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"Impact Of Maternal Cardiac Disease On Pregnancy Outcome & To Study Predictors Of Cardiac Events"

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ABSTRACT :Objective:To study the effect of maternal heart disease on pregnancy outcomes in terms of maternal and perinatal morbidity with the predictors of cardiacevents during pregnancy.Setting:High risk Obs. Unit at tertiary care superspecalityhospital,Wanless Mission Hospital, Miraj.

Design:Prospectiveobservational study.Duration: June2012 to June 2014.Subjects andMethod:All diagnosed cases of congenital and acquired heart diseases were included& were followed during ANC period upto the time of delivery. Newly diagnosed cases during pregnancy were excluded.Primary outcome measures were maternal complications relating to cardiovascular system & immediate perinatal outcome. Secondary outcome measures were associated predictors of poor maternal outcome & mode of delivery.

Results:Baseline characteristics: Total 50 cases were enrolled.Maximum cases,41(82%) were between age group of 21 to 30 years, 36(72%) were para one &two.Out of 50 cases 38(76%) were rheumatic heart diseases, 9(18.10%) congenital heart diseases & 3 others(cardiomyopathy,ventricular tachycardia ,heart block).Mitral stenosis was the commonestlesion with ASD & VSD being common amongst congenital heart diseases.Sixteen cases had cardiac surgical intervention either during or before pregnancy.Primary outcome: All maternal cardiac complications occurred in Group II(NYHA III&IV) with Pulmonary edema in 5,congestive cardiac failure in 2 ,atrial fibrillations in 1case.There was no maternal mortality.Out of 42 group I cases,10 (13.8%)babies had IUGR, 2(2.5%) preterm & 2(2.5%) stillbirth. Out of 8cases in group II cases,3(36.5%) babies had IUGR,prematurity in 5(62.5%).Secondary outcome: NYHA class >II, obstructive lesions of heart, significant cardiac complications prior to pregnancy, ejection systolicfraction <40% were associated with poor maternal outcome. In 26 (52%) cases cesarean wasperformed.All 8 cases in Group II required emergency cesarean section for cardiac indications.

Conclusions:Higher the grade of NYHA more are the cardiac complications & prematurity. Despite wide clinical variability in acquired & congenital heart disease predictors of risk factors may anticipate maternal complications.

Keywords: Maternal heart disease, pregnancy outcomes

I . INTRODUCTION

Incidence of heart disease in pregnancy is about 1% and it is the fourth most common cause of maternal mortality during last few decades.The etiology of heart disease has changed from primary Rheumatic to congenital. This is due to early diagnosis &treatment of congenital lesions with even surgical repair.But,still Rheumatic fever is the common cause of heart disease with decreased incidence of early diagnosis &treatment in childhood in India.

The hemodynamic changes that occur during pregnancy like increase in stroke volume & cardiac output – have profound effect on ailing heart of cardiac disease & may exceed limited function which results in complications like CCF, Puloedema, thromboembolism, sudden death.There are several dangerous periods during pregnancy like 12-16 weeks, 28-32 weeks, during labour& delivery, early & late postpartum period where maximum care is needed.

Perinatal outcome is also affected in form of abortion, preterm labour, IUGR, stillbirth.Frequency of these problems is related to severity of functional impairment & chronic tissue hypoxia. There is increase risk of having congenital lesion (4.5%) in baby when the mother is having congenital heart disease (0.6%).

Preconceptional counseling regarding optimum time of pregnancy & type of facilities for delivery plays vital role. Initial assessment of all patients for NYHA & risk categories i.e.low, intermediate & high risk should be done.Four important risk factors are categorized by Siu&colman (2004)[8](A) NYHA grade >2(B) Obstructive lesions of heart-Mitral valve <2cm, Aortic valve <1.5cm, gradient peak >30, (C) Prior cardiac events before pregnancy like Heart failure, Arrythmia, Transient – Ischemic attacks, strokeetc. (D) Ejection fraction <40%.In present study pregnancy outcomes were studied in patients with heart disease.Risk assessment was also studied by assessing predictors.

II . MATERIAL & METHODS

Prospective observational study was done in 50 cases during 2012 to 2014 in High risk obstetric care unit at tertiary care centre with superspeciality (cardiology,CTS) at Wanless Mission Hospital, Miraj.

All diagnosed cases of congenital & acquired heart Diseases were included & followed during ANC period till delivery along with cardiologists & CTS. Newly diagnosed cases during pregnancy were excluded. They were classified according to NYHA class. Primary outcome was studied i.e. maternal complications related to CVS &immediate perinataloutcome. Secondary outcome was studied i.e. predictors for cardiac events&mode of delivery.

