

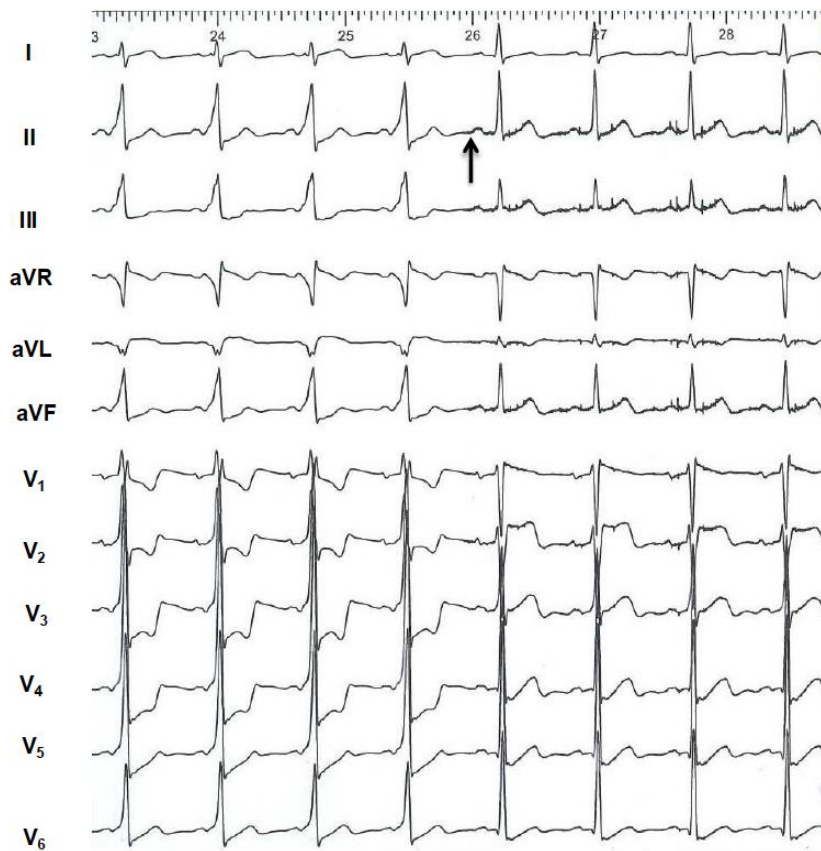


Figure 1. Wolff-Parkinson-White syndrome due to a left lateral accessory pathway. Application of radiofrequency energy during catheter ablation (arrow) results in loss of preexcitation and restoration of normal conduction.

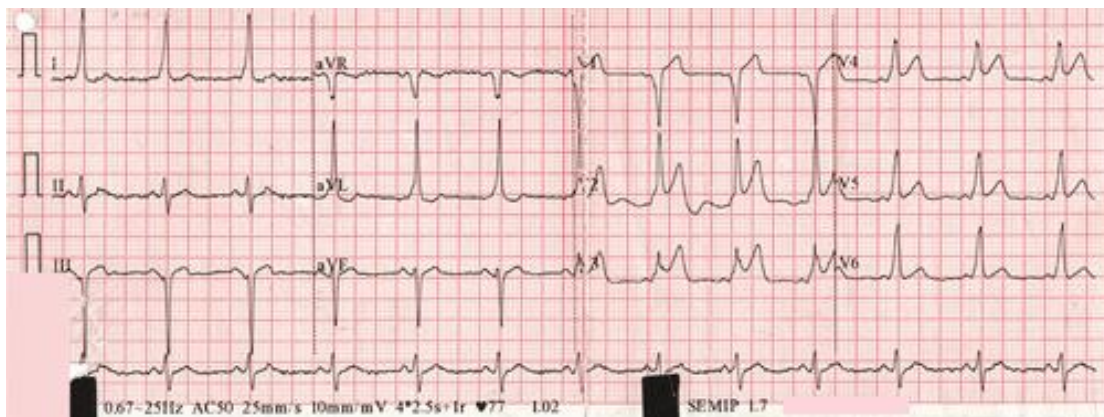


Figure 2. ECG in the presence of right posteroseptal pathway. Secondary ST-T changes are most prominent in the leads with the delta waves and are discordant, that is, in a direction opposite to the delta wave.

Bhasin D, et al. Chest Pain With ST-Segment Elevation: Looking Behind the Masquerade. *Circulation*. 2020;142:86-88.

