Maternal and Fetal Outcome in Pregnanacies Complicated by Rheumatic Heart Disease: A Single-Centre Experience

MONA M. SHABAN, M.D.* and ABIR ZAKARIA, M.D.**
The Departments of Obstetrics & Gynecology* and Internal Medicine**, Faculty of Medicine, Cairo University

Abstract

Objectives: To assess maternal and fetal outcome in pregnancies complicated with RHD (Rheumatic heart disease).

Methods: A retrospective study which was carried out in high risk pregnancy unit over 18 months duration on 156 women having RHD (not having any valvular surgery). All patients had a multi dispensary team follow up of obstetrician, cardiologist and obstetric anesthesiologist all through their pregnancy with interpretation of fetal and maternal outcome.

Results: Women who had RHD were 92% of all pregnant cardiac patients in our unit, mean maternal age 28.6±4.5ys; mean gestational age at time of termination 37.4±3.2ws. MS (mitral stenosis) was the commonest lesion (76.9%) either alone or associated with other lesions. 94.2% of patients were NYHA (New York heart association) class 1, 11. Regarding the mode of delivery it was 51 vaginal deliveries (32.7%), 102 CS (65.4%) and 3 abortion (1.92%). No maternal mortality, 12 maternal morbidities (acute pulmonary edema, sub rectus hematoma, puerperal sepsis, sub acute bacterial endocarditis). 3 IUFD and 6 neonates needed assisted ventilation.

Conclusion: RHD is still a common disease in Egypt. Maternal and fetal morbidity and mortality are correlated with maternal cardiac functional classification.

Key Words: Rheumatic heart disease — Pregnancy — Maternal outcome — Fetal outcome.

Introduction

The incidence of heart disease with pregnancy varies from one region to another with a global incidence around 1%. It's predominant in developing countries and still is a common indirect cause of maternal mortality III.

Heart disease with pregnancy is commonly due to rheumatic heart disease, congenital abnormalities and less commonly due to ischemic heart or cardiomyopathy. In Egypt heart disease is a common cause of maternal mortality [2].

Recently rheumatic fever decreased in the developed countries but remains a serious problem in the developing countries. Rheumatic mitral stenosis is the most common abnormality encountered during pregnancy and may complicate by atrial fibrillation (AF) and pulmonary edema during pregnancy or shortly after labor.

The severity of heart disease is classified according to New York heart association classification (NYHA) into 4 classes; class III and IV carry a significant risk of maternal mortality [3,4].

The main physiological changes during pregnancy are increased blood volume, heart rate, cardiac output and increased peripheral vascular resistance reaching their maximum between 20 and 24 weeks gestation and remain till delivery. All these changes increase the burden on the diseased heart, in addition the early postpartum period is the most critical period because of despite the external bleeding the cardiac output increased by 60% to 80% because of decompression of the inferior vena cava by the pregnant uterus and shift of blood from contracted uterus [5].

To improve maternal and fetal outcome in patients having rheumatic heart disease with pregnancy a multidisciplinary team approach including cardiologist, obstetrician, and obstetric anesthesiologist is mandatory. Maternal and fetal morbidity are correlated with the functional class; Patients with tight mitral stenosis, NYHA class III and IV carry a significant risk (5-15%) of maternal mortality [3].

Timing and mode of delivery is shared decision of both obstetrics and cardiology, in general vaginal delivery with proper analgesia and shortening of the second stage is more preferable than Cesarean section (so long there is no contraindications for delivery)
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vaginal delivery) which carries more complications. Whatever the mode of termination strict fluid monitoring is mandatory in moderate and severe cases especially in early perpurium which is associated with increased blood volume, increased possibility of heart failure and pulmonary edema [6].

Antibiotic prophylaxis against infective endocarditic is mandatory before vaginal or cesarean section however recently the American Heart Association/American College of Cardiology practice guidelines doesn't recommend antibiotic prophylaxis for uncomplicated vaginal or cesarean section on basis of studies indicate low risk of bacteremia associated with these procedures [7].

The possible complications of rheumatic heart disease with pregnancy may maternal or fetal complications, maternal complications include pulmonary edema, heart failure, arterial fibrillation, embolisation, infective endocarditis and maternal death. Fetal complications are intrauterine growth restriction and prematurity.

