Pregnancy complicated by heart disease in Nepal

Shailaja Chhetri,[1] Nikesh Raj Shrestha,[2] Thomas Pilgrim[3]

[1]Department of Obstetrics & Gynecology, BP Koirala Institute of Health, Dharan, Nepal
[2]Department of Cardiology, BP Koirala Institute of Health, Dharan, Nepal
[3]Department of Cardiology, Bern University Hospital, Bern, Switzerland

Correspondence to
Dr Shailaja Chhetri, Department of Obstetrics & Gynecology, BP Koirala Institute of Health Sciences, Dharan, Nepal; shailzac@hotmail.com

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ABSTRACT

Objective To investigate the prevalence, characteristics and maternal and perinatal outcomes of pregnancies complicated by heart disease.

Design Prospective single-centre registry.

Setting Tertiary care teaching hospital in eastern Nepal.

Patients Pregnant women presenting to the antenatal clinic and/or labour room between 1 March 2012 and 31 March 2013.

Main outcome measures Prevalence, characteristics, and maternal and perinatal outcomes of pregnancies complicated by heart disease.

Results Fifty-three out of 9463 pregnancies (0.6%) were complicated by cardiac disease. Proportions of acquired, congenital and arrhythmic heart disease amounted to 89%, 9% and 2%, respectively. Rheumatic heart disease (RHD) was the most frequent cardiac disease complicating pregnancy (n=47). Among 45 women with RHD continuing pregnancy until delivery, 30 (67%) were primigravidae. The predominant valvular pathology was mitral stenosis (62%), followed by mitral regurgitation (21%) and aortic regurgitation (13%). Twenty women (44%) underwent elective or emergency caesarean section. Maternal and fetal/perinatal mortality of pregnancies complicated by RHD amounted to 4% and 16%, respectively. New York Heart Association (NYHA) functional class III or class IV (HR 6.0, 95% CI 1.2 to 29.1, p=0.026), pulmonary hypertension (HR 9.1, 95% CI 1.6 to 51.5, p=0.012) and severe mitral stenosis (HR 7.0, 95% CI 1.4 to 34.4, p=0.017) were identified as predictors of maternal or fetal/perinatal mortality in an univariate analysis.

Conclusions Rheumatic mitral stenosis was the most frequent heart disease complicating pregnancy in a consecutive cohort from a teaching hospital in Nepal. Exercise intolerance, pulmonary hypertension and severe mitral stenosis were identified as predictors of maternal or fetal/perinatal mortality.

INTRODUCTION

During pregnancy, the changes of cardiovascular physiology can impose an additional load on the cardiovascular system of women with underlying heart disease. This results in a greater haemodynamic burden and may increase the risk of morbidity and mortality during pregnancy and delivery in women with cardiac disease.[1 2] Rheumatic heart disease (RHD), congenital abnormalities and previous endocarditis are the most common causes resulting in clinically relevant valvular heart disease among women of childbearing age.[3] Cardiac disease may be clinically silent throughout pregnancy and manifest only at the time of delivery. Whereas asymptomatic patients with valvular regurgitation tend to tolerate volumetric overload during pregnancy, patients with mitral and aortic valve stenosis are at increased risk for the development of congestive heart failure and pulmonary oedema.[3]

The prevalence of RHD continues to be high in developing and emerging countries where access to healthcare resources is limited. Several studies have suggested a higher prevalence of RHD among women, presumably due to closer contact with children and consecutively greater exposure to group A β-haemolytic streptococci.[4–9] Moreover, the absence of social insurance compromises the adherence to regular prenatal exams and may result in significant delay of pregnant women to seek medical attention.

The objective of the present study was to evaluate the prevalence of cardiovascular disease among pregnant women presenting to a tertiary care university hospital in Nepal, and to investigate predictors of adverse maternal and fetal/perinatal clinical outcomes.

METHODS

Patient population and data collection

Between 1 March 2012 and 31 March 2013, all pregnant women presenting with cardiovascular disorders to the antenatal clinic and/or labour room of a tertiary care university hospital in eastern Nepal were consecutively included into a prospective registry. A detailed history and physical examination was performed in all pregnant women presenting to the antenatal clinic and/or labour room. If cardiovascular disease was suspected based on the clinical findings transthoracic echocardiography was performed. The echocardiographic examination was carried out at rest using a Hewlett Packard Sonos 1500 echocardiography machine.

The study was approved by the hospital ethics committee and all patients provided informed consent.

Statistical analysis

SPSS Statistics V.21.0 was used for all statistical analyses. Categorical data are expressed as frequencies (percentages) and continuous variables are presented as mean±SD or median, respectively. Univariate analysis was performed to assess predictors of adverse maternal or fetal/perinatal death. In view of the relatively small number of events we refrained from doing a multivariate analysis.

