

Supraventricular Arrhythmias (Management of Patients with)

ACC/AHA Task Force on Practice Guidelines
and the ESC Committee for Practice Guidelines

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ACC/AHA/ESC guidelines for the management of patients with supraventricular arrhythmias[☆] – executive summary

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients With Supraventricular Arrhythmias)

Developed in collaboration with NASPE–Heart Rhythm Society

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Levels of recommendation

Strength of recommendation	Definition
Class I	Evidence and/or general agreement that a given treatment or procedure is useful and effective
Class II	Conflicting evidence and/or divergence of opinions about the usefulness/efficacy of a treatment or procedure
IIa	Weight of evidence/opinion is in favour of usefulness/efficacy
IIb	Usefulness/efficacy is less well established by evidence/opinion
Class III	Evidence or general agreement that the treatment/procedure is not useful/effective and in some cases may be harmful

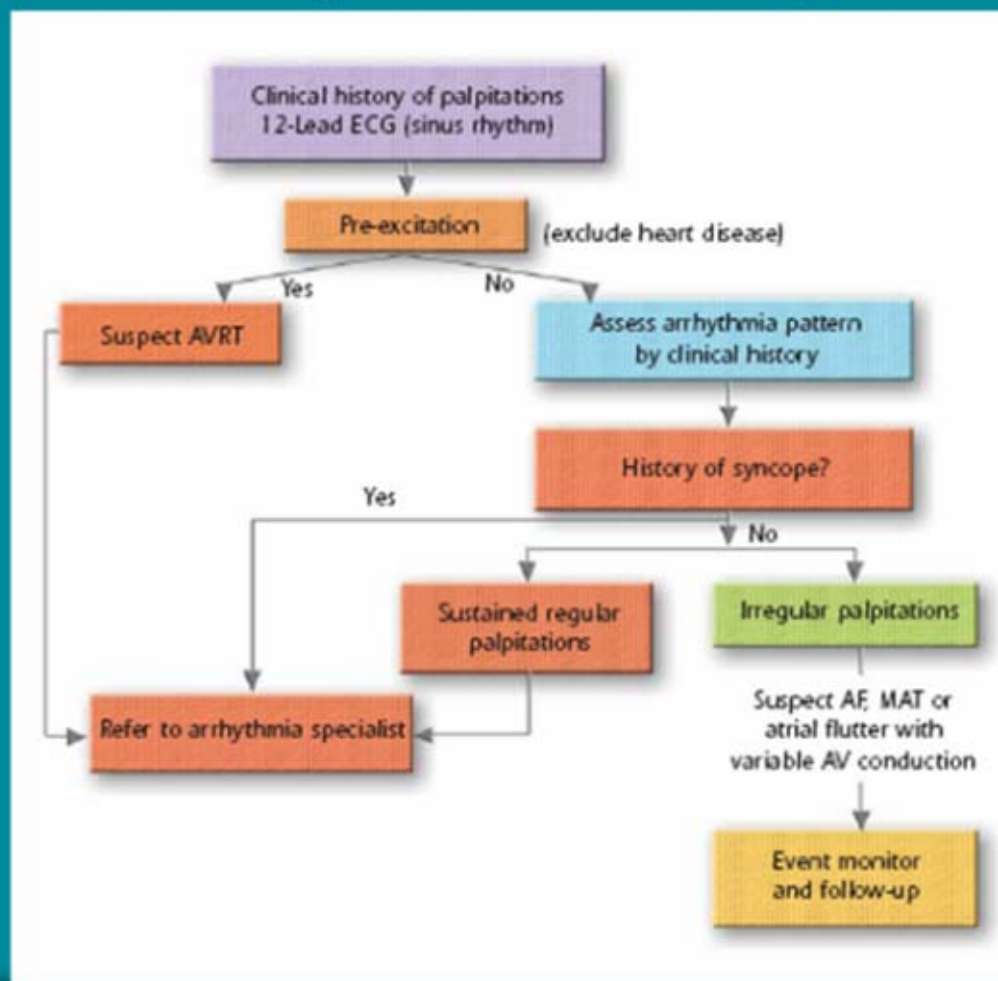
Levels of evidence

Level of evidence	Available evidence
A	Multiple randomized clinical trials or meta-analyses
B	Single randomized trial or large non-randomized studies
C	Consensus opinion of experts

