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## Original Research Article

# Perinatal outcomes in pregnant women with heart disease: Hospital General León experience

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## ABSTRACT

**Background:** Pregnancies in patients with heart disease are often complicated. The prevalence in our country is at 0.1 to 4%. An increase in the morbidity and mortality of pregnant patients with heart disease was observed, so it is recommended to evaluate the maternal risk with the WHO Classification. The objective of the study was to determine adverse outcomes; cardiac, obstetric and fetal/neonatal.

**Methods:** We retrospectively studied all pregnancies of women with heart disease that were presented on an outpatient basis in the period of 4 years at the General Hospital of León and maternal, obstetric and fetal/ neonatal outcomes were reviewed.

**Results:** In our study population, no maternal or fetal mortality was observed. Of 16 pregnancies of patients with heart disease were complicated by adverse cardiac events (2 of 16), obstetric (9 of 16), fetal/ neonatal (6 of 16). Hospitalization was required during the pregnancy of 11 patients. WHO class IV was the only group in which there were adverse cardiac events. 12 pregnancies were interrupted abdominally. Low fetal growth curve was observed in 6 of the 16 patients.

**Conclusions:** Pregnancies in patients with heart disease have a high risk of cardiac, obstetric and fetal / neonatal complications. Therefore, preconceptionally counseling and specialized multidisciplinary management should be offered to reduce perinatal morbidity and mortality.

**Keywords:** Adverse outcomes, Heart disease, Pregnancy

## INTRODUCTION

With the successful repair of different congenital heart diseases in childhood, a large percentage of patients survive to adulthood.<sup>1</sup> Part of these patients have as expectations to have children in the future. However, there is also a group of patients in which they do not know about heart disease and therefore this group is the one that is related to an increase in maternal mortality.<sup>2-4</sup> Preconceptional counseling should be offered by a specialized multidisciplinary team to assess cardiac function and structural defects to all women with congenital heart disease who want pregnancy.<sup>5</sup> Currently,

0.2-4% of all pregnancies in industrialized, western countries are complicated by cardiovascular diseases.<sup>6,7</sup>

In the western world, congenital heart disease is the most frequent cardiovascular disease during pregnancy (75-82%), with a predominance of shunts (20-65%).<sup>8,9</sup> Rheumatic valvular disease dominates in non-Western countries and comprises 56-89% during pregnancy. Cardiomyopathies are rare, but they are serious causes of complications.<sup>10</sup> Several scoring systems have been developed to try to staminate the maternal cardiovascular risk, as well as the contraindications for pregnancy. It is recommended to stage the maternal cardiovascular risk according to the modified classification of the World

Health Organization (WHO) (Table 1 and 2).<sup>11</sup> Pregnancy induces hemodynamic changes, which can be poorly tolerated in women with congenital heart defects. Although maternal mortality is reported very rarely, maternal and fetal/ neonatal complications are much more frequent numerically.<sup>12,13</sup>

The objective of this study was to determine adverse outcomes, which occur in pregnant women with known and unknown heart disease. We estimated the cardiac, obstetric and fetal / neonatal outcomes that occurred in patients of our hospital who attended on an outpatient basis.

**Table 1: Modified classification of the World Health Organization of maternal cardiovascular risk and its application, modified by Thorne et al.<sup>11</sup>**

Risk class	Risk of pregnancy according to disease
I	No increase in detectable risk of maternal mortality and no increase or slight increase in morbidity
II	Slightly increased risk of maternal mortality or moderate increase in morbidity
III	Significantly increased risk of maternal mortality or serious morbidity. Guidance from a specialist is required. If it is decided to continue the pregnancy, intensive cardiac and obstetric monitoring is needed by specialists throughout the pregnancy, delivery and puerperium
IV	Extremely high risk of maternal mortality or serious morbidity; contraindicated pregnancy. If the pregnancy takes place, its interruption should be assessed. If the pregnancy continues, attention according to class III

