Dissertation On

MATERNAL AND FOETAL OUTCOMES IN RHEUMATIC HEART DISEASE IN PREGNANCY

Submitted in partial fulfilment of

Requirements for

M.D. (BRANCH - II)

OBSTETRICS AND GYNAECOLOGY

of

THE TAMILNADU Dr.M.G.R MEDICAL UNIVERSITY

CHENNAI

INSTITUTE OF OBSTETRICS AND GYNAECOLOGY

MADRAS MEDICAL COLLEGE

CHENNAI – 600 003.

MARCH 2008

CERTIFICATE

This is to certify that the work embodied in the dissertation entitled **"MATERNAL AND FETAL OUTCOMES IN RHEUMATIC HEART DISEASE IN PREGNANCY"** has been carried out by **Dr.DHIVYA SETHURAMAN** during the period between March 2005 & March 2008 in the Institute of Obstetrics & Gynaecology, Madras Medical College, Chennai for the partial fulfillment of MD BRANCH II OBSTETRICS AND GYNAECOLOGY Degree Examination.

The work has been carried out with care and precision .

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ACKNOWLEDGEMENTS

I wish to thank **Prof.T.P.KALANITI, MD.,** Dean of Madras Medical College, Chennai and, **Prof SARASWATHY MD DGO** permitting me to utilize the clinical material of IOG, Egmore, Chennai.

I wish to express my heartfelt gratitude and sincere thanks to **Prof.K.SARASWATHY.MD.DGO,** our beloved Director and Superintendent, IOG, Egmore for being a major source of inspiration, guidance and support.

I also wish to thank our previous directors **Prof.V.MADHINI, MD DGO,MNAMS, Prof.CYNTHIA ALEXANDER, MD DGO** and **Prof.S.DHANALAKSHMI,MD DGO** for their valuable suggestions and advise.

I wish to thank **Prof**.**DR.ANJALAKSHMI CHANDRASEKAR. MD DGO** whose suggestions, advice, support and guidance has been invaluable for this dissertation.

I also wish to thank my **ASSISTANT PROFESSORS** for their guidance.

Last but not the least I would like to thank my **PATIENTS** without whom this study would not have been possible.

CONTENTS

INTRODUCTION

In the 1930s, it was estimated that 1% to 2% of all pregnancies were complicated by maternal cardiac disease and that 6% of these women died during pregnancy. The current estimated clinical prevalence of clinically significant cardiac disease during pregnancy is similar (0.1% -1.4%)[14,27]; however the maternal mortality for these patients during pregnancy has decreased to 0.5% to 2.7%[14,27]. Nevertheless, cardiac disease contributes to 15% of maternal mortality.

Although patients with significant cardiac disease were discouraged strongly from becoming pregnant in the past, the vast improvements in cardiac care and vast improvements in reproductive technology may result in more women who have cardiac diseases planning pregnancies. As pregnancy represents a unique heamodynamic state with profound implications for cardiac function, obstetricians and cardiologists must be prepared to provide optimal care to these patients.

REVIEW OF LITERATURE

Rheumatic heart disease results from single or repeated attacks of rheumatic fever that produces rigidity and deformity of valve cusps ,fusion of the commissures, or shortening and fusion of the chordae tendinae. Stenosis or insufficiency results, and the two often co exist. The mitral valve is affected in 50-60% of cases; combined lesions of the aortic and mitral valves occur in 20%; pure aortic valve lesions are less common. Tricuspid valve involvement occurs in 10% of cases, but only in association with mitral or aortic valve disease and is thought to be more common when recurrent infection occur. The pulmonary valve is rarely affected.

A history of rheumatic fever is obtained only in 60% of patients with rheumatic valve disease.

With advance in medical care more number of women in child bearing age are undergoing valve replacement procedures bringing with it problems related to anticoagulation and its impact on future pregnancies. These women have to be counseled on the maternal and fetal effects of these drugs on pregnancy.

HEAMODYNAMIC CHANGES IN PREGNANCY

Parameter	modification	Magnitude	Peak	Reference
O2 consumption (vo2)	Increased	+20% +40-60%	Term	Gemzell 1957 Pernoll 1975
O2 delivery	Increased	700-1400ml\min	Term	Hankins 1996
Blood volume Plasma RBC	Increased Increased	+45-50% +25-32%	32 wk 30-32 wks	Mclennon 1984 Letsky 1995
Total body water	Increased	+6-+8L	Term	Satchilk 1967 Lindhrime 1973

Resistance changes Systemic Pulmonary	Decreased Decreased	-2% -34%	16-24 wks 34 wks	Kitabatak 1983 Clark 1989
Blood pressure Systolic Diastolic	Both decreased	-9%	25 wks	Wilson 1980
Cardiac output	Increased	+30-50%	Term	Van opel1996
Myocardial contractility Chronotropism (HR) Ionotropism (SV)	Both increased	+20to30% +11to32%	Term	Wilson 1980
Utero placental circulation	Increased	+100%	Term	Metcalfe 1955

DIAGNOSIS

Many of the physiological adaptation of normal pregnancy alter physical findings, making the diagnosis of the heart disease more difficult.

CLINICAL INDICATORS OF HEART DISEASE DURING PREGNANCY [35]

SYMPTOMS

Progressive dyspnea or orthopnea

Nocturnal cough

Hemoptysis

Syncope

Chest pain

CLINICAL FINDINGS

Cyanosis

Clubbing of fingers

Persistent neck vein distension

Systolic murmur grade 3/6 or greater

Diastolic murmur

Cardiomegaly

Persistent arrhythmia

Criteria for pulmonary hypertension.

Information regarding rheumatic fever and penicillin prophylaxis need to be elicited in history taking. It has been noted that only 60%[1] with rheumatic heart disease give a history of previous rheumatic fever.

Cardiac auscultation remains the most widely used method for screening for valvular heart disease. In instances like valvular aortic stenosis, detection of a cardiac murmur gives a clue to the detection of a cardiac disease when asymptomatic, or may define the reason for cardiac symptoms. A diastolic murmur however, virtually always represents pathological conditions and requires further evaluation.