Supraventricular arrhythmias

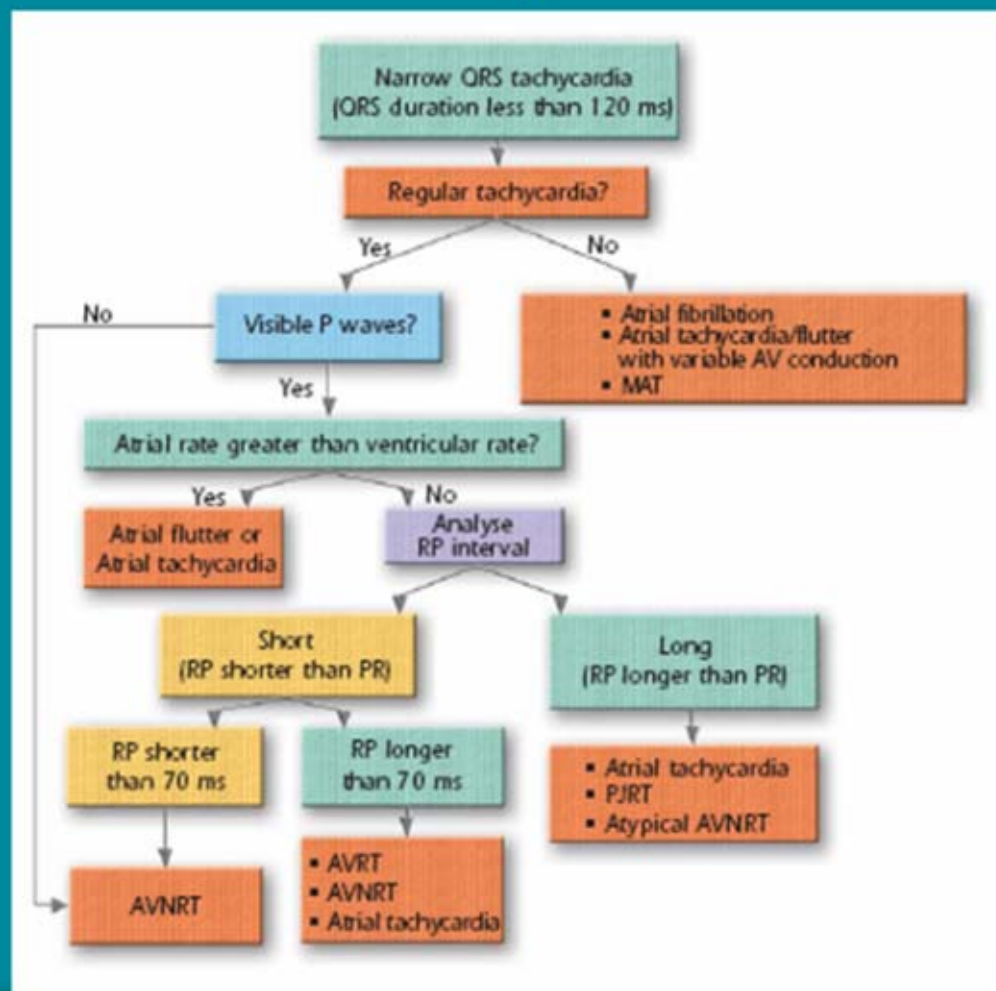
- Group of common rhythm disturbances including rhythms emanating from:
 - Sinus node
 - Atrial tissue (atrial flutter)
 - Junctional/reciprocating or accessory pathway-mediated tachycardia
- Most common treatment strategies:
 - Antiarrhythmic drug therapy
 - Catheter ablation

Initial evaluation of patients with suspected tachycardia



AF = atrial fibrillation; AV
= atrioventricular; AVRT =
atrioventricular
reciprocating tachycardia;
MAT = multifocal atrial
tachycardia

Differential diagnosis for narrow QRS tachycardia



AV = atrioventricular;
 AVNRT = atrioventricular
 nodal reciprocating
 tachycardia; AVRT =
 atrioventricular
 reciprocating tachycardia;
 MAT = multifocal atrial
 tachycardia; ms =
 milliseconds; PJRT =
 permanent form of
 junctional
 reciprocating tachycardia;
 QRS = ventricular activation
 on ECG

ECG pattern of typical AVNRT

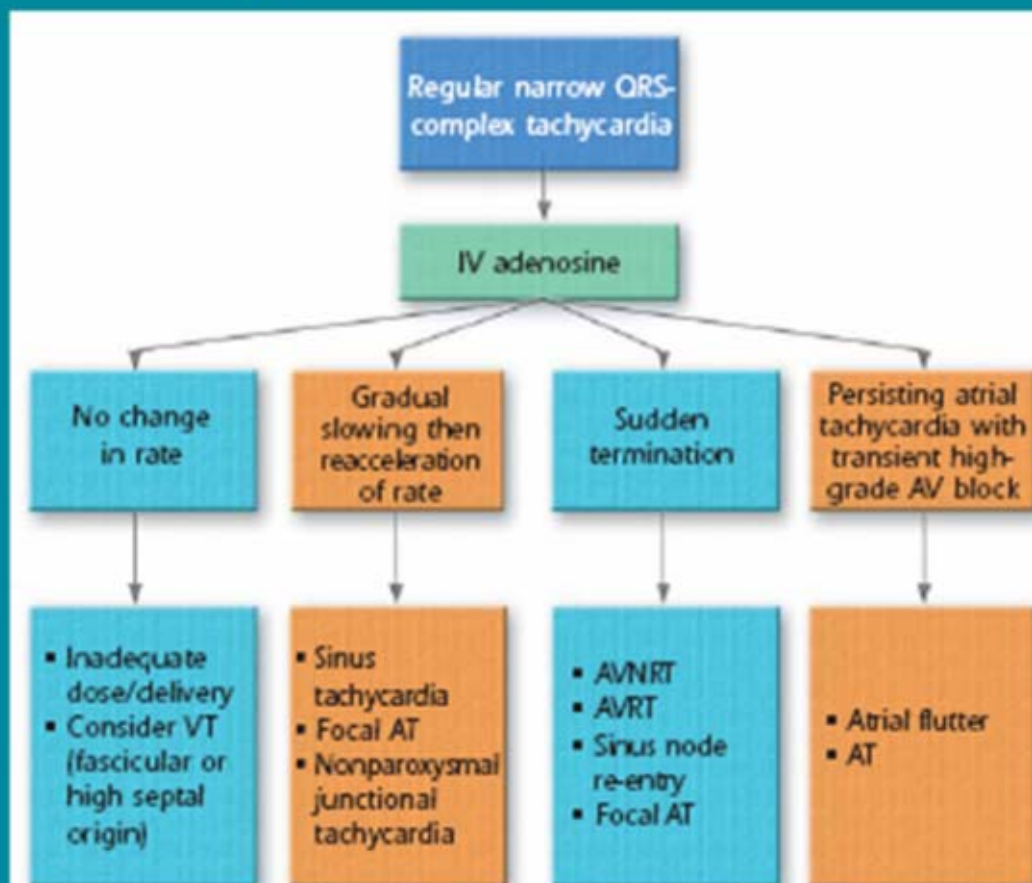


Panel A: 12-Lead ECG shows a regular SVT recorded at an ECG paper speed of 25 mm/sec.