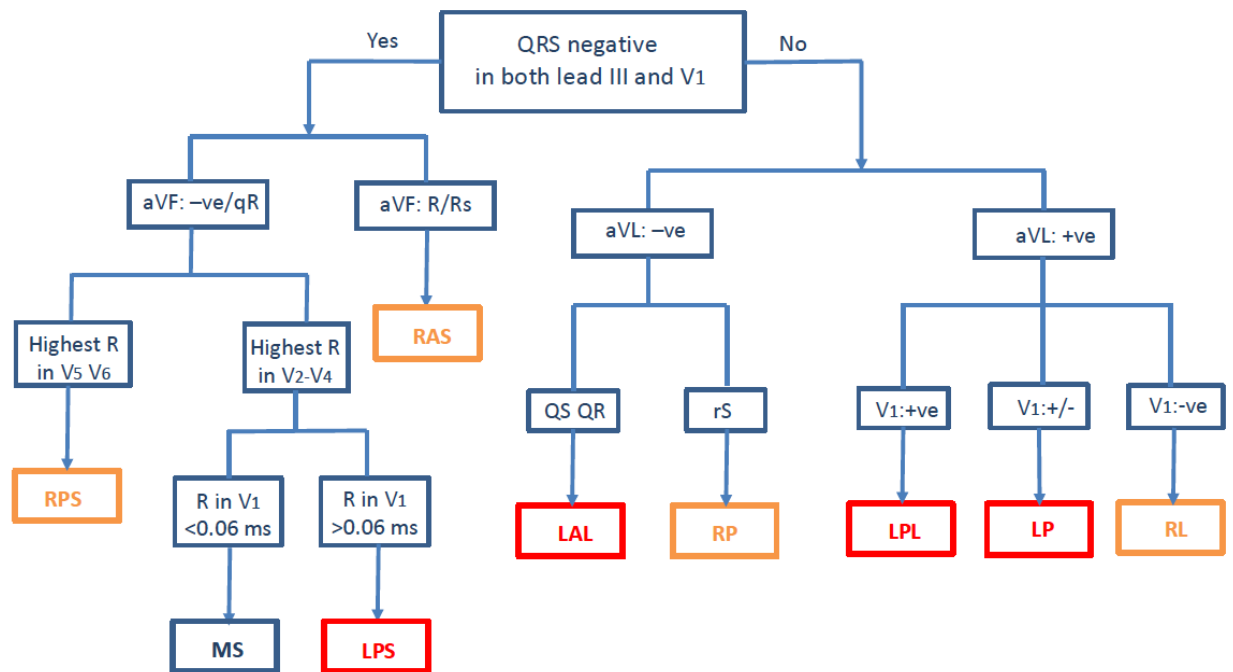


Figure 3. The St George's algorithm for localization of accessory pathways.

YES: QRS complex negative in both lead III and lead V1; +: positive QRS complex; -: negative QRS complex; ± = equiphasic QRS complex;

LAL: left anterolateral; LP: left posterior; LPL: left posterolateral; LPS: left posteroseptal; MS: midseptal; RAS: right anteroseptal; RP = right posterior; RPS: right posteroseptal; RL = right lateral; RW: R wave width in V1; RWH: the highest R wave recorded in precordial leads.

Xie B, Heald SC, Bashir Y, et al. Localization of accessory pathways from the 12-lead electrocardiogram using a new algorithm. *Am J Cardiol.* 1994;74:161-5.

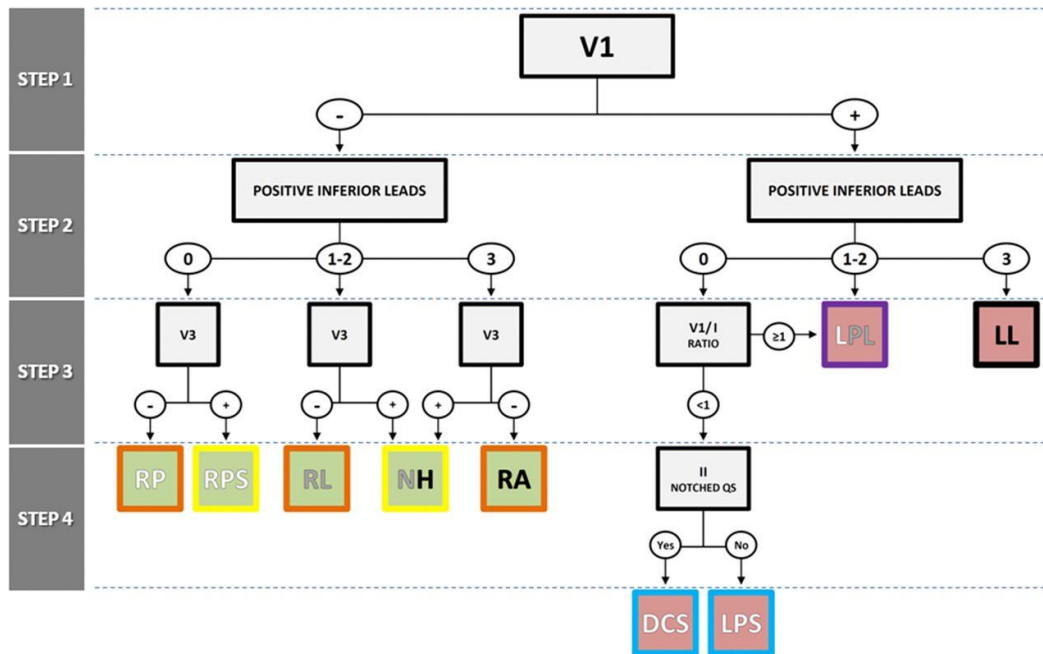


Figure 4. Localization of accessory pathway in the presence of maximum preexcitation.

