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REVIEW ARTICLE

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Congenital Heart Disease (CHD) & Pregnancy

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ABSTRACT

Both pregnancy & Congenital Heart Disease affect each other, due to hemodynamics changes, which may affect both mother & fetus. In this article we are going to talk about pre-pregnancy assessment, complications, drugs & mode of delivery in pregnancy with Congenital Heart Disease.

Mother's complications: Heart failure, arrhythmias, bleeding or thrombosis, and rarely maternal death [1].

Fetus complications: Birth defects, prematurity, low birth weight, abortion, and stillbirth [1].

Conclusion: All CHD female patients must receive pre-pregnancy counseling, thus preventing all pregnancy-related avoidable risks and complications for both mother and fetus.

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Introduction

Congenital Heart Diseases CHD are the most common types of congenital defects, which are structural anomalies of the heart and endothoracic great vessels present at birth.[2] Due to evolution of cardiology medical sciences, Over 80-85% of infants with CHD are now expected to reach adulthood, therefore numbers of females who are at risk of pregnancy are increasing. Most women are willing to have at least ONE pregnancy in lifetime. For females with low risk CHD, with proper pre-pregnancy assessment & counseling, proper drug use & optimal care are provided, successful pregnancy is predicted, and most of the complications could be avoided/managed.

Pre-Pregnancy: Every CHD female, planning to conceive, must has pre-pregnancy assessment.

Assessment includes:

- History taking including detailed obstetric history.
- Physical examination
- Chest X-ray
- Electrocardiogram (ECG)
- Cardiopulmonary stress test or exercise ECG
- Echocardiography
- Baseline measurements for serial follow-up includes with detailed assessment of cardiac lesion, dimensions, ventricular function and filling pressures.
- Management and prophylaxis of infective endocarditis must be considered
- If heart failure is expected during/after pregnancy, it must be counselled before pregnancy.
- Cardiac catheterization & Holter monitoring may be used whenever necessary.

Pre-pregnancy counselling

About the complications of CHD that affect the mother pre/during/after pregnancy, and the fetus, is a must. CHD patients, with

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high risk, require careful monitoring during pregnancy, although it is strongly recommended to avoid pregnancy according to WHO. Table 1

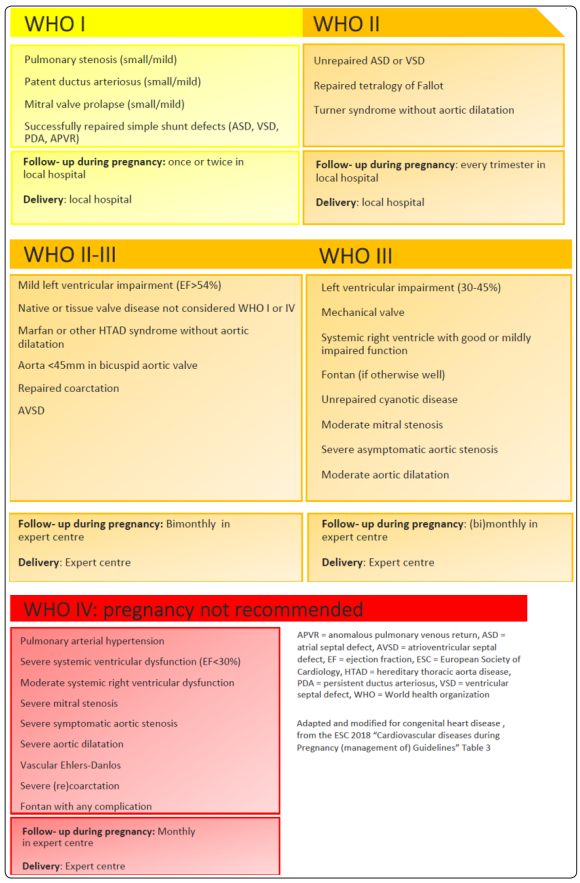

Table 1

Complications

Mother's complications

Main and most frequent complications reported are heart failure, arrhythmias, bleeding or thrombosis and rarely maternal death [1].Obstetric events such as pregnancy-induced hypertension (3%), (pre-) eclampsia (2%) and postpartum hemorrhage (3%) do not occur more often in women with CHD in general [3]. Pregnancy-induced hypertension & gestational DM may cause an increase in afterload and potential deterioration in cardiac function [4, 5] .Aortic dissection risk is higher in pregnant patient with aortic diseases, an influence of hormonal change [6].Pregnancy leads to hemodynamic changes, which may not be tolerable by CHD patient. However, most of these patients can tolerate the changes if they were low risk CHD. Moderate/Sever risk CHD may face many complications due to these changes during pregnancy, delivery and postpartum. Includes: volume overload, arrhythmias, progressive cardiac dysfunction, thrombosis, and death.