Panel B: After conversion to sinus rhythm, the 12-lead ECG shows sinus rhythm with narrow QRS complexes. In comparison with Panel A: Note the pseudo r' in V1 (arrow) and accentuated S waves in 2, 3, aVF (arrow). These findings are pathognomonic for AVNRT.

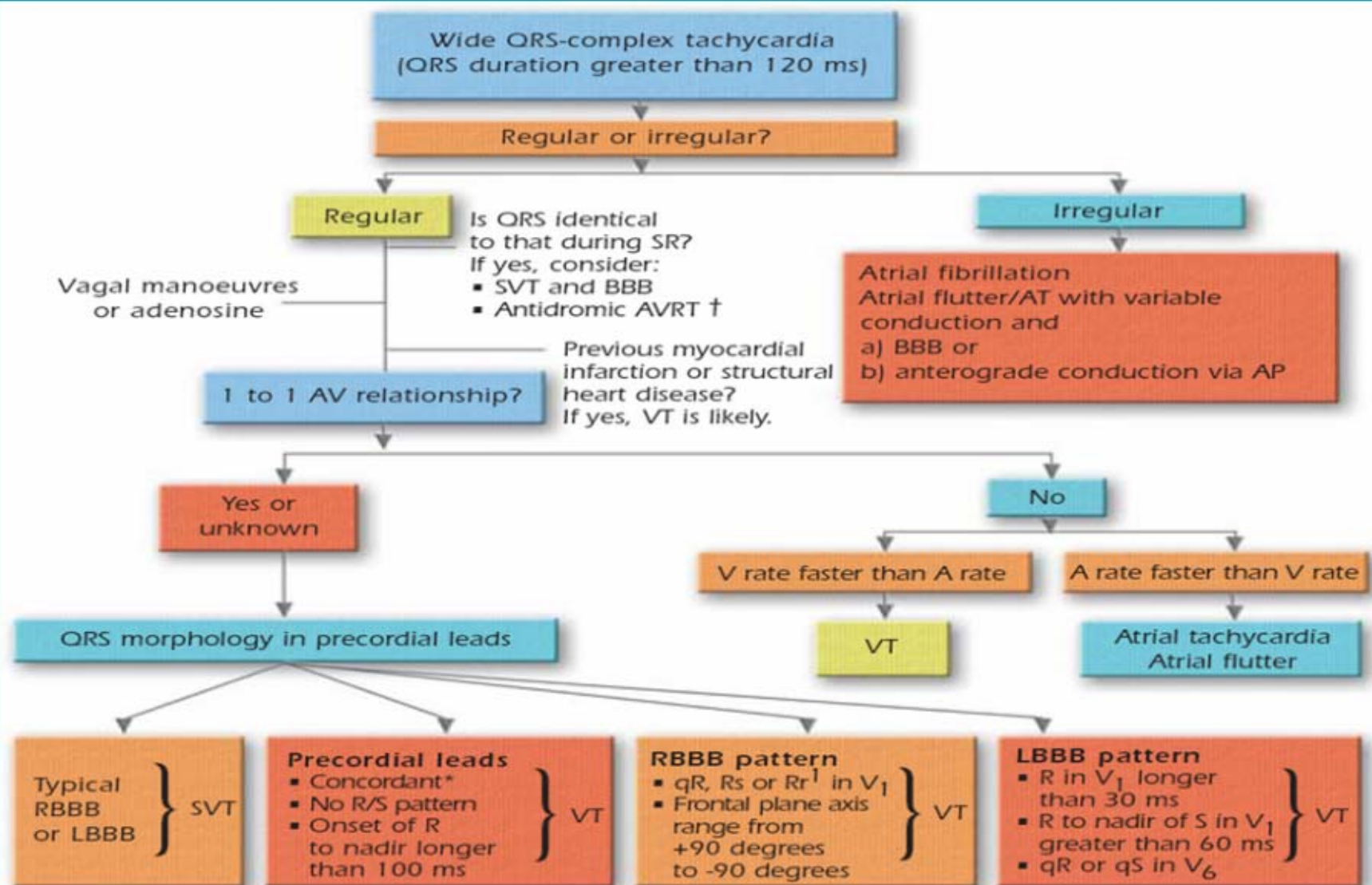
AVNRT = atrioventricular nodal reciprocating tachycardia; mm/sec = millimeters per second; QRS = ventricular activation on ECG; SVT = supraventricular tachycardia; VF = ventricular fibrillation.

