

# Arrhythmia in Pregnancy



by  
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Arrhythmias in pregnancy are common.

Recurrence/ 1<sup>st</sup> presentation.

Majority → Benign.

Remaining minority: TTT.

## Arrhythmia and gender

Women have:

- 1- HR+++ , shorter SNRT.
- 2- longer QT → LQTs.
- 3- Higher incidence of drug induced TDP.
- 4- 2:1 female predominance of AVNRT.

**Sex hormones**

## ECG changes in pregnancy

- +++HR 10 bpm → -- PR, QRS, QT.
- Leftward axis.
- PACs, PVCs.

## Mechanism (Unclear)

- Hormonal:  
(+estrogen, beta HCG) → ++ expression of cardiac ion channels.
- Hemodynamic:  
+++ circulating volume → ++++ COP → myocardial stretch → +++EDV
- Autonomic.

## Women at risk

- Previous arrhythmias.
- Structural heart disease.
- Congenital heart disease.

## ARRHYTHMIA DIAGNOSIS

1- Accurate diagnosis of the arrhythmia: prognosis, TTT.

2-Additional heart disease.

3-Exclude systemic disorders (thyroid, Hge, Pulmonary embolism, infection, inflammatory).

## Thorough history and examination.

Palpitations are the most common symptom.

Syncope or pre-syncope → cardiac cause, VD maximal in the second trimester.

3<sup>rd</sup> trimester → more symptomatic with activity → even minor arrhythmias may present with symptoms (SOB, CP).

## TTT

- Reassure.
- Remove stimulants.
- Catheter ablation before planning pregnancy.
- Drugs: the later the better, significant symptoms/ hemodynamic compromise

Which Drug ?



## FDA Pregnancy Categories

Category	Description
A	Controlled studies of pregnant women show no risk in first trimester
B	Animal studies show no risk, or animals show risk unconfirmed in humans
C	Animal studies show risk, caution is advised, benefits may outweigh risks
D	Evidence of risk to human fetus, benefits may outweigh risks in serious conditions
X	Risk outweighs benefit

Adapted from Dwosh E, et al. *Int MSJ*. 2003;10:52-59.

MedscapeCME

## Drug Used

- Avoid in 1<sup>st</sup> trimester.
- Lowest dose.
- Shortest time required.

**I- Tachyarrhythmias**

## AVNRT... AVRT

Acute

- Vagal maneuvers.
- Adenosine IV.
- BB (IV Metoprolol).
- DC.

Prophylaxis

Is symptomatic/ intolerable.

- **Digoxin, Cardioselective BB**, sotalol, flecanide, propafenone.

**2015 ACC/AHA/HRS Guideline for the  
Management of Adult Patients With  
Supraventricular Tachycardia**



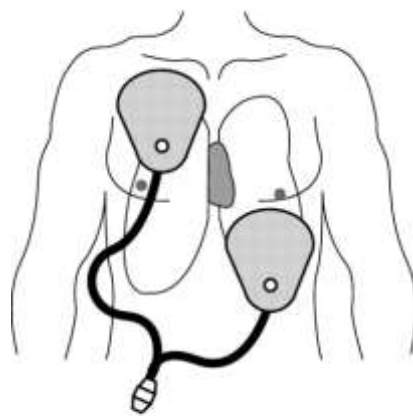
COR	LOE	RECOMMENDATIONS
I	C-LD	1. Vagal maneuvers are recommended for acute treatment in pregnant patients with SVT
I	C-LD	2. Adenosine is recommended for acute treatment in pregnant patients with SVT
I	C-LD	3. Synchronized cardioversion is recommended for acute treatment in pregnant patients with hemodynamically unstable SVT when pharmacological therapy is ineffective or contraindicated (516).

## Electrical Cardioversion



- Safe.
- Synchronized.
- Position: energy away from uterus.
- Fetal monitoring.
- Energy dose: same as non pregnant.

Antero-lateral



Front

IIa

C-LD

1. Intravenous metoprolol or propranolol is reasonable for acute treatment in pregnant patients with SVT when adenosine is ineffective or contraindicated (516).

IIb

C-LD

1. Intravenous verapamil may be reasonable for acute treatment in pregnant patients with SVT when adenosine and beta blockers are ineffective or contraindicated (516).

