

## ORIGINAL ARTICLE

### The outcome of pregnancy early after cardiac surgery

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## ABSTRACT

### Objective

To determine the outcome of pregnancy following cardiac surgery

### Methods

This is a retrospective study of all patients who underwent open heart surgery from January 2016 to August 2017 and conceived within a year after surgery. The preoperative and operative parameters of patients including patient's name, age, parity, type of cardiac surgery, time to conceive, mode of delivery was noted. Pregnancy outcome was determined in terms of miscarriage, live birth (premature/term delivery) of healthy fetus and birth weight of baby was also noted to rule out low birth weight babies.

### Results

Our study included 67(95.3%) patients with valve replacement surgery and 3(4.3%) with surgical repair of congenital heart defects. The time to conceive after cardiac surgery was minimum of 3 months and maximum of 10 months giving mean of 6.61 months. Regarding the outcome of pregnancy, 7(10%) patients had miscarriage while 63(90%) had live births, out of which 55(87.3%) had full term pregnancy and

8(12.7%) delivered preterm. Mode of delivery was vaginal in 37(58.87%) patients while 26(41.3%) had C-section. We found no case of congenital anomaly or Warfarin related embryopathy in our study.

### Conclusion:

Our study confirms safe outcome of pregnancy after cardiac surgery and no adverse impact on time and mode of delivery along with birth weight of baby is observed.

**Keywords:** Cardiac surgery. Congenital heart diseases, valvular heart disease, pregnancy.

## INTRODUCTION

Heart disease in pregnancy is the most common indirect cause of maternal death. It is estimated that about 0.1-4% of pregnancies are affected by heart disease out of which nearly 50% are congenital while the rest are acquired like rheumatic heart disease, coronary heart disease, etc. Management of pregnancy with heart disease (whether untreated or medically managed) is quite challenging and poses high risk to the mother and fetus. However, after undergoing corrective surgery, pregnancy in this high risk population is

much safer for both mother and fetus [1]. In developed countries, it is observed that early surgical correction for congenital heart disease reduces the complications of pregnancy from 3.6% to 1.5% [2]. The incidence of rheumatic heart disease in women of child bearing age is much higher in developing countries and an increasing number of women are coming to obstetric clinics after valve replacement or repair procedures. The patients who have conceived after bioprosthetic valve replacement are considered as WHO modified Class-II, as there is slightly increased risk of maternal/fetal morbidity and mortality. While patients who have undergone mechanical valve replacement need lifelong anticoagulation, including the course of pregnancy, to reduce their chances of valve thrombosis which will otherwise result in fatal complications for mother and fetus [3]. A large number of studies have shown that there is no optimum anticoagulant which is safe in pregnancy after valve replacement surgery. However, the observed risk of fetal embryopathy and low birth weight babies in patients taking oral warfarin is actually much less as compared to estimated risk. Moreover, maternal mortality is the most devastating complication, which is very low if a patient conceives after definitive management by cardiac surgery [4].

## METHODS

This study was conducted retrospectively at Faisalabad Institute of Cardiology in the department of cardiac surgery in collaboration with cardiac surgeons, consultant gynecologist and cardiologist. From January 2016 to August 2017, seventy (70) patients between 20-35 years of age who had conceived after undergoing open heart surgery were included in the study. Permission was taken from the hospital ethical committee and informed consent was taken from all the patients to publish the findings of study.

Twenty patients who had previous history of recurrent miscarriages, congenital anomalies of baby, history of chronic debilitating ailments like diabetes, hypertension, tuberculosis, malnutrition, general asthenia and chronic pulmonary hypertension were excluded from study.

The data was collected via direct interviews with the patients during follow-up visits and clinical evaluation and analyzed using SPSS version 17. Mean and standard deviation were calculated for all quantitative variables like age,

gestational age and parity. Frequency and percentages were calculated for all qualitative variables like type of cardiac surgery, miscarriage, mode of delivery, low birth weight, term and preterm delivery. To compare the outcome of pregnancy in patients of previous valve surgery with those congenital heart surgery, Chi-square test was used. A p-value < 0.05 was taken as significant.

## RESULTS

Table 1 shows the demographics of patients including age and parity, type of cardiac surgery, gestational age, time and mode of delivery. The time to conceive after cardiac surgery is also noted. Our study population consisted of 67(95.7%) patients with valve replacement surgery (mitral and aortic valves), 3(4.3%) patients who had repair of congenital heart defects (atrial septal defect repair, mitral valve repair, ventricular septal defect repair) and 1 patient with abdominal aortic aneurysm repair. The mean time taken to conceive after cardiac surgery was 6.61 months (SD + 2.08).

Table 2 represents outcome of pregnancy after cardiac surgery. There were 39(55.7%) primipara and 31(44.3%) multipara patients. In 63 (90%) cases there was history of live birth of babies, out of which 55 (87.3%) patients gave birth to full term babies and 8 (12.7%) had preterm delivery at 35-36 weeks. The cause of preterm birth in all patients was due to obstetric reasons like PIH, Pre-eclampsia, UTI etc. Seven (10%) patients had miscarriages (spontaneous and missed) but no case of congenital anomaly or warfarin related embryopathy was reported. Mode of delivery was vaginal in 37 (58.87%) patients and C-section in 26 (41.3%) due to obstetric indications. The mean birth weight of babies was normal in 49(77.8%) patients and low birth weight was found in 14 (22.2%) patients.