Responses of narrow complex tachycardias to adenosine

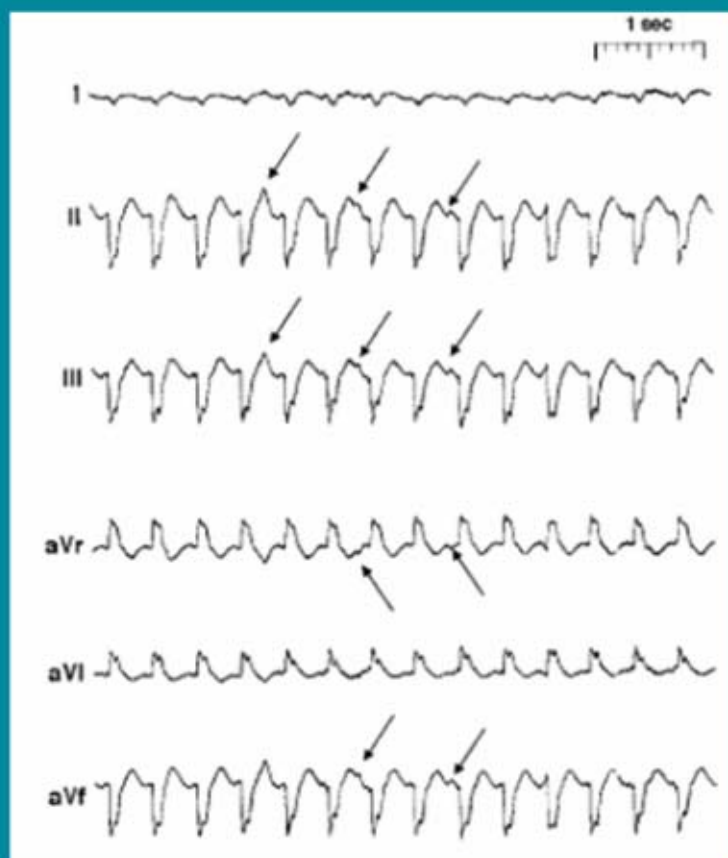


AT = atrial tachycardia;
AV = atrioventricular;
AVNRT = atrioventricular
nodal reciprocating
tachycardia; AVRT =
atrioventricular
reciprocating
tachycardia; IV =
intravenous; QRS =
ventricular activation on
ECG; VT = ventricular
tachycardia.

Differential diagnosis for wide QRS-complex tachycardia (> 120 ms)

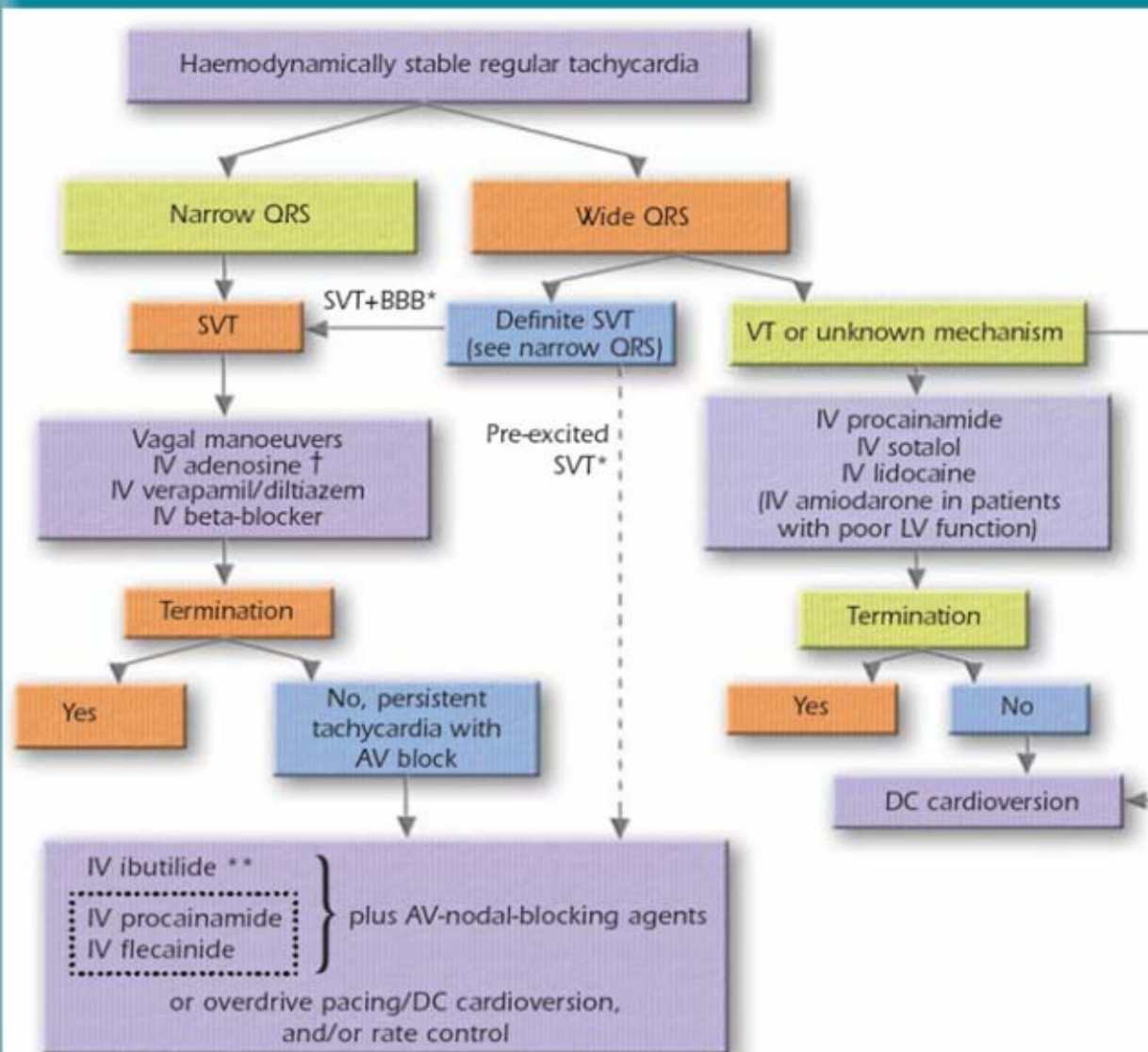


Atrioventricular dissociation during ventricular tachycardia in a patient with wide QRS-complex tachycardia



→ Indicates P waves

Acute management of haemodynamically stable and regular tachycardia



*A 12-lead ECG during sinus rhythm must be available for diagnosis.
†Adenosine should be used with caution in patients with severe coronary artery disease and may produce AF, which may result in rapid ventricular rates for patients with pre-excitation.

**Ibutilide is especially effective for patients with atrial flutter but should not be used in patients with EF less than 30% due to increased risk of polymorphic VT.

AF = atrial fibrillation; AV = atrioventricular; BBB = bundle-branch block; DC = direct current; EF = ejection fraction; IV = intravenous; LV = left ventricle; QRS = ventricular activation on ECG; SVT = supraventricular tachycardia; VT = ventricular tachycardia.