ECG is important in providing negative information at a low cost like the presence of ventricular hypertrophy, atrial enlargement and arrythmias.

Non-invasive investigation like an echocardiography with color flow and spectral Doppler evaluation is a very important tool for assessing the significance of cardiac murmurs and is also the best screening procedure though costly. Information regarding valve morphology and function, chamber size, wall thickness, ventricular function, pulmonary and hepatic vein flow, and estimates of pulmonary arterial pressures can be readily obtained with the help of an echo [31].

NYHA (NEW YORK HEART ASSOCIATION) CLASSIFICATION

CLASS 1 UNCOMPROMISED (no limitation of physical activity)

These women do not have symptoms of cardiac insufficiency or experience anginal pain

CLASS 2 (slight limitation of physical activity)

These women are comfortable at rest, but if extra ordinary physical activity (unaccustomed) is undertaken, discomfort results in the form of excessive fatigue, palpitation, dyspnea, or anginal pain.

CLASS 3(marked limitation of physical activity)

These women are comfortable at rest, but less than ordinary activity (accustomed) cause excessive fatigue, palpitation, dyspnea, or anginal pain.

CLASS 4 severely compromised (inability to perfom any physical activity without discomfort)

Symptoms of cardiac insufficiency or angina may develop even at rest, and if any physical activity is undertaken, discomfort is increased.

RISKS FOR MATERNAL MORTALITY CAUSED BY VARIOUS TYPES OF HEART DISEASE (ACOG 1992)

GROUP 1-Minimal Risk (0-1%)

Atrial septal defect

Ventricular septal defect

Patent ductus arteriosus

Pulmonic or tricuspid disease

Fallot tetrology, corrected

Bioprosthetic valve

Mitral stenosis NYHA class 1 and 2

GROUP 2- Moderate Risk (5-15%)

2A:

Mitral stenosis, NYHA class3 and 4

Aortic stenosis

Aortic coarctation without valvular involvement

Fallot tetralogy, uncorrected

Previous myocardial infarction

Marfans syndrome, normal aorta

2B:

Mitral stenosis with atrial fibrillation

Artificial valve

GROUP 3-Major Risk (25-50%)

Pulmonary hypertension

Aortic coarctation with valvular involvement

Marfans syndrome with aortic involvement

VALVULAR HEART DISEASE ASSOCIATED WITH HIGH

MATERNAL RISK DURING PREGNANCY.

1. Severe aortic stenosis (AS) with or without symptoms.
2. Aortic regurgitation (AR) with NYHA class III-IV symptoms
3. Mitral stenosis (MS) with NYHA class II-IV symptoms.
4. Mitral regurgitation (MR) with NYHA class III-IV symptoms
5. Aortic or mitral valve disease with severe pulmonary hypertension (pulmonary pressure >75% systemic pressure)
6. Aortic or mitral valve disease with severe left ventricular dysfunction (ejection fraction<40%)
7. Mechanical prosthetic valve requiring anticoagulation
8. AR in Marfans syndrome

VALVULAR HEART LESIONS ASSOCIATED WITH LOW
MATERNAL AND FETAL RISKS DURING PREGNANCY[5]

1. Asymptomatic AS with low mean gradient (<50mm Hg) with normal LV systolic function (ejection fraction>50%)
2. NYHA class I-II AR with normal LV systolic function.
3. NYHA class I-II MR with normal LV systolic function.
4. Mild to moderate MS (mean valve area >1.5cm^2, gradient<5mm Hg) without severe pulmonary hypertension.
5. Mild to moderate pulmonic stenosis.
6. Mitral valve prolapse with no MR or with mild to moderate MR with normal systolic flow

PRECONCEPTION CONSIDERATIONS

Optimization of maternal status

- Repair structural defects before pregnancy when indicated
- Adjust medications to optimize maternal functional capacity and minimize foetal effects

Discussion of foetal risks

- Counsel patients regarding risk to foetus due to the maternal cardiac condition or the medications taken.

ANTEPARTUM CONSIDERATIONS

- Regular antenatal visits
- Rigorously treat anemia and urinary tract infections.
- Anticoagulation in patients with mechanical heart valves and atrial arrythmias.

INTRAPARTUM CONSIDERATIONS

- Labour is the most dangerous period for many patients having cardiac disease; this is the period of the greatest increase in cardiac output.
- Vaginal delivery is preferred over caesarean section for most patients because of less blood loss, fewer postpartum infections, and earlier ambulation with less risk of thrombosis and pulmonary complications.
- An assisted second stage to shorten labor and to decrease dramatic fluid shifts that are associated with active pushing.
- Endocarditis prophylaxis in high risk patients.
- Treat postpartum hemorrhage aggressively to prevent hypovolemia.

ANESTHETIC CONSIDERATIONS

Regional anesthesia is appropriate for most patients with heart disease. Benefits of good pain control include:

(a) avoidance of maternal tachycardia which is important in patients with mitral stenosis in whom left ventricular filling is impaired if diastole is shortened;

(b) decreased cardiac work

(c) the ability to perform an assisted vaginal delivery.

Patients with stenotic valve lesions do not tolerate sudden decrease in systemic vascular resistance. Epidural anesthesia must be administered slowly or intrathecal analgesics may be used. For caesarean delivery, these patients may require general anesthesia. Spinal anesthesia is contraindicated because of associated hypotension that is deleterious on the compromised heart.

POSTPARTUM CONSIDERATION

Patients remain at high risk for thromboembolism during postpartum period. Prophylactic anticoagulation should be given for 6 weeks postpartum for patients with mechanical heart valves and atrial fibrillation.