Accessory pathway (AP) locations are green when right sided and red when left sided.

LPL APs can have 0, 1, or 2 inferior leads with positive polarity, whereas NH APs can have 1, 2, or 3 inferior leads with positive polarity. Right-sided APs are framed orange or yellow when the V3 lead is negative or positive, respectively. Left posterior APs are framed blue when V1/I ratio is < 1 or purple when V1/I ratio is ≥ 1 .

Right anterior (RA), right lateral (RL), right posterior (RP), right paraseptal (RPS), nodo-Hisian (NH), deep coronary sinus (DCS), left paraseptal (LPS), left posterolateral (LPL), and left lateral (LL).

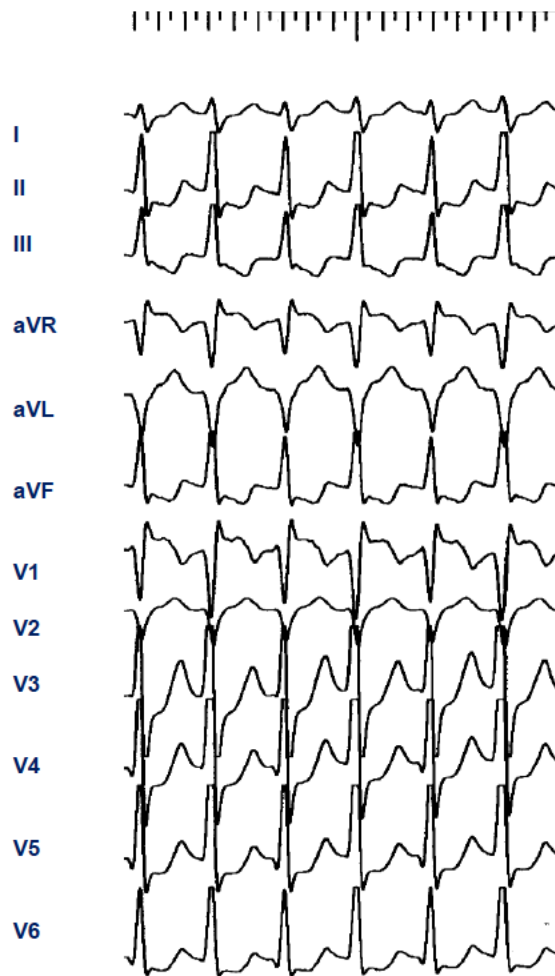


Figure 5. Orthodromic AVRT due to a concealed posteroseptal pathway.