RESULTS

Among 9463 deliveries between 1 March 2012 to 31 March 2013 53 women (0.6%) with a mean age of 25±5 years were detected to have cardiac disease during pregnancy or at the time of delivery. Prevalence rates of acquired, congenital and arrhythmic heart disease amounted to 89%, 9%

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Table 1 Prevalence rates of cardiac disease among 9463 deliveries

Congenital heart disease	
Ostium secundum atrial septal defect (ASD)	2 (0.2/1000)
Perimembranous ventricular septal defect (VSD)	2 (0.2/1000)
Pulmonary stenosis	1 (0.1/1000)
Acquired heart disease	
Rheumatic heart disease	47 (5/1000)
Arrhythmic disease	
Wolff-Parkinson-White syndrome	1 (0.1/1000)

and 2%, respectively (table 1). Forty-nine women (91%) presented only at the time of labour.

Congenital and arrhythmic heart disease

Among the five women with congenital heart disease, two were found to have an ostium secundum atrial septal defect, two were found to have a perimembranous ventricular septal defect and one was found to have congenital pulmonary stenosis. The latter underwent termination of pregnancy in the first trimester due to congestive heart failure. There was no case of miscarriage (fetal death <20 weeks of gestation). However, one of the two women found to have a ventricular septal defect had a fresh stillbirth after 38 weeks of pregnancy. The other one had NYHA class IV shortness of breath and underwent successful emergency caesarean section at 36 weeks. Both women found to have an atrial septal defect had successful deliveries by the use of a forceps in the 38th week and the 41st week of pregnancy, respectively. The women with Wolff-Parkinson-White syndrome underwent successful radiofrequency ablation and had an uncomplicated spontaneous delivery at 36 weeks.

Table 2 Baseline characteristics of pregnant women with rheumatic heart disease

Age/years (mean±SD)	25±5
Gravida n(%)	
1°	30 (67)
2°	9 (20)
3°	4 (9)
>3°	2 (4)
Para n (%)	
0	29 (66)
1	9 (21)
2	4 (9)
>2	2 (4)
Duration of gestation (mean±SD)	38±2 weeks
NYHA functional class n (%)	
I	22 (50)
II	8 (18)
III	8 (18)
IV	7 (16)
Valvular pathology	
Mitral stenosis n (%)	33 (73)
Mild	15 (33)
Moderate	4 (9)
Severe	14 (31)
Mitral regurgitation n (%)	30 (67)
Mild	26 (58)
Moderate	0
Severe	4 (9)
Aortic regurgitation n (%)	10 (22)
Mild	4 (9)
Moderate	4 (9)
Severe	2 (4)
Left ventricular ejection fraction (%) (mean±SD)	58±5
Pulmonary hypertension n (%)	17 (38)

Rheumatic heart disease

Among 47 women with RHD, pregnancy was continued in 45 women until delivery. Two women underwent termination of pregnancy in the first trimester; one due to continued warfarin therapy secondary to mechanical mitral valve replacement in the past, and one due to severe mitral stenosis resulting in congestive heart failure. There was no miscarriage.

Baseline characteristics of the 45 women who continued pregnancy until delivery are summarised in table 2. Thirty women (67%) were primigravidae. Combined valvular disease being common, the predominant valvular pathology was mitral stenosis (62%), followed by mitral regurgitation (21%) and aortic regurgitation (13%). Fourteen women (31%) had severe mitral stenosis, one of which underwent successful mitral balloon valvuloplasty during pregnancy. Clinical outcome is shown in table 3. Twenty women (44%) underwent elective or emergency caesarean section. Seven babies were born preterm (<37 weeks), the mean duration of gestation amounted to 38±2 weeks. The mean weight of the babies at birth was 2.6±0.5 kg (percentile <10 for gestational age). Maternal and fetal/perinatal mortality amounted to 4% and 16%, respectively (figure 1).

Predictors or adverse outcome

NYHA functional class III or class IV (HR 6.0, 95% CI 1.2 to 29.1, p=0.026), pulmonary hypertension (HR 9.1, 95% CI 1.6 to 51.5, p=0.012) and severe mitral stenosis (HR 7.0, 95% 1.4 to 34.4, p=0.017) were identified as predictors of maternal or fetal/perinatal mortality in an univariate analysis. No multivariate analysis was performed in view of the limited number of events (table 4).

DISCUSSION

The principal findings of the present analysis can be summarised as follows: (1) The prevalence of clinically relevant cardiac disease among pregnant women amounted to 0.6%. The majority of pregnant women found to have heart disease were

Table 3 Clinical outcome of pregnant women with rheumatic heart disease

Mode of delivery n (%)	
Spontaneous	15 (33)
Vacuum	9 (20)
Forceps	1 (2)
Elective caesarean section	6 (13)
Emergency caesarean section	14 (31)
APGAR score (median)	7, 8, 9
Birth weight (mean±SD)	2.6±0.5
Maternal death n (%)	2 (4)
Child death n (%)	7 (16)
Stillbirth	4 (9)
Perinatal death	3 (7)

APGAR, appearance, pulse, grimace, activity, respiration.

