

Pregnancy with Previous Mitral Valve Replacement

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Mitral valve replacement has changed many lives of patients with severe mitral stenosis who were doomed due to severe haemodynamic complications. Successful pregnancy outcomes are now numerous. The study was carried out at Services hospital involving 7 pregnant patients with mitral valve replacement, as regards to its antepartum, intrapartum and postpartum management. The study showed the incidence to be 0.2% of all deliveries. Starr-Edwards was the most common (71.5%) prosthetic valve with good haemodynamic outcomes. Five (71.5%) patients remained in NYHA class II, showing the efficacy of valvular surgery and I. Five (71.5%) patients ended in vaginal delivery of healthy infants and 2 (28.5%) had evacuation. Six (85.7%) patients received anticoagulants. Oral warfarin was used in all of these six cases throughout the first trimester. One (14.3%) of these patients ended in spontaneous abortion. One (14.3%) patient had blighted ovum and intravenous heparin was replaced for warfarin 24 hours before evacuation at 12 weeks of gestation. The remaining 4 (57%) patients continued warfarin through second trimester, and replaced by subcutaneous heparin at 34 weeks in 3(42.8%) patients and at 36 weeks in one (14.3%) patient. Coagulation monitoring, which was carried out in only 3 (42.8%) cases, revealed ineffective thromboprophylaxis. Ampicillin and gentamycin was given intravenously at start of labour and then 8 hourly for 48 hours in 6 (85.7%) patients. Antenatal antibiotic prophylaxis was provided only to 1 (14.3%) patient by benzathaine penicillin (penidure-LA, Wythe) 1.2 x 10⁶ units per month. Diuretics, digoxin and beta blockers were prescribed according to individual requirements of patients. Two patients developed pulmonary oedema treated effectively in the intensive care unit I.C.U. There was no mortality in this study. A concerted effort by all the concerned specialities in patients management is necessary to ensure safe outcome. The role of subcutaneous instead of intravenous heparin for prophylaxis in pregnancy should be evaluated by further studies.

Key words: Mitral valve disease, pregnancy

Heart disease in pregnancy is a serious state for the patient and a worrying condition for the obstetrician. The prevalence and incidence of all heart diseases in pregnancy varies between 0.3% to 3.5%¹. The patients usually seen in pregnancy with congenital heart disease, (mitral valve prolapse and atresia, atrial and ventricular septal defects, Eisenmenger syndrome and cyanotic heart diseases) are those who have had corrective surgery in childhood and who have haemodynamically stable status.

Rheumatic heart disease still remains the most common cardiac disorder in the third world despite being almost total eradication in the western countries. It is closely related to streptococcal pyogenes pharyngitis. The cardiac sequel of rheumatic fever remains the most common cause of valvular heart disease complicating pregnancy². The dominant valvular lesion is usually has been mitral stenosis. With chronic rheumatic fever, fibrosis, thickening and contracture of leaflets lead to regurgitation³.

The marked haemodynamic changes of pregnancy have a profound effect on underlying mitral stenosis. The most important consideration is increase in cardiac output (CO) by as much as 30% to 50% with a peak by mid pregnancy. Patients with normal cardiac function comply with these physiological changes without difficulty. The

patients with cardiac disease however may be at a significant risk of morbidity and mortality when faced with these changes⁴. Sometimes pregnancy may unmask a previously asymptomatic cardiac condition.

Treatment of valvular heart disease, specially mitral valve problems has been deeply modified by the experience acquired since the introduction of valve replacement and the technical advances in this field in the last decade⁵. Prosthetic cardiac valves have been available for 35 years and during this period a great many design changes have been undertaken⁶. Harken et al and Starr accomplished the first successful valvular replacement in 1960. The porcine bioprosthesis became suitable for valve substitute in 1969. Anticoagulation is not required with this valve. The ball valve prosthesis developed by Starr-Edwards was the earliest to be applied clinically and has shown an excellent record of durability. Some of the first Starr-Edwards valves have been functioning successfully for 30-35 years. Tilting disc prosthesis (Bjork Shiley) was developed in 1972. Many other prosthetic valves have been evolved, including Lillehei-Kaster in 1971, Medtronic Hall in 1977 and Duromedics in 1982. In addition to material and design changes and improvements, there have been continuing advancement in the investigative techniques, operative management

and postoperative care⁶.

