Journal of the Institute of Medicine 2001; **23**: 14 –20 Original Article

Maternal cardiac diseases complicating pregnancy: a review of 105 cases

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ABSTRACT

The outcome of pregnancies in 105 patients with heart diseases in TUTH, Kathmandu, Nepal between April 1995 and May 2001 was reviewed. The incidence of heart disease was 0.55% of the total 19038 deliveries. Rheumatic (79), congenital (17) and miscellaneous groups (9) complicated the pregnancy.

Significant number (53) had their diagnosis made at the index pregnancy. Patients who developed cardiac failure (17) mostly did during antenatal period (20-42 weeks); the majority had cardiac failure (14) at third trimester. Two of the cases that had cardiac failure at 33 weeks ultimately had stillbirths later at term. Induction of labour for such cases, which was discouraged earlier, should be considered.

In our hospital labour analgesia with epidural anaesthesia, pethidine or morphine is not a routine practice. Injection Methergin is also generally withheld. Save one or two, most Cesaerean sections had obstetrical indication. Prophylactic forceps or ventouse were barely used.

There were two maternal deaths. One of them had pregnancy complication as eclampsia and presented with SVT and MI at 34 weeks. The other case died within 48 hours of Caesarean delivery for critical mitral stenosis with pulmonary hypertension. The perinatal losses were 7.

This article strongly emphasizes the need for routine cardiac evaluation of patients at their very first antenatal check up so that patients with cardiac disease can benefit from shared co-operation between cardiologist, cardiothoracic surgeon, anaesthelogist and obstetrician.

Keywords: Heart disease; pregnancy; cardiac failure; obstretic analgesia; induction of labour.

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INTRODUCTION

Eventhough heart disease complicates less than 1% of pregnancy in most instances, its impact on maternal and perinatal outcome is significant. The decline of congenital heart disease noted elsewhere may be an interesting aspect, but in our Institution Rheumatic heart disease still predominates the scenario and this is similar to some other centers.[1-4]

Today due the surgical advancement, many women, with corrected congenital cardiac lesion or those who have acquired prosthetic valve or who have undergone CMV, CMC or BMV are keen to have safer pregnancy. This is a challenge to both the obstetricians and cardiologists involved in their care. Therefore successful pregnancy outcome in patients with heart disease depends on shared cooperation between cardiologists, anesthologists and the obstetrician.

The aim of this study is to evaluate pregnancy in women with heart disease and also to see the neonatal outcome so that a treatment guideline can be proposed, because even today, there are numerous cases where the heart lesions are known for the first time during the index pregnancy.

METHOD

Data were obtained for 105 cases of >28 week pregnancy with heart disease (for a total of 19038 deliveries) during the period April 1995- May 2001.

Patients

The data on patients with heart disease who either delivered in our hospital or managed during puerperium were recorded. Patients were admitted once the deteriotion of cardiac condition was noted. All the patients with RHD were on regular 3 weekly benzathine penicillin G1200000 units I/M. In labour all the patients received antibiotic prophylaxis against bacterial endocarditis. The peripartum endocarditis prophylaxis (ampcillin + gentomicin) was continued for 5 days. Women were allowed to have spontaneous onset of labour. Heart disease per say was not considered an indication of induction of labour. Labour analgesia was barely considered. None of the cases received epidural anasthesia for pain relief. Operative interference including Caesarean were carried out for definite obstetric indications. The monitoring of women in labour was by noninvasive BP measurements. Ergometrine was avoided. Heart failure was treated with digitalis and diuretics. In our study the central venous pressure monitoring was sparingly used and was reserved for serious patients in ICU or CCU.

Surgical commisurotomy of mitral valve were performed for noncalcified valve in critical mitral stenosis, which provided dramatic benefit and symptomatic improvement.[5] Mitral valve replacement has been spared in pregnancy, fearing high fetal losses. Patient who had BMV in other centers as well as prosthetic heart valves were also managed. It is generally agreed that anticoagulant drugs are essential for prevention of fatal thrombotic complications, but controversy continues for

nonbiologic prosthetic valves. Women who had prosthetic valves were kept on oral anti-coagulants between 12-37 weeks and on heparin before 12 weeks and after 37 weeks of pregnancy, till the onset of labour. Oral anticoagulants were recommenced 24 hours after the delivery. In some institutes heparin was discontinued at the commencement of labour and restarted after 6 hours. This was substituted with acenocumarol 5-7 days after delivery. Anticoagulation status was monitored by PT on coumarin and PPT on heparin.