**Table 2: Cardiovascular risk classification WHO, adapted from Thorne et al.<sup>11</sup>**

WHO I	WHO III
Not complicated, small or light. <ul style="list-style-type: none"> <li>• Pulmonary stenosis.</li> <li>• Permeable Ductus arteriosus.</li> <li>• Prolapse of the mitral valve.</li> </ul>	Mechanical valve
Simple lesions repaired successfully (atrial or ventricular septal defect, patent ductus arteriosus, abnormal pulmonary venous drainage).	Systemic right ventricle.
Ectopic auricular or ventricular heartbeat, isolated.	Circulation of Fontan.
<b>WHO II o III</b>	Cyanotic heart disease (not repaired).
<b>WHO II (If otherwise good and there are no complications)</b>	Another complex congenital heart disease.
Atrial or ventricular septal defect not operated.	Aortic dilatation 40-45mm in Marfan syndrome.
Tetralogy of Fallot repaired.	Aortic dilatation 45-50mm in aortic disease associated with bicuspid aortic valve.
The majority of arrhythmias.	<b>WHO IV (contraindicated pregnancy)</b>
<b>WHO II-III (depending on the person)</b>	Pulmonary arterial hypertension from any cause.
Light left ventricular dysfunction.	Severe systemic ventricular dysfunction (LVEF <30%, NYHA III-IV).
Hypertrophic cardiomyopathy.	Previous peripartum cardiomyopathy with any residual impairment of left ventricle function.
Valvular heart disease or tissue that is not considered WHO I or IV.	Severe mitral stenosis, severe systemic aortic stenosis.
Marfan syndrome without aortic dilation. Aorta < 45mm in aortic disease associated with bicuspid aortic valve.	Marfan syndrome with dilated aorta > 45mm. Aortic dilatation > 50mm in aortic disease associated with bicuspid aortic valve.
Coarctation repaired.	Severe native coarctation.

LVEF: left ventricular ejection fraction; NYHA: New York Heart Association; WHO: World Health Organization.

## METHODS

A retrospective, cross-sectional, observational and analytical study was carried out. We studied all pregnancies with known and not known heart disease that

visited the General De León Hospital on an outpatient basis. Censuses and records were reviewed during the period from March 2015 to August 2018, where interesting data was obtained. Informed consent was not obtained due to the retrospective and purely observational

design of the study. The approval was acquired by the administrative council of the General Hospital of León. The following reference data were collected: from the mother, diagnosis of heart disease, previous surgical interventions, comorbidities, body mass index (BMI), smoking history, knowledge of heart disease. Maternal cardiovascular risk assessment was performed by classifying patients according to the modified World Health Organization (WHO). Data related to pregnancy, including obstetric history (Pregnancies previously or unsuccessfully achieved) were reported; age of conception; cardiac, obstetric and fetal / neonatal complications; hospitalizations during pregnancy; the method of termination of pregnancy. It was reported that a pregnancy was complicated when adverse cardiac, obstetric or fetal/neonatal events were observed. Here we describe cardiac complications such as cardiac death, clinical signs of heart failure (requiring hospitalization or cardiac intervention), symptomatic arrhythmia, thromboembolic complications, postpartum hemorrhagic complications (>500 ml at delivery and >1000ml in caesarean section), preeclampsia (pregnancy-induced hypertension with >0.3 gr of proteinuria in the urine sample of 24 hours) (data of damage to target organ), gestational diabetes.

#### **Inclusion criteria**

- Fetal/neonatal complications that included mortality, preterm labor (delivery <37 weeks), small fetuses for gestational age (percentile <10) and intrauterine growth restriction (IUGR) (percentile <3).

#### **Exclusion criteria**

- Patients who did not collect all the previous variables.

Continuous variables are expressed as mean or median and categorical data as counts. The multivariate analysis was not performed due to the low number of adverse events.

