Arrhythmias During Pregnancy

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Arrhythmias are the most common cardiac complication encountered during pregnancy in women with and without structural heart disease.

Arrhythmias may manifest for the first time during pregnancy, and in other cases, pregnancy can trigger exacerbations in women with preexisting arrhythmias.
The exact mechanism of increased arrhythmia burden during pregnancy is unclear, but has been attributed to:

- Hemodynamic
- Hormonal
- Autonomic changes
Who are at risk?

- Women with established arrhythmias.
- **Structural heart disease.** Highest risk of developing arrhythmias during pregnancy.
- **Congenital heart disease.** There has been an increase in the number of women of childbearing age with congenital heart disease, and these women are at particularly high risk for arrhythmias.
Prevalence of arrhythmias during pregnancy in women with congenital heart disease
The approach to the treatment of arrhythmias in pregnancy is similar to that in the nonpregnant patient. However, antiarrhythmic drugs are often reserved for the treatment of arrhythmias associated with clinically significant symptoms or hemodynamic compromise.
Choice of therapy, for the most part, is based on limited data from animal studies, case reports, observational studies, and clinical experience.
Atrial premature beats (APBs)

APBs are very frequent in pregnant women and the prevalence is dependent on the duration of observation.

In one study of 162 pregnancies in women with structurally normal hearts evaluated with 24-hour Holter monitoring, the prevalence of APBs was 57 percent and frequent APBs occurred in six percent of pregnancies. There was a significant reduction in the frequency of atrial and ventricular ectopic activity in nine women in whom Holter monitoring was repeated postpartum.

Am J Cardiol 1997; 79:1061
Management

No therapy is required for APBs in the asymptomatic woman.

Pregnant women with symptomatic APBs should be reassured of the benign nature of APBs and be advised to discontinue potential precipitant factors such as smoking, coffee intake, alcohol intake, or other stimulants.

If ectopic activity continues and is associated with intolerable symptoms, treatment with cardioselective β blockers such as metoprolol can be effective.
Supraventricular tachycardia (SVT)

In women with structurally normal hearts, AV nodal reentrant tachycardia (AVNRT) is the most common SVT, followed by AV reciprocating tachycardia (AVRT).

In one single center study, the prevalence of SVT has been estimated at 24 per 100,000 hospital admissions in pregnant women.

Am J Cardiol 1995; 76:675
Clin Cardiol 2008; 31:538
i.v. adenosine is the first drug of choice if vagal manoeuvres fail to terminate an episode of paroxysmal SVT.

i.v. metoprolol is recommended if adenosine fails to terminate a tachycardia.

Am J Cardiol 1995;75:521-523
Prophylactic Management of SVT

Prophylactic antiarrhythmic drug therapy should be used only if symptoms are intolerable or if the tachycardia causes haemodynamic compromise.

For long term; digoxin or a selective β-blocking agent are the first-line agents, followed by sotalol, flecainide, or propafenone.

AV nodal blocking agents should not be used in patients with manifest pre-excitation on resting ECG.

Am J Cardiol 1995;75:521-523
Catheter ablation may be necessary in the case of drug-refractory and poorly tolerated tachycardias.

Due to the high radiation exposure, ablation should be postponed to the second trimester if possible, and it should be performed with maximal use of echo- and electro-anatomic mapping systems.

Circulation 2001;104:893
ESC Guidelines on the management of cardiovascular diseases during pregnancy

The Task Force on the Management of Cardiovascular Diseases during Pregnancy of the European Society of Cardiology (ESC)

Endorsed by the European Society of Gynecology (ESG), the Association for European Paediatric Cardiology (AEPC), and the German Society for Gender Medicine (DGesGM)

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### Recommended for the management of arrhythmias