Symptomatic heart failure remains the primary indication for mitral valve replacement, when medical measures are unsuccessful¹³. With successful repair many of these women now are likely to attempt pregnancy. In some instances surgical correction of valvular lesions have been performed even during pregnancy with good outcome.

The pregnant patients with artificial valve have an increased incidence of thromboembolism and infective endocarditis so life long anticoagulation is required in form of warfarin, however due to its teratogenesis heparin is given in first trimester and in last 4 weeks of pregnancy. Modified Hirsch's regimen⁷ is not applicable now days due to teratogenic effects of warfarin. Similarly to avoid the risk of endocarditis, vigorous antibiotic cover is given during, antenatal period, labour and surgical procedures⁸.

With the rapidly changing face of cardiac surgery in our set-up, we have started to see cases of successful mitral valve replacement presenting with pregnancy. This study was conducted to evaluate the incidence, outcome and complications of pregnant patients who have had earlier mitral valve replacement.

Material and method

This study was carried out at Services Hospital during the period 15.8.95 to 14.8.96. The patients presenting in labour ward with pregnancy and with history of mitral valve replacement were included in the study. Booking status of the patient was disregarded. The patients who had undergoing valvotomy, commissurotomy, valvuloplasty and surgical correction of congenital lesions were excluded from the study. The patients undergoing therapeutic termination were also excluded. A detailed account of the present, past and menstrual history were obtained. Information regarding social status and parity was also collected. The events of pregnancy, labour and puerperium were also recorded and any adverse event noted. The information was obtained according to a specially designed Performa and the data obtained was pooled on a computer database. The results were compiled and analysed.

Results

During the period of study 7 patients with pregnancy and mitral valve replacement were analysed. Age distribution is shown in table-1. Minimum parity was zero and maximum was 5 with mean figure of 1.5 ± 2 . Four (57%) patients were booked at teaching hospital (with 1-2 visits only) and 3(42.9%) were un-booked. Two (28.5%) patients had previous home deliveries, 1(14.3%) had

previous hospital delivery and 1(14.3%) had both hospital and home deliveries. Six (85.7%) patients were uneducated.

Table 1: Patient distribution

Criteria	Min	Max	Meant±SD
Age	21	35	26.88±4.64
Gravida	1	6	2.2±1.57
Para	0	5	1.1±1.57
Abortions	0	1	0.2±0.39

Table 2: Type of valve

Type	No. of patients	Percentages
Starr-Edwards	5	71.5
Bjork Shiley	1	14.3
Porcine	1	14.3

Table 3. Obstetric outcome

Outcome	n=	Percentage
Blighted ovum	1	14.3
Spontaneous abortion (,20wks)	1	14.3
21-37 weeks	4	57
>38 weeks	1	14.3

The types of valve prosthesis are shown in table 2, majority (71.5%) being of Starr-Edwards type. Table 3 reveals obstetric out come of these patient. No foetal congenital anomalies were noted. 4(57%) patients had preterm delivery. NYHA functional cardiac class is shown in table IV. showing the efficacy of valvular surgery. Five (71.5%) patients were delivered vaginally out of which 2 (28.5%) patients developed signs and symptoms of pulmonary oedema for which they were treated in the intensive care unit (I.C.U).

Drug therapy is evident by table V and table VI. 6 (71.5%) patients received anticoagulants. All these (71.5%) patients continued warfarin in the first trimester. One (14.3%) of these patients ended in spontaneous first trimester abortion. One (14.3%) patient had blighted ovum at 12 weeks of gestation and intravenous heparin was replaced for warfarin 24 hours before evacuation. The remaining 4 (57%) patients continued oral warfarin through second trimester and replaced by subcutaneous heparin at 34 weeks in 3 (42.8%) cases and at 36 weeks in 1 (14.3%) patient (table 6). There were no maternal side effects or increased tendency to bleed. Coagulation control was monitored by prothrombin time (PT), activated partial thromboplastin time (APTT) and platelet count in 3 (42.8%) cases. They all revealed inadequate anticoagulation. INR was not carried out in any of these patients.