Haemodynamically stable and regular tachycardia: management recommendations (1)

Recommendation ^a	Grading	Recommendation ^a	Grading
Narrow QRS-complex tachycardia (SVT)		Wide QRS-complex tachycardia	
Vagal manoeuvres	I B	<ul style="list-style-type: none"> ▪ <i>SVT + BBB</i>: As for narrow QRS-complex ▪ <i>Pre-excited SVT/AF</i> 	
Adenosine	I A	Flecainide ^b	I B
Verapamil, diltiazem	I A	Ibutilide ^b	I B
Beta-blockers	IIb C	Procainamide ^b	I B
Amiodarone	IIb C		
Digoxin	IIb C	DC cardioversion	I C

^a All listed drugs are administered intravenously; ^b Should not be taken by patients with reduced LV function. AF = atrial fibrillation; BBB = bundle-branch block; DC = direct current; LV = left ventricular; QRS = ventricular activation on ECG; SVT = supraventricular tachycardia.

Haemodynamically stable and regular tachycardia: management recommendations (2)

Recommendation ^a	Grading	Recommendation ^a	Grading
Wide QRS-complex tachycardia of unknown origin		Wide QRS-complex tachycardia of unknown origin in patients with poor LV function	
Procainamide ^b	I B	Amiodarone	I B
Sotalol	I B	DC cardioversion, lidocaine	I B
Amiodarone	I B		
DC cardioversion	I B		
Lidocaine	IIb B		
Adenosine ^c	IIb C		
Beta-blockers ^d	III C		
Verapamil ^e	III B		

^a All listed drugs are administered intravenously; ^b Should not be taken by patients with reduced LV function; ^c Adenosine should be used with caution in patients with severe coronary artery disease because vasodilation of normal coronary vessels may produce ischemia in vulnerable territory. It should be used only with full resuscitative equipment available; ^d Beta blockers may be used as first-line therapy for those with catecholamine-sensitive tachycardias, such as right ventricular outflow tachycardia; ^e Verapamil may be used as first-line therapy for those with LV fascicular VT. DC = direct current; LV = left ventricular; QRS = ventricular activation on ECG; VT = ventricular tachycardia.

Inappropriate sinus tachycardia: treatment recommendations

Treatment	Recommendation	Grading
Medical	Beta-blockers	I C
	Verapamil, diltiazem	IIa C
Interventional	Catheter ablation – sinus node modification/elimination (as a last resort)	IIb C

Recurrent AVNRT: long-term treatment recommendations (1)

Clinical presentation	Recommendation	Grading
Poorly tolerated AVNRT with haemodynamic intolerance	Catheter ablation	I B
	Verapamil, diltiazem, beta blockers, sotalol, amiodarone	IIa C
	Flecainide ^a , propafenone ^a	IIa C
Recurrent symptomatic AVNRT	Catheter ablation	I B
	Verapamil	I B
	Diltiazem, beta-blockers	I C
	Digoxin ^b	IIb C
Recurrent AVNRT, unresponsive to beta or calcium-channel blockers; patient not desiring RF ablation	Flecainide ^a , propafenone ^a , sotalol	IIa B
	Amiodarone	IIb C

^a Relatively contraindicated for patients with coronary artery disease, left ventricular dysfunction, or other significant heart disease. ^b Digoxin is often ineffective because its pharmacologic effects can be overridden by enhanced sympathetic tone. AVNRT = atrioventricular nodal reciprocating tachycardia; RF = radiofrequency.

Recurrent AVNRT: long-term treatment recommendations (2)

Clinical presentation	Recommendation	Grading
AVNRT with infrequent or single episode in patients who desire complete control of arrhythmia	Catheter ablation	I B
Documented PSVT with only dual AV-nodal pathways or single echo beats demonstrated during electrophysiological study and no other identified cause of arrhythmia	Verapamil, diltiazem, beta-blockers, flecainide ^a , propafenone ^a	I C
	Catheter ablation ^b	I B
Infrequent, well-tolerated AVNRT	No therapy	I C
	Vagal manoeuvres	I B
	Pill-in-the-pocket	I B
	Verapamil, diltiazem, beta-blockers	I B
	Catheter ablation	I B

^a Relatively contraindicated for patients with coronary artery disease, left ventricular dysfunction, or other significant heart disease. ^b Decision depends on symptoms. AV = atrioventricular; AVNRT = atrioventricular nodal reciprocating tachycardia; PSVT = paroxysmal supraventricular tachycardia.

ECG in focal junctional tachycardia



Sinus rhythm

Tachycardia
onset

→ Characteristic finding of isorhythmic atrioventricular dissociation

Focal and nonparoxysmal junctional tachycardias: treatment recommendations

Tachycardia	Recommendation	Grading
Focal junctional tachycardia	Beta-blockers	IIa C
	Flecainide	IIa C
	Propafenone ^a	IIa C
	Sotalol ^a	IIa C
	Amiodarone ^a	IIa C
	Catheter ablation	IIa C
Nonparoxysmal junctional tachycardia	Reverse digitalis toxicity	I C
	Correct hypokalemia	I C
	Treat myocardial ischemia	I C
	Beta-blockers, calcium-channel blockers	IIa C

^a Data available for paediatric patients only.