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
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<tbody>
<tr>
<td><strong>Management of supraventricular tachycardia (SVT)</strong></td>
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<td>For acute conversion of paroxysmal SVT, vagal manoeuvre followed by i.v.</td>
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<tr>
<td>adenosine is recommended.</td>
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<tr>
<td>Immediate electrical cardioversion is recommended for acute treatment of any</td>
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<td>tachycardia with haemodynamic instability.</td>
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<tr>
<td>For long-term management of SVT oral digoxin(^c) or metoprolol/propranolol(^k)</td>
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<td>is recommended.</td>
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<tr>
<td>For acute conversion of paroxysmal SVT, i.v. metoprolol or propranolol should</td>
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<td>be considered.</td>
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<tr>
<td>For long-term management of SVT, oral sotalol(^b) or ecainide(^f) should be</td>
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<td>considered if digoxin or a (\beta)-blocking agent fails.</td>
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<tr>
<td>For acute conversion of paroxysmal SVT, i.v. verapamil may be considered.</td>
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<tr>
<td>For long-term management of SVT, oral propafenone(^f), or procainamide may be</td>
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<td>considered as a last option if other suggested agents fail and before</td>
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<tr>
<td>amiodarone(^e) is used.</td>
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<tr>
<td>For long-term management of SVT, oral verapamil(^c) may be considered for</td>
<td>IIb</td>
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<tr>
<td>rate regulation if the other AV nodal-blocking agents fail.</td>
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<tr>
<td>Atenolol(^d) should not be used for any arrhythmia.</td>
<td>III</td>
<td>C</td>
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</table>
It is very rare during pregnancy unless structural heart disease or hyperthyroidism is present.

A rapid ventricular response to this arrhythmia can lead to serious haemodynamic consequences for both the mother and the fetus.
In haemodynamically stable patients with structurally normal hearts, pharmacological termination can be considered. i.v. ibutilide, flecainide or propafenone are usually effective, and may be considered, but the experience during pregnancy is very limited.

Since there is even less or no experience of vernacalant, pharmacological conversion of AF during pregnancy, it may only be considered if all other attempts at cardioversion fail.
Prophylactic antiarrhythmic drugs (sotalol, flecainide, or propafenone) may be considered in the case of severe symptoms despite rate-controlling drugs.

Dronedarone, a new antiarrhythmic drug, should not be used during pregnancy.
Episodes of atrial fibrillation and flutter that cause **hemodynamic instability** require emergent DC cardioversion.

For patients in whom immediate cardioversion is not needed, it is important to recognize that if an episode of AF lasts more than 48 hours, or is of unknown duration.

**TEE** should be performed or systemic anticoagulation maintained for 3-4 weeks prior to/after electrical or pharmacologic cardioversion.

Eur Heart J 2006;27:1979-2030
Rate control

For heart rate control of AF, β-blockers are recommended as first choice. Verapamil, diltiazem should be the drug of second choice.

Digoxin can also be used but is less effective during strenuous exercise.

Digoxin blood concentrations are unreliable in pregnancy because of interference with immunoreactive serum components.
Guidelines for the management of atrial fibrillation

The Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC)

Developed with the special contribution of the European Heart Rhythm Association (EHRA)

Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS)

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<table>
<thead>
<tr>
<th><strong>DCC can be performed safely at all stages of pregnancy, and is recommended in patients who are haemodynamically unstable due to AF, and whenever the risk of ongoing AF is considered high, for the mother or for the foetus.</strong></th>
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<tr>
<td><strong>If rate control is necessary, a β-blocker or a non-dihydropyridine calcium channel antagonist should be considered. During the first trimester of pregnancy, the use of β-blockers must be weighed against the potential risk of negative foetal effects.</strong></td>
<td>IIa</td>
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<tr>
<td><strong>In haemodynamically stable patients with structurally normal hearts, flecainide or ibutilide given intravenously to terminate recent-onset AF may be considered, if arrhythmia conversion is mandatory and DCC considered inappropriate.</strong></td>
<td>IIb</td>
<td>C</td>
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<tr>
<td><strong>If rate control is indicated, and β-blockers or non-dihydropyridine calcium channel antagonists are contraindicated, digoxin may be considered.</strong></td>
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Anticoagulation in atrial fibrillation

The thrombo-embolic risk in AF depends upon the presence of risk factors. However, large studies during pregnancy are not available.

