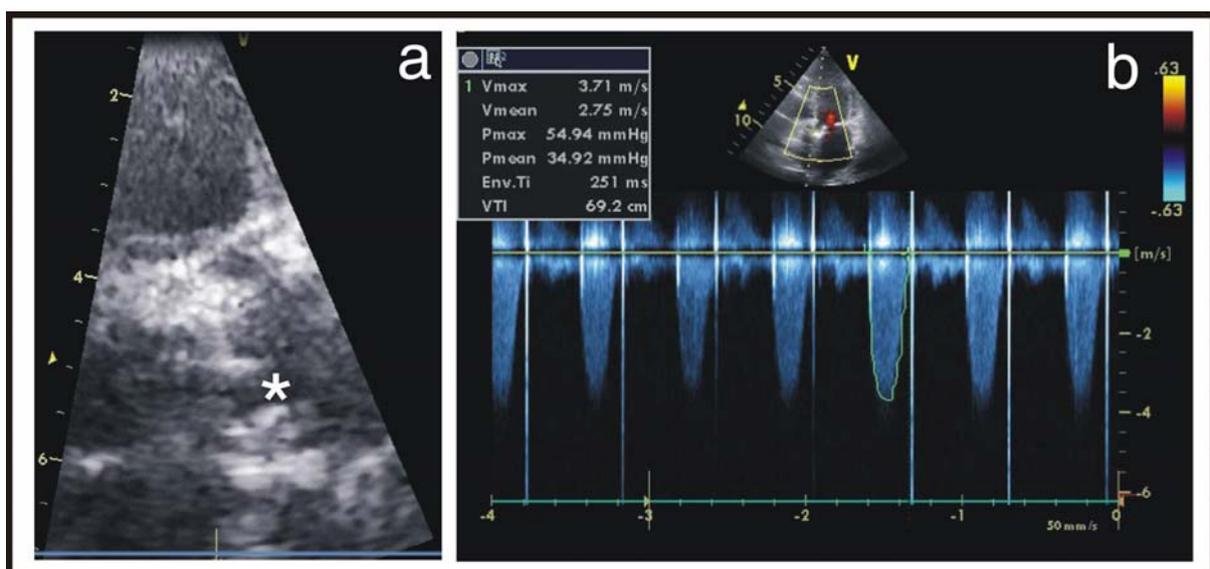


Figure 2: a- Parasternal long axis view after thrombolysis showing completely resolved thrombus; b- Continuous wave Doppler signals showing decreased LV out flow obstruction after thrombolysis

## DISCUSSION

Pregnancy, due to its physiological changes such as increase in platelet adhesion, plasma viscosity, fibrinogen and coagulation factors, obstruction of venous return by gravid uterus, decreased levels of antithrombin III and decreased fibrinolysis, is a procoagulant state. The rate of prosthetic valve thrombosis (incidence 4-14%), deep venous thrombosis and pulmonary embolism are increased.<sup>7</sup>

For patients with a mechanical prosthetic valve, the incidence of thromboembolism during pregnancy is estimated from 7 to 23% with maximum episodes (50%) in the first trimester, as compared to 14% in the second trimester and 36 % in the third trimester; leading to maternal mortality of 2-15% in different clinical groups.<sup>2,4,6</sup> The risk is increased due to the hypercoagulable state related to pregnancy, failure to continue Coumadin or due to switch-over to heparin.<sup>1,7</sup> PVT during pregnancy requires immediate therapy such as valve replacement, thrombolysis or surgical thrombectomy.<sup>2</sup> Guidelines recommend management strategy for PVT in these patients similar to that in non-pregnant ones.<sup>2,4</sup> Optimization of anticoagulation in non-critically ill patients with recent sub-therapeutic anticoagulation is recommended. Surgery is recommended when anticoagulation fails, for critically ill patients with obstructive thrombosis, or large non-obstructive PVT complicated by embolism.<sup>2,4</sup> Fibrinolysis is recommended for either critically ill patients when surgery is not immediately available or when PVT is right-sided. Though during pregnancy, administration of thrombolytic therapy is considered a relative contraindication in general<sup>4</sup>, it is considered first line treatment for PVT in the absence of contraindications<sup>2,5,6</sup>. Streptokinase is a pregnancy Category C drug, meaning that no adequate studies have been done in humans but potential benefits outweigh risks.<sup>8</sup> The minimal amount of it that reaches the fetal circulation is not enough to cause fibrinolytic effects in the fetus.<sup>8</sup> In this population, it is associated with 71-85% success rate.<sup>6,9</sup> This is almost similar to that (85%) in non-pregnant patients with PVT.<sup>2</sup> Overall complication rate is 18% (14% major and 32% minor), maternal mortality rate is 5.6-10% and fetal/neonatal mortality is 8-20%.<sup>2,6,9</sup> Clinical success correlated with NYHA class, with best prognosis with class I (success rate 100%) and worst with class IV (65.2%).<sup>6,9</sup> Success is also higher in the aortic position than in the mitral one (83.3% vs. 67.2%).<sup>6,9</sup>