Patients and Methods

It is a retrospective study which was carried out in high risk pregnancy unit, Obstetrics and Gynecology Department, Cairo University Hospital, Egypt; over 18 months duration on total 156 patients having rheumatic heart disease (not having valve replacement or any other cardiac surgery).

The research protocol was approved by Ethics Committee of Obstetrics and Gynecology Department; Cairo University.

Each patient was managed by co management of both obstetrician and cardiologist. The frequency of visits was every 2 weeks till 30 weeks (in uncomplicated cases) and thereafter every week till delivery.

In first visit full history, cardiac examination, obstetric examination and ultrasound, echocardiography, diagnosis of type and severity of the lesion, functional grade according to NYHA classification (New York heart association classification) were done.

Each visit obstetric ultrasound was done to assess fetal growth and wellbeing, cardiological clinical assessment to assess any change in the functional class (NYHA). Hospitalization was indicated whenever any cardiac or obstetric indications, antibiotic prophylaxis was advised before any surgical procedure and peripartum.

The time and mode of termination was a shared decision of both the cardiologist and the obstetrician according to the functional grade, obstetric indications and any cardiac or obstetric complications. In this study we commented on mode and time of termination of pregnancy, indication of termination, maternal and fetal complications, maternal ICU admission and its duration.

Assessment of fetal outcome was regarding birth weight, prematurity (37 weeks), still birth, intrauterine fetal death and neonatal death.

Statistical analysis:

Data were entered into a computer database using Microsoft Excel software and analyzed with SPSS version 15 and epi info 2002 statistical package. Results are presented in frequencies, percentages and summary statistics. Comparison of categorical variables was by computing the CHI square test, while students'- test was used to compare two means and ANOVA test was used to compare more than one mean. Observed differences between two samples were considered statistically significant where p<0.05.

Results

Regarding maternal age it was ranging from 19 to 41 years old (mean 28.6±4.5 years), mean maternal age of cases terminated with CS was 28.8±4.4 years and in vaginal deliveries was 27.6±3.7 years.

Gestational age at the time of termination was ranging from 16 to 40 weeks (mean 37.4±3.2 weeks), in cases terminated by CS the mean gestational age was 37.7±1.24 weeks and in cases terminated by vaginal deliveries was 38.1±0.6 weeks.

Rheumatic heart lesions' distribution among our patients is shown in Table (1).

The mode of termination in different valvular lesions is shown in Table (2).

Table (3) shows the distribution of NYHA class; Most of our patients were in class I and II NYH (94.2%).

Among the 66 patients, who had a mitral valve area of <1.5 cm², only 3 patients (4.54%) were in the NYHA class III-IV group.

The clinical features in different NYHA classification is shown in Table (4).
There is no statistical difference between NYHA class I, II and NYHA class III, IV regarding maternal age, gestational age at time of termination and fetal weight.

Regarding the obstetric outcome we have 3 abortions, 102 CS and 51 vaginal deliveries Table (5).

Indications of CS were 30 cases for cardiac reasons, 66 for obstetric reasons and 6 cases for combined cardiac and obstetric reasons.

All cases class III & IV were terminated by CS.

Regarding maternal complications they were encountered in 12 cases (acute pulmonary edema, sub rectus hematoma, puerperal sepsis and one case of sub acute bacterial endocarditis and she had valve replacement on the same setting of CS Table (6).

Postoperative maternal ICU admission was in 36 cases (23.1%) for 1-2 days only except the case who had Infective endocarditis; she underwent aortic valve replacement on the same setting of CS and spent 30 days in ICU. All cases of NYHA class III and IV had ICU admission Table (6).

Regarding fetal outcome we have three intrauterine fetal deaths (1.9%) and were terminated by vaginal delivery.

Only 6 neonates needed assisted ventilation (3.8%), all were delivered at 38 weeks gestation, with fetal weight 3100 to 3200gm. Three neonates the mother had acute pulmonary edema and the other three neonates; the mother had severe pulmonary hypertension; we believe the need for assisted ventilation is based on the adverse maternal conditions instead of the time of delivery or the fetal weight.

Table (1): Distribution of different cardiac lesions among our patients.