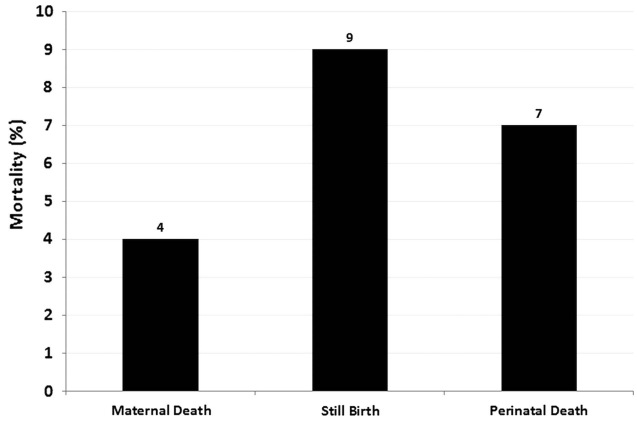

Figure 1 Maternal, fetal and perinatal mortality among 45 pregnant women with rheumatic heart disease.

primigravidae. (2) The most common cardiac disorder was RHD, in particular rheumatic mitral stenosis. (3) NYHA functional class III or class IV, presence of pulmonary hypertension and severe mitral stenosis were identified as predictors of maternal or fetal/perinatal death in an univariate analysis.

The prevalence rate of cardiac disease among pregnant women presenting to a tertiary care university hospital in Nepal amounted to 6 per 1000 pregnancies. Consistent with previous reports from Southeast Asia RHD accounted for the majority of cardiac disorders complicating pregnancy.[10] In turn, congenital heart disease was more common than acquired heart disease in a large cohort from Canada.[2] Pregnant women were systematically screened by detailed history and physical examination; subsequent evaluation by ECG and echocardiography was performed only when indicated by detailed history and physical examination, thus underestimating the true prevalence of silent disease not manifesting during pregnancy. Two-thirds of the women with cardiac disease complicating pregnancy were primigravidae. This finding may be explained twofold. The haemodynamic burden of pregnancy may unmask early stages of congenital or acquired heart disease that are usually silent and become manifest normally only later in the course of the disease. Second, manifestation of cardiac complications during the first pregnancy may prevent women from subsequent pregnancies.

The majority of cardiac complications during pregnancy was attributable to RHD, specifically rheumatic mitral stenosis. The differential vulnerability to the haemodynamic changes of pregnancy may potentially introduce an observation bias. While mitral regurgitation is the predominant rheumatic valvular disease overall,[8] haemodynamic changes induced by pregnancy such as an increase in cardiac output and a reduction in systemic vascular resistance are less well tolerated in patients with mitral stenosis. Eight among 14 women with severe mitral stenosis in our cohort suffered exercise intolerance NYHA functional class III or class IV. One woman underwent percutaneous mitral balloon valvuloplasty during pregnancy; the remaining were medically treated with diuretics and β blockers in order to decrease filling pressures and prolong the diastolic filling period, respectively. Mitral balloon valvuloplasty was not offered on a regular basis during the initial start-up phase of a new cardiac catheterisation laboratory in the hospital. Referral to a hospital offering mitral balloon valvuloplasty was often prevented by limited resources. A non-randomised comparison of percutaneous mitral balloon valvuloplasty with open mitral valve commissurotomy suggested a lower fetal and neonatal mortality in women with mitral balloon valvuloplasty.[11]

Table 4 Univariate predictors of maternal or fetal/perinatal mortality

Variable	HR (95% CI)	p Value
NYHA functional class III/IV	6.0 (1.2 to 29.1)	0.026
Pulmonary hypertension	9.1 (1.6 to 51.5)	0.012
Severe mitral stenosis	7.0 (1.4 to 34.4)	0.017

Maternal and fetal/neonatal mortality amounted to 20% and was considerably higher as compared with previous reports.[10 12] These studies however included less patients with symptomatic cardiac disease reflected by a lower number of women in NYHA functional class III or class IV. In an univariate analysis NYHA functional class III or class IV, presence of pulmonary hypertension, and severe mitral stenosis were identified as predictors of maternal or fetal/perinatal death. An analysis from a prospective multicentre study identified NYHA functional class >II, maternal left heart obstruction, smoking, multiple gestations and the use of anticoagulants as predictors of neonatal events. Primary cardiac events in the mother were predicted by prior cardiac events or arrhythmia, NYHA functional class >II, left heart obstruction and systemic ventricular dysfunction.[2] Similarly, Silversides *et al*[12] documented an increased occurrence of adverse fetal/neonatal events with increasing severity of mitral stenosis.

The present analysis has several limitations. First, no systematic screening for heart disease in pregnant women using echocardiography or ECG was performed, inducing an observation bias for symptomatic and more advanced cardiac disease. Second, medical management prior to delivery was not documented in detail. More than 90% of women presented only at the time of labour and did not have regular visits with an obstetrician. Third, outcome data is limited to mortality rates. Information on other clinical outcomes was not collected systematically.

In conclusion, rheumatic mitral stenosis was the most frequent heart disease complicating pregnancy in a consecutive cohort from a teaching hospital in Nepal. Exercise intolerance, pulmonary hypertension and severe mitral stenosis were identified as predictors of maternal or fetal/perinatal mortality.

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Competing interests None.

Patient consent Obtained.

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