

The Summary of:



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ESC GUIDELINES



2019 ESC Guidelines for the management of patients with supraventricular tachycardia

The Task Force for the management of patients with supraventricular tachycardia of the European Society of Cardiology (ESC)

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Classes of recommendations

Definition		Wording to use
Class I	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended or is indicated
Class II	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.	
Class IIa	Weight of evidence/opinion is in favour of usefulness/efficacy.	Should be considered
Class IIb	Usefulness/efficacy is less well established by evidence/opinion.	May be considered
Class III	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.	Is not recommended

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Level of evidence A	Data derived from multiple randomized clinical trials or meta-analyses.
Level of evidence B	Data derived from a single randomized clinical trial or large non-randomized studies.
Level of evidence C	Consensus of opinion of the experts and/or small studies, retrospective studies, registries.

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Table 3 Changes in SVT Guidelines recommendations since 2003

	2003	2019			
Acute management of narrow QRS tachycardias			Therapy of focal AT		
Verapamil and diltiazem	I	IIa	Acute		
Beta-blockers	IIb	IIa	Flecainide/propafenone	IIa	IIb
<i>Amiodarone and digoxin are not mentioned in the 2019 Guidelines</i>			Beta-blockers	I	IIa
Acute management of wide QRS tachycardias			Amiodarone	IIa	IIb
Procainamide	I	IIa	<i>Procainamide, sotalol, and digoxin are not mentioned in the 2019 Guidelines</i>		
Adenosine	IIb	IIa	Chronic		
Amiodarone	I	IIb	Beta-blockers	I	IIa
<i>Sotalol and lidocaine are not mentioned in the 2019 Guidelines</i>			Verapamil and diltiazem	I	IIa
Therapy of inappropriate sinus tachycardia			<i>Amiodarone, sotalol, and disopyramide are not mentioned in the 2019 Guidelines</i>		
Beta-blockers	I	IIa	Therapy of atrial flutter		
			Acute		
			Atrial or transoesophageal pacing	I	IIb
			Ibutilide	IIa	I
			Flecainide/propafenone	IIb	III
			Verapamil and diltiazem	I	IIa
			Beta-blockers	I	IIa

Table 3 Changes in SVT Guidelines recommendations since 2003

Therapy of AVNRT		
Acute		
<i>Amiodarone, sotalol, flecainide, and propafenone are not mentioned in the 2019 Guidelines</i>		
Chronic		
Verapamil and diltiazem	I	IIa
Beta-blockers	I	IIa
<i>Amiodarone, sotalol, flecainide, propafenone, and the 'pill-in-the pocket' approach are not mentioned in the 2019 Guidelines</i>		
Therapy of AVRT		
Flecainide/propafenone	IIa	IIb
Beta-blockers	IIb	IIa
<i>Amiodarone, sotalol, and the 'pill-in-the pocket' approach are not mentioned in the 2019 Guidelines</i>		
SVT in pregnancy		
Verapamil	IIb	IIa
Catheter ablation	IIb	IIa*
<i>Sotalol, propranolol, quinidine, and procainamide are not mentioned in the 2019 Guidelines.</i>		

Table 4 New recommendations in 2019

Ivabradine alone or in combination with a beta-blocker should be considered in symptomatic patients with inappropriate sinus tachycardia.	IIa
Ibutilide (i.v.) ibutilide may be considered for acute therapy of focal atrial tachycardia.	IIb
Ivabradine for postural orthostatic tachycardia syndrome, and ivabradine with a beta-blocker for chronic therapy of focal atrial tachycardia, may be considered.	IIb
Patients with atrial flutter without AF should be considered for anticoagulation, but the threshold for initiation is not established.	IIa
Ibutilide (i.v.), or i.v. or oral (in-hospital) dofetilide are recommended for conversion of atrial flutter.	I
High-rate atrial pacing is recommended for termination of atrial flutter in the presence of an implanted pacemaker or defibrillator.	I
i.v. amiodarone is not recommended for pre-excited AF.	III
Performance of an EPS to risk-stratify individuals with asymptomatic pre-excitation should be considered.	IIa