IIb

C-LD

2. Intravenous procainamide may be reasonable for acute treatment in pregnant patients with SVT (

IIb

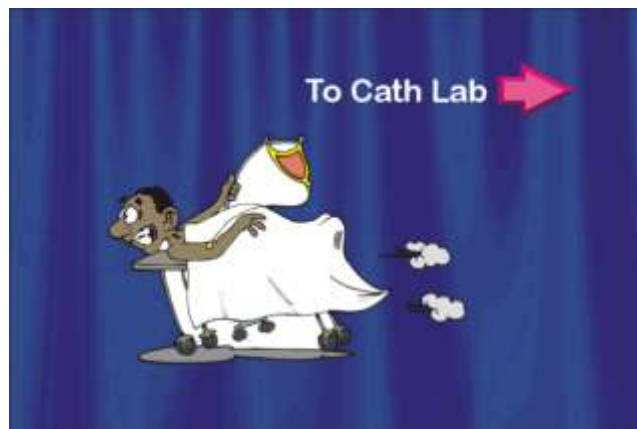
C-LD

3. Intravenous amiodarone may be considered for acute treatment in pregnant patients with potentially life-threatening SVT when other therapies are ineffective or contraindicated (517,523).

IIb

C-LD

1. Catheter ablation may be reasonable in pregnant patients with highly symptomatic, recurrent, drug-refractory SVT with efforts toward minimizing radiation exposure (526,527).



# Ablation

1. Hemodynamic compromise (CHF)
2. No response to medical therapy/cardioversion
3. Reduced EF from incessant tachycardia

- Methodology in Pregnancy
- Intracardiac echocardiography
- Mapping without fluoroscopy

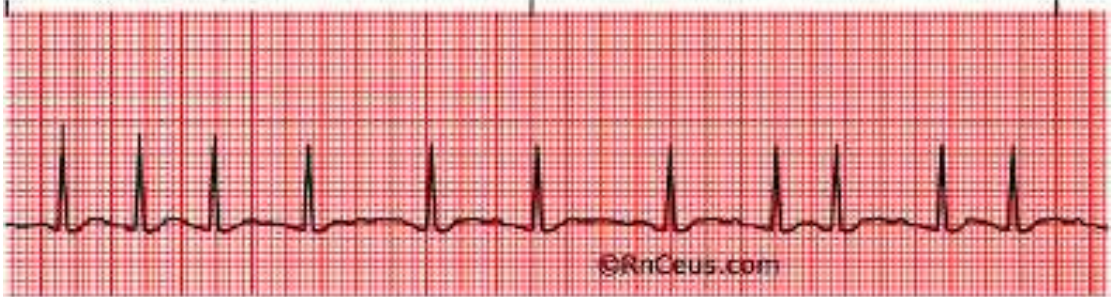
Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
<b>Management of supraventricular tachycardia (SVT)</b>		
For acute conversion of paroxysmal SVT, vagal manoeuvre followed by i.v. adenosine is recommended.	I	C
Immediate electrical cardioversion is recommended for acute treatment of any tachycardia with haemodynamic instability.	I	C
For long-term management of SVT oral digoxin <sup>c</sup> or metoprolol/propranolol <sup>c,d</sup> , is recommended.	I	C
For acute conversion of paroxysmal SVT, i.v. metoprolol or propranolol should be considered.	IIa	C
For long-term management of SVT, oral sotalol <sup>e</sup> or flecainide <sup>f</sup> should be considered if digoxin or a $\beta$ -blocking agent fails.	IIa	C
For acute conversion of paroxysmal SVT, i.v. verapamil may be considered.	IIb	C
For long-term management of SVT, oral propafenone <sup>f</sup> , or procainamide may be considered as a last option if other suggested agents fail and before amiodarone <sup>e</sup> is used.	IIb	C
For long-term management of SVT, oral verapamil <sup>g</sup> may be considered for rate regulation if the other AV nodal-blocking agents fail.	IIb	C
Atenolol <sup>d</sup> should not be used for any arrhythmia.	III	C

IIb

C-LD

2. Oral amiodarone may be considered for ongoing management in pregnant patients when treatment of highly symptomatic, recurrent SVT is required and other therapies are ineffective or contraindicated (517,523).

#### ATRIAL FIBRILLATION



## Afib

- Very rare.
- Structural heart disease or hyperthyroidism.

## Pregnant women with AF should be managed as high-risk pregnancies

in close collaboration with

- cardiologist,
- Obstetricians
- neonatologists.

## In haemodynamically stable + normal hearts

- Pharmacological termination:

i.v. ibutilide, flecainide or propafenone.

- Prophylactic: (sotalol, flecainide, or propafenone) → severe symptoms.

## Afib +hemodynamic instability:

- Emergent DC cardioversion.
- For patients in whom immediate cardioversion is not needed →  $\geq 48$  h or unknown → TEE/ systemic anticoagulation (3-4 w)

prior to/after electrical or pharmacologic cardioversion.