Regarding antibiotic prophylaxis only 1(14.3%) patient was given Benzathaine penicillin (penidure-LA, Wythe) 1.2×10^6 units per month during, the antenatal period. The other 6 (85.7%) of 7 cases received ampicillin (2 gm) and gentamycin (120 mg) intravenously in single

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doses at the start of labour and then 8 hourly for 48 hours.

Table 4. NYHA staging

Stage	n=	Percentage
I	2	28.5
II	3	42.8
III	1	14.3
IV	0	0

Table 5. Drug therapy

Drug	n=	Percentage
Anticoagulants	6	85.7
Inotropes	3	42.8
Diuretics	4	57
Antibiotics	6	85.7

Table 6. Types of anticoagulants

1 st Trimester	2 nd Trimester	3 rd Trimester	n=r	%age
Warfarin	Warfarin	Warfarin	0	0
Warfarin	Warfarin	S/C Heparin	4	14.3
Warfarin + I/V Heparin	-	-	1	14.3
Warfarin	-	-	1	14.3
I/V Heparin	Warfarin	I/V Heparin	0	0
S/C Heparin	Warfarin	S/C Heparin	0	0

One (14.3%) patient received hydrochlorothiazide (Moduretic, MSD) during antenatal period in-patient with stage III (NYHA). In another 1(14.3%) case oral frusemide (lasix, HoechstHoechst) was advised for pulmonary hypertension along with potassium supplement to avoid hypokalaemia. Intravenous frusemide was required in 4(57%) cases during labour.

One (14.3%) patient received digoxin during antenatal period for tachycardia and the other one (14.3%) case required this during labour. Aspirin was given in one (14.3%) patient as prophylactic measure. Atenolol was required in one (14.3%) patient during the antenatal period. None of the patients in our study had echocardiography being done during pregnancy. There were no mortalities.

Discussion

Rheumatic mitral valve disease still results in significant morbidity and mortality. Valve replacement offers a second life to some of these patients who without it surely would have died. The incidence of pregnancy with mitral valve replacement in our study is 0.2%. A literature search did not reveal the incidence of mitral valve replacement in pregnancy. Mitral valve replacement has revolutionised the management of obstetric patients with severe mitral stenosis. Reports of subsequent and successful pregnancy outcome are now quite numerous and indeed successful pregnancies have followed replacement of even three heart valves by prosthesis⁹.

Due to proximity of Punjab institute of cardiology to Services Hospital, many patients with cardiac disease present and end up in Services hospital. In our series the

patients having Starr-Edwards mechanical prosthesis did well in pregnancy and labour with good haemodynamic outcomes. One (14.3%) patient who received porcine bioprosthesis 10 years back developed signs and symptoms of heart failure and pulmonary congestion (NYHA IV), rapidly deteriorating postpartum reflecting probable degeneration of bioprosthesis. At the same time it was noted that remarkable physiological changes of pregnancy caused slight deterioration of haemodynamic status and cardiac functional class (NYHA) of the patient (table IV).

Women with prosthetic valves pose unique problem during pregnancy. Their haemodynamic reserve is usually more than adequate for safe pregnancy. Majority of our patients had good functional reserves (table 4) demonstrating the efficacy of valvular surgery in alleviating symptoms. The major problem with prosthetic valve is increased incidence of infective endocarditis and thromboembolism. So these patients require permanent anticoagulation especially during pregnancy¹¹. Heparin is a better anticoagulant in the first trimester and last 4 weeks of pregnancy with second trimester covered by oral warfarin as warfarin given in first trimester may cause remarkable embryopathy¹². However in our study 6 out of 7 patients received oral warfarin throughout first trimester. In only one patient it was replaced by intravenous heparin 24 hours before evacuation at 12 weeks of gestation. Another patient ended up in spontaneous abortion and in remaining 4 cases warfarin was continued through second trimester to be replaced by subcutaneous heparin at 34 weeks in 3 cases and at 36 weeks in 1 case as shown in table VI.

The obstetric outcome with this above mentioned regimen is shown in table III. There were no maternal side effect or fetal anomaly. One patient did not receive anticoagulant at all (having bioprosthesis) due to late presentation. Two patients developed pulmonary oedema for which they were treated in intensive care unit (ICU).