Catheter ablation is recommended in asymptomatic patients in whom electrophysiology testing with the use of isoprenaline identifies high-risk properties, such as SPERRI ≤ 250 ms, AP ERP ≤ 250 ms, multiple APs, and an inducible AP-mediated tachycardia.	I
Non-invasive evaluation of the conducting properties of the AP in individuals with asymptomatic pre-excitation may be considered.	IIb
Catheter ablation may be considered in a patient with asymptomatic pre-excitation and low-risk AP at invasive or non-invasive risk stratification.	IIb
Catheter ablations should be considered in patients with asymptomatic pre-excitation and LV dysfunction due to electrical dyssynchrony.	IIa
AV nodal ablation with subsequent pacing ('ablate and pace'), either biventricular or His-bundle pacing, is recommended if a tachycardia responsible for TCM cannot be ablated or controlled by drugs.	I
During the first trimester of pregnancy, it is recommended that all antiarrhythmic drugs are avoided, if possible.	I
In pregnant women, beta-1 selective blockers (except atenolol) or verapamil, in order of preference, should be considered for prevention of SVT in patients without WPW syndrome.	IIa
In pregnant women, flecainide or propafenone should be considered for prevention of SVT in patients with WPW syndrome and without ischaemic or structural heart disease.	IIa

Table 5 Conventional classification of supraventricular tachycardias

Atrial tachycardias
Sinus tachycardia
● Physiological sinus tachycardia ● Inappropriate sinus tachycardia ● Sinus nodal re-entrant tachycardia
Focal AT
Multifocal AT
MRAT
● Cavotricuspid isthmus-dependent MRAT – Typical atrial flutter, counter-clockwise (common) or clockwise (reverse) – Other cavotricuspid isthmus-dependent MRAT ● Non-cavotricuspid isthmus-dependent MRAT – RA MRAT – LA MRAT
AF
AV junctional tachycardias
Atrioventricular nodal re-entrant tachycardia (AVNRT)
● Typical ● Atypical
Non-re-entrant junctional tachycardia
● JET (junctional ectopic or focal junctional tachycardia) ● Other non-re-entrant variants
Atrioventricular re-entrant tachycardia (AVRT)
● Orthodromic (including PJRT) ● Antidromic (with retrograde conduction through the AVN or, rarely, over another pathway)

Table 6 Differential diagnosis of narrow and wide QRS tachycardias

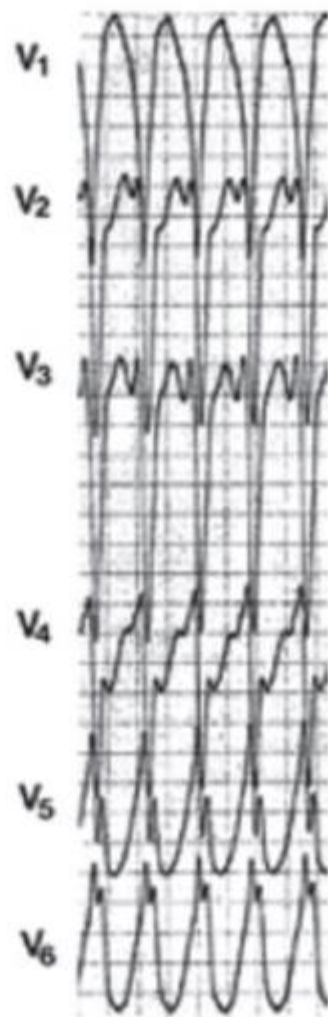
Narrow QRS (≤ 120 ms) tachycardias
Regular
● Physiological sinus tachycardia ● Inappropriate sinus tachycardia ● Sinus nodal re-entrant tachycardia ● Focal AT ● Atrial flutter with fixed AV conduction ● AVNRT ● JET (or other non-re-entrant variants) ● Orthodromic AVRT ● Idiopathic VT (especially high septal VT)
Irregular
● AF ● Focal AT or atrial flutter with varying AV block ● Multifocal AT

Wide QRS (>120 ms) tachycardias
Regular
● VT/flutter ● Ventricular paced rhythm ● Antidromic AVRT ● SVTs with aberration/BBB (pre-existing or rate-dependent during tachycardia) ● Atrial or junctional tachycardia with pre-excitation/bystander AP ● SVT with QRS widening due to electrolyte disturbance or antiarrhythmic drugs
Irregular
● AF or atrial flutter or focal AT with varying block conducted with aberration ● Antidromic AV re-entrant tachycardia due to a nodo-ventricular/fascicular AP with variable VA conduction ● Pre-excited AF ● Polymorphic VT ● Torsade de pointes ● Ventricular fibrillation
Occasionally, AF with very fast ventricular response may apparently resemble a regular narrow QRS tachycardia.

