



## Review

## Pregnancy and delivery in cardiac disease

Titia P.E. Ruys (MD)<sup>a,\*</sup>, Jérôme Cornette (MD)<sup>b</sup>, Jolien W. Roos-Hesselink (MD, PhD)<sup>a</sup><sup>a</sup> Department of Cardiology, Erasmus Medical Center, Rotterdam, The Netherlands<sup>b</sup> Department of Obstetrics & Gynecology, Division of Obstetrics & Prenatal Medicine, Erasmus Medical Center, Rotterdam, The Netherlands

## ARTICLE INFO

## Article history:

Received 15 August 2012

Accepted 10 November 2012

Available online 3 January 2013

## Keywords:

Pregnancy  
Heart disease  
Counseling  
Delivery  
Fetal outcome

## ABSTRACT

Although its prevalence is relatively low in pregnant women, heart disease is the most important cause of maternal mortality. Problems may arise due to hemodynamic burden and the hypercoagulable state of pregnancy. Heart disease may be congenital or acquired. In developed countries, the former composes the biggest part of women with heart disease. Patients with unrepaired lesions, cyanotic lesions, diminished systemic ventricular function, complex congenital heart disease, left ventricular outflow tract obstruction, pulmonary hypertension, or mechanical valves are at highest risk of developing complications during pregnancy.

All patients with known cardiac disease should preferably be counseled before conception. Pre-pregnancy evaluation should include risk assessment for the mother and fetus, including medication use and information on heredity of the cardiac lesion. Management of pregnancy and delivery should be planned accordingly on individual bases. The types of complications are related to the cardiac diagnosis, with arrhythmias and heart failure being most common. Treatment options should be discussed with the future parents, as they may affect both mother and child. In general, the preferred route of delivery is vaginal. The optimal care for pregnant women with heart disease requires multidisciplinary involvement and is best concentrated in tertiary centers.

© 2012 Japanese College of Cardiology. Published by Elsevier Ltd. All rights reserved.

## Contents

Introduction .....	108
Epidemiology .....	108
Physiological changes in normal pregnancy .....	108
Management of pregnancy in women with heart disease .....	108
Pre-pregnancy counseling .....	108
Complications during pregnancy .....	108
Diagnosis in pregnancy .....	109
Treatment during pregnancy .....	109
Management of delivery .....	110
Delivery team .....	110
Timing .....	111
Mode of delivery .....	111
Vaginal delivery .....	111
Cesarean section .....	111
Post-partum period .....	111
Fetal outcome .....	111
Predictors .....	111
Monitoring .....	111
References .....	111

\* Corresponding author at: Erasmus Medical Centre Ba 308, P.O. Box 2040, 's-Gravendijkwal 230, 3000 CA Rotterdam, The Netherlands. Tel.: +31 10 703 2432; fax: +31 10 703 5498.

E-mail address: [p.ruys@erasmusmc.nl](mailto:p.ruys@erasmusmc.nl) (T.P.E. Ruys).

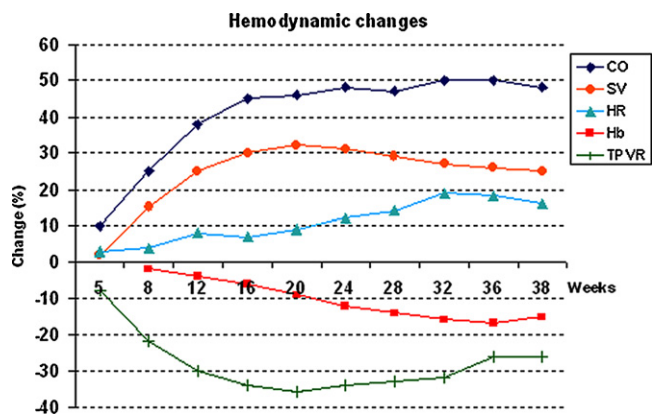


Fig. 1. Hemodynamic changes in pregnancy. CO, cardiac output; SV, stroke volume; HR, heart rate; Hb, hemoglobin; TPVR, total peripheral vascular resistance.

## Introduction

### Epidemiology

In the developed world many women with congenital heart disease are reaching childbearing age and wish to become pregnant.

While congenital heart disease is more often encountered than acquired disease in pregnant women, it seems associated with a lower risk. Acquired conditions such as aortic dissection, peripartum cardiomyopathy, and acute coronary syndrome (ACS) cause the highest maternal mortality rates [1,2]. Pregnancy increases the risk of having an ACS three- to four-fold [3]. The overall incidence of pregnancy related ACS is reported to be between 2.7 and 6.2 per 100,000 deliveries and this figure is increasing, probably due to changes in lifestyle, higher prevalence of obesity, and older age at pregnancy [3,4]. In the developing world, rheumatic heart disease remains the most common pathology [5].