Though subcutaneous heparin is considered to deliver subclinical dose for thromboembolic prophylaxis but in our study none of the patients on subcutaneous heparin, developed thromboembolism. Subcutaneous heparin as a prophylaxis would be a better choice if possible, considering patient's compliance and ease of management. We propose that the role of anticoagulants be reappraised as pregnancy itself is a thrombogenic condition. Further trials in this aspect are necessary. Our study is relatively small to rule out definite recommendations regarding this aspect. Monitoring of coagulation is mandatory in all these cases. Serial INR estimation is a better method as standard values of prothrombin time (PT) and activated partial thromboplastin time (APTT) may vary from laboratory to laboratory. It is equivalent to a PT ratio of 1.8. It should

lie between 3.5 to 4.5. Subcutaneous heparin is continued through labour to avoid risk of thromboembolism in the days following labour and delivery¹³. Intravenous heparin if used is temporarily stopped during labour. The findings of our study correlates well with Liang, -BL & Chen, -FR regarding management and outcome¹⁴.

Prosthetic valve endocarditis is a constant risk and prophylactic antibiotics are required for all dental and surgical procedures and during labour³. We, as others in our study, recommend the use of ampicillin (2 gm) and gentamycin (120 mg) intravenously as a bolus dose at start of labour and then 8 hourly for 48 hours in all patients with prosthetic valve during labour and major and minor surgical procedures (caesarean section and evacuation and curettage) to avoid the risk of endocarditis⁸. In accordance with reference⁸. Regular antibiotic prophylaxis during antenatal period is also required even in uncomplicated patients with valve replacement as it poses an additional risk factor for development of infective endocarditis⁸. In our study only 1 patient received benzathine penicillin (penidure-LA, Wythe) 1.2 x 10⁶ units per month in the antenatal period. This patient had off and on low-grade fever throughout pregnancy and the drug was used to prevent development of infective endocarditis, in this patient with prosthetic valve.

Digoxin in pregnant patients with prosthetic valve is required only in those patients with history of tachycardia as the patients may develop systemic embolism. Only 2 of our patients received digoxin. Similarly diuretics (hydrochlorothiazide and frusemide) are not needed in every patient but only in those patients with definite signs and symptoms of pulmonary hypertension (table V). We recommend cautious diuretic use in pregnancy as they may effect the placental efficiency and endanger the fetus.

Regular echocardiography is essential during the antenatal period especially during the first, and the third trimester as the patient may move to a higher NYHA stage in a very short time span. Labour itself imparts special risks due to vigorous fluid shift. Regular assessment of haemodynamic and cardiac status by echocardiography is mandatory in all patients with valve replacement. None of our patients had echocardiography in the antenatal period due to lack of facilities, and lack of education, and ignorance of the patients and above all failure of recognition of this serious matter by the physicians to realise the severity of situation themselves. Unluckily the small number of patients presenting with cardiac problem make them transparent to the health policy makers and leading professionals alike in this field. This attitude contributes to marked maternal and fetal morbidity and mortality in this patient group.

As there is increased risk of spontaneous abortions, still births, low birth weight and malformed fetuses in patients with prosthetic valves (table III). So pregnancy should be undertaken by these patients only after serious consideration⁵. There is dire need for pre-pregnancy counselling clinics in such patients with these pathologies to help these patients plan their pregnancy. Oral contraceptives containing oestrogen and progestogen are contraindicated in women with prosthetic valves due to their possible thrombogenic potential. A smaller family size should be recommended. Satisfactory Contraception can be achieved, however, by using traditional barrier techniques but they do not always work. A smaller family size should be recommended and a permanent method like sterilisation should be recommended where possible. The husband should be counselled regarding vasectomy instead of female sterilisation if desired possible.

The chances of success in these patients depends on their haemodynamic status, the state of their valves, vigilance of physicians in realising dangers and signs and symptoms of underlying cardiac pathology and preventing complications. The possible effects on child of drugs given to the mother and (in certain cases) the risk of the child inheriting the parental disease must be considered¹⁶. Indeed with meticulous antepartum and intrapartum care, including access to appropriate facilities and personnel, most patients with a cardiac valve replacement may deliver a healthy new-born, without significant adverse maternal sequelae¹⁷. In every case, optimal care should be provided by a team including an obstetrician, a perinatologist, a neonatologist, a cardiologist and an anaesthetist to ensure satisfactory outcome.

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