Antidromic AVRT



VT with negative concordance



VT with positive concordance

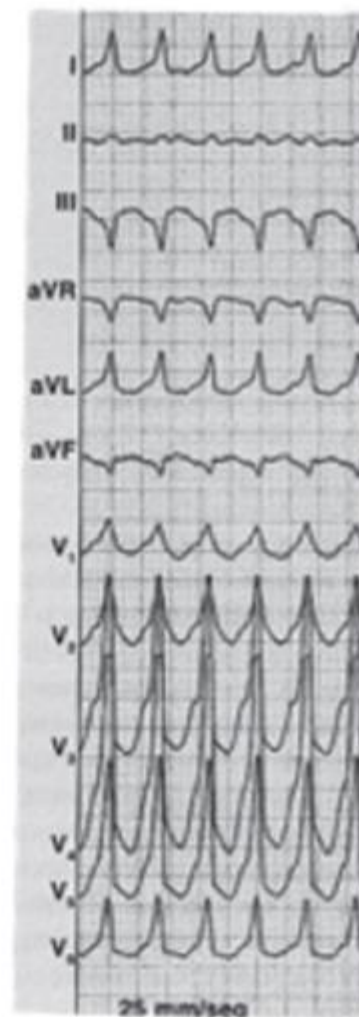
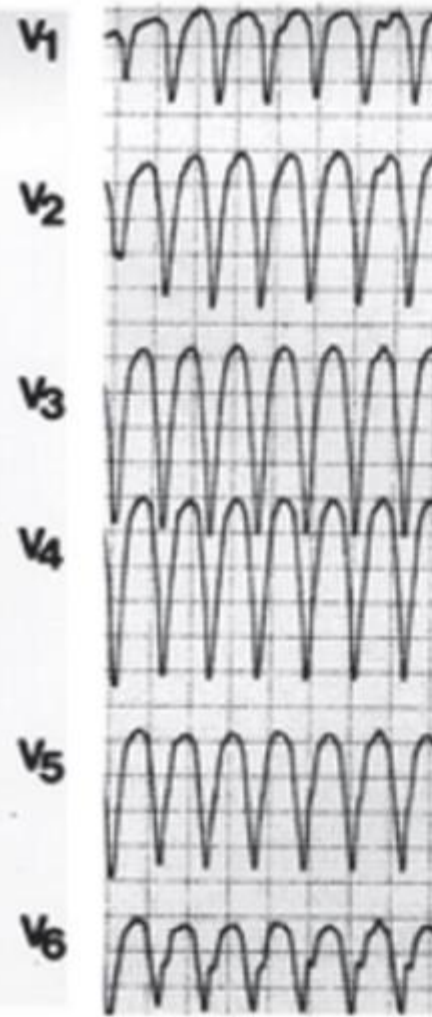
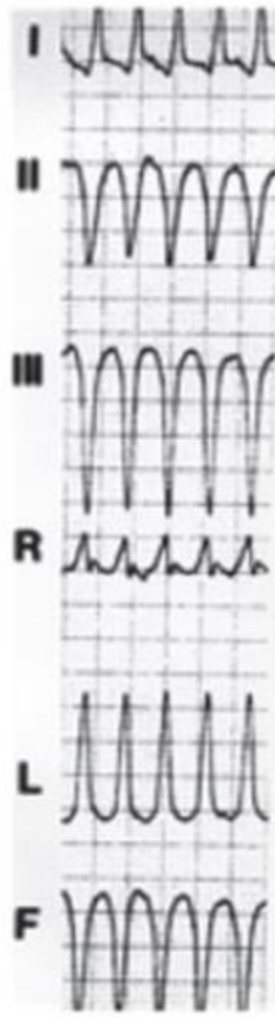


Figure 3 Examples of positive and negative chest lead concordance in VT.
AVRT = atrioventricular re-entrant tachycardia; VT = ventricular tachycardia.

