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Prospective Study of Maternal and Fetal Outcome in Cardiac Disease Complicating Pregnancy

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ABSTRACT

Health care associated infections are becoming challenging day by day. Just to perceive the interplay of underlying epidemiological factors in current scenario this prospective study was undertaken for a period of ten months in associated hospital of LN Medical College, Bhopal. Various hospital acquired infection's related data was evaluated in separate time periods. Over a period of 10 months catheter-associated urinary tract infections (CAUTI), central-line-associated blood stream infections (CLABSI), ventilator-associated pneumonias (VAP) related rates were revealed as 12.59, 12.4 & 16.15 respectively per thousand device days. Surgical site infection (SSI) rates were found to be fluctuating in-between 0.792% to 10.5%. It was concluded that in order to bring down these rates bundled intervention based surveillance checklists are to be followed along with other disinfection & sterilization related measures. Also root cause analysis approach has been recommended to gain control over the problem.

KEYWORDS : Hospital Acquired Infections, Surveillance, Bundled Care Interventions, Root Cause Analysis, In Patient Department, Bhopal

INTRODUCTION :

In the year 2005 the Federation of Obstetrics and Gynaecological Societies of India adopted "Optimizing labour and delivery for SAFE MOTHERHOOD" as its theme to emphasize the importance of reducing maternal mortality rate in India. The maternal mortality rate in India for the year 2007-2009 was 212/1,00,000 live births.[1] A better understanding of the effect of heart disease on pregnancy outcome is of value for risk assessment and stratification and the design of a therapeutic plan which can reduce maternal mortality to marked extent due to heart disease.

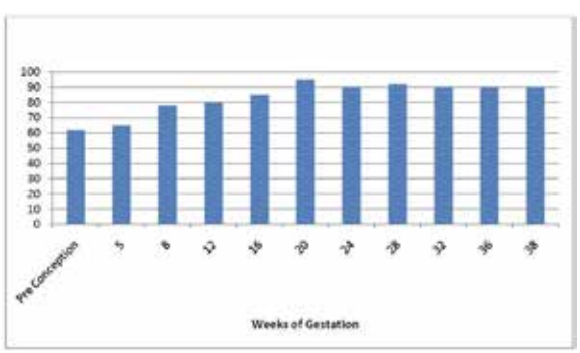
All aspects of cardiovascular physiology undergo significant changes during pregnancy including cardiac output, stroke volume, systemic arterial and venous blood pressure, blood volume, and left ventricular contractility.

Cardiac output is evident as early as 5th gestational week and reaches a peak between 20 to 24 weeks, when it plateaus till term.[6]

Initially stroke volume is the major factor causing the increase in cardiac output, but as pregnancy progresses an increased heart rate becomes the more predominant factor.[6]

Stroke Volume:

Increase in stroke volume as early as 8th gestational week and reaching a maximum by 20th week of gestation. There after a slight fall in observed till term, principally due to decreased venous return caused by the compression of the Inferior Venacava by the gravid uterus.



Heart Rate :

A study observed progressive increase in resting heart rate starting from first trimester and reaching a plateau by 32nd week of gestation.[5] An average of 10-20 beats/min higher than pre pregnancy level is achieved by term.

Blood Pressure :

The study also reported that systemic blood pressure falls early in pregnancy with a gradual return to non-pregnancy levels by term. The fall in systemic vascular resistance is more marked, decreasing to two thirds of resting non pregnant values at about 20th week of pregnancy and then gradually rising through remainder of pregnancy.[5] Because of increased progestrogen.

Blood Volume :

Increments in blood volume start- early in first trimester and peaks at 32nd week gestation at a level 40% above non-pregnant values. This alteration results in part from a 20% - 40% increase in red cell mass but a larger factor is the 50% expansion of plasma volume.5 Blood volume expansion may be proportional to fetal weight.

Left Ventricular Contractility:

Parameter	1st Trimester	2nd Trimester	3rd Trimester
Blood volume	↑	↑↑	↑↑↑
Cardiac output	↑	↑↑↑	↑↑
Stroke volume	↑	↑↑↑	↔or ↓
Heart rate	↑	↑↑	↑↑↑
Systolic blood pressure	↔	↓	↔
Diastolic blood pressure	↓	↓↓	↔
Pulse pressure	↑	↑↑	↔
Systemic vascular resistance	↓	↓↓↓	↓↓
Oxygen consumption	↔ or ↑	↑↑	↑↑↑
Left ventricular volume	↔	↑	↑
Left ventricular systolic function	↔	↔	↔

Key : ↔ No change compared with non pregnant level; ↑, small increase; ↑↑, moderate increase; ↑↑↑, large increase; ↓ small decrease; ↓↓, moderate decrease; ↓↓↓, large decrease.8 Cardiovascular symptoms during pregnancy[4]

NORMAL SYMPTOMS	ABNORMAL SYMPTOMS
Fatigue	Symptoms at rest
Chest Pain	Exertional chest pain
Dyspnea	Exertional, severe Dyspnea
Orthopnea	Orthopnea (Progressive)
Hyperapnea	Paroxysmal nocturnal Dyspnea
Palpitations (tachycardia)	Palpitations (dysrhythmia)
Vasovagal syncope	Exertional Syncope