CONTRACEPTION[9]

Contraceptive advice is needed from adolescence onwards and the implication of an unplanned pregnancy in an unprepared cardiac patient should be discussed with all young adults with heart disease. Barrier method of contraception is unreliable and the combined contraceptive pill is contraindicated in all conditions where thrombosis and paradoxical embolism is a risk. Progesterone only preparation have a better side effect profile and long acting, slow release preparations, such as implanon and mirena

intrauterine system, have improved efficacy compared to oral preparations. Preinsertion screening for genito-urinary infection is recommended as is endocarditis prophylaxis to cover the insertion procedure. Sterilisation may be considered according to the wishes of the couple. Laproscopic clip sterilization is contraindicated because carbon- di- oxide pnemoperitoneum and trendelenberg position is not tolerated by these patients. However, it is recognized that women with serious defects have a shortened life expectancy and the partner may wish to preserve his fertility to have a family in the future.

ENDOCARDITIS PROPHYLAXIS

Endocarditis is believed to occur from bacterial seeding of damaged heart valves and bacteremia occurs with only 1-5%[23,30] of deliveries. Hence, the ACC\AHA does not routinely recommend antibiotic prophylaxis for patients with valvular heart disease undergoing vaginal or caesarean delivery. Clinical infections, such as chorioamnionitis, may be associated with bacteremia, and therefore, endocarditis prophylaxis is warranted. In addition, the ACC\AHA allow for "optional" endocarditis prophylaxis for patients having a history of endocarditis or high risk cardiac lesions such as prosthetic valves.

Despite these recommendations many obstetricians routinely administer antibiotics during labor or at the time of caesarean delivery.

Surgue et al[32] collected serial blood cultures from 83 patients following vaginal deliveries. They found a 3.6% incidence of bacteremia but noted a possible increased

risk with manual removal of placenta. A concurrent series of 2165 patients who had cardiac disease revealed a 0.09% of endocarditis following pregnancy, but these patients had manual removal of placenta. This is a complication of delivery that cannot be predicted. Therefore many obstetricians liberalize the administration of prophylactic antibiotics at the time of delivery. This must be weighed against the risks of promoting bacterial resistance

ENDOCARDITIS PROPHYLAXIS REGIMEN FOR GENITOURINARY/GASTROINTESTINAL(EXCLUDING ESOPHAGEAL)PROCEDURES[5]

SITUATION	AGENTS	REGIMEN
High risk patient	Ampicillin +gentamicin	Ampicillin 2gm IM/IV plus gentamicin 1.5mg/kg (not to exceed120mg) within 30 minutes of starting the procedure.Six hours later, ampicillin 1.0gm IM/IV or ampicillin 1.0gm orally.
High risk patient allergic to ampicillin	Vancomycin +gentamicin	Vancomycin 1.0gm IV over 1-2 hours plus gentamicin 1.5mg/kg (not to exceed 120mg).Complete infusion within 30 mts of starting the procedure
Moderate risk patient	Amoxycillin or ampicillin	Amoxicillin 2.0gm orally 1hr before procedure or ampicillin 2.0gmIM/IV within 30mts of starting the procedure.
Moderate risk patient allergic to ampicillin	Vancomycin	Vancomycin 1.0gm IV over 1-2hours.Complete infusion within 30mts of starting the procedure.

AMERICAN HEART ASSOCIATION RECOMMENDATION FOR ANTIBIOTIC PROPHYLAXIS TO PREVENT BACTERIAL ENDOCARDITIS (2003)[23]

CARDIAC LESION	PROPHYLAXIS FOR UNCOMPLICATED DELIVERY	PROPHYLAXIS FOR SUSPECTED BACTEREMIA
HIGH RISK CATEGORY Prosthetic cardiac valves	Optional	Recommended
Previous bacterial endocarditis	Optional	Recommended
MODERATE RISK Acquired valvular dysfunction(most commonly R H D)	Not recommended	Recommended
Mitral valve prolapse with valvular regurgitation or thickened leaflet or both	Not recommended	Recommended
LOW RISK Previous rheumatic fever without valvular dysfunction	Not recommended	Not recommended

MITRAL STENOSIS (MS)

Mitral stenosis occurs most commonly as a consequence of rheumatic heart disease. Complications include pulmonary edema, right ventricular failure, atrial arrythmias and embolisation. Pregnancy is detrimental to cardiac function in the setting of mitral stenosis for several reasons. Expanded blood volume can increase the risk of pulmonary congestion and oedema. The physiologic tachycardia of pregnancy decreases left ventricular filling time leading to elevated left atrial pressures and pulmonary

edema, decreased forward flow causes hypotension ,fatigue and syncope.

Normal mitral valve area[5] is 4-5 cm^2

SEVERITY[5]

MITRAL VALVE AREA	SEVERITY
>1.5cm^2	Mild
1.1-1.5 cm^2	moderate
<=1 cm^2	Severe

In a prospective study of 80 pregnancies in 74 women who had mitral stenosis, the rate of maternal cardiac complications was 35% and the rate of adverse fetal and neonatal outcomes was 30%. There were no cases of stroke, cardiac arrest or death in this series, nor was there a need for invasive interventions. The incidence of maternal and fetal complications was associated significantly with the severity of MS based on valve area. The pre-pregnancy NYHA classification did not correlate with maternal and fetal outcomes[29]; however all women in this series had class1 or II disease. With class III and class IV previous series reported maternal mortality rates of 5% to 7% and perinatal mortality rates of 12% to 31%[26,33].

Treatment

Medical

Treatment of mitral stenosis in patients who have a history of rheumatic heart

disease includes, daily prophylactic penicillin, gentle diuresis to prevent pulmonary edema without decreasing placental perfusion, and beta blockers as needed to prevent tachycardia. New onset atrial fibrillation can be treated with cardioversion; digoxin or beta blockers may be used for rate control in atrial fibrillation. Patients with atrial fibrillation should be anticoagulated to prevent systemic embolisation.

Surgical

The surgical treatment of mitral stenosis during pregnancy include closed mitral commisurotomy balloon mitral valvuloplasty(BMV) .Valve replacement is usually best avoided during pregnancy due to high maternal and fetal morbidity and mortality.