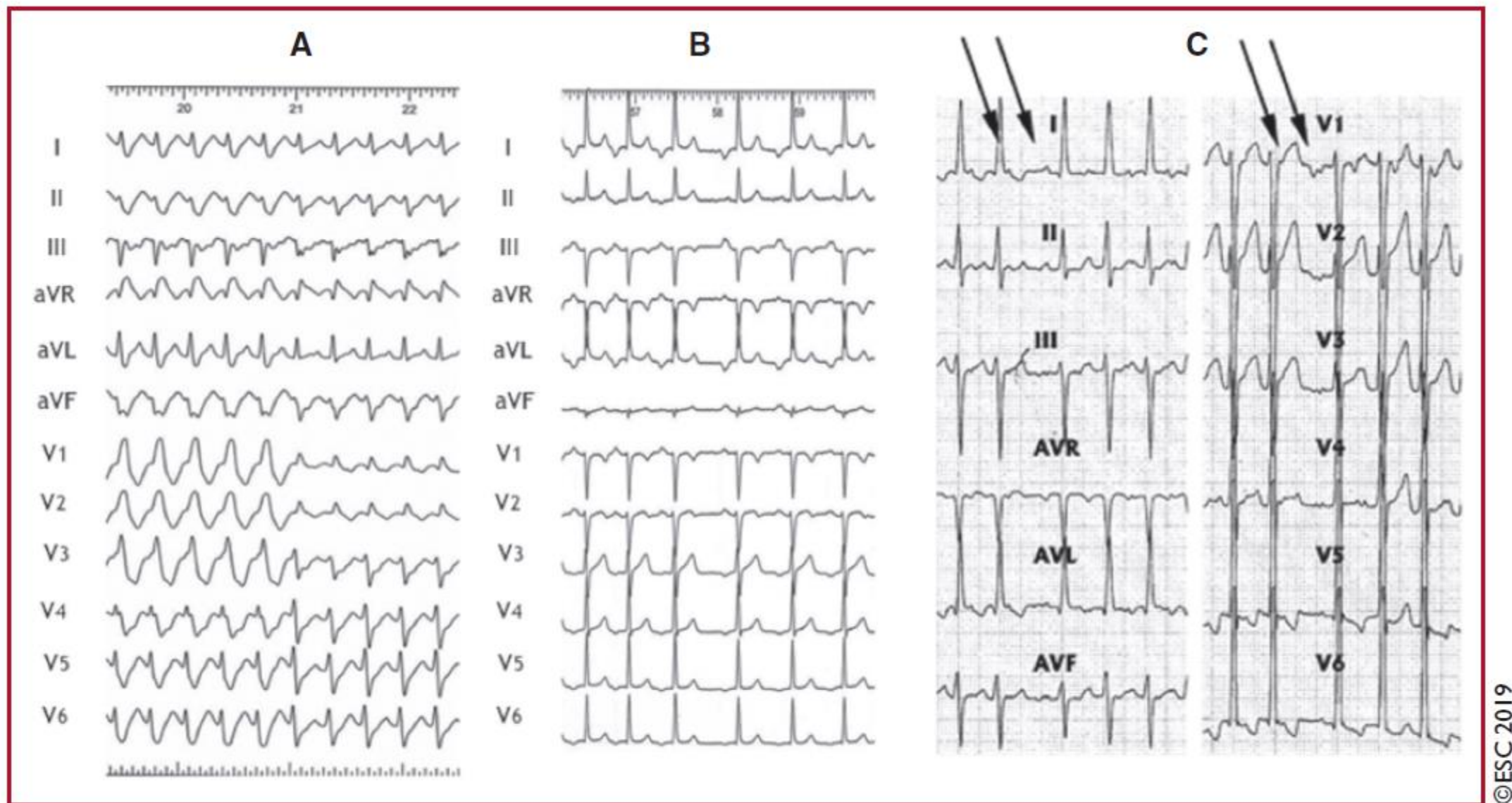


Figure 7 Focal atrial tachycardia. (A) Focal atrial tachycardia originating at the lateral right atrium conducted initially with full and then incomplete right branch bundle block aberration. (B) Focal atrial tachycardia originating at the left atrium (left superior pulmonary vein). (C) Focal atrial tachycardia from the right atrial appendage. Atrioventricular dissociation during carotid sinus massage (P waves indicated by arrows).