The neonatologist examined all the newborns. Pregnancies terminating between 28-36 weeks were considered preterm. All the newborns birth weight less than 2.5 kg were considered growth retarded (for babies born at term).

RESULTS OF CLINICAL DATA

Total births were 19038. The incidence of heart disease was 0.55% (n=105). RHD (75%) outnumbered CHD (16 %) and others (9%).

RHD remained the major category in this series comprising of 75%,mitral stenosis being the dominant lesion (Tables I-V).

Table I: Major diagnostic types of heart diseases in pregnancy

Heart Lesion	*Patient No. (%)*
Rheumatic	79 (75)
Congenital	17 (16)
Others	9 (8.6)
Total	105

Table II: Types of rheumatic heart diseases in pregnancies

Dominant value defect	*Patient (n = 79)*
Mitral stenosis:	
Pure	26 (33%)
With mitral regurgitation	12 (15%)
Mitral regurgitation	15 (19%)
Mitral valve prolapse	1 (1.3%)
Aortic regurgitation	1 (1.3%)
Aortic stenosis	0
Multivalvular	24 (30.4%)

Table III: Types of congenital heart diseases complicating pregnancies (n = 17)

Heart lesion	*Patients no. (%)*	*No of patients corrected surgically*
Atrial and Ventricular Septal defect	1 (5.8)	
Atrial septal defect	8 (47)	2
Ventricular septal defect	3 (17.6)	
Pulmonary stenosis	2 (11.8)	
Aortic stenosis	0	
Eisenmenger's syndrome	0	
Congenital heart block	1 (5.8)	
Patent ductus atreriosus	0	
Coarctation of the aorta	0	
TOF	1 (5.8)	1
Ebstein anomaly	1 (5.8)	

Table IV: Number of pregnancies in the miscellaneous group of heart disease (n = 9)

Heart lesion	*No. of pregnancies (%)*
Supraventricular tachycardia	3 (33.3)
Ectopic beats	2 (22.2)
Ischaemic heart disease	0

Cardiomyopathy	2 (22.2)
Secondary pulmonary hypertension	8 (not included in calculation)
Acute myocardial infraction during pregnancy	1 (11.1)
Viral myocarditis	1 (11.1)

Table V: Severity of disease by mitral valve area. Mitral valve area assessed by echo-doppler.

Mitral valve stenosis grade	*Mitral valve area (cm^2)*	*No. of women (n = 43)*
I. Critical	< 0.8	6
II. Severe	0.8 - 1.0	4
III. Moderately severe	1.1 - 1.2	3
IV. Moderate	1.3 - 1.8	13
V. Mild	> 1.9	17

Results for

(a) Maternal disease characteristic and obstetric outcome.

(b) Perinatal outcome.

(c) Maternal complication

Maternal disease characteristic and obstetric outcome

The mean age at pregnancy was 23.7 (range15-42), maximum patient number fell on age 19-24 (44%). Significant numbers (8%) were also seen in less than 19 years age group. Primigravidas were essentially in large number (58%).

A significant number (53) had diagnosis made at the index pregnancy. A case of congenital heart disease was picked up at anaesthesia; other case of ventricular defect was diagnosed postpartum.

Patients who developed cardiac failure (17) mostly did during antenal period (20-42 weeks); majority had cardiac failure (14) at third trimester. Except for the two preterm delivery, most of the cases had term delivery. Two of the cases that had cardiac failure at 33 weeks ultimately had stillbirths later at term (Table VI). A case with encerclage for repeated 11 previous pregnancy losses admitted in failure at 26 weeks of gestation was diagnosed as a case of severe mitral stenosis (MVO 0.9) who underwent valvotomy at 27 weeks and we were able to give her a live girl of 1.7 kg.

Table VI: Maternal complications like pre-existing artrial fibrillation.