III . OBSERVATION AND RESULTS

	Number of cases
Rheumatic	38(76%)
Congenital	9(18%)
Others	3(6%) Cardiomyopathy, Heart block, Ventricular tachycardia

There were total 1000 deliveriesamongst which 50 were cardiac cases giving the incidence of 5%. Thirty four cases (68%) were booked, 16 cases (32%) were unbooked. Maximum cases 41 (82%) were between 21-30 years, whereas 36 (72%) cases were para 1+2.As far asetiology is concerned,38(76%) were rheumatic heart disease, 9(18%)congenital,others3(6%) cardiomyopathy, heartblock, ventricular tachycardia(Refer table No.I).

Table I: Etiology Of Cardiac Disease

AmongstRheumatic disease,mitral stenosis 15 (39.4%) was commonest whereas ASD 3(33.3%) was commonest amongst congenital.Mitral stenosis was associatedwithMR(28.9%),aorticstenosis(5.2%),PulmonaryStenosis(5.2%).

There were 3 cases of valve replacement requiring anticoagulation inform of injection Heparin in 1st& last trimester.Surgery for cardiac pathology was done in 16 cases.Ballon mitral valvotomy was done in 2 cases (4%) during pregnancy where as in 8 (16%)cases before pregnancy. Other cases were MVR, AVRdoublevalvereplacement,ASDclosure,PulmonaryValvotomy,permanent pacemaker each in one case.All50 cases were classified according to NYHA grade I 36 (72%), II 6 (12%), III 2 (4%), IV 6 (12%)(tableII).

Table II:ClassificationOf Cases According To NYHA Grade

NYHA grade (50 cases)		
I	36(72%)	**42(84%)**
II	6(12%)	
III	2(4%)	**8(16%)**
IV	6(12%)	

Incidence of cardiac failure with advancing pregnancy showed maximumincidence at 32-24 weeks – 5 (62.5%).Regardingcardiac complications (25%) MR + MS, pulmonary oedema 5 (62.5%) in severe MS & atrial fibrillation 1(12.5%) in severe MS (Table III & IV)

Table III.Incidence Of Cardiac Failure With Advancing Pregnancy

Weeks of Pregnancy	**Incidence**
12-24 wks	NIL
24- 28 wks	NIL
28-32 wks	2(25%)
32-34 wks	5(62.5%)
>36 wks	1(12.5%)

Table IV. Cardiac Complications According To NYHA Class

CARDIAC COMPLICATIONS	I + II	III + IV
Congestive cardiac failure	-	2(25%)
Pulmonary edema	-	5(62.5%)
Atrial fibrillation	-	1(12.5%)

Predictors of cardiac events during pregnancy were divided into 4 categories (A) NYHA grade >2 (B) obstructive lesion of Lt heart (C) Prior cardiac event (D) Ejection systolic fraction<40%. Present study shows presence of one predictor in2 cases,withcardiac complicationin one case (9%), two predictors in 3 cases with complication in 2(66%)&3 predictors in 4 cases (100%) with all havingcardiac complications(100%)(Table V & VI)

TableV.Predictors Of Cardiac Events During Pregnancy

A	B	C	D
NYHA grade>2	• **Obstructive lesions of left heart** • **Mitral valve area<2cm$^{2.}$** • **Aortic Valve area<1.5 cm$^{2.}$** • **Gradient peak>30**	• **Prior cardiac events before pregnancy.** • **Heart failure** • **Arrthymias** • **Stroke**	**Ejection systolic fraction<40%**

TableVI.Risk factors and complications in cases

No. Of factors	Risk Factors					
	A	B	C	D	Complications	Percentage
I (11 cases)	1	9	0	1	1	9%
II (3cases)	2	3	1	0	2	66%
III (4 cases)	4	4	4	0	4	100%

Outof 50 cases 24 (48%) had vaginal delivery & 26 (52%) had LSCS (Table VII).InNYHA I + II 10 patient had elective LSCS i.e. with cardiac valve replacement, 10 had emergency LSCS all obstetric indication. NYHAIII+IV all 6 LSCS indication were cardiac like CCF, Pulmonary Odem, Atrial fibrillation. There were IUGR (23.8%), preterm 2 (4.7%) stillbirth 2 (4.7%), NICU admission 15 (35.7%) in 42 cases of NYHA I + II. In NYHA class III+IV there were 3 IUGR(37.5%), 5 preterm (62.5%)& 8 (100%) NICU admission(Table VIII). Perinatal morbidity increased as class increases.

