



ARRHYTHMIA

Background

Of all the cardiac complications that can occur during pregnancy, arrhythmias are the most common. They can occur in women with and without structural heart disease. Supraventricular and atrial tachycardias are much more common in women of childbearing age compared to ventricular tachycardias. Bradyarrhythmias will not be discussed in this section.

Arrhythmias may present for the first time during pregnancy or pregnancy can trigger arrhythmias in women with a preexisting history of arrhythmias. (1,2) Pregnant women with symptoms suggestive of arrhythmia may present with a variety of complaints, including palpitations, dizziness, presyncope, syncope, chest discomfort, heart failure or fatigue. Palpitations during pregnancy are often not associated with arrhythmias and can be due to sinus tachycardia, sinus arrhythmia or ectopic beats.

Paroxysmal supraventricular tachycardia (PSVT) are the most common arrhythmias detected during pregnancy. PSVT is usually secondary to reentry within the atrioventricular node or through an accessory pathway (overt or concealed). In women without heart disease atrioventricular nodal reentrant tachycardia (AVNRT) is the most common supraventricular tachycardia, followed by atrioventricular reciprocating tachycardia (AVRT).

Atrial fibrillation and flutter during pregnancy are less common than PSVT. They most commonly occur in women with structural heart disease such as rheumatic heart disease, valvular heart disease, cardiomyopathy or congenital heart disease. They can occur in women with structurally normal hearts. Metabolic disturbances such as hyperthyroidism and electrolyte imbalances can also contribute to the development of atrial fibrillation during pregnancy. Women with rheumatic heart disease or congenital lesions may have significant hemodynamic consequences if they develop atrial fibrillation or flutter. Pregnant women with atrial fibrillation are at increased risk of systemic embolism.

Ventricular tachycardia (VT) is rare during pregnancy. It can occur in women with structurally normal heart, but is usually associated with structural heart disease (e.g., congenital heart disease, valvular disease, peripartum cardiomyopathy, hypertrophic cardiomyopathy, coronary artery disease). Other conditions which may contribute to VT are hypomagnesemia, hypertension, thyrotoxicosis and long QT syndrome. Idiopathic VT during pregnancy usually originates from the right ventricular outflow tract and it rarely is associated with unstable rhythm. It has a good prognosis.

Rarely, pregnant women have an implantable cardioverter defibrillator (ICD). Pregnancy is not associated with increased number of shocks, ICD-related complications or adverse fetal events.

Effects of Pregnancy on Arrhythmogenesis

There is an increased propensity for arrhythmias during pregnancy. It is likely due to the combination of hemodynamic, hormonal, and autonomic changes related to pregnancy. Intravascular volume increases, augmenting the preload on the ventricles, and increasing both atrial and ventricular size. Myocardial stretch may contribute to arrhythmogenesis due to stretch-activated ion channel activity. There is also an increase in heart rate, which may be arrhythmogenic. (see Cardiovascular Changes During Pregnancy)

Maternal Cardiac Complications

The chance of developing arrhythmias during pregnancy depends on a number of factors including: the type of arrhythmia, the history of preexisting arrhythmias, the presence of underlying structural disease and the use of arrhythmia therapy or interventions (i.e. ablation) before pregnancy.

The decision to treat arrhythmias needs to be assessed on an individual basis. The decision to start antiarrhythmic drugs depends on the frequency, duration and symptoms associated with the arrhythmia. The fetal risk of the antiarrhythmic medication needs to be discussed with the mother.

General Management Strategies

Because arrhythmias can be associated with structural heart disease, all women presenting with arrhythmias should have a complete cardiac examination, an electrocardiogram and a transthoracic echocardiogram. A search for provoking factor (e.g., hyperthyroidism, alcohol abuse) is important.

For women with significant arrhythmias, coordinated care with a heart specialist and a high-risk obstetrician should be implemented. The frequency of assessments during pregnancy should be determined on an individual basis.

Management of arrhythmia is based on the type of arrhythmia detected and the underlying cardiac condition. In general, treatment of arrhythmias during pregnancy is similar to treatment of arrhythmias in the non-pregnant state. However, because of potential adverse effects of antiarrhythmic drugs on the fetus, they are typically only used when arrhythmias are associated with significant symptoms or hemodynamic compromise. Drug choice should take into account both expected efficacy and also fetal risk. Almost all antiarrhythmic drugs cross the placental barrier. The teratogenic effect of drugs occurs during organogenesis. The concerns with antiarrhythmic drug use during the 2nd and 3rd trimesters relate to their pro-arrhythmic effects and their effects on fetal growth and development. In general, drug studies in pregnant women are lacking. Table 1 shows the drug classification of typical cardiac medications used during pregnancy. The potential fetal risks of all medications need to be discussed with the mother.