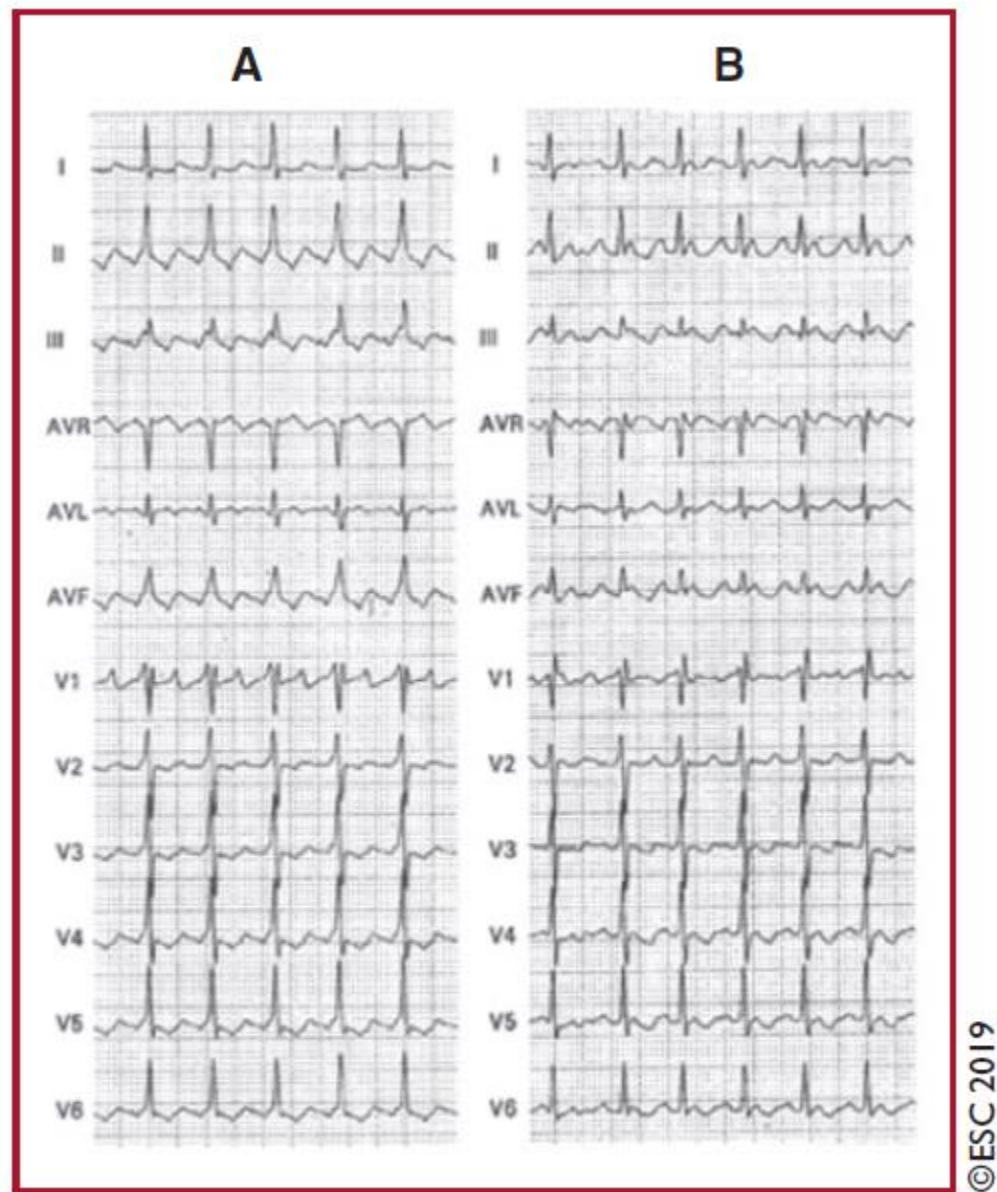


Figure 10 Counter-clockwise (A) and clockwise (B) atrial flutter with 2:1 atrioventricular conduction.