## **RESULTS**

During the period of 4 years. A total of 20 pregnancies diagnosed with heart disease were found and examined on an outpatient basis. Of which 3 were excluded because they did not have a file to gather information and 1 when they were currently in pregnancy and therefore did not have complete perinatal results. Of the 16 patients who met the variables: The age group in which more patients were found was between 19-22 years. Of 16 patients, 10 were nulliparous, 12 of the 16 patients reached the end successfully. Of the 16 patients, abdominal via 12 and 4 were interrupted vaginally. In our study, valvular heart disease prevalence was observed in relation to our population with a total of 10 out of 16, of which 3 had aortic stenosis. The short circuit cardiopathies were 5 of

16 and only one patient with peripartum cardiomyopathy. (Table 3).

**Table 3: Cardiac injury.**

Subtype of heart disease.	No.
Peripartum cardiomyopathy	1
Rheumatic heart disease/mitral valve injury	1
Aortic stenosis	3
Pulmonary stenosis	2
Prolapse of the mitral valve/mitral insufficiency	1
Aortic insufficiency	1
Bicuspid Aortic Valve	2
Interatrial communication	2
Interventricular communication/common arteriovenous trunk/severe pulmonary hypertension	1
Ebstein's Disease/IAC/Foramen ovale permeable	1
Tetralogy of Fallot	1

IAC: Interatrial communication.

It was observed that the majority of our patients (10 of 16), had a Body Mass Index greater than 25 (Table 4).

**Table 4: Characteristics of the patients.**

Basal characteristics of the mother	No.
Maternal age	19-22 years
<b>Body mass index (BMI)</b>	
Under weight	1
Normal	5
Overweight	8
Obesity	2
<b>Modified class WHO</b>	
I	0
II	4
II-III	3
III	7
IV	2
<b>Diagnosis of heart disease</b>	
Known disease	1
Unknown disease	5
<b>No surgical management</b>	9
<b>Surgical repair</b>	2
<b>Mechanical valve</b>	5
<b>Smoking</b>	1
<b>Comorbidities</b>	
Do not	13
Chronic hypertension	2

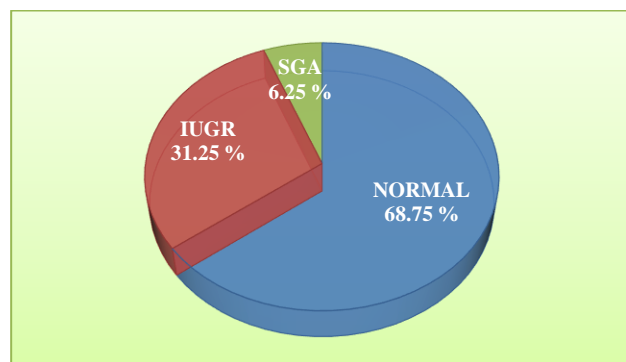
#### **Cardiac events**

Cardiac events occurred in 2 of 10 patients, who experienced dyspnea and hemodynamic instability with progression to cardiac failure, which required interruption of pregnancy after stabilization (Table 5).

### Obstetric events

Of the 16 pregnant patients' obstetric complications were observed in 9, where 4 patients had hypertensive disease of pregnancy, 4 prematurity and one patient presented obstetric hemorrhage, without the need for blood transfusion (Table 5).

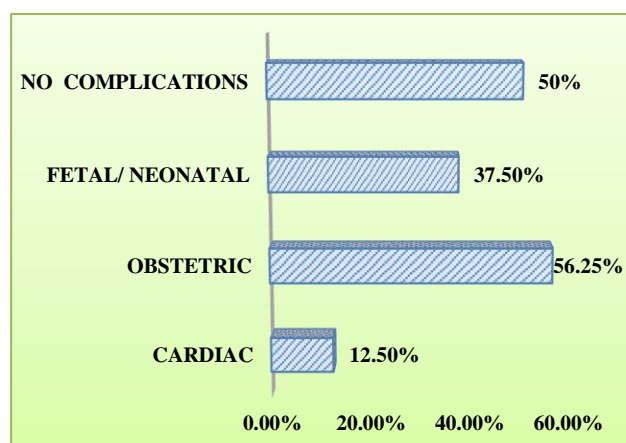
### Fetal/neonatal events



IUGR: Intrauterine Growth Restriction, SGA: Small for gestational age.

