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CARDIAC ARRHYTHMIAS IN PREGNANT WOMEN: A COMPREHENSIVE REVIEW

Khudoyarova Dildora Rakhimovna

MD, Professor, Head of the Department of Obstetrics and Gynecology

No. 1, Samarkand State Medical University

Kobilova Zarina Khamzaevna

1st-year resident of the Master's program of the Department of Obstetrics and Gynecology No. 1 of the Samarkand State Medical University, Samarkand, Uzbekistan

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ABSTRACT

Cardiac arrhythmias in pregnant women present a unique clinical challenge due to physiological adaptations during pregnancy and their potential impact on maternal and fetal health. Although most arrhythmias during pregnancy are benign, some may indicate underlying cardiac disorders or pose significant risks to the mother and fetus. This review explores the pathophysiology, epidemiology, diagnostic approaches, and management of arrhythmias in pregnancy, emphasizing evidence-based strategies to optimize outcomes.

СЕРДЕЧНЫЕ АРИТМИИ У БЕРЕМЕННЫХ: КОМПЛЕКСНЫЙ ОБЗОР

Худоярова Дильдора Рахимовна

Доктор медицинских наук, профессор, заведующая кафедрой акушерства и гинекологии № 1, Самаркандский государственный медицинский университет

Кобилова Зарина Хамзаевна

Магистр 1-го года обучения магистерской программы кафедры акушерства и гинекологии № 1 Самаркандского государственного медицинского университета Самарканд, Узбекистан

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Сердечные аритмии, беременность, здоровье матери, суправентрикулярная тахикардия, желудочковые аритмии, исходы для плода.

ABSTRACT

Сердечные аритмии у беременных женщин представляют собой уникальную клиническую проблему в связи с физиологической адаптацией во время беременности и их потенциальным влиянием на здоровье матери и плода. Хотя большинство аритмий во время беременности носят доброкачественный характер, некоторые из них могут указывать на основные нарушения сердечной деятельности или представлять значительный риск для матери и плода. В данном обзоре рассматриваются патофизиология, эпидемиология, диагностические подходы и лечение аритмий при беременности с акцентом на научно обоснованные стратегии оптимизации исходов.



Introduction. Pregnancy induces significant cardiovascular changes, including increased heart rate, plasma volume, cardiac output, and hormonal and autonomic nervous system alterations. These changes can predispose pregnant women to the development or exacerbation of cardiac arrhythmias. While arrhythmias are often benign, their presence during pregnancy requires careful evaluation and management to ensure the safety of both the mother and fetus. This article provides a comprehensive review of the current understanding of arrhythmias during pregnancy and their clinical implications.

Epidemiology. Cardiac arrhythmias occur in approximately 1–3% of pregnant women. Their prevalence is higher in women with pre-existing structural heart disease or a history of arrhythmias. The most commonly encountered arrhythmias include:

- Supraventricular tachycardia (SVT): The most frequent pathological arrhythmia during pregnancy.
- Atrial fibrillation (AF): Uncommon but potentially dangerous, especially in women with structural heart disease.
- Ventricular arrhythmias (VA): Rare but can be life-threatening, particularly in women with cardiomyopathy or ischemic heart disease.
- Bradyarrhythmias: Rare, often associated with congenital heart block or structural abnormalities.

The pathophysiology of arrhythmias in pregnancy is influenced by:

1. Hemodynamic stress: Increased preload, stroke volume, and heart rate can predispose to arrhythmogenesis.
2. Hormonal effects: Elevated levels of estrogen and progesterone influence myocardial excitability and ion channel activity.
3. Autonomic changes: Increased sympathetic tone and reduced vagal activity contribute to tachyarrhythmias.
4. Electrolyte imbalances: Hyperemesis gravidarum or preeclampsia may lead to potassium and magnesium imbalances, increasing arrhythmia risk.

Clinical Presentation. Arrhythmias in pregnancy may present with a range of symptoms, from asymptomatic palpitations to life-threatening hemodynamic instability. Common symptoms include:

- Palpitations
- Dizziness or presyncope
- Fatigue
- Chest pain
- Dyspnea

In severe cases, arrhythmias can lead to syncope, heart failure, or fetal compromise.

Diagnosis of arrhythmias in pregnancy requires careful consideration of both maternal and fetal safety. The following diagnostic tools are commonly used:

1. Electrocardiogram (ECG): First-line investigation to identify the type of arrhythmia.
2. Ambulatory Holter monitoring: Useful for detecting intermittent arrhythmias.
3. Echocardiography: Assesses structural abnormalities and cardiac function.
4. Laboratory tests: Evaluate for electrolyte disturbances, thyroid dysfunction, or anemia.



5. Magnetic resonance imaging (MRI): Used selectively to evaluate structural or functional abnormalities when other modalities are inconclusive.

The management of arrhythmias in pregnancy involves a multidisciplinary approach, with input from cardiologists, obstetricians, and anesthesiologists.

General Principles

- Avoid unnecessary interventions in asymptomatic, benign arrhythmias.
- Optimize maternal hemodynamics while minimizing fetal exposure to medications or procedures.
- Treat underlying conditions (e.g., electrolyte imbalances, thyroid disorders).

The choice of antiarrhythmic drugs depends on the type of arrhythmia and its severity. Safety for the fetus is a critical consideration:

- Beta-blockers (e.g., metoprolol): First-line for rate control in SVT and AF; avoid atenolol due to fetal growth restriction risks.
- Calcium channel blockers (e.g., verapamil, diltiazem): Used in certain supraventricular arrhythmias.
- Adenosine: Safe for acute termination of SVT.
- Amiodarone: Reserved for life-threatening arrhythmias due to potential fetal thyroid toxicity.

Non-Pharmacological Interventions

- Vagal maneuvers: Effective for terminating SVT.
- Electrical cardioversion: Safe and effective for hemodynamically unstable arrhythmias.
- Catheter ablation: Considered in refractory cases during the second trimester to minimize radiation exposure.

Ventricular Arrhythmias

- Acute management includes intravenous antiarrhythmics such as lidocaine or amiodarone.
- Implantable cardioverter-defibrillators (ICDs) may be indicated in women at high risk of sudden cardiac death.

Antiarrhythmic drugs cross the placenta and may affect fetal development. Close fetal monitoring is recommended, particularly when using medications with known teratogenic risks. Invasive procedures should be performed with fetal shielding to minimize radiation exposure.

In most cases, pregnancy-related arrhythmias resolve postpartum. However, women with structural heart disease, cardiomyopathies, or severe arrhythmias require long-term follow-up to manage potential complications.

Conclusion. Cardiac arrhythmias during pregnancy require a nuanced approach that balances maternal and fetal well-being. Advances in diagnostic tools and pharmacological options have improved the management of arrhythmias, but further research is needed to refine treatment protocols and improve outcomes. A multidisciplinary team approach is essential for optimizing care in this complex patient population. Pregnancy induces profound cardiovascular changes, including increased cardiac output, plasma volume expansion, and hormonal shifts, which may predispose women to arrhythmias or exacerbate pre-existing ones.



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