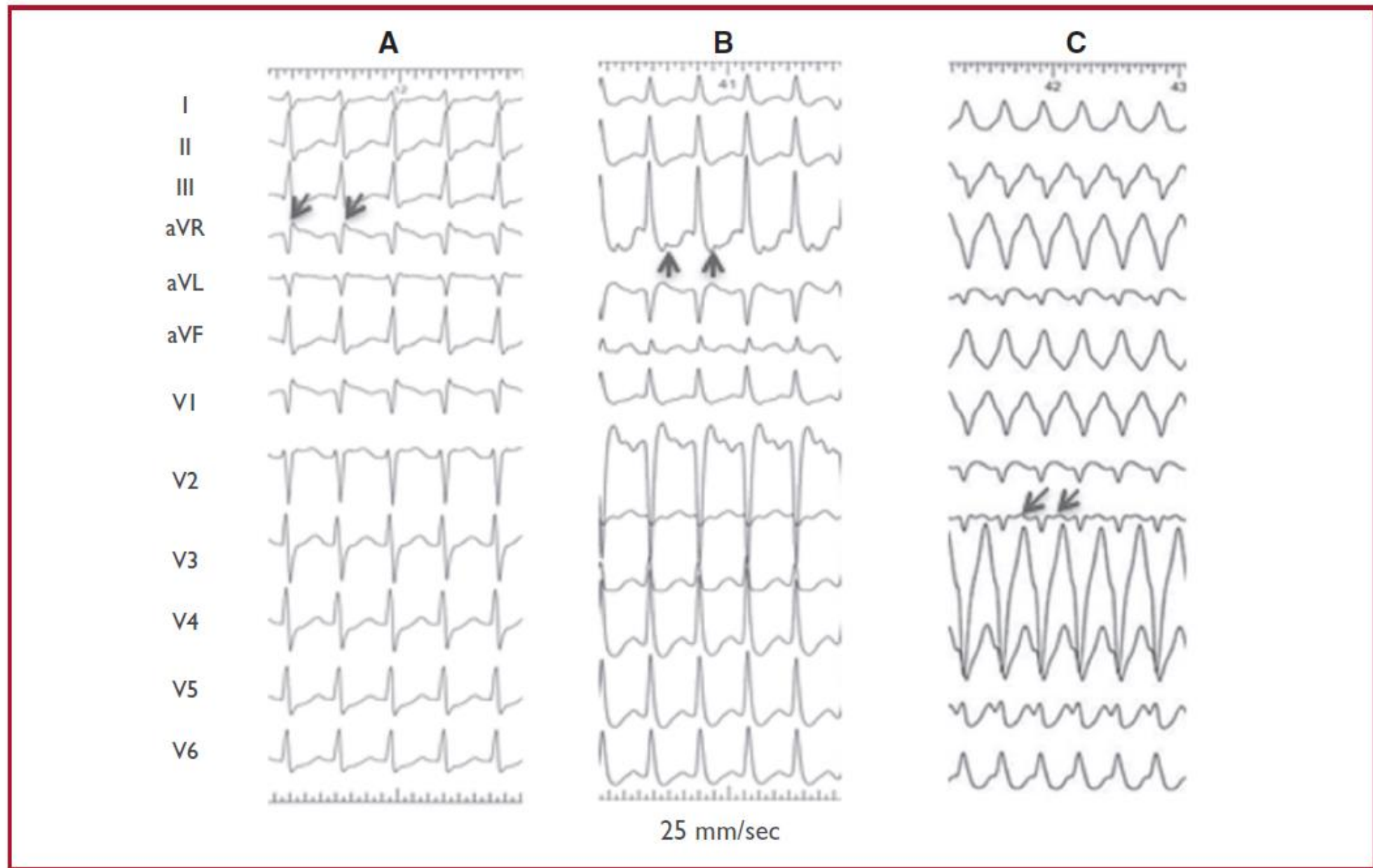


Figure 13 Atrioventricular nodal re-entrant tachycardia. (A) Typical atrioventricular nodal re-entrant tachycardia. (B) Atypical atrioventricular nodal re-entrant tachycardia. (C) Atypical AVNRT with (unusual) left bundle branch block aberration. Retrograde P waves are indicated by arrows.