Indications for CMC AND BMV:

- being failure of medical therapy with intractable medical symptoms
- history of pulmonary edema with risk of recurrence in pregnancy
- profuse hemoptysis.
- Asymptomatic patients with pulmonary hypertension(PASP>50mm Hg).

Contraindications for CMC and BMV:

- calcified valve
- the presence of moderate to severe MR.

Ideally, this should be done before conception in symptomatic women who have severe MS. For women with severe MS with clinical deterioration during pregnancy, the procedure can be done safely done during pregnancy. It was shown to carry less fetal risk than open mitral commisurotomy.

Labour Management

During labour, adequate pain relief using intrathecal narcotics is important to prevent tachycardia and its consequences. Epidural anesthesia can cause hypotension in an already compromised MS patient.

MITRAL REGURGITATION (MR)

Mitral regurgitation (MR) in pregnant women is most commonly due to mitral valve prolapse, though rheumatic heart disease remains an important cause in developing countries. The heamodynamic changes of pregnancy are beneficial to a patient who has MR , because a state of increased volume and decreased systemic vascular resistance promotes forward flow across the regurgitant valve. Pregnancy is usually well tolerated.

VALVE JET AREA	SEVERITY
<=4 cm^2	Mild
5-8 cm^2	Moderate
>=9 cm^2	Severe

The small number of patients who develop pulmonary congestion can be treated with diuretics. Vasodilators such as hydralazine, are beneficial in women having associated systemic hypertension. Severe MR can lead to marked left atrial dilatation and consequent atrial fibrillation. Epidural anesthesia can be safely used with adequate intravenous(IV) hydration.

AORTIC STENOSIS (AS)

The most common cause of AS in younger women is a congenital bicuspid aortic valve. Rheumatic heart disease is a less common cause in the western world though it may be seen in less developed countries.

Severity	Valve area /Peak gradient
Mild	>1.5cm^2 /<36mm Hg
Moderate	1-1.5cm^2 /36-63mm Hg
Severe	<1cm^2 />=64mm Hg

Women who have severe stenosis or symptoms are advised to undergo surgical repair before attempting pregnancy[5]. Patients having severe AS have difficulty achieving an increased cardiac output that is required by pregnancy. Their stroke volume is fixed by the obstructed valve. Heart rate is the key determinant of cardiac output, both tachycardia and bradycardia being detrimental.

In a Toronto study[29] from 1986-2000 of 49 pregnancies in women who had AS, all belonged to NYHA class I and II at the time of enrollment. Pregnancy was generally well tolerated. Ten percent of patients (3/29) with severe disease had early cardiac

complications (pulmonary edema or atrial arrythmias) during pregnancy; the remaining 20 patients with mild to moderate disease did not have pregnancy complications.

Twelve percent of pregnancies were complicated by preterm labor, respiratory distress syndrome, or intrauterine growth restriction (IUGR); this rate is similar to that seen in the general population. In 1000 patients studied in Brazil [2]from 1989-1999 68.5% of patients had no complications.

The subset of patients having moderate to severe AS had morbidity, including congestive cardiac failure, angina, two patients needed valve replacement, and there was one sudden death.

Mild to moderate AS in pregnancy is managed conservatively. For women who have severe symptomatic disease in pregnancy, balloon valvuloplasty has been reported without complications. This procedure is contraindicated in the presence of significant aortic regurgitation (AR). Open valve replacement is also an option for patients who have decompensation during pregnancy, but it is associated with a foetal mortality of 30%[9].

During labor, epidural anesthesia may be used cautiously, with generous fluid hydration to prevent hypotension and reflex tachycardia. In these patients postpartum hemorrhage should be treated aggressively, as the decrease in preload can be catastrophic.

AORTIC REGURGITATION (AR)

In acute AR, as there is no time to accommodate increase in regurgitant volume by the normal sized LV, the patient presents with pulmonary edema and cardiogenic shock.

In chronic AR, compensatory mechanisms counteract the left ventricular volume overload. Hence majority of the patients remain asymptomatic. Vasodilator therapy has the potential to reduce heamodynamic burden in such patients.

MECHANICAL HEART VALVES

Pregnant women who have mechanical heart valves present one of the greatest challenges to obstetricians and cardiologists. These women have a maternal mortality rate of 1-4%[8,13] secondary to valve thrombosis, despite anticoagulation. Therefore, women with valvular heart disease desiring future child bearing should be considered for valve replacement with a biological valve, if possible[34].

Optimal anticoagulation for these women during pregnancy has become a subject of great controversy. Out side of pregnancy, warfarin is the preferred anticoagulant for patients who have mechanical heart valves. The addition of aspirin has been shown to provide added protection. The goal INR for mechanical valves patient is 2.5to3.5[5].

Generally warfarin is considered to be contraindicated during pregnancy for several reasons. It may lead to warfarin embryopathy consisting of nasal and limb hypoplasia, epiphysial stippling and CNS abnormalities in 5to10% of foetuses but this risk can be eliminated if heparin is substituted for warfarin from 6to12 weeks gestation[8]. It can also cause intracranial hemorrhage in the fetus during vaginal delivery.

When unfractionated heparin has been substituted for warfarin throughout pregnancy, thromboembolism rates of 33% have been reported; this is equivalent to the rates of thromboembolism with no anticoagulation. When heparin was substituted for warfarin from 6to12 weeks of gestation only, the rate of thromboembolism was 9.2% compared with 3.9% in patient who received warfarin throughout pregnancy[8]. High rates of thrombosis with heparin are suspected to be secondary to inadequate dosages.

ACC\AHA recommendations for anticoagulation during pregnancy in women with mechanical prosthetic valves[5]

1 through 35 weeks

- The decision on the choice of anticoagulant must be made after full discussion with the patient on the side effects of medications.

- High risk women (H\O thrombembolism, older valve prosthesis) on IV unfractionated heparin, dosage given should maintain aPTT at 2-3 times control.

- High risk women on warfarin , INR should be maintained between 2.0-3.0 and low dose aspirin should be given.

- Low risk women may be managed with adjusted SC heparin (17,500-20,000 IU BD) maintaining aPTT 2-3 times control.