An increase in thrombo-embolic risk in non-valvular AF is assessed with the $\text{CHA}_2\text{DS}_2\text{VASc}$ score in nonpregnant patients.

Eur Heart J 2010; 12; 1360
Thromboprophylaxis is recommended in high risk patients.

The choice of the anticoagulant is made according to the stage of pregnancy.

Vitamin K antagonists are recommended in most cases from the second trimester until 1 month before expected delivery.
Subcutaneous administration of weight-adjusted therapeutic doses of LMWH is recommended during the first trimester and during the last month of pregnancy.

The new oral thrombin antagonists such as dabigatran have shown fetotoxicity with high doses and should not be used.

Either single or dual antiplatelet therapy (clopidogrel and acetylsalicylic acid) are not as effective as warfarin in high risk patients with AF.
Life-threatening ventricular arrhythmias during pregnancy are rare.

The presence of inherited arrhythmogenic disorders should always be considered by family history and appropriate diagnostic tests during or after pregnancy.

Eur Heart J 2006;27:2099-2140.
In healthy patients idiopathic RV outflow tract tachycardia is the most frequent type.

VT associated with structural heart disease is associated with an increased risk of sudden cardiac death for the mother.
For acute treatment of VT with haemodynamic instability, immediate cardioversion, which seems safe in all phases of pregnancy, is recommended.

Timely restoration of sinus rhythm is desirable even if VT is well tolerated, and can be achieved with cardioversion, anti-arrhythmic medication, or, in selected cases, overdrive pacing.

In women with non-long QT-related sustained VT and a stable haemodynamic situation, i.v. sotalol acutely can be considered to terminate the tachycardia.
i.v. amiodarone should be considered for patients with sustained monomorphic VT that is haemodynamically unstable, refractory to conversion with countershock, or recurrent despite other agents.
Prophylactic therapy with a cardioselective β-blocking agent, such as metoprolol, may be effective.

Sotalol or class IC antiarrhythmic drugs may be considered in the absence of structural heart disease if β-blocking agents are ineffective.

Amiodarone and/or ICD implantation should be considered to treat therapy-resistant VT if necessary also during pregnancy for protection of maternal life.
In women with the **congenital long QT syndrome**, the risk of cardiac arrest is greater during the post-partum period compared with before or during pregnancy.

β-Blocking agents have a major benefit post-partum but are also recommended during pregnancy in these women.

The presence of an ICD does not itself contraindicate future pregnancy. Treatment with an ICD should also be considered during pregnancy to protect the mother’s life.

In general, if pregnancy is planned, the implantation of an ICD should be considered in patients with high risk factors for sudden cardiac death.

Eur Heart J 2006;27:2099-2140
Circulation 1997;96:2808-2812
Acquired complete heart block, most often seen in congenital heart disease after corrective surgery, is rare during pregnancy.

Isolated congenital complete heart block has a favourable outcome during pregnancy, especially when the escape rhythm has a narrow QRS complex.

Vaginal delivery carries no extra risks in a mother with congenital complete heart block, unless contraindicated for obstetric reasons.

Supportive pacing during pregnancy is usually not necessary.
Permanent pacing

The risks of permanent pacemaker implantation (preferably one chamber) are generally low.

Implantation can be performed safely, especially after first trimester. Echo guidance may be helpful for implantation.

Conclusions

Since cardiac arrhythmias are frequently associated with structural heart disease, any woman who presents with an arrhythmia during pregnancy should undergo clinical evaluation for structural heart disease.

In general, the approach to the treatment of arrhythmia is similar to that in the nonpregnant patient.

Treatment strategies during pregnancy are hampered by the lack of randomized trials in this cohort of women.

Choice of therapy, for the most part, is based on limited data.

Tailored approach is needed for management of arrhythmias, doing best to prevent fetus from the adverse effects of drugs and interventions.
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