**Figure 1: Fetal growth curve.**

Fetal events were reported in 6 of 16 pregnancies. There was no fetal or neonatal mortality. The fetal growth curve of 6 pregnancies is striking. Of which 1 were below the percentile <10 and 5 below the percentile <3 (Table 5) and (Figures 1 and 2).



**Figure 2: Results of events in pregnancy cardiopathy.**

### Hospitalization during pregnancy

Of all the pregnancies that took control in the General Hospital of León, 11 of 16 patients needed hospitalization. Of these only two patients were admitted to intensive care and 4 patients remained hospitalized for hypertensive disease of pregnancy; of which 1 was classified as gestational hypertension and 3 as preeclampsia with severity data. (Table 5).

**Table 5: Adverse complications.**

Complications during pregnancy	No
<b>Cardiac complications</b>	2
Mortality	0
Dyspnoea	2
Heart failure	2
Symptomatic cardiac arrhythmia	0
Thromboembolic events	0
<b>Need for hospitalization</b>	11
<b>Obstetric complications</b>	9
Induced hypertension during pregnancy	1
Pre-eclampsia	3
Gestational diabetes	0
Obstetric hemorrhage	1
Prematurity	4
<b>Fetal/ neonatal complications</b>	6
Mortality	0
Small for gestational age	1
Intrauterine growth restriction	5

## DISCUSSION

### Cardiac events

Only two pregnancies were complicated by cardiac events; presenting dyspnea, hemodynamic instability and progression to heart failure with the need to interrupt gestation. These cardiac events were only observed in patients in WHO group IV. (Peripartum cardiomyopathy and common arteriosus trunk / VSD / severe pulmonary hypertension) increasing the risk of mortality, which agrees with that reported in the international literature.<sup>14</sup>

### Obstetric events

The main obstetric events were hypertensive diseases and Prematurity.

### Fetal/neonatal events

In our study, no fetal or neonatal mortality was observed, however, increased morbidity due to prematurity and low weight for gestational age (6/16).

Data were collected retrospectively, including information and selection bias. In addition, the study was carried out in a single medical center; General Hospital of León. This prevents safe conclusions regarding the population and any result must be interpreted with caution. However, given that the prevalence of heart disease in our country is 0.1 to 4%, our results provide information on the evolution and potential complications of pregnancy in this group of patients. In the literature there are different classifications that predict the risk of maternal complications in pregnant women with heart disease. The most used is the WHO modified risk classification, since it is the one that most correlates with maternal complications, however, there are other

prognostic classifications such as CARPREG and ZAHARA, we rely on the WHO risk classification.<sup>15</sup> Pregnancy occurs with various physiological changes, in which a woman without pathologies would have no major problem, in pregnant women with heart disease pregnancy can be harmful to both the mother and the fetus, this due to the hemodynamic changes of pregnancy, is appropriate preconceptional counseling and adequate assessment of the possible risks that pregnancy in conjunction with maternal heart disease would cause the fetus and the mother, in addition to heart disease that is not compatible with pregnancy and in this case contraindicated, some examples they are: Eisenmenger syndrome, cyanotic non-repaired heart disease and Marfan syndrome with aortic repercussions.<sup>16</sup> There are not enough studies yet to establish guidelines in pregnant women with heart disease in order to reduce the morbidity and mortality of the mother and the fetus, at the moment it is important to identify this group of patients and categorize them by risk, taking a multidisciplinary prenatal control by of cardiology and maternal fetal medicine.<sup>16,17</sup>

## CONCLUSION

Pregnancies in patients with heart disease have a high risk of cardiac, obstetric and fetal/ neonatal complications. Therefore, preconceptional counselling and specialized multidisciplinary management should be offered to reduce perinatal morbidity and mortality.

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