Table VII.Mode Of Delivery According To NYHA Class

NYHA	Vaginal delivery	TOTAL LSCS	LSCSElective	LSCS Emergency	TOTAL CASES
I + II	22	20	10	10	42
III + IV	-	8	-	8	8
TOTAL	22(44%)	28(56%)			50

Table VIII.Fetal Complications In NYHA Grade

Complications	I + II (42)	III + IV (8)
IUGR	10(23.8%)	3(37.5%)
Preterm	2(4.7%)	5(62.5%)
Stillbirth	2(4.7%)	-

NICU admissions	15(35.7%)	8(100%)

IV . DISCUSSION

Pregnant women with associated cardiac disease represent a major challenge for obstetrician & cardiologist. Careful clinical evaluation,judicioususe of diagnostic tools (Echo),Antepartum Ballon mitral valvotomy in critical cases result in better outcome.Amongst etiology of Rheumatic disease mitral stenosis (39.4%) was predominant lesion.It was associated with Aortic stenosis 5.2%, Pulmonary stenosis 5.2%& MR 28.9%.There were 3 cases of valve replacement requiringanticoagulation. They were put on low dose injection heparin in 1st& last trimester &warfarin in-between. The incidence of congenital heart disease was 18% (33.3%) amongst which ASD was predominant lesion.

The incidence of Rheumatic & congenital heart disease is comparable to study by T chengetal(1988)[3]&Devebhaktunl(2009)[4]being56%,44%, 60.6% &32%, respectively.

As far as functional grade there were lesser patient (12%) incidence of NYHA class III, IV as compared to study by T cheng et al[3]&Devebhaktunl[4] because of smaller sample size.As far as maternal morbidity, total 8 cases had complications like CCF (4%), AF (2%), pulmonary oedema(10%).All cases belonged to NYHA class III + IV.Cardiac failure developed at 28-32 weeks in both cases. Both were severe MS,underwent antepartum Mitral valvotomy during 2ndtrimester. Out of 5 cases of PulmonaryOedema two were post BMV with twin pregnancy,two with moderate MS, one MR with severe anaemia,one case of tight MS, developed AF.Majority had cardiac complications in last trimester &stenotic lesion which is comparable to study by T chang[3],Krishna Alogatar[7].Incidence of cardiac complications is comparable to study by A U&khairy et al[5,12].PulmonaryOedema complication was more in Devebhaktuni study[4] due to large sample size. There were no maternal deaths in present study.

Spontaneous onset &labouris preferred in cardiac patients &vaginal delivery is best option as risk of bleeding, infection, clotting complications are less. However there are cardiac & obstetric indications for elective& emergency LSCS.Cardiac indications for elective LSCS were cases of valve replacements, Essenmengercomplex, Tight MS& for Emergency LSCS – all cases with cardiac complications like AF,CCF, Pulmonaryoedema.In our study 48% had vaginal delivery & 52% had LSCS.Thus, incidence of LSCS is more.Out of 28 cases of LSCS, 11 (39.3%) had cardiac indications& rest had obstetric reasons.Results are comparable with YB Song[11].Reason of increased incidence of

LSCS is that our hospital isTertiary care center. However incidence of vaginal delivery is more in study by Krishna alogatar[7]&Devabhaktuni[4] due to large sample size.

Predictors of cardiac events during pregnancy were studied:(A) NYHA 7 II (B) obstructive lesions of Lt heart (C) prior cardiac event (D) Ejection systolic fraction <40%. In present study risk for cardiac complication with one predictor was 9%, with two predictors 66%, more than two predictors risk was 100%, which are comparable to study by Sui&Colmanet al[10] risk being 25%, 75% and 100% respectively.Assessing predictors during antenatal period helpspatients regarding type of medical care & type of hospital where delivery should occur.As far as perinatal outcome, incidence of IUGR (62.5%), pretermlabour is more in NYHA III & IV due to chronic placental insufficiency & chronichypoxic state. The incidence of IUGR & preterm labour is more as compared to study by Barbosa et al. [9], Hameed et al.[6],Devabhaktuni et al.[4]Sui & Colman et al.[10] mentioned NUHA > II, moderate to severe stenotic lesions as independent risk factors for adverse fetal out come despite best obstetric & cardiac care.

V . CONCLUSIONS

Amongst Rheumatic heart diseasemitral stenosis is still the major cause whereas ASD is commonest amongst congenital heart disease. Poor functional class is associated with increased maternal & perinatal morbidity. Higher the NYHA grade more are the cardiac complications like CCF, Pulmonary oedema,AF&perinatal complications like IUGR, prematurity. All complications are associatedwith mitral stenosis.

Predictors for risk factors assess maternal cardiac complications. Risk factors 2 or more than 2 predicts complications in 75 to 100% cases and if there are 3 or more than 3 predictors,then there is 100% risk of complications.Risk assessment determines the type of facility where patient should deliver despite wide clinical variability in heart disease.

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