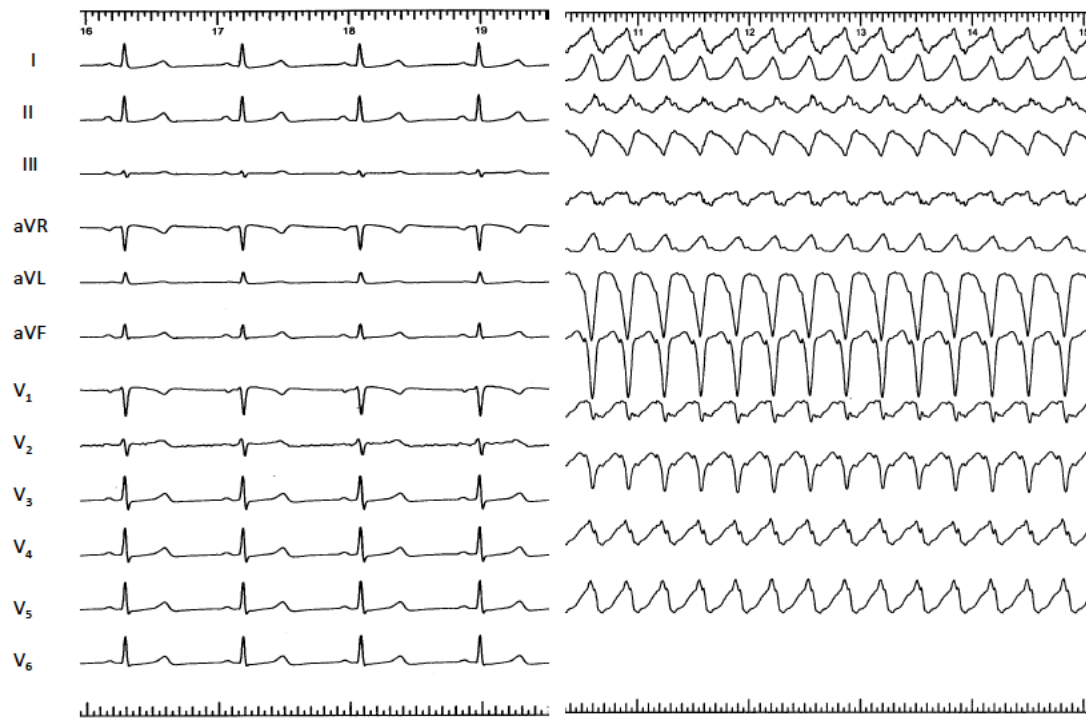


Figure 6. Antidromic AVRT due to an atriohisian atypical pathway. Note that ECG is normal during sinus rhythm (left panel).

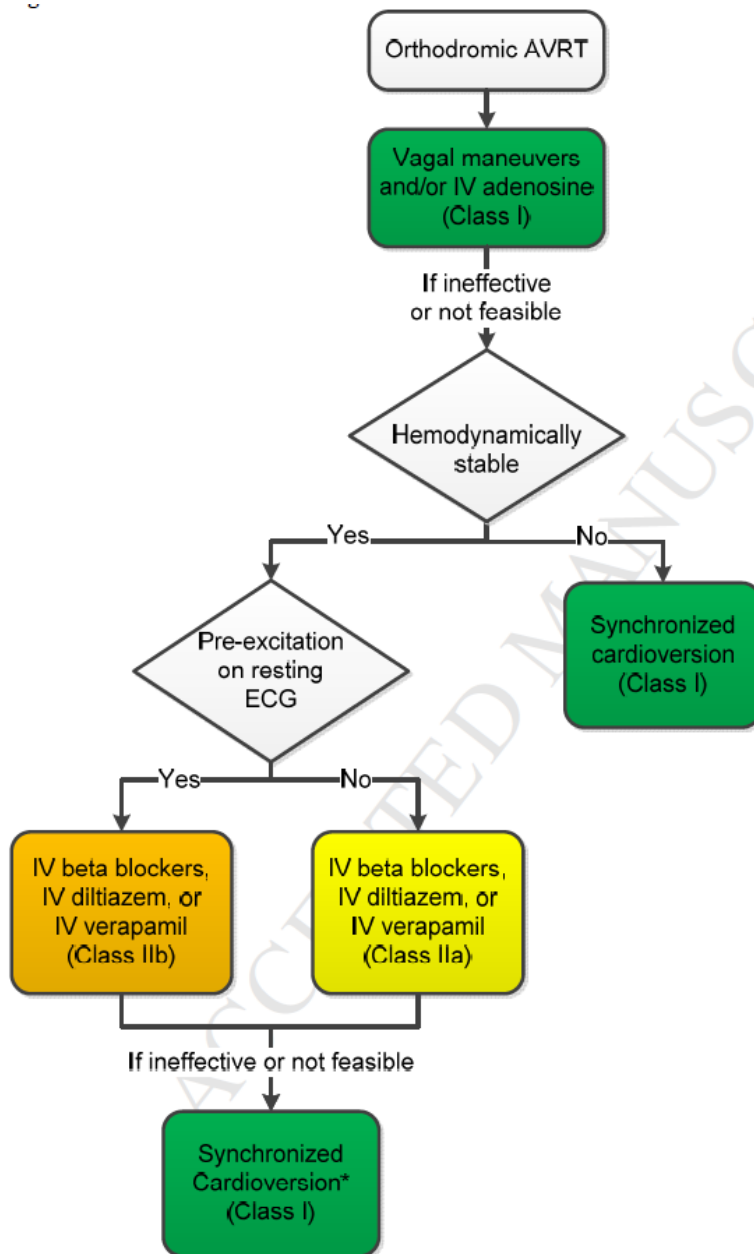


Figure 7. ACC/AHA/HRS 2015 GL on SVT. Acute treatment of orthodromic AVRT.

Drugs listed alphabetically.

*For rhythms that break or recur spontaneously, synchronized cardioversion is not appropriate.