After the 36th week

- Warfarin is stopped by 36 weeks and heparin substituted.

- If labor begins during treatment with warfarin, a cesarean should be performed due to risk of intracranial hemorrhage to foetus.

- In the absence of significant bleeding, heparin can be started 4-6 hrs after delivery and warfarin can be given orally.

PROGNOSIS-IN-RHEUMATIC HEART DISEASE

In the long run, pregnancy does not adversely affect the survival of a woman with rheumatic heart disease, once she has survived the pregnancy itself.

The nulliparous patient with heart disease fares no better in life than the parous woman, and the death rate, age for age, shows no difference between two groups. Statistically, the death rate does not appear to be influenced by the number of pregnancies.

Patients with rheumatic heart disease have good prognosis, if they receive good antenatal supervision. The immediate death rate is around 1-2%, and of the survivors, more than half have no alteration in cardiac grading. There is a tendency for patient to drop one class during the course of her pregnancy.

A history of cardiac failure prior to pregnancy, and atrial fibrillation are poor prognostic signs. mitral stenosis who may be asymptomatic at the on -set of pregnancy but may go in to failure in late pregnancy. The prognosis become clear by 28 to 32 weeks of pregnancy when the heart is shouldering its greatest load .If the patient is able to cope well at this time, the outlook of labour is good

EFFECTS OF CARDIOVASCULAR DRUGS TAKEN DURING PREGNANCY [6,27,24]

SUMMARY OF MATERNAL MORTALITY WITH SELECTED CARDIAC CONDITION

CONDITION	MATERNAL MORTALITY
Mitral stenosis All mitral stenosis [2,29] NYHA class III\IV [26,33]	 0-1.6% 5-7%
Aortic stenosis All aortic stenosis [2,29]	 0-2%
Mechanical heart valve [8,13]	1-4%

AIMS OF THE STUDY

1. To study the maternal and fetal outcomes in pregnancies complicated by rheumatic heart disease in our institution over a period of one year.

2. To analyse possible prognostic factors that would enable us to formulate necessary guidelines for safe motherhood.

3. To analyse outcomes in surgically corrected heart disease.

MATERIALS AND METHODS

TYPE OF STUDY

Prospective study.

MATERIALS

This study was conducted in The Institute of Obstetrics and Gynecology, Egmore, Chennai. One hundred and twenty nine (129) women with rheumatic heart disease were registered in this study from January 2006 to December 2006.

INCLUSION CRITERIA

All patients with Rheumatic heart disease (MS, MR, AR, AS: as diagnosed from history, clinical examination and echocardiography) who were

- On long term treatment
- Newly diagnosed
- Surgically operated on
- And in need of medical termination and sterilization were included for the study.

EXCLUSION CRITERIA

Patients with

- Mitral valve prolapse with mitral regurgitation
- Isolated aortic stenosis
- Congenital heart disease

METHOD

All patients having RHD, outpatients, inpatients and those admitted via our emergency department were meticulously followed up antenatally as well as from admission till discharge. The clinical course during pregnancy and the maternal, foetal outcomes were studied.

PHYSICAL EXAMINATION

Height, weight, anemia, cyanosis, pedal edema, elevated jugular venous pressure, peripheral pulses, blood pressure, respiratory rate, cardiovascular system examination for systolic and diastolic murmurs, loud P2, respiratory system examination for basal rales and wheeze and abdominal examination for organomegaly were done.

OBSTETRIC EXAMINATION

Uterine fundal height, abdominal girth and fetal heart were recorded.

LABORATORY INVESTIGATIONS

- Haemoglobin, haematocrit , total count, differential count.
- Urine for microscopic examination and deposits.
- Urine culture and sensitivity.
- ECG, ECHO

ROUTINE MANAGEMENT

Patients were routinely examined every antenatal visit for signs of anemia and congestive cardiac failure. They were usually admitted at 28-32 weeks of gestation unless they presented with symptoms of cardiac failure earlier in pregnancy. Frequency of the antenatal visits depended on the functional cardiac status.

Our patients were already under the supervision of cardiologists. Patients with severe disease were on the following drugs through out pregnancy:

Tab. Digoxin 0.25 mg 1-0-0 for five days a week.

Tab.furosemide 40 mg 1-0-0 twice a week

Tab.penicillin 250 mg 1-0-0 twice a day

Syrup Kcl 2 tsp twice daily

They were advised to have adequate bed rest and take high calorie diet. Anemia was corrected by oral iron supplementation and urinary tract infection treated

with appropriate antibiotics.

Patients in cardiac failure were treated with bed rest, nasal oxygen, parenteral diuretic , digoxin and vasodilators in the intensive care unit.

LABOUR MANAGEMENT

The rule was to wait for spontaneous onset of labor. Patients were put in a propped up position, an intravenous line was started, and nasal oxygen given. Epidural analgesia was routinely given to all our patients excepting those on anticoagulants. Pulse, BP and foetal heart rate were carefully monitored and endocarditis prophylaxis was given to all patients at the onset of labour by ampicillin regimen.

Outlet forceps was applied to shorten second stage of labour in many cases. Episiotomies and perineal lacerations were meticulously sutured. LSCS was done strictly for obstetric indications alone. Monitoring in the ICU was done till 48 hours postpartum. Babies were given to the mothers immediately, unless the mother was seriously ill.

Advice on contraception and spacing of pregnancy was given. Puerperal sterilization was done 6 weeks after delivery if desired. Patients were discharged 10-14 days after delivery.

