Original Article

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MANAGING PREGNANT CARDIAC PATIENTS IN A TERTIARY CARDIAC CARE UNIT IMPROVES FETOMATERNAL OUTCOME

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ABSTRACT

Objective: To observe the frequency of fetomaternal complications in a cohort of high risk pregnant cardiac patients in a dedicated facility

Study Design: Descriptive observational study.

Place and Duration of Study: This study was conducted at AFIC / NIHD Rawalpindi from July 2014 to Dec 2014.

Methodology: All the patients booked for antenatal and admitted to obstetrics ward AFIC / NIHD for child birth were included. Their cardiac disease and functional status were determined. Maternal cardiac and obstetric complications, fetal complications and maternal mortality rate were recorded. Data was collected and descriptive analysis was done using SPSS.

Results: A total of 73 pregnant cardiac patients were studied. Mean age was 28 years SD=4.3 yrs, mean parity was P 2, gestation at delivery was 36.93 SD= 4.8. Eight% patients were booked and 19% were unbooked. The patients were divided by cardiac lesions into 70% rheumatic heart disease, 12.4% congenital heart disease, 9.6% arrhythmias, 6.8% cardiomyopathy and 1.4% pulmonary hypertension. Mode of delivery was 37% LSCS, 52% vaginal delivery, 9.6% instrumental vaginal delivery and 1.4% assisted breech delivery. Maternal complications included cardiac and obstetric complications. Cardiac complications were 8.2% cardiac failure, 4.1% arrhythmia and 1.4% pulmonary embolism. 86.2% had no cardiac complication. Maternal mortality was 2.7%, intrauterine deaths were 5.5%.

Conclusion: Closed vicinity of obstetrics ward with operation theatre and twenty four hour availability of cardiologists, cardiac anaesthetists and, dedicated midwifery staff improves the pregnancy outcome in these high risk patients. The fetomaternal outcome is almost comparable to normal obstetric population.

Keywords: Cardiac disease, Pregnancy, Maternal mortality, Fetomaternal.

INTRODUCTION

Cardiovascular disease is the most encountered cause of maternal death during pregnancy in western world and an increase in maternal mortality due to cardiac disease has been observed. More and more women with congenital and acquired heart disease have the desire to become pregnant. As surgical repair techniques for congenital heart disease progress the number of women undergoing repair surgery is increasing as well. Pregnancy poses a major hemodynamic burden so risk of developing complications is increased as compared with normal population[1]. Pregnancy is characterized as a high flow low resistance state with increased cardiac output and diminished vascular resistance. Heart disease is now the second most common cause of death after psychiatric causes, more common than those from previous most common direct causes thrombo-embolism[2]. Population of pregnant woman with heart disease represents a unique group with risk for adverse outcome which can be reduced with pre pregnancy intervention. Besides management during antenatal period timing and mode of delivery should be decided upon jointly by obstetrician, cardiologist and obstetric anaesthesiologist[3].

Main cardiac diseases affecting pregnancy are congenital including septal defects, transpositionof vessels, tetralogy of fallot[4]. Acquired diseases are rheumatic especially with mitral valve involvement and ischemic heart diseases[5]. Cardiomyopathies especially peripartum cardiomyopathy is a severe disease occurring in pregnancy and post partum period. It carries high mortality[6]. Main pathophysiological mechanism in congenital heart disease are volume overload, left right shunts, pressure overload and cyanotic right to

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left shunt. As surgical repair techniques for congenital heart disease progress the number of pregnant woman who have undergone congenital heart disease repair is also increasing. In left heart stenotic valvular disease pregnancy is a high risk situation. In pregnant woman with mitral or aortic stenosis, <1.5 cm^2 aortic valve area, <2.0 cm^2 mitral valve area and a >30 mmHg peak pressure gradient in left ventricular outflow tract, ejection fraction diminished by 40% are predictors of maternal cardiac morbidity and neonatal events[7].

