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Case Report

## A successful pregnancy outcome after mitral valve replacement: a case report

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### ABSTRACT

Valvular heart disease can be acquired or congenital. Although the incidence of rheumatic heart disease is on the decline, the number of patients with congenital heart disease who survive into adulthood has grown substantially over the past 30 years. Therefore, a large number of patients with valvular heart disease will be of childbearing age. Here we presented a case of second gravida who was diagnosed with rheumatic heart disease and had undergone mitral valve prosthesis and tricuspid valve repair delivered a healthy live male baby weighing 2.250 kg.

**Keywords:** Valvular heart disease, Rheumatic heart disease, Mitral valve prosthesis, Pregnancy

### INTRODUCTION

The evaluation of individuals with valvular heart disease who are or wish to become pregnant is a difficult issue. Issues that have to be addressed include the risks during pregnancy to the mother and the developing fetus by the presence of maternal valvular heart disease as a pre-existing disease in pregnancy. Normal physiological changes during pregnancy require, on average, a 50% increase in circulating blood volume that is accompanied by an increase in cardiac output that usually peaks between the midportion of the second and third trimesters.<sup>1</sup> The increased cardiac output is due to an increase in the stroke volume, and a small increase in heart rate, averaging 10 to 20 beats per minute.<sup>1</sup> In a study 39 pregnancies in 34 patients after valve replacement gave rise to 30 healthy babies.<sup>2</sup> This makes it likely that these women represented the best end of the spectrum of cardiac function after valve replacement.<sup>2</sup> The risk of thromboembolism, miscarriage, and premature birth is felt to be higher in patients who have prosthetic heart valves requiring anticoagulation.

### CASE REPORT

A 39-year-old second gravida patient came to Institute of Kidney Diseases and Research Centre IKDRC in Gynae OPD on 14 July 2023. Patient had previous female child with cerebral palsy. Her LMP was 18 November 2022 and EDD was 25 August 2023. In 2016 she was diagnosed with rheumatoid heart disease with severe MS (mitral stenosis), moderate MR (mitral regurgitation), moderate TR (tricuspid regurgitation), moderate PAH (pulmonary arterial hypertension). Patient had undergone open heart surgery and mitral valve prosthesis in 2016. On 16 June 2023 her PT/INR was 23.6/2.18. She was on tablet ecosprin 75 mg od, tablet warfarin 5 mg od and tablet metoprolol 25 mg 1 bd and tablet pentid (penicillin G) 400 mg 1 bd. 2d echo on 14 July 2023 showed mitral valve prosthesis *in situ* and tricuspid valve repair ring *in situ* with mild valvular MR and LVEF 60%. On the day of visit she was 34 weeks pregnant with BP 136/89 mmHg.

The patient was admitted for threatened preterm labour on 18 July 2023. She underwent cardiology reference. She was advised to shift on LMWH/unfractionated heparin

prior to delivery and then to oral anticoagulant after delivery. As advised by cardiologist she was shifted to LMWH injection clexane 0.6 SC bd. Steroid injection betamethasone 12 mg 2 doses were given 24 hrs apart for lung maturity. Her INR was 2.55, creatinine-0.66, S. Na/K-133/4.97, Hb-11.3, PT/INR at the time of discharge 40/2.86, APTT-42.8. Ecosprin was stopped 5 days before delivery. Anesthesia fitness was taken. Her investigations were as shown in Table 1.

Patient was started on antibiotic to prevent infective endocarditis. Patient underwent elective LSCS due to

cephalopelvic disproportion on 5 August 2023 at 9:37 am with a live healthy male baby weighing 2.250 kg with Apgar score of 9/10. Injection heparin was restarted 6 hours after delivery and overlapped with tablet warfarin 5 mg OD at the time of discharge.

Table 1 shows investigations of patient at the time of mitral valve replacement in 2016. Her creatinine was 1.25, urea 36.38 mg/dl. In 2023 in the course of her pregnancy her investigations showed normal parameters.

**Table 1: Investigations.**

Parameters	14/11/2016	23/3/2018	14/7/2023	3/8/2023	4/8/2023
Hb gm/dl	12.2	11.8	11.3	12.1	12.3
Wbc/cumm	15800	14800	12760	10760	10780
Platelets/cumm	125000	134000	2,06,000	1,47,000	1,67,000
RBS mg/dl	89	82	75	86	84
HbA1C			5.5%		
S. creatinine	1.25	1.08	0.66		
Urea mg/dl	36.38	29			
Total bilirubin/direct/indirect mg/dl	1.6/1.0/0.6		0.3/0.1/0.2		
SGOT/SGPT	132/39	32/18	24/18	28/17	
PT/INR/APTT	3.66	78.9/7.108	27.3/2.55/45.9	14.1/1.01/55.1	14.1/1.01/49.4
ECG			NAD		NAD
Proteins/albumin/globulin gm/dl	5.1/2.4/2.7		6.9/3.6/3.30		

2d echo was done after delivery on 11 August 2023 which showed mitral valve prosthesis *in situ*, tricuspid valve repair ring *in situ*, mild valvular MR and LVEF-55%. Cardiac follow up was done on 17 August 2023. Her PT/INR was 16.3/1.47. She was started on tablet warfarin 6/7 mg HS, tablet ecosprin 75 mg 1 od, tablet metoprolol 25 mg 1 bd, tablet pentid 400 mg 1 bd.