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Total (156 women)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS (Mitral stenosis)</td>
<td>30 (19.2%)</td>
<td>63 (40.4%)</td>
<td>27 (17.3%)</td>
<td>120 (76.9%)</td>
</tr>
<tr>
<td>MR (Mitral regurge)</td>
<td>57 (36.5%)</td>
<td>42 (26.9%)</td>
<td>15 (9.6%)</td>
<td>114 (73.1%)</td>
</tr>
<tr>
<td>AS (Aortic stenosis)</td>
<td>0 (0.0)</td>
<td>3 (1.9%)</td>
<td>9 (5.8%)</td>
<td>12 (7.7%)</td>
</tr>
<tr>
<td>AR (Aortic regurge)</td>
<td>36 (23.3%)</td>
<td>24 (15.4%)</td>
<td>6 (3.8%)</td>
<td>66 (42.3%)</td>
</tr>
<tr>
<td>TS (Tricuspid stenosis)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>3 (1.9%)</td>
<td>3 (1.9%)</td>
</tr>
<tr>
<td>TR (Tricuspid regurge)</td>
<td>33 (21.15%)</td>
<td>18 (11.55%)</td>
<td>6 (3.8%)</td>
<td>57 (36.5%)</td>
</tr>
<tr>
<td>PS (Pulmonary stenosis)</td>
<td>0 (0.0)</td>
<td>3 (1.9%)</td>
<td>0 (0.0)</td>
<td>3 (1.9%)</td>
</tr>
<tr>
<td>Pulmonary hypertension</td>
<td>30 (19.2%)</td>
<td>18 (11.5%)</td>
<td>15 (9.6%)</td>
<td>63 (40.4%)</td>
</tr>
</tbody>
</table>

Table (2): Pregnancy outcome in women having Rheumatic heart according to their valvular lesion.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Abortion no</th>
<th>NVD no</th>
<th>CS no</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS (Mitral stenosis)</td>
<td>Mild</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Mod</td>
<td>30</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>3</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>3</td>
<td>21</td>
<td>33</td>
</tr>
<tr>
<td>MR (Mitral regurge)</td>
<td>Mod</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>Severe</td>
<td>6</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>AS (Aortic stenosis)</td>
<td>Mild</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>(severe)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>AR (Aortic regurge)</td>
<td>Mod</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Severe</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>TS (Tricuspid stenosis)</td>
<td>Mild</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>(severe)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>TR (Tricuspid regurge)</td>
<td>Mod</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Severe</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>6</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Pulmonary hypertension</td>
<td>Mod</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>3</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>AF (Atrial fibrillation)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
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Table (3): Different NYHA (New York heart association) classification among the included Rheumatic heart pregnant women.

<table>
<thead>
<tr>
<th>NYHA class</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>NYHA I</td>
<td>111</td>
<td>71.1</td>
</tr>
<tr>
<td>NYHA II</td>
<td>36</td>
<td>23.1</td>
</tr>
<tr>
<td>NYHAIII</td>
<td>3</td>
<td>1.9</td>
</tr>
<tr>
<td>NYHAIV</td>
<td>6</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Table (4): Differences between NYHA classes as regards their socio demographic Characteristics and mean Gestational age and mean neonatal weight.

<table>
<thead>
<tr>
<th>Variable</th>
<th>NYHA I&amp;II</th>
<th>NYHA III&amp;IV</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>28.55±4.56</td>
<td>31.0±3.6</td>
<td>0.36</td>
</tr>
<tr>
<td>GA (wks)</td>
<td>37.5±3.3</td>
<td>35.7±1.5</td>
<td>0.33</td>
</tr>
<tr>
<td>Fetal wt (grams)</td>
<td>2880.6±589.3</td>
<td>2766.7±251.7</td>
<td>0.74</td>
</tr>
</tbody>
</table>

Table (5): Mode of termination.

<table>
<thead>
<tr>
<th>Mode of termination</th>
<th>VD (Vaginal delivery)</th>
<th>CS (Caesarean section)</th>
<th>Abortion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>51 (32.6%)</td>
<td>102 (65.3%)</td>
<td>3 (1.9%)</td>
</tr>
</tbody>
</table>

Table (6): Maternal morbidity, mortality, ICU (intensive care unit) admission among our patients.