As well as the risk of death, pregnancy in woman with cardiac disease is associated with significant morbidity including endocarditis, arrhythmias, paroxysmal embolic events, heart failure and pulmonary hypertension. Fetal risks include intrauterine growth restriction, premature delivery and low birth weight babies. Incidence of structural cardiac defects is increased to 3-50% in babies of woman with congenital cardiac disease as compared to 0.8% in general population8. In pregnant woman the process for diagnosing cardiac disease is challenging. History and examination along with echocardiography which is safe for mother and fetus in diagnosing and severity assessment is done[9]. A joint clinic with a multidisciplinary team, a detailed plan for antenatal and intrapartum care is discussed and documented in the notes. Subsequent visit frequency is individualized to each woman but increased surveillance is definitely necessary. Intrapartum care and postnatal high dependency care should be done. However even if labour is progressing normally and a spontaneous vaginal delivery is expected it must be remembered that these woman have a serious medical condition which can be labile and unpredictable. Very close surveillance must always be maintained.

Studies have shown that incidence of clinically significant cardiac disease in pregnancy is reported to be between 0.9-3.7 percent[10]. Research in pregnancy is challenging as it involves a special vulnerable group, mother and fetus. Even prospective observational studies are difficult to perform in these high risk patients due to difficulty in obtaining consent and patient recruitment[11]. As this Centre gets cardiac obstetric patients exclusively so getting consent and recruitment of a good cohort became possible. In this study we will determine the cardiac lesion if not already known, assess functional status and

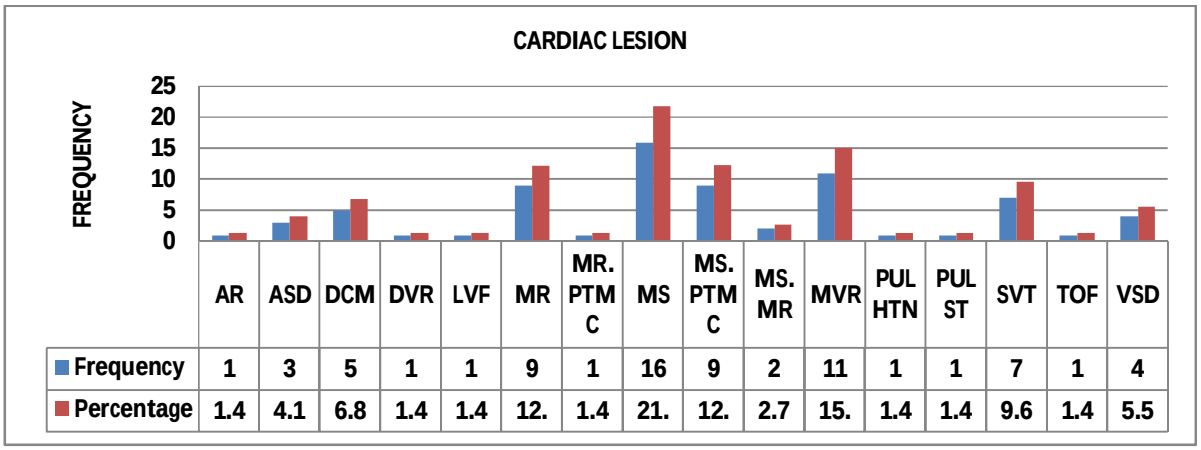


Figure-1: Showing frequency of different cardiac lesions.

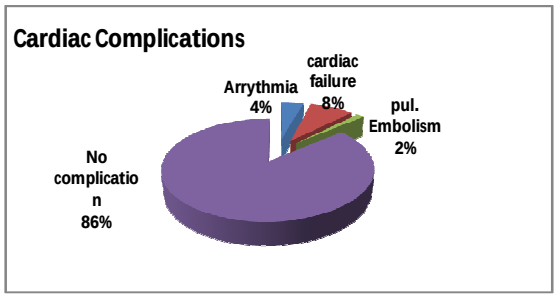


Figure-2: Showing types of Cardiac complications.

determine feto maternal complications during pregnancy and intrapartum period.