Thrombolysis is limited by the risk of hemorrhagic complications, especially with long acting fibrinolytic agents, longer infusions and with an underlying bleeding predisposition.<sup>1</sup> There is a risk for the development of uterine hematomas in

pregnant women. Caesarean section or therapeutic abortion may be required for undue hemorrhagic complications.<sup>1</sup>

The incidence of thromboembolic complications is 18%.<sup>1</sup> The incidence of permanent neurological deficit due to embolism and major hemorrhage are 3 to 6%.<sup>6,9</sup> Moreover, the incidence of recurrent thrombosis after successful treatment is 19.5%.<sup>6,9</sup> Spontaneous abortion rate (8-20%) associated with thrombolytic therapy is almost similar or only slightly higher than that in the general population.<sup>2,7</sup> No permanent sequelae in surviving children have been reported.<sup>7</sup>

There is an association between increasing lytic therapy complications and the severity of heart failure symptoms. The overall mortality rate associated with lytic therapy is 9.9 to 10%, the highest rates are in NYHA class III and IV with 11.9% and 13%, respectively.<sup>1,6,9</sup>

Several agents have been administered as fibrinolytic treatment, such as streptokinase, urokinase, tissue plasminogen activator etc. in the second trimester.<sup>1,2,7,10</sup>

Emergency surgery for valve replacement or thrombectomy is traditionally the commonest treatment. But, cardiac surgery using the cardiopulmonary bypass exposes mother and fetus to a greater risk than thrombolytic therapy does, with 6-10% maternal mortality (25% in some reports) and 24% morbidity; 9-33% fetal mortality and 30% morbidity in surviving women.<sup>2,7</sup> Severity of heart failure symptoms is associated with worsening surgical mortality. The mortality rates of thrombolysis are lower compared with surgery, particularly in patients with serious heart failure. Most cases of PVT who had undergone surgery were in second trimester or immediate post-partum<sup>9</sup>, while short-course thrombolysis appears to be an effective alternative to surgical intervention for the treatment of thrombotic dysfunction of aortic valve prostheses in early second trimester of pregnancy<sup>10</sup>. Here we report an antenatal case of aortic PVT, presenting in first trimester and thrombolysed with streptokinase.

## CONCLUSION

Fibrinolytic therapy for mechanical valve thrombosis of aortic prosthesis is a reasonable alternative to surgery in the first trimester of pregnancy.

## REFERENCES

1. Fleyfel M, Bourzoufi K, Huin G, Subtil D, et al. Recombinant tissue type plasminogen activator treatment of thrombosed mitral valve prosthesis during pregnancy. *Can J Anaesth.* 1997;44(7):735-8.

2. Özkan M1, Çakal B, Karakoyun S, Gürsoy OM, et al. Thrombolytic therapy for the treatment of prosthetic heart valve thrombosis in pregnancy with low-dose, slow infusion of tissue-type plasminogen activator. *Circulation*. 2013;128(5):532-40.
3. López HP, Cáceres Lóriga FM, Hernández KM, Sánchez HF, et al. Thrombolytic therapy with recombinant streptokinase for prosthetic valve thrombosis. *J Card Surg*. 2002;17(5):387-93.
4. Bonow RO, Carabello BA, Chatterjee K, de Leon AC Jr, et al. 2008 focused update incorporated into the ACC/AHA 2006 guidelines for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to revise the 1998 guidelines for the management of patients with valvular heart disease). Endorsed by the Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2008;52(13):e1-142.
5. Elkayam U, Bitar F. Valvular heart disease and pregnancy. Part II: prosthetic valves. *J Am Coll Cardiol*. 2005;46(3):403-10
6. Choi C, Midwall S, Chaille P, Conti CR. Treatment of mechanical valve thrombosis during pregnancy. *Clin Cardiol*. 2007;30(6):271-6.
7. Leonhardt G, Gaul C, Nietsch HH, Buerke M, et al. Thrombolytic therapy in pregnancy. *J Thromb Thrombolysis*. 2006;21(3):271-6.
8. Streptokinase Pregnancy and Breastfeeding Warnings. Retrieved from: <http://www.drugs.com/pregnancy/streptokinase.html>
9. Koller PT, Arom KV. Thrombolytic therapy of left-sided prosthetic valve thrombosis. *Chest*. 1995;108(6):1683-9
10. Behrendt P, Schwartzkopff B, Perings S, Gerhardt A, et al. Successful thrombolysis of st. Jude medical aortic prosthesis with tissue-type plasminogen activator in a pregnant woman: a case report. *Cardiol Rev*. 2002;10(6):349-53..