<table>
<thead>
<tr>
<th>Maternal morbidity/mortality (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal mortality</td>
</tr>
<tr>
<td>Infective endocarditis</td>
</tr>
<tr>
<td>Acute pulmonary edema</td>
</tr>
<tr>
<td>Puerperal sepsis</td>
</tr>
<tr>
<td>Sub rectus hematoma</td>
</tr>
<tr>
<td>AF (atrial fibrillation)</td>
</tr>
<tr>
<td>ICU admission all</td>
</tr>
<tr>
<td>Class I and II NYHA</td>
</tr>
<tr>
<td>Class III and IV NYHA</td>
</tr>
</tbody>
</table>

Discussion

RHD is prevalent in developing countries and still is a common indirect cause of maternal mortality [11].

Although pregnancy hemodynamic changes can be tolerated by normal heart; it increase the burden on the diseased heart and in addition labor pose an extra cardiovascular burden due to contractions, pushing, and the auto-transfusion that occurs after delivery which is reflected on maternal and fetal outcome [5].

Vaginal delivery is more preferable than caesarean section except if there is an obstetric indication for CS because less incidence of infection, post operative thrombophlebitis and blood loss. The spontaneous vaginal delivery is more preferable than induction of labor however prolonged deliveries should be avoided by proper analgesia (epidural analgesia), proper fetal and maternal monitoring (strict monitoring of fluid balance) and shortening of the second stage [8].

Rheumatic heart disease constitutes about 92% of all pregnant cardiac women referred to our unit.

Mitral stenosis was the commonest lesion (76.9% of our cases in different severity either as a single lesion or accompanied with other valvular lesions) and this was in agreement with Bhatla et al., Abdel-Hady et al. and Desai et al. [9-11].

Among the 66 patients, who had a mitral valve area of <1.5cm$^2$, 3 patient (4.54%) was in the NYHA class III-IV group.

The mean gestational age at time of termination is mean 37.4±3.2 weeks; there is no statistical difference between cases terminated by vaginal delivery or caesarean section.

Patients in class NYHA I and II constitute 94.2% of our patient which was similar to the other series [1,9,10,12].

AF was reported in 3 patients only (1.9%) that was similar to James et al. [13] and Silversides et al. [14] who stated that AF is less likely to occur in women of child-bearing age than in older patients.

Regarding mode of termination we have 51 cases (32.7%) had vaginal deliveries and 102 cases (65.4%) were terminated by caesarean section and 3 abortion (1.92%). The incidence of caesarean section among rheumatic heart disease patients in our study were similar to Abdel-Hady et al. [10], and much more higher than Faiz et al. [15], Cabral et al. [16], Walkiria et al. [17] and Samuel et al. [18].

Indications for CS were 30 cases for cardiac reasons, 66 for obstetric reasons (failure of progress, fetal distress, previous CS) and 6 cases for combined cardiac and obstetric reasons and all cases of NYHA class III, IV were terminated by CS.

Regarding fetal outcome we have 3 intrauterine fetal death (1.9%), and were terminated by vaginal delivery.

Only 6 neonates needed assisted ventilation (3.8%), all were delivered at 38 weeks gestation by CS, with fetal weight ranged from 3100 to 3200. 3 neonates; the mother had acute pulmonary edema and the other 3 neonates the mother had sever pulmonary hypertension; we believe the need for
assisted ventilation is based on the adverse maternal conditions instead of the time of delivery or the fetal weight.

Fetal outcome has no statistical significant difference between different classes of NYHA in contrast with Perloff et al. [19], McFaul et al. [20] and LIU et al. [21].

We have no maternal mortality and only 12 maternal morbidities in the form of acute pulmonary edema, sub rectus hematoma, puerperal sepsis, one case of sub acute bacterial endocarditis and she had valve replacement on the same setting of CS.

Only 36 cases (23.1%) needed postpartum ICU (intensive care unit) admission for 1 to 2 days only except the one who had aortic valve replacement on the same session of CS stayed for 30 days.

**Conclusion:** RHD is still a common disease in Egypt. Maternal and fetal morbidity and mortality are correlated with maternal cardiac functional classification.

**Acknowledgment:**

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**Declaration of Interest:**

The authors report no declarations of interest.

**References**