METHODOLOGY

This was a descriptive observational study done at armed forces institute of cardiology, Pakistan from July 2014 to Dec 2014. A total of 73 women were recruited in this study. During the study all pregnant cardiac patients reporting to obstetrics department were included. Those cardiac patients undergoing termination of pregnancy and miscarriage were excluded. An informed consent was obtained. Patients were categorized into those having acquired or congenital heart disease. Symptomatic patients were investigated by taking detailed history, examination, electrocardiography and echocardiography. Patient's functional status was determined by New York heart association classification.

The demographic profile of patients was studied which included age, parity, gestation at delivery. Maternal cardiac complications included cardiac failure, arrhythmia and embolism. Obstetric complications included antepartum hemorrhage, postpartum hemorrhage, tears and pretermdelivery. Fetal complications included fetal growth restriction, congenital anomalies and intrauterine death. The patients were seen in OPD according to institutional protocol every two weeks till 34 weeks and then weekly by obstetrician. Antenatal card is attached as annexure. Patients were seen by cardiologist in every trimester and delivery plan formulated and medicines adjusted with joint collaboration. The patient's anesthetic plan was also discussed with cardiac anesthetist and documented. Mode of delivery and caesarean section date calculated. Delivery was conducted in a dedicated labor ward sited in obstetrics/gynecology ward. Continuous cardiac monitoring of blood pressure, pulse and oxygen saturation was done. Considering the high risk situation continuous fetal heart rate monitoring was done. A 24 hour functional adult cardiac theatre is located on the same floor in close proximity and helped in managing all complications promptly. Full cardiac resuscitation facilities were available along with resident cardiologist in the ward. All the data collected was analyzed using SPSS software. Descriptive statistics were used to describe the data, and frequency and percentage were calculated.

RESULTS

A total of 73 pregnant cardiac patients delivered during this period out of 120 obstetric admissions, 60% of the total admissions. Demographic profile showed mean age 28.3 with SD = 4.3 years, mean parity was P 2, gestation at delivery was 36.9 SD = 4.82. Booked patients were 81% and 19% were un-booked.

The patients were divided by cardiac lesions into rheumatic heart disease 70%, congenital heart disease 12.4%, arrhythmias 9.6%, cardiomyopathy 6.8% and pulmonary hypertension 1.4%. Amongst the study population in rheumatic disease group 30.3% were operated by valve replacements and PTMC. The rest of the patients had uncorrected lesions. The dominant lesion was mitral stenosis. Patients with congenital lesions were already operated upon except two patients as shown in Figure-1. All our study population had the valve replacements, PTMC and corrective surgery for congenital lesions done in this institute. Functional status of patients was determined. 47.90% were in NYHA classification class 1, 43.8% class 2 and 8.2% class 3.

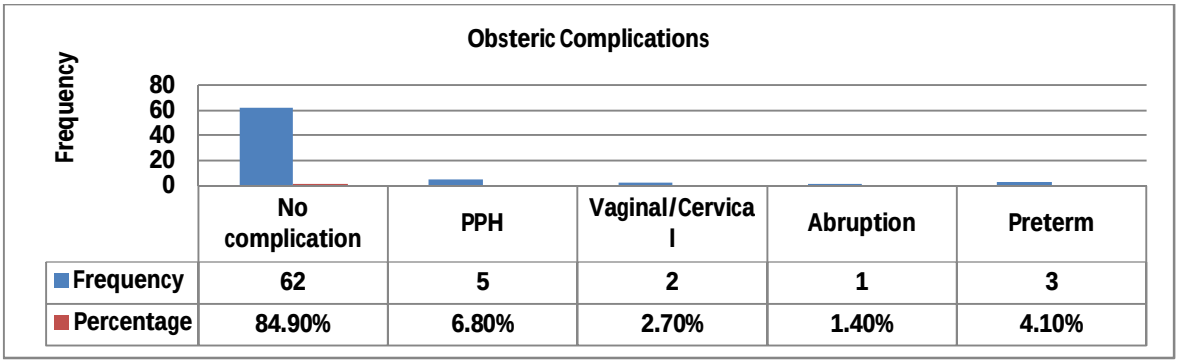
Mode of delivery was LSCS 37%, vaginal delivery 52.1%, instrumental vaginal delivery 9.6% and assisted breech delivery 1.4%. Maternal complications included cardiac and obstetric complications. Cardiac and obstetric complications are shown in Figure 2,3. Fetal complications were fetal growth restriction 20.5%, congenital heart disease 4.1%, fetal anomalies 4.1%, and twins 1.4% as shown in Fig-4. Maternal mortality was 2.7% and intra-uterine deaths were 5.5%. Both the patients who died were unbooked, NYHA 3 and had uncorrected ventricular septal defect and peripartum cardiomyopathy.