## Rate control

- |                 |                       |
|-----------------|-----------------------|
| 1 <sup>st</sup> | $\beta$ -blockers.    |
| 2 <sup>nd</sup> | Verapamil, diltiazem. |
| 3 <sup>rd</sup> | Digoxin.              |

FDA → pregnancy safety class C  
(benefits may outweigh risk)

- None of the agents are teratogenic, but they readily cross the placenta.
- BB → IUGR → Growth scans after 20 w
- Digoxin: maternal and foetal arrhythmias.
- Verapamil / Diltiazem: Insufficient data

**Rate control using BB and/or digoxin is recommended**



## Breastfeeding

- All rate control agents are present in breast milk.
- BB, digoxin, and verapamil: low levels.
- Diltiazem: high levels → second line.

## Rhythm control

- Case studies.
- Amiodarone: severe adverse foetal SE → only for emergency.
- Flecainide and sotalol: conversion of foetal arrhythmias without major adverse effects → safe to treat maternal symptomatic AF.
- Electrical cardioversion can be effective for restoration of sinus rhythm when tachyarrhythmia is causing haemodynamic instability, with low rates of adverse outcomes for both mother and foetus.
- Electrical cardioversion: only if facilities are available for foetal monitoring and emergency caesarean section.
- As with other emergencies during pregnancy, patients should receive 100% oxygen, intravenous access should be established early, and the mother should be positioned in the left lateral position to improve venous return.

## Anticoagulation

- VKAs:

Avoid in

- a. 1<sup>st</sup> trimester → teratogenic effects.
  - b. 2–4 weeks preceding delivery → foetal bleeding.
- LMWH: safe → don't cross the placenta.

## In 3<sup>rd</sup> trimester

- Frequent lab checks for adequate anticoagulation (10–14 d) and corresponding dose adjustments are advised, given that in some women high doses of both VKA and heparin may be needed to maintain adequate anticoagulation.
- Pregnant + AF + mechanical prosthetic valves: who elect to stop VKA treatment in consultation with their specialist team between 6–12 weeks of gestation, should receive continuous, dose-adjusted UFH or dose-adjusted SC LMWH.
- NOAC: limited data → avoid.



European Heart Journal (2016) 37, 2893–2962  
doi:10.1093/eurheartj/ehw210

**ESC GUIDELINES**

## 2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
Electrical cardioversion 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 the foetus.	<b>I</b>	<b>C</b>
Anticoagulation is recommended in pregnant patients with AF at risk of stroke. To minimize teratogenic risk and intrauterine bleeding, dose-adjusted heparin is recommended during the first trimester of pregnancy and in the 2–4 weeks before delivery. Vitamin K antagonists or heparin can be used in the remaining parts of the pregnancy.	<b>I</b>	<b>B</b>
NOACs should be avoided in pregnancy and in women planning a pregnancy.	<b>III</b> (harm)	<b>C</b>

<p>If rate control is necessary, a <math>\beta</math>-blocker or a non-dihydropyridine calcium channel antagonist should be considered. During the first trimester of pregnancy, the use of <math>\beta</math>-blockers must be weighed against the potential risk of negative foetal effects.</p>	<p><b>IIa</b></p>	<p><b>C</b></p>
<p>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.</p>	<p><b>IIb</b></p>	<p><b>C</b></p>
<p>If rate control is indicated, and <math>\beta</math>-blockers or non-dihydropyridine calcium channel antagonists are contraindicated, digoxin may be considered.</p>	<p><b>IIb</b></p>	<p><b>C</b></p>

Eur Heart J 2010; 1

## Ventricular Arrhythmias

Not related to PPCMP

Related to PPCMP

I- Not related to PPCMP

## Risk of VT

- +++Catechoamines.
- +++ previous VT.
- +++ Structural heart disease.