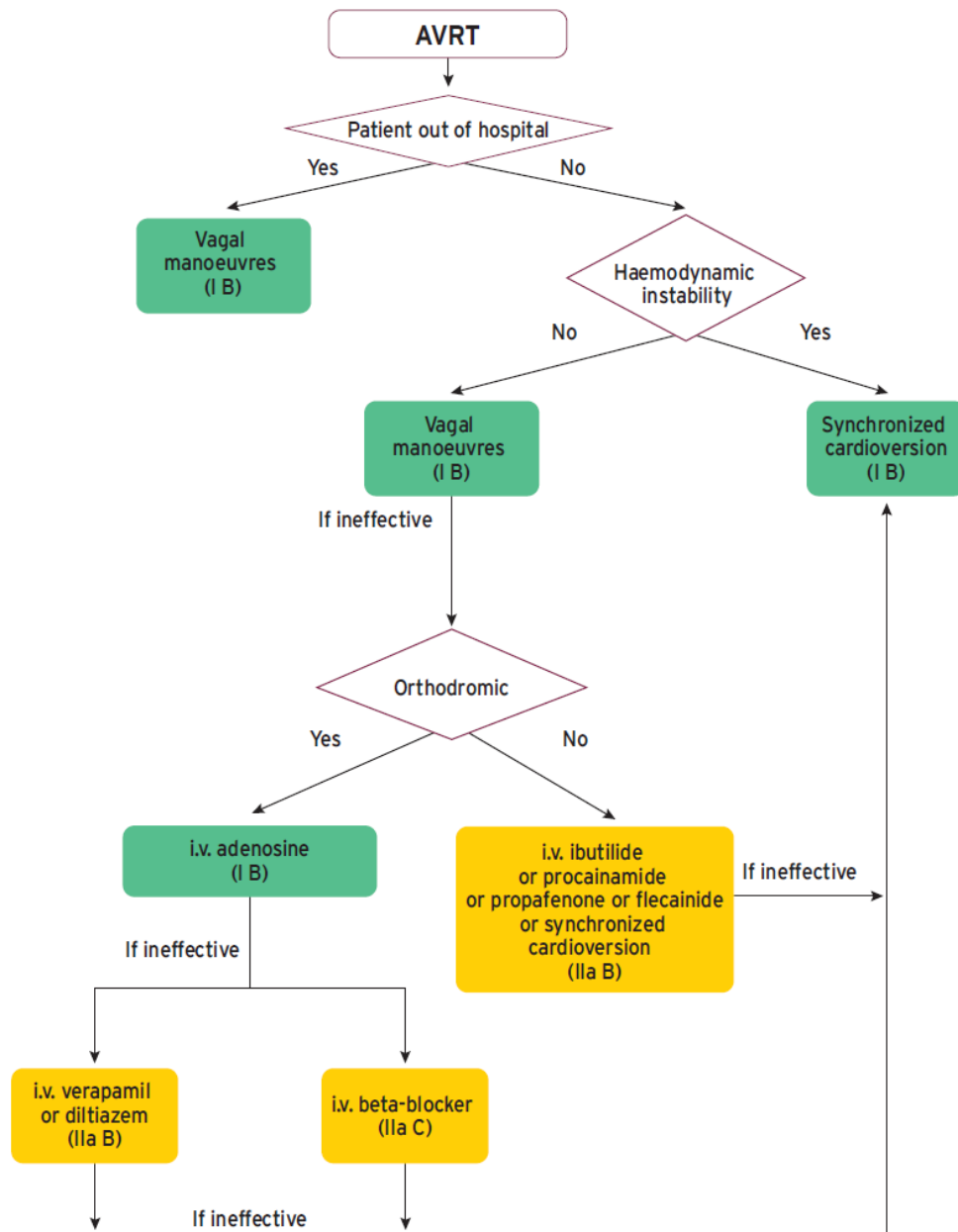


Figure 8. ESC 2019 GL on SVT. Acute therapy of AVRT.

i.v.flecainide and propafenone are contraindicated in patients with ischaemic or structural heart disease.

i.v.ibutilide and procainamide are contraindicated in the presence of prolonged QTc interval.

AVRT = atrioventricular re-entrant tachycardia; i.v. = intravenous; SVT = supraventricular tachycardia.