DISCUSSION

Serious maternal cardiac disease complicating pregnancy is relatively uncommon however it can have a significant

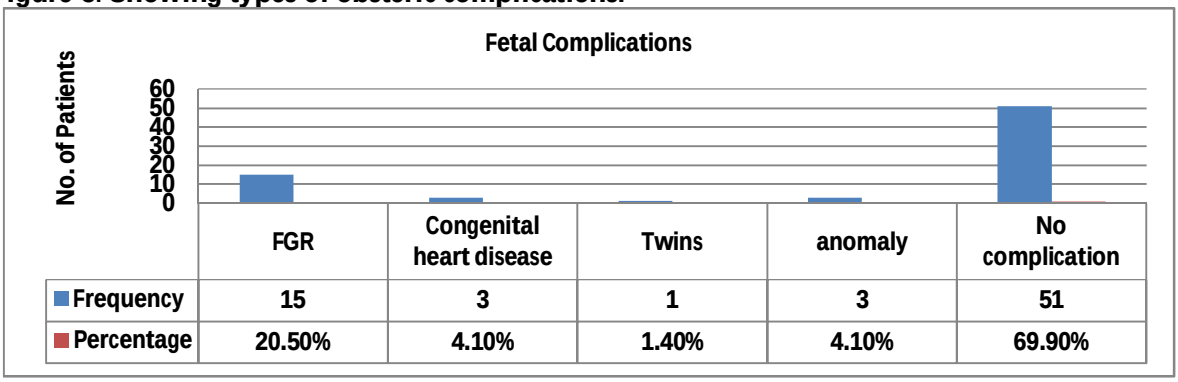
adverse effect on maternal and fetal outcome despite modern cardiac care. With a decrease in maternal death as a result of the classic causes of hemorrhage, hypertension and infection the relative importance of cardiac disease has increased. During the last few decades, the etiology of heart disease in developed countries has changed from primarily rheumatic to predominantly congenital. The commonest cause of heart disease is still rheumatic in developing countries like Pakistan, as is the result in our study and also, in other studies done here[12-15]. Prevalence of peripartum cardiomyopathy varies between studies as 1:400 to 1:1000. Although rare it is associated with highest morbidity and mortality[16]. Despite the potential for significant maternal morbidity, most patients with cardiac disease can expect a satisfactory outcome with careful antenatal, intrapartum and postpartum management.

Most of the studies done in Pakistan show comparable results in terms of age, parity, periodof gestation and cardiac lesion to our study[17,12]. In a study done in India on cardiac patients, number of patients was less than our study in spite of study period being two years. Similar was the case in local studies[12,13]. Cardiac complications were 7% with congestive cardiac failure as leading cause[18] and these were higher in patients with congenital heart disease as compared to normal population. In another study inspite of mode of delivery being operative in 45% of patients, maternal mortality was eighteen fold higher[19]. Spontaneous vaginal delivery was the dominant mode of delivery in our study. Traditionally cesarean section was regarded as the mode of delivery of choice for high risk patients but growing experience in this field has made this advice controversial .In this study Cesarean section rate was 37%. Cesarean section rate worldwide has increased steeply over more than a decade but has steadied in 2011[20]. Rates reported from Latin America and Caribbean are highest at 29.2% and Africa shows lowest 3.5%. Average cesarean section rate in Asia is 15.9%[21]. WHO recommends that rates above 15% seem to do more harm than good. Caesarean section rate reported from local studies in cardiac patients is comparable[15,17] but strangely that reported in normal obstetric patients is quite high[22].