## DISCUSSION

Although studies on the outcome of pregnancy after cardiac surgery are encouraging but still many women of reproductive age have fears in their minds regarding effect of surgery on conception, course and outcome of pregnancy. The burden of valvular heart disease is growing worldwide due to the high incidence of rheumatic heart disease in developing countries [1]. Rheumatic heart disease (RHD) is endemic in

Variable	Mean or N	SD or %	Max-Min
Age	39.03	8.71	20-35
Time to conceive after cardiac surgery	6.61	2.08	3-10
Gestational age	37.7	1.3	34-40
Birth weight of baby	3.06	0.72	1.7-4
Parity			
Primigravida	39	55.7	NA
Multigravida	31	44.3	NA
Type of cardiac surgery			
Valve replacement surgery	67	90	NA
Congenital heart surgery	3	10	NA

Variables		Valve replacement surgery	Congenital heart surgery	p-value
Miscarriage	Yes	6 (9%)	1 (3.3%)	0.169
	No	61 (91%)	2 (66.7%)	
Time of delivery	Preterm	8 (13.1%)	0	0.584
	Full term	53 (86.9%)	2 (100%)	
Mode of delivery	Vaginal delivery	36 (59%)	1 (50%)	0.799
	C-section	25 (41%)	1 (50%)	
Low birth weight	Yes	14 (23%)	0	0.442
	No	47 (77%)	2 (100%)	

Pakistan with a prevalence of 5.7 in 1,000. A significant proportion of patients with RHD is below 20 years of age [2]. The surgical replacement of diseased heart valves is based on the premise that the prosthesis chosen to replace a diseased heart valve improves or prevents further deterioration of heart function, relieves symptoms, improves functional status, and prolongs overall survival [3]. Although the pregnancy in patients with previous cardiac surgery is a challenge, the relatively younger age of these patients provides an optimism for good results. There is one report in literature where a woman underwent three major valve operations of complex nature during successive pregnancies and survived. The last operation of this "series" involved a redo mitral valve replacement combined with Bentall's procedure for endocarditis [4]. The women who conceive after cardiac surgery, require multidisciplinary team approach both during and after pregnancy to optimize their functional status. In this regard the task force on the Management of Cardiovascular Diseases during Pregnancy of the European Society of Cardiology (ESC) provides very comprehensive guidelines which can ensure excellent outcome of pregnancy after open heart surgery [5]. It is customary to consider the management of anticoagulation in pregnant women with prosthetic valves as daunting experience. However, the available literature does challenge this common perception. Local reports like the one by Khalil et al do support the idea of continuing Warfarin during pregnancy with very low risk of embryopathy [6]. Ayed et al have reported that the use of Warfarin during the first trimester is safer for the mother but may result in more fetal loss if the dose exceeds 5 mg [7].

The incidence of maternal complications is greater in women who receive LMWH or unfractionated heparin during the first trimester, especially prosthetic valve thrombosis, although the fetal outcome is better because heparin does not cross the placenta. Poor outcome of pregnancy after open heart surgery is perhaps dictated by the functional class and cardiac status of the mother.

The underlying pathophysiology due to congenital heart disease or acquired valvular heart disease must be clearly understood as it has direct impact on poor maternal and fetal outcome in pregnancy. In un-repaired cardiac lesions (both valvular and congenital) the right ventricular volume is increased due to increase in plasma volume in pregnancy ultimately leading to

ventricular failure and arrhythmias. Another common pathology is left to right shunt, commonly seen in congenital heart diseases such as atrial septal defects (ASD) and ventricular septal defects (VSD), which results in failure to increase the cardiac output in pregnancy causing neonatal morbidity and low birth weight baby. However, the repair of congenital defects is rather curative while surgery for valve diseases are mostly palliative. It is quite plausible that the outcome of pregnancy in a mother who underwent repair of simple congenital heart defect is more likely to be smoother than the one who underwent surgery for valve diseases. Ranjan et al from Bangladesh have reported this expected finding in their study of 56 pregnancies where the incidence of still births was 8.1% in mothers who underwent surgery for congenital heart defects compared to 42.1% in those who had heart valve surgery [8]. Bhutta et al from Pakistan have reported excellent results of pregnancy after cardiac surgery. They followed one hundred and seventy pregnancies in 113 women. There were 18 spontaneous abortion, and three (2%) still births. Valve surgery was done in 103 of 113 women (91.15%). The mitral valve was mostly frequently involved i.e. in 92 (89.32%). Forty two (28%) infants were underweight for the period of gestation [9]. On the contrary a multicenter European study reported by van-Hagen has showed high rate of complications in mothers with mechanical heart valves (MVH). It was concluded that women with an MVH had only a 58% chance of experiencing an uncomplicated pregnancy with a live birth. The use of Warfarin in the first trimester was associated with significantly higher rates of miscarriages and late fetal deaths when compared with heparin [10].

Vasapollo et al. studied relationship of maternal cardiac function with intrauterine fetal growth restriction associated with abnormal umbilical artery flow during the third trimester of pregnancy. In this study they documented that the patients with IUGR had a lower heart rate, stroke volume and cardiac output compared with control subjects who had normal intrauterine growth. The lower stroke volume in mothers was due to the smaller end-diastolic volume and the larger end-systolic volume [11]. The relationship of IUGR with low placental perfusion has been reported much earlier and attempts have been made to develop clinical techniques for the non-invasive measurement of placental perfusion, to

enable early detection of intrauterine growth restriction (IUGR). In this regard Francis et al developed perfusion-sensitive echoplanar imaging (EPI) technique of making magnetic resonance images. Their findings confirmed that patterns of perfusion within the placenta of mothers with IUGR differed significantly from pregnancies normal intrauterine growth [12].

These finding highlight that mothers who had undergone open heart surgery in recent past are likely to have poor cardiac function may have poor placental flow. This may in turn result in poor fetal growth.

## CONCLUSION

Our findings suggest that pregnancy can be safe early after cardiac surgery, with minimal peripartum complications, if the mother has good functional status and the pregnancy is supervised by multidisciplinary team at a tertiary care center.

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