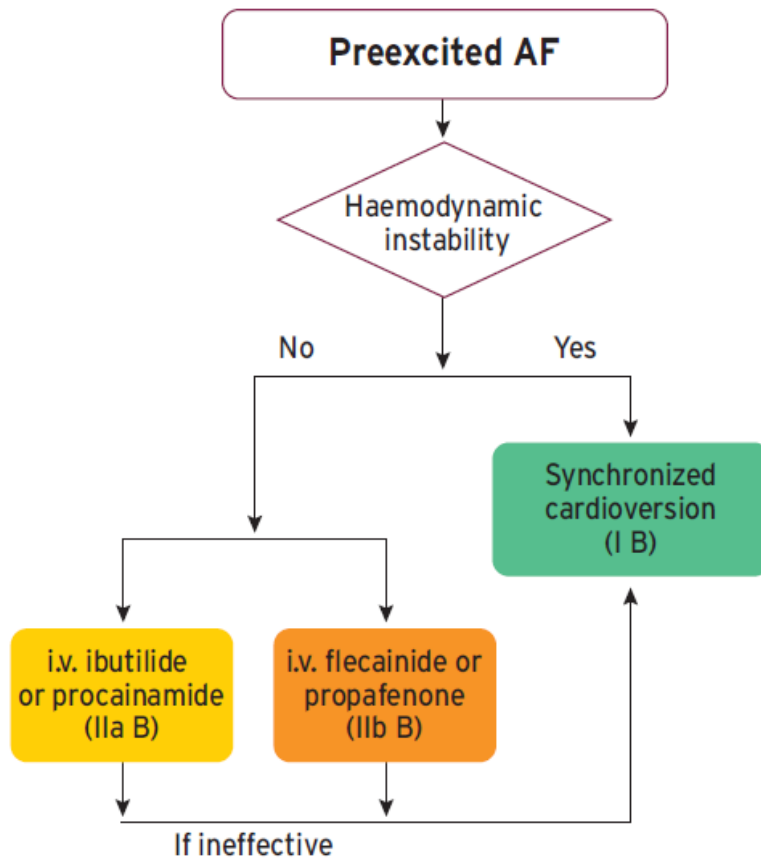


Figure 9. ESC 2019 GL on SVT. Acute therapy of preexcited AF.

i.v.flecainide and propafenone are contraindicated in patients with ischaemic or structural heart disease.

i.v.ibutilide and procainamide are contraindicated in the presence of prolonged QTc interval.

AF = atrial fibrillation; i.v. = intravenous.

Table 1. Therapy of AVRT.**ACC/AHA/HRS 2015 GL on SVT. Manifest or concealed accessory pathways**

Acute treatment	
Vagal maneuvers for orthodromic AVRT	I-B-R
Adenosine for orthodromic AVRT	I-B-R
Synchronized cardioversion in hemodynamically unstable patients with AVRT if vagal maneuvers or adenosine are ineffective or not feasible	I-B-NR
Synchronized cardioversion in hemodynamically stable patients with AVRT when pharmacological therapy is ineffective or contraindicated	I-B-NR
Synchronized cardioversion in hemodynamically unstable, pre-excited AF	I-B-NR
Ibutilide or IV procainamide in hemodynamically stable, pre-excited AF	I-C-LD
IV diltiazem, or verapamil for orthodromic AVRT in the absence of pre-excitation on the resting ECG during SR	IIa-B-R
IV beta blockers for orthodromic AVRT in the absence of pre-excitation on the resting ECG during SR	IIa-C-LD
IV beta blockers, diltiazem, or verapamil for orthodromic AVRT and pre-excitation on the resting ECG and no response to other therapies	IIb-B-R
IV digoxin, IV amiodarone, IV or oral beta blockers, diltiazem, and verapamil are potentially harmful in patients with pre-excited AF	III-C-LD
Ongoing management	
Catheter ablation of the accessory pathway in AVRT and/or pre-excited AF	I-B-NR
Beta blockers, diltiazem, or verapamil for AVRT without pre-excitation on the resting ECG	I-C-LD
Flecainide or propafenone in patients without structural heart disease or ischemic heart disease, AVRT and/or pre-excited AF, and not candidates for catheter ablation	IIa-B-R
Dofetilide or sotalol for AVRT and/or pre-excited AF in patients not candidates for catheter ablation	IIb-B-R
Amiodarone in AVRT and/or pre-excited AF, not candidates for catheter ablation and beta blockers, diltiazem, flecainide, propafenone, and verapamil ineffective or contraindicated	IIb-C-LD
Beta blockers, diltiazem, or verapamil for orthodromic AVRT, pre-excitation on the resting ECG, and not candidates for catheter ablation	IIb-C-LD
Digoxin for orthodromic AVRT, no pre-excitation on the resting ECG, and not candidates for catheter ablation	IIb-C-LD
Digoxin potentially harmful for AVRT, and pre-excitation on the resting ECG	III-C-LD (Harm)

ESC 2019 GL on SVT. Recommendations for the therapy of atrioventricular nodal re-entrant tachycardia (AVRT) due to manifest or concealed accessory pathways

Acute therapy		
<i>Haemodynamically unstable patients</i>		
Synchronized direct-current cardioversion for haemodynamically unstable patients.	I	B
<i>Haemodynamically stable patients</i>		
Vagal manoeuvres, preferably in the supine position with leg elevation.	I	B
In orthodromic AVRT, adenosine (6–18 mg i.v. bolus) if vagal manoeuvres fail.	I	B
In orthodromic AVRT, i.v. verapamil or diltiazem if vagal manoeuvres and adenosine fail.	IIa	B
In orthodromic AVRT, i.v. beta-blockers (esmolol or metoprolol) if vagal manoeuvres and adenosine fail.	IIa	C