Complication	*No. of women (n = 23)*
Pulmonary odema	17
Pyrexial illness (pneumonia or urinary infection)	-
Pulmonary embolous	2
Probable infective endocarditis	2
New atrial fibrillation	2

Table VII: Medical therapy

Therapy	*Women treated (n =93)*
Propranolol	1
Digoxin	32
Calcium antagonist (diltiazem)	-
Diuretic (frusemide)- initial	12

Diuretic maintainance	33
Warfarin or heparin	2+1
Antihypertensive (methyldopa)	4

Cardorone	3
Verapamil	3
Xylocard	2

Table VIII: Obstretic outcome. Values are given as n (%) or mean SD

Outcome	*Women treated (n = 121) (%)*	
Abortion 14 (not included in calculation)		
Ectopic 2 (not included in calculation)		
Gestational age at delivery (weeks)		
28-31	1	(0.9)
32-33	1	(0.9)
34-36	9	(8.6)
Term	71	(67.6)
Postdate	20	(19)
Pastdate	2	(1.8)
LMP ?	1	(0.9)
Method delivery:		
Vaginal delivery:	81	(77)
Spontaneous	67	(61)
Twin	1 (included in elective caesarean)	
Breech	1	(0.9)
Forceps	9	(8.6)
Ventouse	4	(3.6)
Caeserean section:	24	(22.8)
Elective (prelabour)	14	(13.3)
Emergency	10	(9.5)
Birth weight: (mean)	2.71kg SD 0.55	
Birth weight < 1.5kg	3	

Pregnancy complications were severe: PIH (3), Eclampsia (1), APH, Abruptio (2) and BOH (3). There were 3 cases who were admitted with congestive cardiac failure; among the 6 cases with severe anaemia, one also had PIH. Pericardial effusion was seen in 3 cases.

CMV was done in 9 cases during the index pregnancy resulting all in livebirths (Table IX). Ten mothers with corrective surgical measures prior to index pregnancy had mean pregnancy interval of 60 months (2 months - 10 years). Seven cardiac surgeries were performed for RHD, {CMV (4), BMV (1), mitral valve replacement (2)}; Three cases of

congenital heart disease were corrected ones (a case of TOF and two cases of atrial septal defect).

BMV (Ballon mitral valvoplasty) is not possible when valves are calcified. A woman conceived after 2 months of this procedure and was delivered at our hospital without any complication. MVO, pre and post surgery was 1.1 and 2.0 respectively. We do not have reports on bioprosthetic valves but they are believed to deteriorate fast, especially during pregnancy needing replacement .[3]

Table IX: Pregnancy outcome after CMV in relation to NYHA class and MVO diameter

Age	*Index Pregnancy*	*Gestational age (weeks)*	*Assoc. Contd.*	*MVO in sq.cm*		*NYHA class*		*Delivery*	*Birth in Wt (kg)*
				Pre-op	*Post-op*	*Pre-op*	*Post-op*		
19	1	8	TR-II, PAH	0.9	2.3	3	1	ND	2.7
21	1	23	-	1.3	2.26	4	2	ND	2.8
19	1	19	-	0.8	2.4	4	2	LSCS	3.1
26	2	32	TR-I	0.7	3	4	1	ND	2.5
22	2	26	-	0.8	2.4	3	1	ND	2.9
24	2	23	MR-I	0.9	1.6	3	2	LSCS	2.8
19	1	23	-	0.55	1.82	4	2	ND	2.6
30	12	27+4	MR,TR PAH	0.9	1.7	4	1	ELCS	**1.7**
19	1	22+4	-	0.5	1.6	4	1	ND	2.9

Pulmonary arterial hypertensions were associated risk factors in 9 cases. A mother died 48 hours post Caesarean section. This was one of the few cases where the Caesarean indication given was for cardiac reason (pulmonary hypertention with critical mitral stenosis).

Sixty-one percent ended up in spontaneous delivery (Table VIII) Intracervical protaglandin, by avoiding fluid overload and retention has been expressed as a satisfactory means for pregnancy induction in cases of IUGR, PIH, and past date, though seldom used in our set up (documented use has been for IUD, pulmonary arterial hypertention 2, post dated 3: altogether in 6 cases)

The Caesarean section rate (23%) was higher than general incidence. Caesarean Section in RHD were performed as an elective (10); emergency (7): CHD 4, a case of corrected tetralogy of Fallots had elective while congenital heart block (detected while anesthesising), corrected atrial septal defect, and VSD had emergency Caesarean Section. All the 3 Caesarean cases in the miscellaneous group were elective operations

(indication were CPD in 2, SVT with IUGR in the other).