	No complication	PPH	Vaginal/Cervical	Abruption	Preterm
Frequency	62	5	2	1	3
Percentage	84.90%	6.80%	2.70%	1.40%	4.10%

Figure-3: Showing types of obsteric complications.



	FGR	Congenital heart disease	Twins	anomaly	No complication
Frequency	15	3	1	3	51
Percentage	20.50%	4.10%	1.40%	4.10%	69.90%

Figure-4: Showing types of Fetal complications.

Most studies reported low risk of complications in NYHA I-II functional classification patients and highest mortality in NYHA 3-4 group[15,23]. All these studies demonstrated adverse outcome in adult congenital heart disease patients compared with normal age matched controls. Higher risk of maternal death, neonatal death, preterm birth, fetal growth restriction and longer hospital stay. Ventricular septal defect was associated with highest risk like in our study[24].

Maternal deaths were 2.7% in this study. In a study cardiac disease as a cause of indirect maternal death was 2.4%[24] but the study population was non cardiac and even then the mortality rate is comparable with our study in which all patients were high risk cardiac patients. Maternal mortality has decreased from 770/ to 282/100,000 in Africa where leading causes is still hemorrhage and sepsis[24]. Maternal mortality in different Pakistani sites is 281 in Karachi to 673 in khuzdar[25]. Whereas reported MMR in India is 519/100,000[26]. Obstetric complications in our study group were similar to normal obstetric population with postpartum hemorrhage the leading complication while fetal complications were fetal growth restriction followed by anomalies. In a study done in south Africa maternal mortality due to heart conditions was 4.1%. Cardiomyopathies were high and frequent complications were pulmonary edema, thromboembolism and major bleeding with warfarin[27]. Our patients even when developed complications were managed promptly whether obstetric or cardiac because of modern diagnostic modalities, prompt resuscitation facilities and twenty four hour emergency functioning operation theatre.

CONCLUSION

This study shows that the feto maternal outcome in booked cardiac patients is comparable to normal obstetric population. In a combined clinic setting, a comprehensive, detailed plan for antenatal and intrapartum care should be discussed and documented. The level of risk and need for surveillance should be determined on an individual basis. Between 15-52% of cardiac abnormalities are first diagnosed during pregnancy as this is often when woman, especially from lower socioeconomic classes have first contact with the healthcare system. It is therefore important that careful examination of heart and lungs in all pregnant patients is not overlooked. As cardiac disease kills more woman than thromboembolism, management of these patients needs to be in a combined setup with an ongoing multidisciplinary approach to care which definitely improves the outcome for both mother and baby.

Conflict of Interest

This study has no conflict of interest to declare by any author.