In antidromic AVRT, i.v. ibutilide, or procainamide, or flecainide or propafenone, or synchronized direct-current cardioversion if vagal manoeuvres and adenosine fail.	IIa	B
In antidromic AVRT, i.v. amiodarone in refractory cases.	IIb	B
Synchronized direct-current cardioversion when drug therapy fails to convert or control the tachycardia.	I	B
Chronic therapy		
Catheter ablation of accessory pathway(s) in patients with symptomatic, recurrent AVRT.	I	B
Beta-blockers or non-dihydropyridine calcium-channel blockers (verapamil or diltiazem, in the absence of HFrEF), if no signs of pre-excitation are present on resting ECG, if ablation is not desirable or feasible.	IIa	B
Propafenone or flecainide in patients with AVRT and without structural heart disease, if ablation is not desirable or feasible.	IIb	B
Digoxin, beta-blockers, diltiazem, verapamil, and amiodarone are not recommended and are potentially harmful in patients with pre-excited AF.	III	B

i.v. verapamil and diltiazem are contraindicated in the presence of hypotension or HFrEF.

i.v. beta-blockers are contraindicated in the presence of decompensated heart failure.

i.v. ibutilide is contraindicated in patients with prolonged QTc interval.

i.v. procainamide prolongs the QTc interval but much less than class III agents.

i.v. flecainide and propafenone are contraindicated in patients with ischaemic or structural heart disease. They also prolong the QTc interval but much less than class III agents.

i.v. amiodarone prolongs the QTc but torsades des pointes is rare.

AF = atrial fibrillation; AVNRT = atrioventricular nodal re-entrant tachycardia; ECG = electrocardiogram; HFrEF = heart failure with reduced left ventricular ejection fraction; i.v. = intravenous.

Table 2. AF in WPW syndrome

ESC 2019 GL on SVT. Therapy of pre-excited AF

Haemodynamically unstable patients		
Synchronized DC cardioversion is recommended in haemodynamically unstable patients.	I	B
Haemodynamically stable patients		
Intravenous ibutilide or procainamide should be considered.	IIa	B
Intravenous flecainide or propafenone may be considered.	IIb	B
Synchronized DC cardioversion is recommended if drug therapy fails to convert or control the tachycardia.	I	B
Intravenous amiodarone is not recommended.	III	B

i.v. ibutilide is contraindicated in patients with prolonged QTc interval.

i.v. procainamide prolongs the QTc interval but much less than class III agents.

i.v. flecainide and propafenone are contraindicated in patients with ischaemic or structural heart disease. They also prolong the QTc interval but much less than class III agents.

i.v. = intravenous.

ACC/AHA/ACCP/HRS 2023 guideline on AF. WPW and Preexcitation Syndromes

Electrical cardioversion for AF with rapid anterograde conduction (preexcited AF), and hemodynamic instability. 1 B-NR

Catheter ablation of accessory pathways for preexcited AF 1 B-NR

Pharmacological cardioversion with intravenous ibutilide or intravenous procainamide as an alternative to elective cardioversion for preexcited AF and hemodynamic stability. 1 C-LD

In preexcited AF, pharmacological agents that block atrioventricular nodal conduction (verapamil, diltiazem, amiodarone, digoxin, adenosine, or beta blockers) are contraindicated due to risk of precipitating VF or hemodynamic deterioration. 3 B-NR Harm