TABLE I
INCIDENCE OF HEART DISEASE

TOTAL NO OF DELIVERIES	HEART DISEASE TOTAL	INCIDENCE
18700	180	0.96%

TABLE II
INCIDENCE OF RHEUMATIC HEART DISEASE

HEART DISEASE	PATIENTS WITH RHD	PERCENTAGE
180	129	71.6%

TABLE III
RHEUMATIC FEVER AND RHD

PATIENTS WITH RHD	H\O RHEUMATIC FEVER	PERCENTAGE
129	84	65.1%

TABLE IV
OPERATED VS NON OPERATED RHD

RHEUMATIC HEART DISEASE	N0 OF PATIENTS	PERCENTAGE
OPERATED	45	34.9%
NOT OPERATED	84	65.1%
TOTAL	129	100%

TABLE V
TYPE OF SURGERY FOR MITRAL VALVE LESIONS

RHEUMATIC HEART DISEASE	OPERATED	PERCENTAGE
CLOSED MITRAL COMMISUROTOMY	36	80%
BALLOON MITRAL VALVULOPLASTY	2	4.5%
MITRAL VALVE REPLACEMENT	6	13.5%
OPEN MITRAL VALVOTOMY	1	2%
TOTAL	45	100%

TABLE VI

TYPE OF LESION

TYPE OF LESION	NUMBER	PERCENTAGE
MITRAL STENOSIS	60	46.5%
MITRAL REGURGITATION	27	20.9%
COMBINED MITRAL VALVE LESIONS	21	16.3%
MULTIVALVULAR LESIONS	21	16.3%
TOTAL	129	100%

There were no lesions of isolated aortic regurgitation.

TABLE VII

SOCIO-ECONOMIC STATUS

SOCIO ECONOMIC STATUS	NUMBER	PERCENTAGE
CLASS I	0	0%
CLASS II	2	1.6%
CLASS III	10	7.6%
CLASS IV	41	31.6%
CLASS V	76	59.2%
TOTAL	129	100%

90.8% of patients belonged to class IV-V socioeconomic class.

TABLE VIII

AGE DISTRIBUTION

AGE	NUMBER	PERCENTAGE
< =20 YRS	4	3.1%
21-24 YRS	76	58.9%
25-28 YRS	36	27.7%
>= 30 YRS	13	10.3%
TOTAL	129	100%

86.6% of patients were between 21-28 years.

The youngest was aged 18 years and the oldest

35 years.

TABLE IX

SEVERITY OF RHEUMATIC HEART DISEASE

SEVERITY(ECHO)	NUMBER	PERCENTAGE
MILD	6	4.7%
MODERATE	61	47.3%
SEVERE	62	48%
TOTAL	129	100%

95.3% of patients had moderate to severe disease.

TABLE X

NYHA FUNCTIONAL CLASS

NYHA CLASSIFICATION	NUMBER	PERCENTAGE
I	4	3.1%
II	101	78.3%
III	18	14%
IV	6	4.6%
TOTAL	129	100%

TABLE XI

PREGNANCY OUTCOME

PREGNANCY OUTCOME	NUMBER OF PATIENTS	PERCENTAGE
LABOUR NATURALIS	75	58.1%
OUTLET FORCEPS	24	18.6%
LSCS		
PRIMARY	8	6.2%
REPEAT	12	9.3%
SPONTANEOUS ABORTIONS	2	1.6%
MTP	8	6.2%
TOTAL	129	100%

65.9% of patients had vaginal deliveries of which 15.5% were forceps deliveries;

24.1% of patients had LSCS.

TABLE XII

BIRTH WEIGHT IN OPERATED VS NON OPERATED RHD

38.1% of babies were below 2.5 kg.

TABLE XIII

LOW BIRTH WEIGHT IN OPERATED VS NOT OPERATED RHD

	OPERATED	NOT OPERATED
NO: OF BIRTHS	41	76
BIRTH WT<2.5 KG	8	38
PERCENTAGE	19.5	50

Chi^2= 4.79

P <0.05

There were 50% of babies weighing less than 2.5 kg in the not operated group as compared to 19.5% in the operated group and the association was found to be statistically significant.

TABLE XIV

MATERNAL COMPLICATION IN RHD
OPERATED VS NON OPERATED

COMPLICATIONS	OPERATED		NOT OPERATED	
	NO	%	NO	%
PRETERM	2	1.6	20	15.5
PIH	1	0.8	4	3.1
CCF	6	4.7	18	13.9
ARRYTHMIA	0	0	1	0.8
EMBOLISM	0	0	1	0.8
FEVER	1	0.8	5	3.9
ANEMIA	5	3.9	13	10.1

TABLE XV

PRETERM BIRTHS IN OPERATED VS NON OPERATED RHD

	OPERATED	NOT OPERATED
NO: OF BIRTHS	41	76
PRETERMS	2	20
PERCENTAGE	4.8	26.3

$Chi^2 = 5.82$

$P<0.05$

The incidence of preterm births was 26.3% in the not operated group compared to 4.8% in the operated group and the association was found to be statistically significant.

TABLE XVI

CCF IN OPERATED VS NON OPERATED RHD

	OPERATED	NOT OPERATED
NO OF PATIENTS	45	84
CCF	6	18
PERCENTAGE	13.3	21.4

Chi^2=0.76

P=0.68

The incidence of CCF in the non operated group was 21.4% compared to 13.3% in the not operated group which was not statistically significant.

TABLE XVII

PERINATAL COMPLICATION IN RHD

OPERATED VS NON- OPERATED

COMPLICATIONS	OPERATED		NOT OPERATED	
	NO	%	NO	%
IUD	0	0	1	0.8
STILL BIRTH	1	0.8	1	0.8
SEPSIS	0	0	4	3.1
HYPERBILIRUBINEMIA	0	0	1	0.8
BIRTH ASPHYXIA	1	0.8	4	3.1
RDS	0	0	8	6.2

TABLE XVIII

PERINATAL MORTALITY IN RHD

OPERATED VS NOT OPERATED

	OPERATED	NOT OPERATED
NO: OF BIRTHS	41	76
PERINATAL DEATH	1	9
PERCENTAGE	2.4	11.8

Chi^2 =5.82

P<0.05

Perinatal mortality was 11.8% in the not operated group compared to 2.8% in the operated group which was statistically significant.

TABLE XIX

MATERNAL MORTALITY IN RHD

OPERATED VS NON OPERATED

	OPERATED	NOT OPERATED
NO: OF PATIENTS	45	84
NO: OF MATERNAL DEATHS	2	2
PERCENTAGE	4.4	2.3

There were 2.3% maternal deaths in the not operated group and 4.4% maternal deaths in operated group.