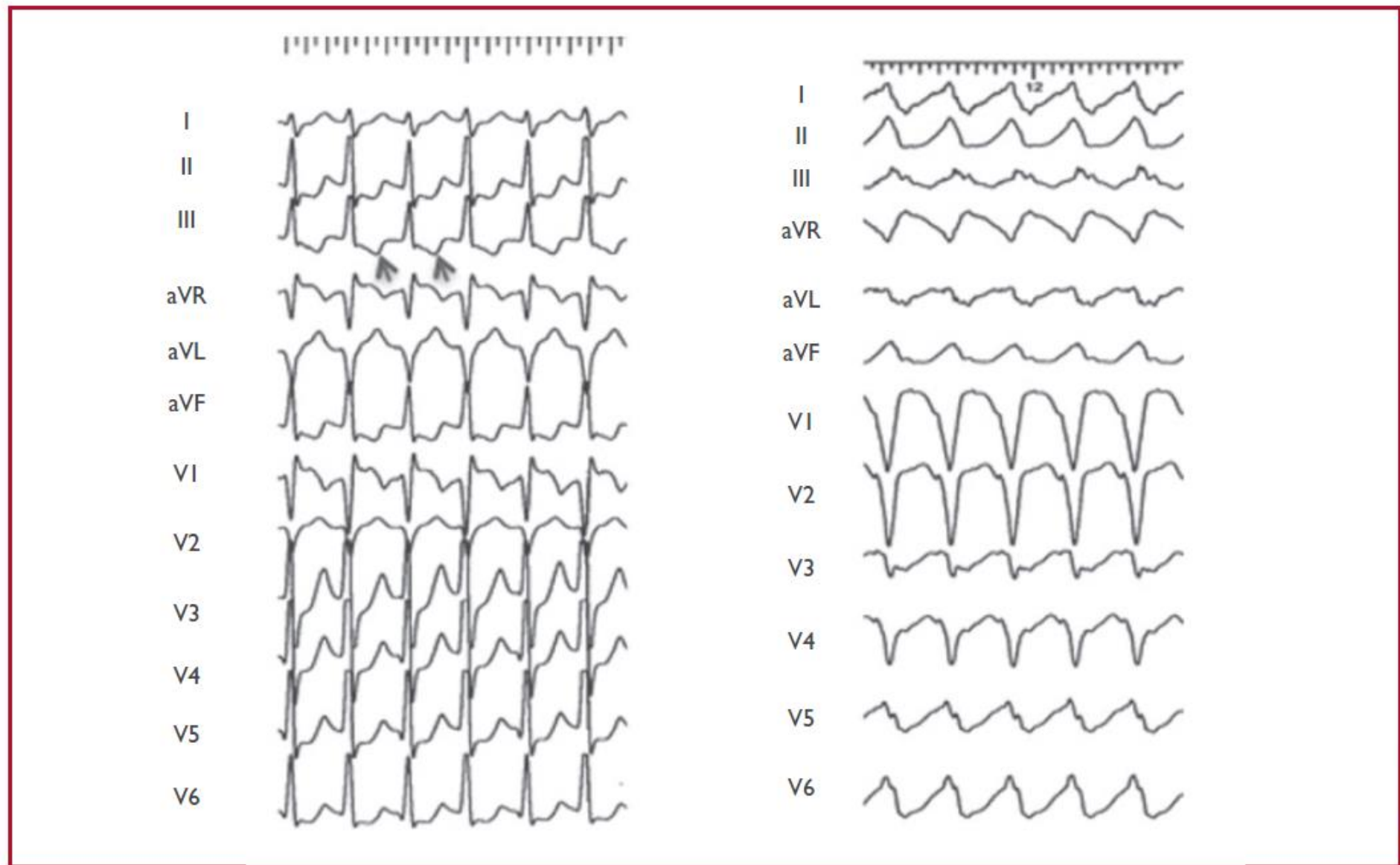
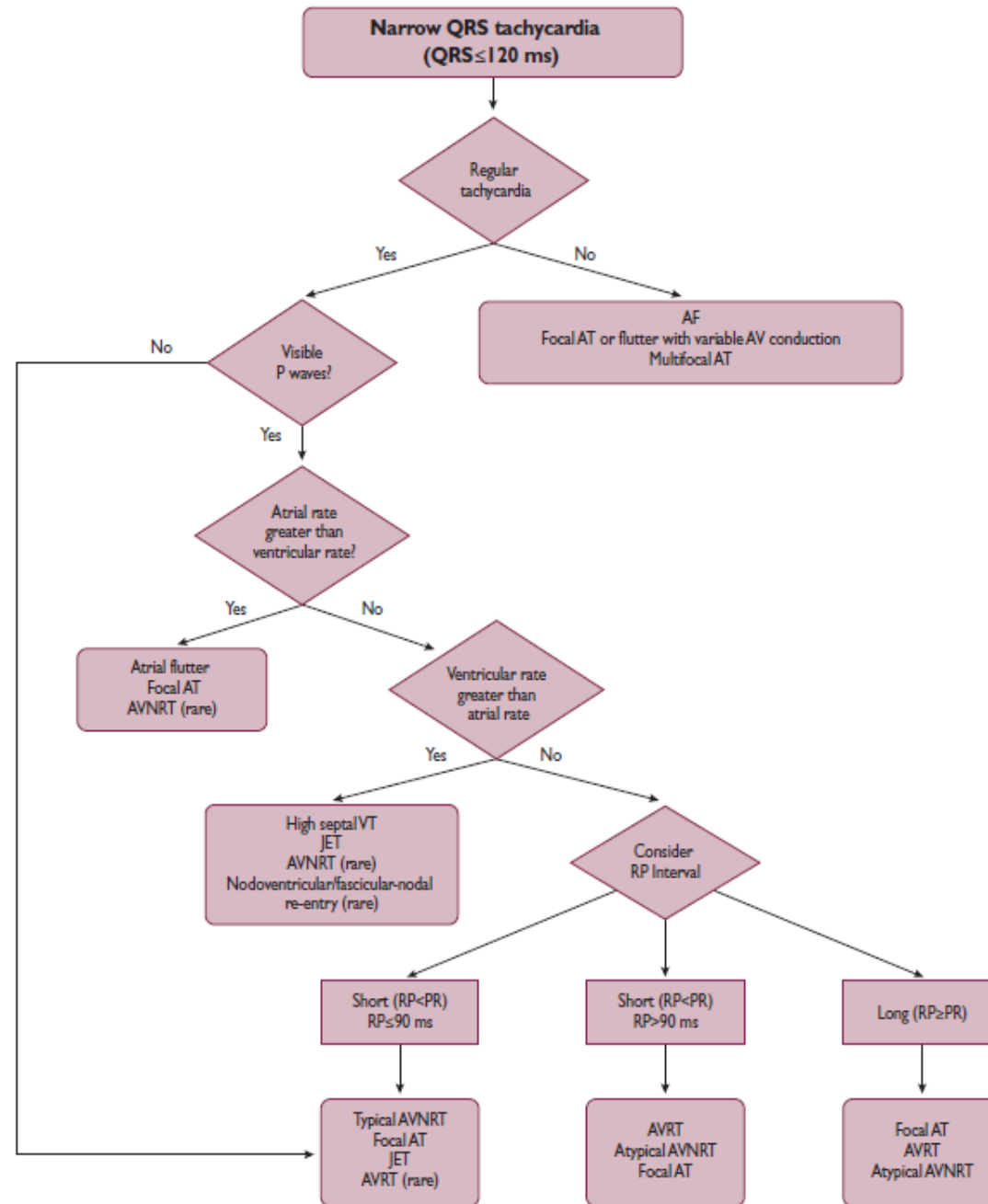


Figure 18 Atrioventricular re-entrant tachycardia. Left: orthodromic atrioventricular re-entrant tachycardia due to a concealed posteroseptal accessory pathway. Retrograde P waves are negative during tachycardia in the inferior leads (arrows). Right: Antidromic atrioventricular re-entrant tachycardia due to an atriofascicular accessory pathway. The axis during tachycardia due to atypical pathways depends on the way of insertion into the right bundle and fusion over the left anterior fascicle.