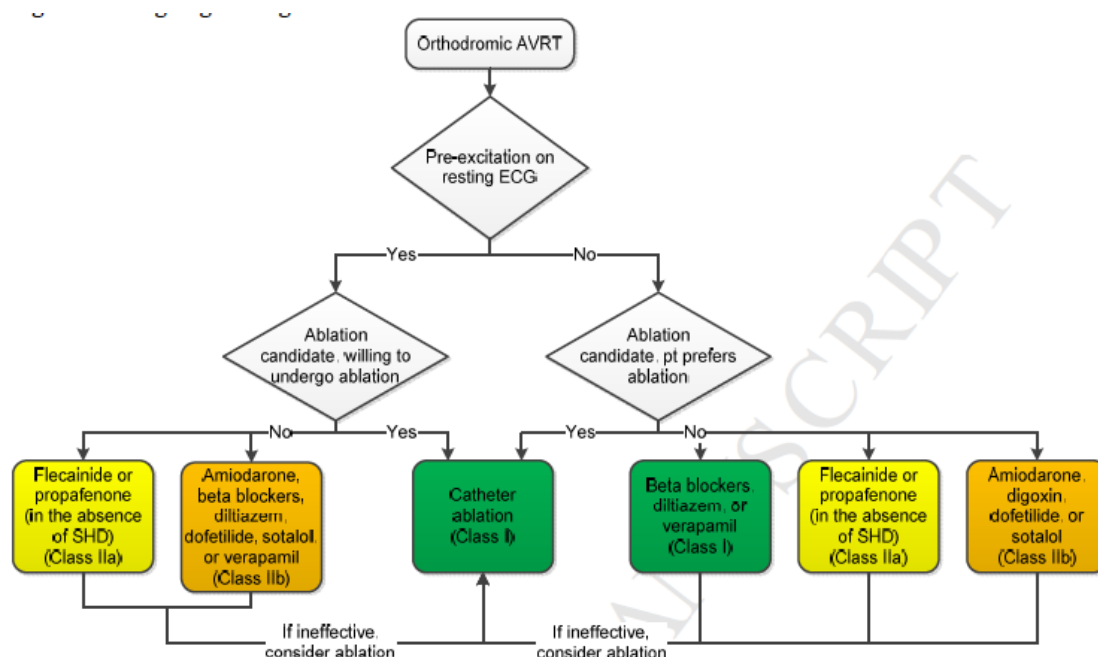


Figure 10. ESC 2019 GL on SVT. Chronic therapy of AVRT.

Oral verapamil and diltiazem are contraindicated in the presence of HFrEF.

Oral flecainide and propafenone are contraindicated in patients with ischaemic or structural heart disease.

AVRT = atrioventricular re-entrant tachycardia; HFrEF = heart failure with reduced left ventricular ejection fraction.

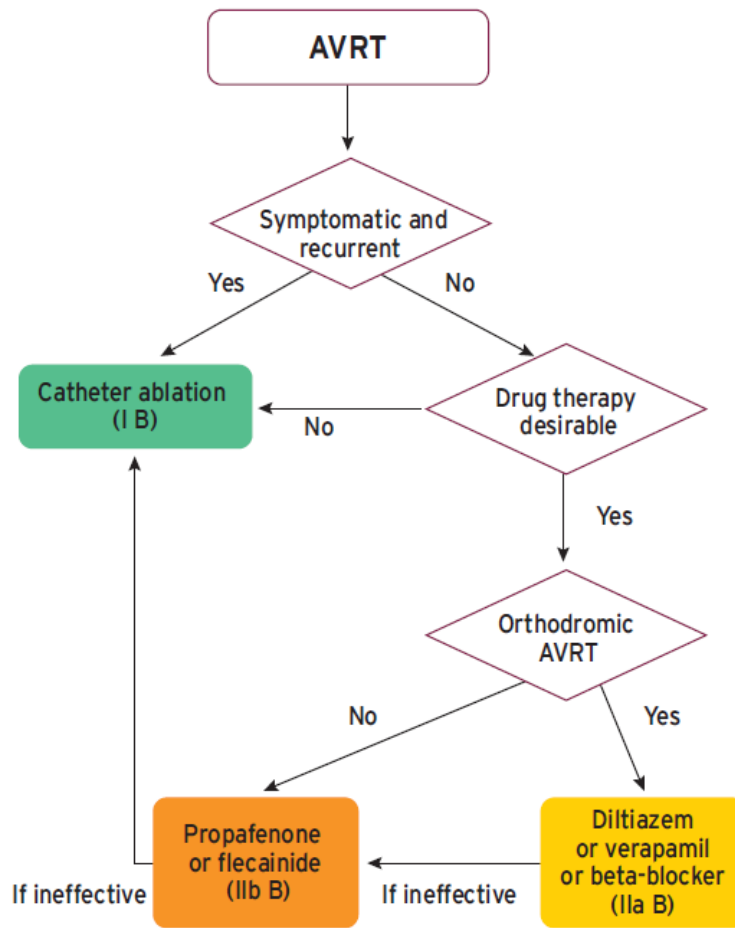


Figure 11. ACC/AHA/HRS 2015 GL on SVT. Ongoing management of orthodromic AVJRT.

Drugs listed alphabetically.

SHD: structural heart disease (including ischemic heart disease).

Table 3. ESC 2020 GL on Sport. Recommendations for exercise and sports participation in individuals with paroxysmal supraventricular tachycardia and pre-excitation

A comprehensive assessment to exclude (latent) pre-excitation, structural heart disease, and VAs in individuals with palpitations.	I B
Participation in all sports activities in individuals PSVT without preexcitation	I C
Ablation of the accessory pathway in competitive and recreational athletes with pre-excitation and documented arrhythmias.	I C
In competitive/professional athletes with asymptomatic pre-excitation, an EP study to evaluate the risk for sudden death.	I B
Ablation in competitive athletes with PSVT but without pre-excitation	IIa C

EP = electrophysiological; PSVT = paroxysmal supraventricular tachycardia; VA = ventricular arrhythmia.