Signs in Heart Disease in Pregnancy

NORMAL SIGNS	ABNORMAL SIGNS
Neck vein pulsation	Neck vein distention
Diffuse displaced apical pulse	Cardiomegaly; heave Load P_2; wide split of S_2
Split S_1 accentuated S_2	Summation gallop
Third heart sound	Loud systolic murmur
Systolic murmur (1-2/6)	Systolic murmur (4-6/6)
Venus hum	Diastolic murmur
Sinus dysrhythmia	Sustained dysrhythmia
Peripheral edema	Clubbing / cyanosis

The New York Heart Association Classification

Class I:	No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea, or anginal pain.
Class II:	Slight limitation of physical activity. Patients are comfortable at rest. Ordinary physical activity results in fatigue, palpitations, dyspnea, or anginal pain.
Class III:	Marked limitation of physical activity. Patients e comfortable at rest. Less than ordinary physical activity results in fatigue, palpitation, dyspnea, or anginal pain.
Class IV:	Inability to carry on any physical activity without discomfort. Symptoms of cardiac insufficiency or of anginal syndrome may be present even at rest. If any physical activity is undertaken discomfort is increased.

High Risk heart diseases in pregnancy : The following at the high risk cases in pregnancy there will be high maternal mortality.

- Eisenmenger's syndrome
- Severe pulmonary hypertension
- Complex cyanotic heart disease (TOF, Ebstein's anomaly, TA, TGA, tricuspid atresia)
- Marfan syndrome with aortic root or valve involvement
- Severe AS with or without symptoms
- Aortic or mitral valve disease, or both (stenosis or regurgitation), with moderate or severe LV dysfunction (EF < 40%)
- NYHA Class III or IV symptoms associated with any valvular disease or with cardiomyopathy of any cause
- History of prior peripartum cardiomyopathy

RESULT :

Heart disease complicating pregnancy has been implicated as the second most common indirect cause of maternal mortality in India next to anemia[2].The incidence of cardiac disease in pregnancy has remained fairly constant over the years although the proportion contributed by congenital lesions has been increased. Reduction in the prevalence of rheumatic heart disease and improved survival of patients with congenital lesions explain this trend.

The current study was undertaken between August 2013 and July 2014 involving 25 pregnant women with cardiac disease confirmed by clinical and echocardiography evaluation. Patients were studied till their discharge from hospital.

Age and Parity:

The mean age of the mothers was 27 which concurs with other reports. In our study, 58% of the studied women were multi gravidas.[3]

Socio Economic Status

In the present study, majority of the women belonged to low socio economic status (81%).

Cardiac Lesions:

The proportion of acquired lesions in the present study was 70%. The most common acquired lesion was mitral stenosis with regurgitation. Mitral valve prolapse was the only nonrheumatic acquired structural lesion in our study and it was present in 10% of the women.

Congenital heart disease group constituted only 30% of the study population. In a retrospective study of 223 pregnancies complicated by heart disease it was reported that acquired heart disease accounted for 76% of the cases and congenital heart disease for the remaining 24%.[3] The studied population consisted of patients referred from places around Kurnool.

Ischemic heart disease (IHD) was not present in our study. Different studies reported incidences of 8.6% and 4.1 % of ischemic heart disease complicating pregnancy.

Functional Class During Pregnancy :

In the present study, majority of women were in the NYHA functional class 1 or 2 during pregnancy.

In a retrospective study, 78% of patients were in functional class 1 or 2 by the time they were admitted3.Another study reported a proportion of 40% of patients in class 3 or 4. Their study recruited women who had undergone TVMC or were candidates for TVMC during the index pregnancy, i.e. patients with severe mitral valve obstruction.

Labour outcome :

In our study spontaneous onset of labour was awaited in women admitted before labour. Induction of labour, augmentation and cesarean section were all done for obstetrical indications. The mean duration of the stages of labor were simitar between congenital heart disease group and acquired heart disease group. The difference between the groups was not statistically significant. The rate of instrumental deliveries in our study was 4% and that of cesarean section was about 60%.

In a study group the rate of caesarean section was 27% Out of all indications for caesarean sections, 4% were maternal cardiac conditions: The type of delivery had no association with maternal cardiac events[11]. In our study the rate of caesarean section for maternal indications was 5 cases (20%).

Perinatal outcome :

The incidence of preterm births in the present study was 5 babies (20%).

The overall incidence of preterm births in pregnancies with cardiac disease is 28%. Fetal mortality increases with worsening maternal functional capacity and may be as high as 30% when the mother has NYHA class IV symptoms[3].

The Incidence of preterm births was 17.5% in a prospective study and 23% in a retrospective study.

In the present study, the mean birth weight of babies born after 37 completed weeks was 2600 grams, and that of babies born before 37 completed weeks was 1000 grams. The mean birth weight of term babies were comparable to the overall mean birth weight of babies delivered in the institution.

The rate of small for gestational age (SGA) infants in the current study was 26% which was comparable to the overall incidence of SGA babies in the study period.

Maternal outcome and Perinatal mortality :
In our study maternal mortality was 4% that is we lost 1 case of primary pulmonary hypertension .

Fetal outcome:
Fetal mortality we had 8% that is we lost 2 babies which were due to prematurity.

CONCLUSIONS

The early diagnosis of heart disease and proper antenatal checkups in teritiary health care centers can improve maternal / fetal outcome with cardiac disease complicating pregnancy.

Early diagnosis and timely intervention can decrease the maternal mortality and can improve the outcome of pregnancy. 5 cases delivered by caesarian section which were mainly due to CPD.

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