TABLE XX

CONTRACEPTION

FORM OF CONTRACEPTION	NO OF PATIENTS	PERCENTAGE (%)
MTP WITH STERILIZATION	8	6.2
LSCS WITH STERILIZATION	12	9.3
PUERPERAL STERILIZATION	7	5.4
COPPER-T	4	3.1
BARRIER METHODS	15	11.6
VASECTOMY	6	4.6

DISCUSSION

A study by Shawney et al[26] on maternal and perinatal outcome in rheumatic heart disease in 486 pregnant patients with rheumatic heart disease concluded that RHD in pregnancy is associated with significant maternal and perinatal morbidity in NYHA class III-IV patients.

Another study by Batla N et al3 on cardiac disease in pregnancy in 207 patients concluded that rheumatic heart disease was the predominant type. Patients in NYHA class I/II had a better maternal and fetal outcome than those in NYHA class III/IV. Surgical correction of the cardiac lesion prior to pregnancy was associated with better pregnancy outcome. Pregnant women with prosthetic valves tolerated pregnancy well.

However, Malhotra M et al[20] in their study on mitral valve surgery and maternal and fetal outcome in valvular heart disease in 308 patients concluded that mitral valve surgery before or during pregnancy did not significantly improve maternal and fetal outcomes but decreased adverse events such as congestive heart failure and cardiac arrhythmias. It should be therefore performed only in selected cases.

A study by Butta SZ et al[4] on pregnancy following cardiac surgery in 113 patients concluded that with appropriate care, the outcome of pregnancy in women who have had cardiac surgery is favorable, if their functional class is good.

A study by Lesnaik-Sobelga[19] on clinical and echocardiographic assessment of pregnant women with valvular heart diseases and maternal and fetal outcome concluded that pregnant women with critical mitral valve stenosis form a high-risk group of life-threatening complications. In women with severe aortic stenosis, pregnancy could lead

to sudden clinical status deterioration. Cardiac complications can be expected in patients with left ventricular enlargement and its depressed function. Key factors influencing successful course of pregnancy and labour in patients with prosthetic valves were adequate left ventricular function, properly functioning valves, and effective anticoagulation.

Another study by Routray et al[25] on balloon mitral valvuloplasty during pregnancy concluded that BMV is feasible, safe and effective. Maternal and fetal outcomes are excellent. Growth and milestone of development are not affected.

INCIDENCE

This study was conducted in the Institute of Obstetrics and Gynecology, Egmore, Chennai during the year 2006-2007. The incidence of heart disease was found to be 0.96%. This is comparable with other similar studies.

Mudaliar and Menon [21] , 2005	**0.97%**
Williams[35], 2005	**1%**
Present study 2006	**0.96%**

About 129 women with rheumatic heart disease were included in this study. Rheumatic heart disease constituted for 71.6% of heart disease in pregnancy. A study by

Batla N et al3 in 2003 showed 88% incidence of RHD.

Batla N [3]2003	**88%**
Present study 2006	**71.6%**

RHEUMATIC FEVER AND RHD

In our study 65.1% of patients with RHD gave a history of prior rheumatic fever. This is comparable to 60% incidence quoted in CMDT 2007.

CMDT 2007 [1]	**60%**
Present study 2006	**65.1%**

SOCIOECONOMIC STATUS

Most of these patients belong to socioeconomic status class IV-V (90.8%). This is comparable to data reported by Nafeesa Beebi et al (92%).

Nafeesa Beebi et al 1985	**92%**
Present study 2006	**90.8%**

TYPE OF LESION

Mitral stenosis has been found to be the dominant lesion in RHD. Sawhney et al[26]showed that mitral stenosis was the most predominant lesion (89.2%) in 486 patients. Batla et al[3] in 2003 had a 34.2% incidence of mitral stenosis in pregnancy. In our study involving 129 patients, 89(69%) had single valve involvement and mitral stenosis was the predominant lesion(48.1%).

STUDY	DOMINANT MITRAL STENOSIS
Shawney et al [16]2003	**89.2%**
Batla et al [4] 2003	**34.2%**
Present study 2006	**46.5%**

SEVERITY AND FUNCTIONAL CLASS

REFERENCE	NHYA I AND II (%)	NYHA III AND IV (%)
Shawney et al [26] 2003	**77.4**	**22.6**
Batla et al [3] 2003	**84.5**	**15.5**
Present study	**81.4**	**18.6**

From the above references it is clear that most patients belonged to NHYA I and II. However in our study sixty two (42%) of patients had severe valvular anatomical disease, but only twenty four (18.6%) belonged to NYHA class III and IV. Hence

anatomical severity did not correlate with functional class.

MATERNAL COMPLICATIONS

Batla et al [3] 2003	**29.9%**
Present study 2006	**28.7%**

The incidence of maternal complications was comparable between both studies. However there was no significant association (P=0.68) between the incidence of CCF in the operated and the not operated group in our study.

PRETERM

Shawney et al [26] 2003	**12%**
Present study 2006	**18.8%**

The incidence of preterm labour was comparable in both studies. However in our study we found a significant association (P<0.05) in incidence of preterm babies in the not- operated (26.3%) verses operated group (4.8%).

FETAL COMPLICATIONS

Batla et al [3]2003	**20.28%**
Present study 2006	**20.5%**

The incidence of fetal complications is comparable in both studies. We found a significant association (P<0.05) in the incidence of low birth weight babies in the operated (50%) versus not-operated (19.5%) group in our study.

PERINATAL MORTALITY

Deepak Lahiri et al [11] 1995	**5.4%**
Present study 2006	**8.5%**

Perinatal mortality is comparable in the above studies. There was a significant association (P<0.05%) between the operated (11.8%) verses not-operated (2.4%) group in our study.