There is also a potential for adverse effects in infants exposed to antiarrhythmic drugs during breast feeding. Generally, the amount of antiarrhythmic drug excreted into breast milk is small. There are only few antiarrhythmic drugs (e.g., atenolol, amiodarone) which are contraindicated for the nursing mother. (4)

Table1. Cardiac Drugs in Pregnancy

Drug Name	FDA Pregnancy Rating (3)*
Adenosine	C
Amiodarone	D
Beta blocker†	C
Digoxin	C
Diltiazem	C
Disopyramide	C
Flecainide	C
Lidocaine	B
Procainamide	C
Propafenone	C
Quinidine	C
Sotalol	B
Verapamil	C

* **Category A:** Adequate, well-controlled studies in pregnant women have not shown an increased risk of fetal abnormalities to the fetus in any trimester of pregnancy

Category B: Animal studies have revealed no evidence of harm to the fetus, however, there are no adequate and well-controlled studies in pregnant women **OR** Animal studies have shown an adverse effect, but adequate and well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus in any trimester.

Category C: Animal studies have shown an adverse effect and there are no adequate and well-controlled studies in pregnant women **OR** No animal studies have been conducted and there are no adequate and well-controlled studies in pregnant women.

Category D: Adequate well-controlled or observational studies in pregnant women have demonstrated a risk to the fetus. However, the benefits of therapy may outweigh the potential risk. For example, the drug may be acceptable if needed in a life-threatening situation or serious disease for which safer drugs cannot be used or are ineffective.

Category X: Adequate well-controlled or observational studies in animals or pregnant women have demonstrated positive evidence of fetal abnormalities or risks. The use of the product is contraindicated in women who are or may become pregnant.

† Except Atenolol

Drug doses may need to be modified during pregnancy because pregnancy can alter the absorption, excretion and plasma concentration of antiarrhythmic drugs.

Cardioversion should be used for any sustained tachycardia with hemodynamic compromise and may be considered for drug-refractory arrhythmias. While there is a theoretical risk of inducing arrhythmia in the fetus, this risk is very small due to the high fibrillation threshold and small amount of energy reaching the fetus. Nonetheless, fetal rhythm monitoring is recommended, because of reported cases of emergency cesarean section due to fetal arrhythmias.

Radiofrequency catheter ablation is usually not performed during pregnancy because of the associated ionizing radiation exposure to the fetus.

Generally, vaginal deliveries are recommended unless there are obstetric indications for a cesarean delivery. Good pain management for labour and delivery is very important in order to minimize maternal cardiac stress.

To detect potential arrhythmias early, continuous monitoring with electrocardiography may be helpful in some instances.

Management of Paroxysmal Supraventricular Tachycardia

Direct-current (DC) cardioversion should be performed for women with hemodynamic compromise. If women are hemodynamically stable, vagal maneuvers or intravenous adenosine can be used to terminate the episode. Second-line drugs include intravenous beta-adrenergic blockers such as propranolol and metoprolol. (5)

Prophylactic therapy of PSVT includes a number of AV nodal blocking agents (i.e., digoxin, beta blockers or verapamil). Beta-blockers are often used. A combination of drugs is sometimes used for women with recurrent symptomatic episodes. Type IA antiarrhythmic drug (e.g., quinidine, procainamide) and digoxin can be used for women with concealed accessory pathway. Beta blocker and digoxin can be used during pregnancy for women with AVNRT. The potential fetal risks of all medications need to be discussed with the mother.

Management of Atrial Fibrillation and Flutter

Direct-current (DC) cardioversion should be performed for women with hemodynamic compromise. If women are hemodynamically stable, pharmacologic cardioversion can be attempted with class IA antiarrhythmic drugs (e.g., quinidine, procainamide), sotalol or, when necessary, amiodarone. (6) The fetal risk of the antiarrhythmic medication needs to be discussed with the mother. If rhythm control cannot be achieved, digoxin, beta blockers or calcium channel blockers alone or in combination can be used to control ventricular rate. (6)

Because pregnancy is a pro-thrombotic state, thromboprophylaxis is recommended in women with atrial fibrillation. Therapy needs to be tailored to the individual and may differ for women with lone atrial fibrillation and/or a low thromboembolic risk (6) There is no standard anticoagulation regime for pregnancy.

Management of Ventricular Tachycardia

Idiopathic ventricular tachycardia

Beta blockers can be used in women with structurally normal hearts during pregnancy. (7)

Long QT syndrome

Beta blockers can be used in women with structurally normal hearts during pregnancy and postpartum. They have been shown to reduce the risk of torsades-de-pointes-related cardiac events.

Ventricular tachycardia in the presence of structural heart disease

Direct-current (DC) cardioversion should be performed for women with hemodynamic compromise with or without the addition of intravenous lidocaine, procainamide, quinidine or amiodarone. (7) In women with structural heart disease and a substantial risk of sudden death, the risks of drug therapy may be outweighed by the potential maternal benefit. The fetal risk of the antiarrhythmic medication needs to be discussed with the mother. This decision should be made in conjunction with an electrophysiologist. The choice of antiarrhythmic therapy needs to be tailored to the individual.

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