Accessory pathway-mediated arrhythmias: long-term therapy recommendations (1)

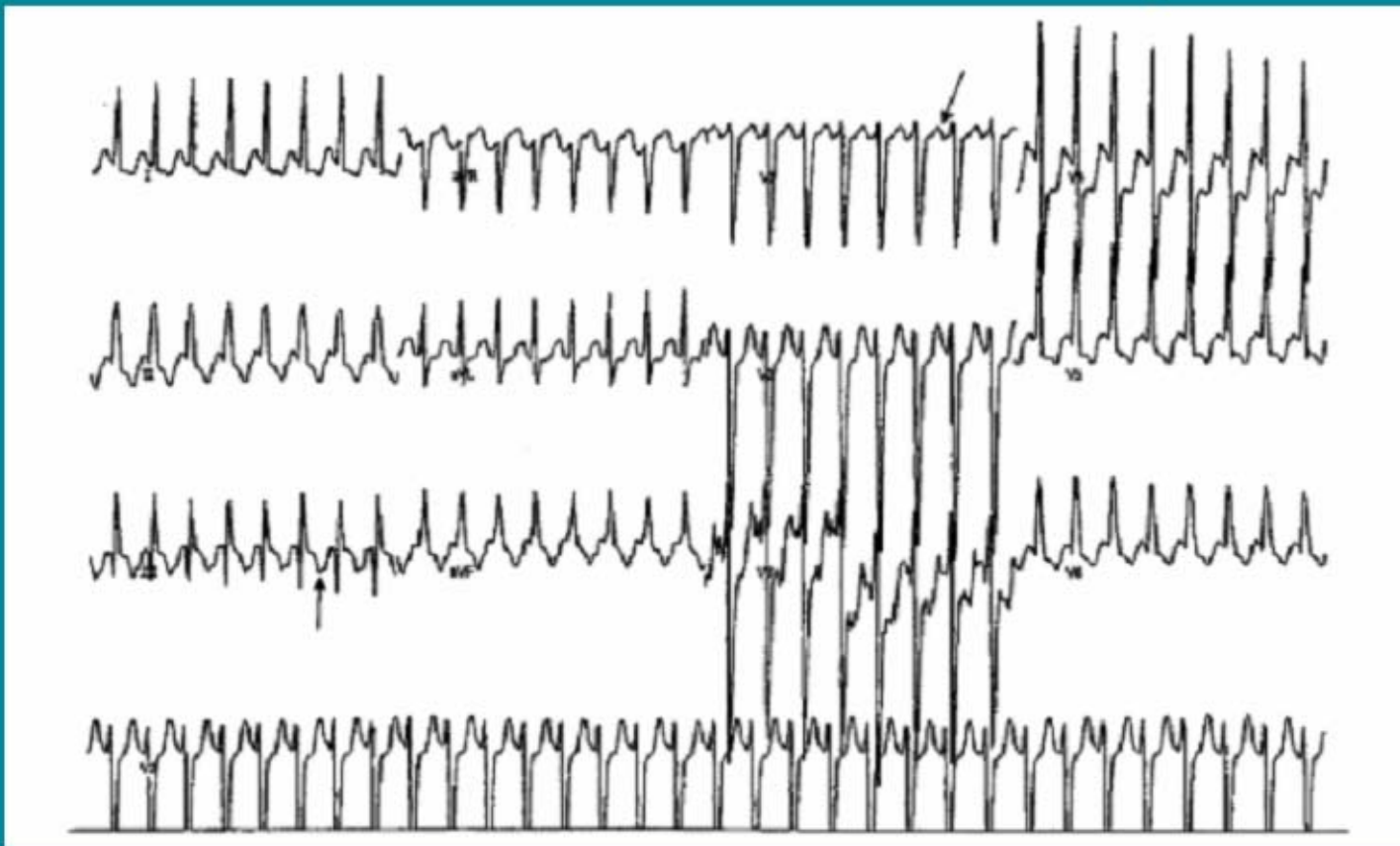
Arrhythmia	Recommendation	Grading
WPW syndrome (pre-excitation and symptomatic arrhythmias), well tolerated	Catheter ablation	I B
	Flecainide, propafenone	IIa C
	Sotalol, amiodarone, beta-blockers	IIa C
	Verapamil, diltiazem, digoxin	III C
WPW syndrome (with AF and rapid-conduction or poorly tolerated AVRT)	Catheter ablation	I B
AVRT, poorly tolerated (no pre-excitation)	Catheter ablation	I B
	Flecainide, propafenone	IIa C
	Sotalol, amiodarone	IIa C
	Beta-blockers	IIb C
	Verapamil, diltiazem, digoxin	III C

AF = atrial fibrillation; AVRT = atrioventricular reciprocating tachycardia; WPW = Wolff-Parkinson-White.

Accessory pathway-mediated arrhythmias: long-term therapy recommendations (2)

Arrhythmia	Recommendation	Grading
Single or infrequent AVRT episode(s) (no pre-excitation)	None	I C
	Vagal manoeuvres	I B
	Pill-in-the-pocket – verapamil, diltiazem, beta-blockers	I B
	Catheter ablation	IIa B
	Sotalol, amiodarone	IIb B
	Flecainide, propafenone	IIb C
	Digoxin	III C
Pre-excitation, asymptomatic	None	I C
	Catheter ablation	IIa B

Focal atrial tachycardia showing a long RP interval relationship



The P wave in atrial tachycardia usually occurs in the latter part of the tachycardia cycle (arrows) but can appear earlier, depending on the rate and status of atrioventricular-nodal conduction.

Focal atrial tachycardia: treatment recommendations^a (1)

Clinical situation	Recommendation	Grading
ACUTE TREATMENT^b		
<i>A. Conversion</i>		
Haemodynamically unstable	DC cardioversion	I B
Haemodynamically stable	Adenosine	IIa C
	Beta-blockers	IIa C
	Verapamil, diltiazem	IIa C
	Procainamide	IIa C
	Flecainide/propafenone	IIa C
	Amiodarone, sotalol	IIa C
<i>B. Rate regulation (in absence of digitalis)</i>		
	Beta-blockers	I C
	Verapamil, diltiazem	I C
	Digoxin	IIb C

^a Excluded are patients with MAT in whom beta blockers and sotalol are often contraindicated due to pulmonary disease. ^b All listed drugs for acute treatment are administered intravenously. DC = direct current; MAT = multifocal atrial tachycardia.