## DISCUSSION

Irrespective of the etiology of valvular heart disease, deterioration of the native valve can result in mitral or aortic regurgitation or stenosis, necessitating replacement with a prosthetic valve. There are various types of prosthetic heart valves that can replace the diseased native valve; the 2 main types are mechanical and bioprosthetic.

Mechanical heart valves are associated with an increased risk of blood clots. Clots formed by red blood cell and platelet damage can block blood vessels leading to stroke. People with mechanical valves need to take anticoagulants (blood thinners), such as warfarin, for the rest of their life. They have excellent durability and structural valve deterioration (SVD) does not occur.<sup>3</sup> Types of thromboembolic complications that have occurred during pregnancies associated with mechanical prosthetic valves

include stroke, valve thrombosis, and myocardial infarction.<sup>4,5</sup>

Bioprosthetic valves are usually made from animal tissue (heterograft/xenograft) attached to a metal or polymer support. Bovine (cow) tissue is most commonly used. The tissue is treated to prevent rejection and calcification. Bioprosthetic valves are less likely than mechanical valves to cause blood clots, so do not require lifelong anticoagulation. As a result, people with bioprosthetic valves have a lower risk of bleeding than those with mechanical valves. Tissue valves are less durable than mechanical valves, typically lasting 10-20 years. Women who have well-functioning bioprosthetic heart valves and who do not have other cardiac risk factors often have uncomplicated pregnancies.<sup>6,7</sup> The main issues with bioprosthetic valves is their finite lifespan and their risk of SVD, reoperation comes with risk, and SVD has been reported to occur both during pregnancy and in the postpartum period, requiring surgery.<sup>3,6</sup> Young age is one of the known risk factors for SVD.<sup>3</sup>

### Pregnancy outcome

It is difficult to predict the outcome of pregnancy in women with artificial heart valves. Cardiac output

increases by up to 50% in pregnancy; this is normally achieved by an increase in stroke volume rather than by an increase in heart rate. Pregnancy in women with heart valve prostheses, even those with mitral valve replacement, is usually well tolerated when the heart has a good ventricular reserve, is in sinus rhythm, and has properly functioning valves. Increases in the concentrations of coagulation factors and a reduction in fibrinolysis in pregnancy add to the risk of thromboembolism associated with the presence of a prosthetic heart valve. Thrombosis of the artificial valve can be prevented by well controlled anticoagulant treatment.

Larrea et al who reported that thromboembolic complications were common in mitral valve prostheses.<sup>8</sup> When compared with women with bioprosthetic valves, women with mechanical heart valves have a higher incidence of pregnancy loss, premature births, maternal deaths, thromboembolic complications, and bleeding.<sup>6,7</sup>

### **Anticoagulants during pregnancy**

Use of anticoagulants during pregnancy is challenging due to the potential teratogenic effects and dosing complexities of the various agents, and the management of anticoagulation around the time of labor. In addition, individuals receiving chronic anticoagulation who are contemplating pregnancy need counseling regarding how to avoid the potential teratogenic effects of warfarin and the passage of some of the anticoagulant to the fetus.

The types of anticoagulation that can be used during pregnancy include warfarin, unfractionated heparin, and low-molecular-weight heparin (LMWH).<sup>4</sup> However, warfarin is teratogenic,<sup>9</sup> and heparin (both LMWH and unfractionated heparin) is probably less effective than warfarin.<sup>4</sup> The use of warfarin between 6 and 12 weeks' gestational age results in a 6% to 10% risk of embryopathy; however, the risk is probably lower if less than or equal to 5 mg of warfarin is prescribed.<sup>5,9-12</sup> The maternal risk of heparin use includes hemorrhage, osteoporosis, heparin-induced thrombocytopenia, and thromboembolic complications.<sup>10</sup> The risk of thromboembolic events during pregnancy in patients treated with heparin is approximately 10%, compared with the 3.9% risk with warfarin use throughout pregnancy.<sup>4,6,10,11</sup> Proper use of LMWH in pregnancy requires very close monitoring of anti-Xa levels.

The risk of thromboembolic complications is greater with prosthetic valves in the mitral valve position than with those in the aortic position (for both mechanical and bioprosthetic valves).<sup>12</sup>

### **Maternal endocarditis**

All patients with prosthetic heart valves (bioprosthetic or mechanical) are at risk of endocarditis.<sup>13,14</sup> Patients with prosthetic heart valves should receive information about

such risk, and preventive measures, such as excellent dental hygiene, should be prescribed.<sup>13,14</sup>

It is not known if using antibiotics at times of risk prevents endocarditis.<sup>13,14</sup> However, some specialists believe the theoretical benefit of giving antibiotic prophylaxis at the time of delivery outweighs the severe consequences of endocarditis in a high-risk woman, making it a prudent strategy.<sup>13</sup>

### **CONCLUSION**

Women who have prosthetic heart valves and are of childbearing age should be counselled before conception about the potential issues that might arise during pregnancy. Having a prosthetic heart valve puts both the mother and fetus at risk; therefore, a multidisciplinary team approach is required for management of high-risk patients throughout pregnancy in a specialized program.

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