Perinatal outcome

There were 105 babies born to 105 pregnant mothers. Eventhough a mother died of severe myocardial infarction at 34 weeks of pregnancy with her baby undelivered, there was also a twin baby delivered by elective Caesarean Section, making a total of 105 babies.

Small for gestation age babies were19% [(11 RHD; 5 CHD {ASD (3); TOF (1), Ebstein (1)}; 2 Other SVT 1,PPCM 1)]. Mean low birth weight is an expected result due to increased frequency of preterm birth and small for gestational age (SGA); however even with the incidence of prematurity (10.4%), mean birth weight was 2.71 Kg (SD 0.55). [Table VIII].

Pregnancy with CMV 13 [(9) in index pregnancy (4) prior to this pregnancy] and BMV (1) done outside, along with 2 cases of Mitral valve replacement ended in appreciably good result with satisfactory outcome. Low birth weight was noted in a case who had CMV during this current pregnancy and other case of CMV done prior to this index where IUGR baby 1.7Kg and 2.4 Kg were noted. There was FSB in one of the cases who had CMV prior to this index pregnancy and the cause for this was abruptio, at 31+4 weeks of pregnancy.

Factors contributing to fetal death were, abruptio (1), placenta previa (1). Of the 7 perinatal deaths {RHD 6, miscellaneous group 1}, two were term and the rest pre-term (5) [3 IUD, 3FSB, 1 PND]

Nine cases were complicated by pulmonary hypertension {6: RHD; 3: CHD [VSD, 1 ASD,1]}. Three babies were born preterm; one was IUD too; 3 cases were induced with Cerviprime, 2 were low birth weight.

Five minute Apgar was above 7 for 94 neonates, between 3-6 for other 4.

Maternal complication

Seventeen mothers developed pulmonary oedema. Three of them also were aggravated by severe anaemia. Nine cases were complicated by secondary pulmonary hypertension; it was associated with cardiac failure in 4 cases. Most of these cases had febrile illness too. Two cases had bacterial endocarditis. One case (not included) is a case of abortion who died post abortion. During pregnancy, other case was admitted twice in failure, a non-compliant patient but she survived although the baby died. There were two maternal deaths. One was as a sequelae to severe hypertension and the death was due to myocardial infarction. Other case died post Caesarean.

Obstetrical conditions that also attributed to maternal cardiac deterioration were severe anaemia, severe PIH and abruptio. A fresh stillbirth and a perinatal death occurred, both as a consequence of prematurity and abruptio, while the mother survived.

DISCUSSION

Despite improvements, mitral stenosis still remains a threat to mother and her baby as we lost one mother and six babies in

this category. In addition few surgical interventions such as Caesarean or MTP [not included in this study] are seen to carry considerable risks. The reasons are difficulty in controlling pulmonary oedema and rapid atrial fibrillation with conventional therapy. Many women had tendency to book later in pregnancy. Some women invariably required medical treatment. Digoxin and frusemide were popular with cardiologists. Aminodarone have also been used with success.

Majority had maternal complications in third trimester. Women who had fresh stillbirths didn't have preventable factors. Three had PIH and one had eclampsia too. Mitral stenosis in conjuction and PIH poses difficult treatment option as the arterial vasodilators can aggravate pulmonary odema and tachycardia.

As many women had their diagnosis during the index pregnancy it is not surprising that some of them were really bad at the initial presentation. Reduction of physical activities and medical therapy bring out remarkable improvements in women with heart disease. These observations have been drawn from our own experience.

Mitral valve prolapse is diagnosed by mid systolic click and has benign course in pregnancy.

Prematurity and growth retardation are frequent accompaniment in babies born to mothers with heart diseases. This would be due to other unexplainable factors along with heart disease. Though fetal outcome in RHD has been reported to be usually favorable, we do not have the same experience to share.

CONCLUSION

More than 2/3rd patients were seen in the index pregnancy, mitral stenosis being the dominant lesion suggesting shortcoming in the healthcare system. Two deaths, one ascribed to critical mitral stenosis and other to myocardial infarction, also needs mention, as both were unbooked cases. Were these deaths preventable, if they had been seen earlier ?

This study also confirms the fact that most women will tolerate vaginal delivery as this was achieved by 3/4th of women.

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