Focal atrial tachycardia: treatment recommendations^a (2)

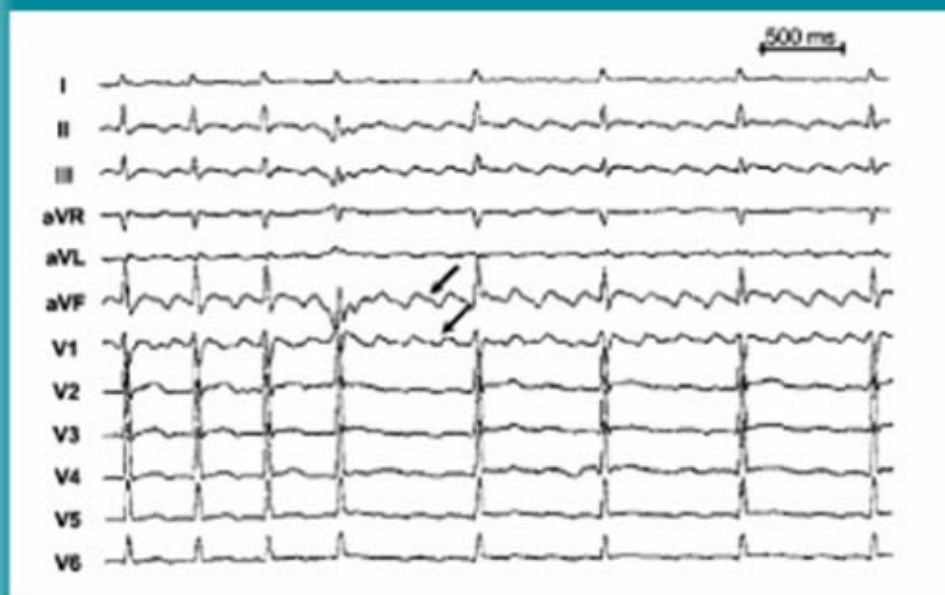
Clinical situation	Recommendation	Grading
PROPHYLACTIC THERAPY		
Recurrent symptomatic AT	Catheter ablation	I B
	Beta-blockers, calcium-channel blockers	I C
	Disopyramide ^b	IIa C
	Flecainide ^b /propafenone ^b	IIa C
	Sotalol, amiodarone	IIa C
Asymptomatic or symptomatic incessant ATs	Catheter ablation	I B
Nonsustained and asymptomatic	No therapy	I C
	Catheter ablation	III C

^a Excluded are patients with MAT in whom beta blockers and sotalol are often contraindicated due to pulmonary disease.

^b Flecainide, propafenone, and disopyramide should not be used unless they are combined with an atrioventricular-nodal-blocking agent. AT = atrial tachycardia; MAT = multifocal atrial tachycardia.

Cavotricuspid isthmus-dependent flutter

COUNTERCLOCKWISE



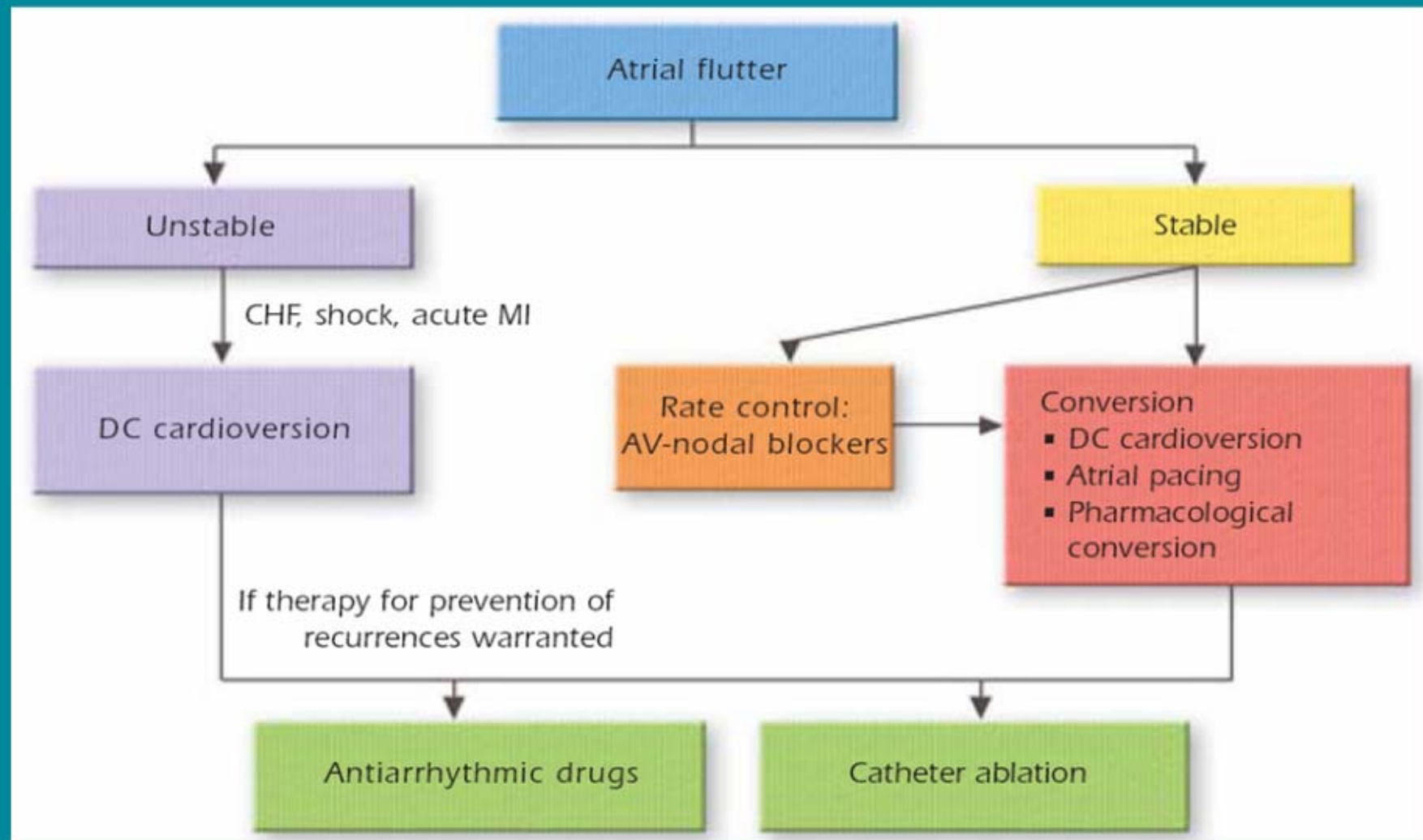
Note that the flutter waves in the inferior leads are predominantly negative (arrow), whereas the flutter waves in lead V1 are positive (arrow).