MATERNAL MORTALITY

Shawney et al [26] 2003	**2.05%**
Silversides CK et al [29] 2003	**5-7%**
Present study 2006	**3.1%**

The maternal mortality is comparable in both studies. There were totally 4 maternal deaths: two in the operated group (4.4%) and two in the not-operated group (2.3%). All four patients died due to acute pulmonary edema secondary to CCF with severe mitral stenosis, two of whom were detected during incident pregnancy.

CONTRACEPTION

Only 40.2% of patients opted for contraception inspite of understanding risks associated with cardiac condition. All patients with valvular heart disease should use contraception in between pregnancies.

It is disturbing that 6.2% of patients underwent MTP with sterilization. All of these patients were multigravidas. We recommend that these patients be encouraged to undergo interval sterilization after the second child.

PREGNANCY AFTER CARDIAC SURGERY

	Butta et al [4] 2003	**Present study 2006**
No of patients	113	45
Patients with prosthesis	45%	13.5%
CCF	16%	4.7%
Arrythmia	4%	0%
PPH	3.5%	0%
PIH	2%	0.8%
Thromboembolism	0.6%	0%
Maternal mortality	0%	4.4%
Abortion	10.6%	0%
Still birth	2%	0.8%
Preterm	6.7%	4.8%
Neonatal deaths	0%	2.4%
Foetal malformation due to warfarin	0%	0%

These two studies are comparable in most variables.

SUMMARY

In this study of 129 pregnant women with RHD :

- The incidence of heart disease was 0.96% for all deliveries during our study period.
- The incidence of RHD was 71.6%
- 65.1% of women gave a h\o rheumatic fever
- 45(34.9%) patients had undergone surgical correction and 84(65.1%) did not undergo surgical correction.
- The most common surgical procedure done was closed mitral commisurotomy(80%).
- The most common valvular lesion was mitral stenosis(48.1%).
- 90.8% of patients belonged to class IV\V socioeconomic status.
- 86.6% of patients were between 21-28 years age.
- 95.3% had moderate to severe disease but only 18.6% were in NYHA class III/IV. Hence severity of disease did not correlate with NHYA class.
- 76.7% of women had vaginal delivery. LSCS was done for obstetric reasons alone.

- There were more preterm births and low birth weight babies in the not-operated group.
- There was no significant difference in the incidence of CCF between both groups.
- Women with mechanical valves had good maternal and fetal outcomes.
- Only 40.2% of women adopted some form of contraception.

CONCLUSION

According to this study, pregnant women with mitral stenosis still are at relatively high risk of experiencing maternal complications. The results shown are consistent with those reported by other studies.

The association of the pre pregnancy functional class with the risk of maternal events raises attention to the possibility of reducing these complications in pregnant women with mitral stenosis by means of early interventions aimed at improving their functional class.

The mitral valve area was also strongly significantly associated with the risk of maternal events. If the mitral valve area was the only determining risk factor for events in these patients, the correction of high-degree stenosis should correspond to a pronounced reduction of the occurrence of maternal complications during pregnancy and puerperium.

Based on this assumption and with the purpose of reducing the gestational risks, interventional treatment (balloon mitral valvuloplasty or surgery) prior to conception has been recommended to patients with severe mitral stenosis who wish to get pregnant. However, like in the present study, usually women with mitral stenosis are referred for cardiological follow-up only after the beginning of pregnancy.

Taking these facts and the low incidence of complications observed when the

balloon mitral valvuloplasty is done during pregnancy this procedure should be seriously considered for all types of valve area, independently of their functional class, particularly if we take into account that acute lung edema can be the first clinical manifestation of mitral stenosis during pregnancy .

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PROFORMA

Name:	IP.NO:	LMP:	DOA:
Age:	Unit:	EDD:	DOD:
		GPLA:	
		Booking:	
		Immunization:	

I Past H/O Rheumatic fever :

II Gestional age at presentation:

Associated pregnancy complications:

Type of valvular lesion:

NYHA:

Associated Factors: obesity/anemia/ fever

III Past obstetric outcome:

What and when:

IV Surgical correction done:

V H/O complications during antenatal period :

VI Purpose of admission:

VII Labour stages:

Ist stage: Posture:

Analgesia:

Duration:

IInd stage: Duration:

Mode of delivery:

IIIrd stage: Complications:

VIII Cesarean : Elective/ Emergency

Indication:

Type of anesthesia:

Complications:

Management

IX Fetal outcome: Sex:

Birth weight:

Apgar:

Preterm/ term:

Admission in NICU:

Complications:

X Contraception: Method adopted:

Sterilization: Type:

Anesthesia :

Time of surgery

ABBREVIATIONS

MS	:	Mitral Stenosis
MR	:	Mitral Regurgitation
AR	:	Aortic Regurgitation
AS	:	Aortic Stenosis
TR	:	Tricuspid Regurgitation
CMC	:	Closed Mitral Commisurotomy.
BMV	:	Balloon Mitral Valvuloplasty.
MVR	:	Mitral Valve Replacement.
OMV	:	Open Mitral Valvotomy.
MOD	:	Moderate
SEV	:	Severe
GPLA	:	Gravida, Para, Live, Abortion.
B.WT	:	Birth Weight
SA	:	Spontaneous Abortions
COMP	:	Complications
ST	:	Sterilization
PROC	:	Procedure
SB	:	Still Born
HYB	**:**	**Hyperbilirubinemia**
FEV	:	Fever
IUD	:	Intrauterine Death
CPD	:	Cephalo Pelvic Disproportion

FD	:	Fetal Distress
PULM EDEMA	:	Pulmonary Edema
PROM	:	Premature Rupture of Membranes
CCF	:	Congestive Cardiac Failure
AF	:	Atrial Fibrillation
EMBO	:	Embolism
MVO	:	Mitral Valve Orifice
MVA	**:**	**Mitral Valve Regurgitant Area**
AVO	:	Aortic Valve Orifice.
PHT	:	Pulmonary Hypertension
RDS	:	Respiratory Distress Syndrome
SEP	:	Sepsis
TAT	:	Trans Abdominal Tubectomy.