### Physiological changes in normal pregnancy

Major hemodynamic changes take place during pregnancy. Total peripheral vascular resistance (TPVR) is reduced and blood volume and cardiac output are increased around 50% [6]. During labor and delivery, cardiac output is further increased as a result of uterine contractions and maternal effort [6]. After delivery, most changes are rapidly reversed in the first 2 weeks with further normalization toward preconception values after 3–12 months. Fig. 1 shows the hemodynamic changes. However, some structural changes might never completely be reversed.

In order to reduce blood loss around delivery, the production of tissue plasminogen activator (tPA), protein C and S is decreased and tPA inhibitor and factors V, VII, VIII, IX, X, XII and von Willebrand factor are increased, leading to a hypercoagulable state [7–9].

### Management of pregnancy in women with heart disease

#### Pre-pregnancy counseling

Counseling after thorough evaluation should be offered to all women of reproductive age with known cardiac disease. This should preferably be done before conception or alternatively in early pregnancy [5]. Risk for persistent deterioration of heart function may influence the choice whether to become pregnant. Pre-pregnancy evaluation should focus on identifying and quantifying risks for both mother and offspring. An exercise test (with VO<sub>2</sub> max measurements) and echocardiogram provide essential information on pre-pregnancy cardiac status and reserve.

Life expectancy and ethical aspects of parenthood should also be discussed during the pre-pregnancy consultation. Genetics and inheritance will be of special interest in some patient groups (congenital heart disease, Marfan syndrome, and hypertrophic cardiomyopathy) [5]. The advantages and disadvantages of medication should be discussed including teratogenicity. If necessary, drug schedules should be adapted. More information on medication in pregnancy can be found in Table 1.

Several risk stratification models have been described over the years. Siu et al. published the CARPREG risk score in 2001 mainly based on women with congenital and valvular heart disease. Significant predictors for adverse maternal and neonatal outcome were prior cardiac events (heart failure, transient ischemic attack, stroke before pregnancy or arrhythmia), baseline New York Heart Association (NYHA) functional class >II or cyanosis, left heart obstruction (mitral valve area <2 cm<sup>2</sup>, aortic valve area <1.5 cm<sup>2</sup>, peak left ventricular outflow tract gradient >30 mmHg by echocardiography) and reduced systemic ventricular systolic function (ejection fraction <40%) [10]. Khairy et al. found additional predictors for adverse outcome namely a history of smoking and severe pulmonary regurgitation [11]. The ZAHARA investigators showed in a large retrospective cohort of women with congenital heart disease that a history of arrhythmic events or mechanical valve implantation are independent predictors for maternal and neonatal complications [12]. The World Health Organization (WHO) developed a risk score based on cardiac pathology and co-morbidity. WHO class 1 indicates low risk, WHO class 2 indicates an intermediate risk, WHO class 3 indicates high risk, and WHO class 4 indicates a contraindication for pregnancy (Table 2) [13].

#### Complications during pregnancy

The type of complication depends on the specific cardiac pathology (Table 1). Arrhythmias and heart failure are the most common complications encountered [14].

**Heart failure:** All patients with heart failure during pregnancy should be admitted for bed rest. Medical treatment includes salt and fluid restriction, diuretics to limit the volume load, and antihypertensive therapy for afterload reduction. Angiotensin-converting enzyme (ACE) inhibitors can induce fetal anuria, pulmonary hypoplasia, and skull deformities especially when used in the second and third trimester. They are, therefore, contraindicated during pregnancy. However, in some specific situations the maternal benefits can outweigh the fetal risks and ACE inhibitors may be used for a short time [5,15].

**Arrhythmias:** The incidence of arrhythmias may be increased during pregnancy in women with heart disease. When drug therapy is deemed necessary, beta-blockers or digoxin are the preferred choice. The latter can be used in women with atrial fibrillation. Due to the increase in blood volume during pregnancy, higher doses are necessary to reach adequate blood levels. Electrical cardioversion is the treatment of choice for all drug-refractory maternal arrhythmias. It can be performed safely during pregnancy [16].

Bradyarrhythmias are uncommon and usually well tolerated. Pacemaker implantation may be necessary in selected patients whereby radiation should be kept to a minimum [17]. Ectopic beats are often benign and also present in one-third of healthy pregnant women. Management mainly consists of reassurance. Supraventricular tachyarrhythmias are rare [17]. Nakagawa et al. studied 11 patients with new-onset ventricular arrhythmia during pregnancy, 73% of these originated from the right ventricular outflow tract, post-pregnancy the arrhythmia disappeared completely in all patients [18].

Download English Version:

<https://daneshyari.com/en/article/5984213>

Download Persian Version:

<https://daneshyari.com/article/5984213>

[Daneshyari.com](https://daneshyari.com)