European Heart Journal (2015) 36, 2793–2867  
doi:10.1093/eurheartj/ehv316

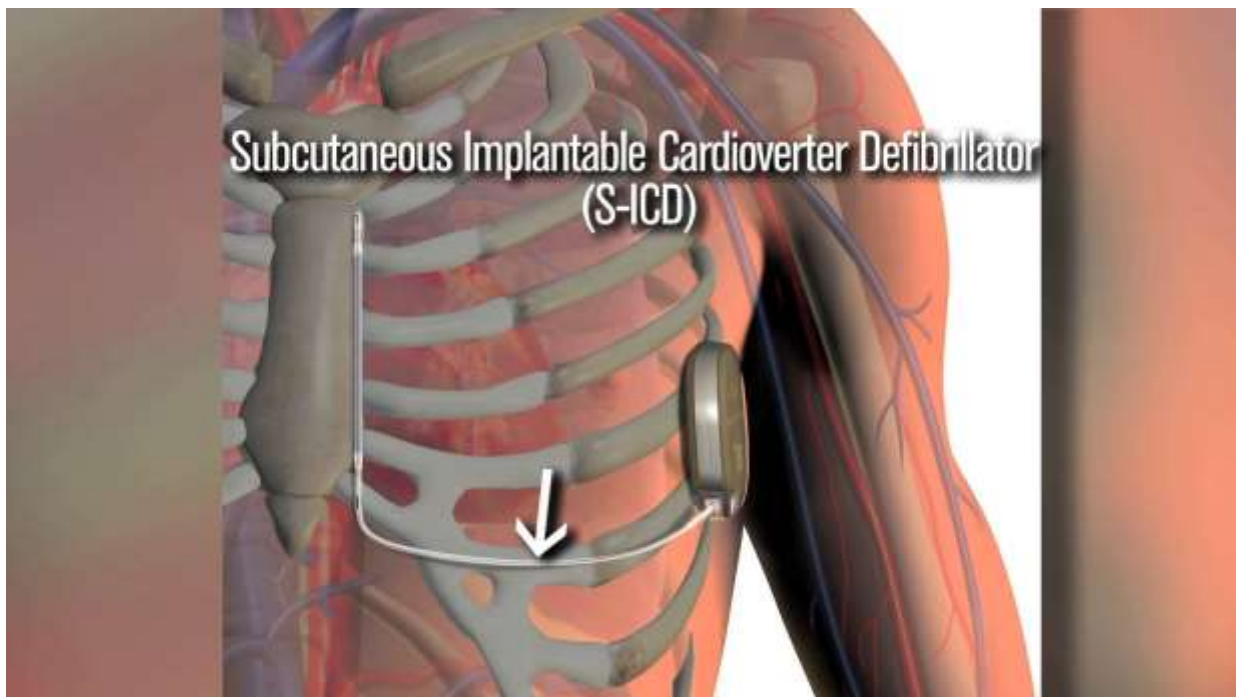
ESC GUIDELINES

## 2015 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
Implantation of an ICD is recommended if an indication emerges during pregnancy.	I	C
Beta-blocking agents are recommended during pregnancy and also post-partum in patients with LQTS or CPVT.	I	C
Oral metoprolol, propranolol or verapamil is recommended for long-term management of idiopathic sustained VT.	I	C

Immediate electrical cardioversion is recommended for sustained VT, especially if haemodynamically unstable.	<b>I</b>	<b>C</b>
Sotalol or procainamide i.v. should be considered for acute conversion of haemodynamically stable monomorphic sustained VT.	<b>IIa</b>	<b>C</b>
Amiodarone i.v. should be considered for acute conversion of sustained, monomorphic VT when haemodynamically unstable, refractory to electrical cardioversion or not responding to other drugs.	<b>IIa</b>	<b>C</b>
Catheter ablation may be considered for management of drug-refractory and poorly tolerated tachycardias.	<b>IIb</b>	<b>C</b>

### Subcutaneous Implantable Cardioverter Defibrillator (S-ICD)



COR	LOE	Recommendations
I	B-NR	1. In mothers with long QT syndrome, a beta blocker should be continued during pregnancy and throughout the postpartum period including in women who are breastfeeding (1).
I	C-EO	2. In the pregnant patient with sustained VA, electrical cardioversion is safe and effective and should be used with standard electrode configuration (2, 3).
IIa	B-NR	3. In pregnant patients needing an ICD or VT ablation, it is reasonable to undergo these procedures during pregnancy, preferably after the first trimester (4, 5).

**2017 AHA/ACC/HRS Guideline for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death**

I- Related to PPCMP



- Post-partum CMP → ruled out in new-onset VT during the last 6 w of pregnancy or in the early PP.

### Management of arrhythmias related to pregnancy-induced cardiomyopathy

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>	Ref. <sup>c</sup>
Electrical cardioversion or defibrillation is recommended in pregnant women developing haemodynamically unstable VT or VF.	I	B	698
Standard management of HF with avoidance of drugs contraindicated in pregnancy (ACE inhibitors, ARB and renin inhibitors) is recommended in pregnant women.	I	C	698, 699

## Wearable cardiac defibrillator

- Life vest



## II- Bradyarrhythmias

- Acquired complete heart block, most often seen in congenital heart disease after corrective surgery, is rare during pregnancy.

## Isolated congenital complete heart block

- Favourable outcome during pregnancy (escape rhythm → narrow QRS).
- Supportive pacing during pregnancy is usually not necessary.
- Vaginal delivery: no extra risks.

## 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.

### Pacing in pregnancy

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
Implantation of permanent pacemakers (preferably one chamber) should be considered with echocardiographical guidance, especially if the foetus is beyond 8 weeks gestation in selected women with symptomatic complete AV block.	IIa	C

2013 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy

## Take Home Message

1. Arrhythmias in pregnancy → Benign.
2. Remove PPT.
3. Drugs... latest, lowest, shortest.
4. DC: safe.
5. Cath Lab: shielding, --- fluoro (pulsatile).
6. S.ICD.
7. Life vests.
8. Congenital CHB → stable rhythm → conserve, vaginal delivery

Thank You 😊