Hemodynamic changes [7,8]

- Plasma volume increases to 40–50% higher than before pregnancy
- Heart rate increases to 20% higher
- Cardiac output increases to 30–50% higher
- Aortic pressure and systemic vascular resistance decrease

Results

- Due to the fall in afterload, the gradient will increase which lead to worsening of all stenotic lesions, & regurgitant lesions is better tolerated.
- After delivery, Uterus pressure is relieved, enlarged inferior vena cava, suddenly increased venous return = induce cardiac dysfunction/failure. If the pregnancy is identified as High risk (originally decreased cardiac function), pregnancy-induced cardiac dysfunction may not be reversible [9].

Fortunately, most of these complications are manageable. First step of management is rest

>medication>surgical interventions> pregnancy termination (rarely) especially after 28 or 30 weeks of gestation. Acute heart failure must be treated without pregnancy restrictions, priority is life of the mother [1]

Fetal complications [1-6]

- Abortion
- Stillbirth 1.7% [10].
- Growth failure
- Teratogenicity due to drugs
- Low birth weight
- Neonatal death 2.3% [10].
- Prematurity 14-16%, with its complications (low Apgar score 6% , retinal and lung immaturity etc...)
- Transmission of CHD. (CHD incidence 8-10 per 100 live born fetus , when the mother has CHD the ratio of CHD in the born fetus will be more than double the previous ratio)

In CHD pregnancies rates of fetal/neonatal morbidity & mortality is higher compared to normal pregnancies, with higher rate of morbidity 16-18% over mortality (fetal death 1.7%, neonatal death 2.3%).These complications depend on mother's cardiac lesions, while CHD transmission depends on maternal & paternal cardiac genetic conditions. If the cardiac lesion is not genetic syndrome the rate of transmission varies between 3-5% [11].

Table 2: Clarifies the risk of recurrence

Table 2 Recurrence risk of congenital heart disease	
Atrial septal defect	4.5%–6%
Ventricular septal defect	6%–9.5%
Patent ductus arteriosus	4%
Atrioventricular septal defect	7.5%–15%
Ebstein	3.9%–6%
Tetralogy of Fallot	2.5%–10%*
Transposition of the great arteries	0.5%†
Bicuspid aortic valve	4.6%–9.3%
Aortic coarctation	4%
Marfan syndrome	50%
Pulmonary valve stenosis	7%

Modified and updated from van Hagen/Roos-Hesselink, SA Heart 2014.
*Range varies to 50% if associated with 22q11.2 deletion.

❖Antenatal cardiac screening is done at 20–22 weeks of gestation.

Mode of delivery

While there is no obstetric indications, vaginal delivery is preferred in all cases except in the cases of Dilated aorta & pulmonary hypertension (cannot tolerate Valsalva maneuver). Also, an indication for C-section, if the cervix is not ready, and the mother is starting to decompensate, even if we need to deliver the baby earlier. Vaginal delivery is less risky, less blood loss, smaller blood shift, fewer blood clotting complication and fewer infections tendency [12]. Although vaginal delivery is preferred it is still a rapid hemodynamic change due to rapid blood loss & labor pain. Thus, painless+/-assisted vaginal delivery is recommended, especially with moderate/sever CHD according to New York Heart Association NYHA. Pain management during labor could be performed with epidural analgesia & lateral decubitus position.

Cardiac Drugs & Pregnancy

- ACEI & ARBs: Contraindicated (fetal renal failure, abortion, or stillbirth)
- Amiodarone: Contraindicated (fetal thyroid function abnormality)
- Statins: Contraindicated
- B-Blockers: Atenolol Contraindicated (reported birth defects). Other b-blockers must be under strict fetal-monitoring because of potential low birth weight [6].
- Aspirin: Contraindicated in the last 12 weeks, otherwise low dose is relatively safe.
- Warfarin: Contraindicated in the first trimester (teratogenic) & must be stopped before delivery at least 2-4 weeks (hemorrhagic tendency). Otherwise preferred to be avoided [13].
- *Risk of thrombosis is less
- Heparin: safe, does not cross the placenta. *Risk of thrombosis is higher
- Continuous Intravenous infusion Oxytocin is safe in labor second stage
- Prophylaxis for deep venous thrombosis, including early ambulation and compression stockings must be considered [1].

Conclusion

Pregnancy is favorable in most of the cases, but All CHD female patients must receive pre-pregnancy counseling & continuous pre/peri/post pregnancy care, thus preventing all pregnancy-related avoidable risks and complications for both mother and fetus.

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