CLOCKWISE



Note that the flutter waves are positive in the inferior leads and predominantly negative double waves in lead V1.

Management of atrial flutter depending on haemodynamic stability



Attempts to electively revert atrial flutter to sinus rhythm should be preceded and followed by anticoagulant precautions, as per AF. AF = atrial fibrillation; AV = atrioventricular; CHF = congestive heart failure; DC = direct current; MI = myocardial infarction.

Atrial flutter: acute management recommendations (1)

Clinical status	Recommendation ^a	Grading
POORLY TOLERATED		
Conversion	DC cardioversion	I C
Rate control	Beta-blockers	IIa C
	Verapamil/diltiazem	IIa C
	Digitalis ^b	IIb C
	Amiodarone	IIb C

^a All drugs are administered intravenously. ^b Digitalis may be especially useful for rate control in patients with heart failure. DC = direct current.

Atrial flutter: acute management recommendations (2)

Clinical status	Recommendation ^a	Grading
STABLE FLUTTER		
Conversion	Atrial or transesophageal pacing	I A
	DC cardioversion	I C
	Ibutilide ^c	IIa A
	Flecainide ^d	IIb A
	Propafenone ^d	IIb A
	Sotalol	IIb C
	Procainamide ^d	IIb A
	Amiodarone	IIb C
Rate control	Diltiazem/verapamil	I A
	Beta-blockers	I C
	Digitalis ^b	IIb C
	Amiodarone	IIb C

^a All drugs are administered intravenously. ^b Digitalis may be especially useful for rate control in patients with heart failure.

^c Ibutilide should not be taken by patients with reduced left ventricular function. ^d Flecainide, propafenone, and procainamide should not be used unless they are combined with an atrioventricular-nodal-blocking agent. DC = direct current.

Atrial flutter: long-term management recommendations

Clinical status	Recommendation	Grading
First episode and well-tolerated atrial flutter	Cardioversion alone Catheter ablation ^a	I B IIa B
Recurrent and well-tolerated atrial flutter	Catheter ablation ^a Dofetilide Amiodarone, sotalol, flecainide ^{b,c} , quinidine ^{b,c} , propafenone ^{b,c} , procainamide ^{b,c} , disopyramide ^{b,c}	I B IIa C IIb C
Poorly tolerated atrial flutter	Catheter ablation ^a	I B
Atrial flutter appearing after use of class Ic agents or amiodarone for AF	Catheter ablation ^a Stop current drug and use another	I B IIa C
Symptomatic non-CTI-dependent flutter after failed antiarrhythmic drug therapy	Catheter ablation ^a	IIa B

^a Catheter ablation of the AV junction and insertion of a pacemaker should be considered if catheter ablative cure is not possible and the patient fails drug therapy. ^b These drugs should not be taken by patients with significant structural cardiac disease. Use of anticoagulants is identical to that described for patients with AF. ^c Flecainide, propafenone, procainamide, quinidine, and disopyramide should not be used unless they are combined with an AV-nodal-blocking agent. AF = atrial fibrillation; AV = atrioventricular; CTI = cavotricuspid isthmus.

SVT during pregnancy: treatment strategy recommendations

Treatment strategy	Recommendation	Grading
Acute conversion of PSVT	Vagal manoeuvre	I C
	Adenosine	I C
	DC cardioversion	I C
	Metoprolol, propranolol	IIa C
	Verapamil	IIb C
Prophylactic therapy	Digoxin	I C
	Metoprolol ^a	I B
	Propranolol ^a	IIa B
	Sotalol ^a , flecainide ^b	IIa C
	Quinidine, propafenone ^b , verapamil	IIb C
	Procainamide	IIb B
	Catheter ablation	IIb C
	Atenolol ^c	III B
	Amiodaraone	III C

^a Beta-blocking agents should not be taken in the first trimester, if possible. ^b Consider atrioventricular-nodal-blocking agents in conjunction with flecainide and propafenone for certain tachycardias. ^c Atenolol is categorized in class C (drug classification for use during pregnancy) by legal authorities in some European countries. DC = direct current; PSVT = paroxysmal supraventricular tachycardia.

SVTs in adults with congenital heart disease: treatment recommendations

Condition	Recommendation ^a	Grading
<i>Failed antiarrhythmic drugs and symptomatic</i>		
Repaired ASD	Catheter ablation in experienced centre	I C
- Mustard or Senning repair of transposition of the great vessels	Catheter ablation in experienced centre	I C
- Unrepaired asymptomatic ASD not haemodynamically significant	Closure of ASD for treatment of the arrhythmia	III C
- Unrepaired haemodynamically significant ASD with atrial flutter ^a	Closure of ASD and ablation of the flutter isthmus	I C
- PSVT and Ebstein's anomaly with haemodynamic indications for surgical repair	Surgical ablation of accessory pathways at time of operative repair of the malformation at experienced centre	I C

^a Conversion and antiarrhythmic drug therapy initial management as described for atrial flutter. ASD = atrial septal defect; PSVT = paroxysmal supraventricular tachycardia.