REFERENCES

1. Vanden Bosch AE, Ruys TP, Roos-Hesselink JW. Use and impact of cardiac medication during pregnancy.Future cardiology 2015;11(1): 89-100.
2. lewisG,DrifeJO.Why mothers die 2000-2002. The sixth report of confidential enquiries into maternal and child health.London: RCOG Press,2004
3. Maryinez. Diaz JL. Valvular heart disease in pregnancy: a review of the literature. Bol Asoc Med PR 2008 Oct; 100(4): 55-9
4. Drenthen W, Pieper PG, Roos-hesselink JW, Vanlottum WA, Voorsa A, Mulder BJ. Outcome of pregnancy in woman with congenital heart disease:a literature review. J Am Coll Cardiol 2007; 1949(24): 2303-11.
5. Hameed A, Karaalp I, Tummala PP, Wani OR, Canetti M, Akhter MW, etal. The effect of valvular heart disease on maternal and fetal outcome of pregnancy . J Am Collcardiol 2001 march 3 (37): 893-99.
6. Ilse. Bollen AE, Eiza D, diederi KW, Kuster D, Velden J. Peripartum cardiomyopathy and dilated cardiomyopathy: difference at heart. Front Physiol 2014; 5:531
7. Siu SC, Sermen M, Colman JM, Alvarez AN, Mercier LA, Mortan BC. Cardiac disease in pregnancy (CARPREG) investigations. Prospective multicenter study of pregnancy outcomes in woman with heart disease. Circulation 2001; 104:515-21.
8. Uebing A, Steer PJ, Yentis SM, Gatzoulis MA. Pregnancy and congenital heart disease. BMJ 2006; 332(7538): 401-6
9. Shim WJ. Role of echocardiography in management of cardiac disease in woman. JCardiovasc Ultrasound 2014; Dec,22(4): 173-79
10. Bhatla N, Lal S, Behera G, Kriplani A, Mittal S, Agarwal N, etal. Cardiac disease in pregnancy. Int J Gynaecol Obstet. 2003; 82(2):153-9
11. Naqvi TZ. Challenges in cardiology research in pregnancy. Future Cardiol 2014 Nov; 10(6): 759-68.doi.10.2217/fca.14.45
12. Asghar F, Kokab H. Evaluation and outcome of pregnancy complicated by heart disease. J Pak Med Assoc 2005; 55(10): 416-9).
13. Wasim T, Amer W, Majrroh A, Siddiq S. Fetomaternal outcome of pregnancy with cardiac disease. J Pak Med Assoc Apr 2008; 58(4): 175-8
14. Tahira T, Tahir S. Pregnancy outcome in cardiac disease Professional Med J. Apr 2012; 19(2):145-9
15. Yasmeen N, Aleem M, Iqbal N. Fetomaternal out come in patients with cardiac disease in pregnancy. Pak J Med Health Sci. Oct-Dec 2011; 5(4): 748-51
16. Elkayam U, Akthar M, Singh H, Khan S, Bitar F, Hameed A, et al. Pregnancy associated cardiomyopathy: Clinical characteristics and a comparison between early and late presentation.Circulation. 2050-55.
17. Mazhar SB, Gul-e-Irum. fetomaternal outcome in pregnancy with cardiac disease. J Coll Physician surgpak 2005 aug 15(8): 476-80
18. Doshi HU, Oza HV, Tekani H, Modi K. Cardiac disease in pregnancy. Maternal and perinatal outcome. J Indian med assoc 2010 May; 108(5):278-80
19. Karamlou T, Diggs BS, Mccrindle BW, Welke KF. A growing problem: Maternal death and peripartum complications are higher in woman with grown up congenital heart disease. Ann Thorac Surg. 2001 Dec; 92(6):2193-8

20. Hamilton BE, Martin JA, Ventura SJ. Births: Preliminary data for 2010. Natl Vital stat Rep 2011; 60(2):1-25
21. Betran PA, Merialdi M, Laeur JA, Shun WB, Thomas J, Look PV et al. Rates of caesarean section: Analysis of global, regional and national estimates. Paediatric and perinatal epidemiology 2007; 21:98-113
22. Khawaja NP, Yousaf T, Tayyab R. Analysis of caesarean delivery at a tertiary care hospital in Pakistan. J Obstet Gynaecol 2004; 24:139-41
23. Asfour V, Murphy MO, Attia R. Is vaginal delivery or caesarean section the safer mode delivery in patients with adult congenital heratdisease. Interact Cardiovasc Thorac Surg. 2013 Jul; 17(1):144-50
24. Melkert P, Melkert D, Kahema L, Vandervelden K, VanRoosmalen J. Estimation of changes in maternal mortality in a rural district of northern Tanzania during last 50 years. Acta Obstet Gynecol Scand 2015 Jan.21.doi:10.1111/aogs.12589
25. Fikree FF, Midhat F, Sauddin S, Berendes HW. Maternal Mortality in different Pakistani sites: Ratios, clinical causes and determinants. Acta Obstet Gynae Scand 1997 Aug; 76(7): 637-45
26. Gupta SD, Khanna A, Gupta R, Sharma NK, Sharma ND. Maternal mortality ratio and prediction of maternal deaths in selected desert districts in Rajasthan. A community based survey and case controlstudy. Woman health issues 2010 Jan-Feb; 20(1):80-5
27. Watkins DA, Sebitloane M, Engel ME, Mayosi BM. The burden of antenatal heart disease in south Africa: A systematic review. BMC Cardiovascular Disord 2012 Mar; 30:12:23.

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