**Adenosine
in regular, narrow QRS tachycardia**

Response

Diagnosis

No effect

Inadequate dose/
delivery
High septal VT

Gradual slowing
then reacceleration

Sinus tachycardia
Automatic focal AT
Junctional ectopic
tachycardia

Sudden termination

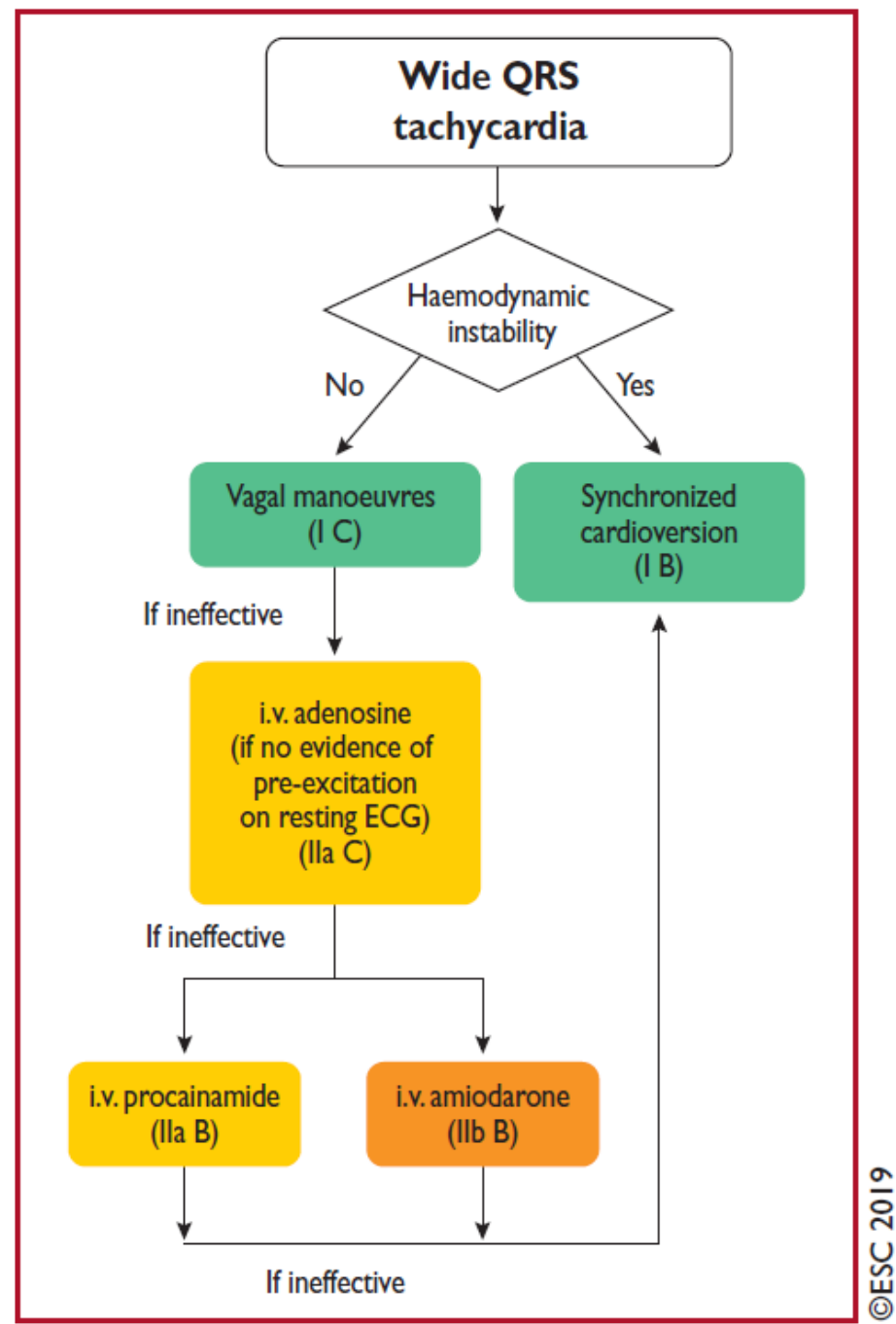
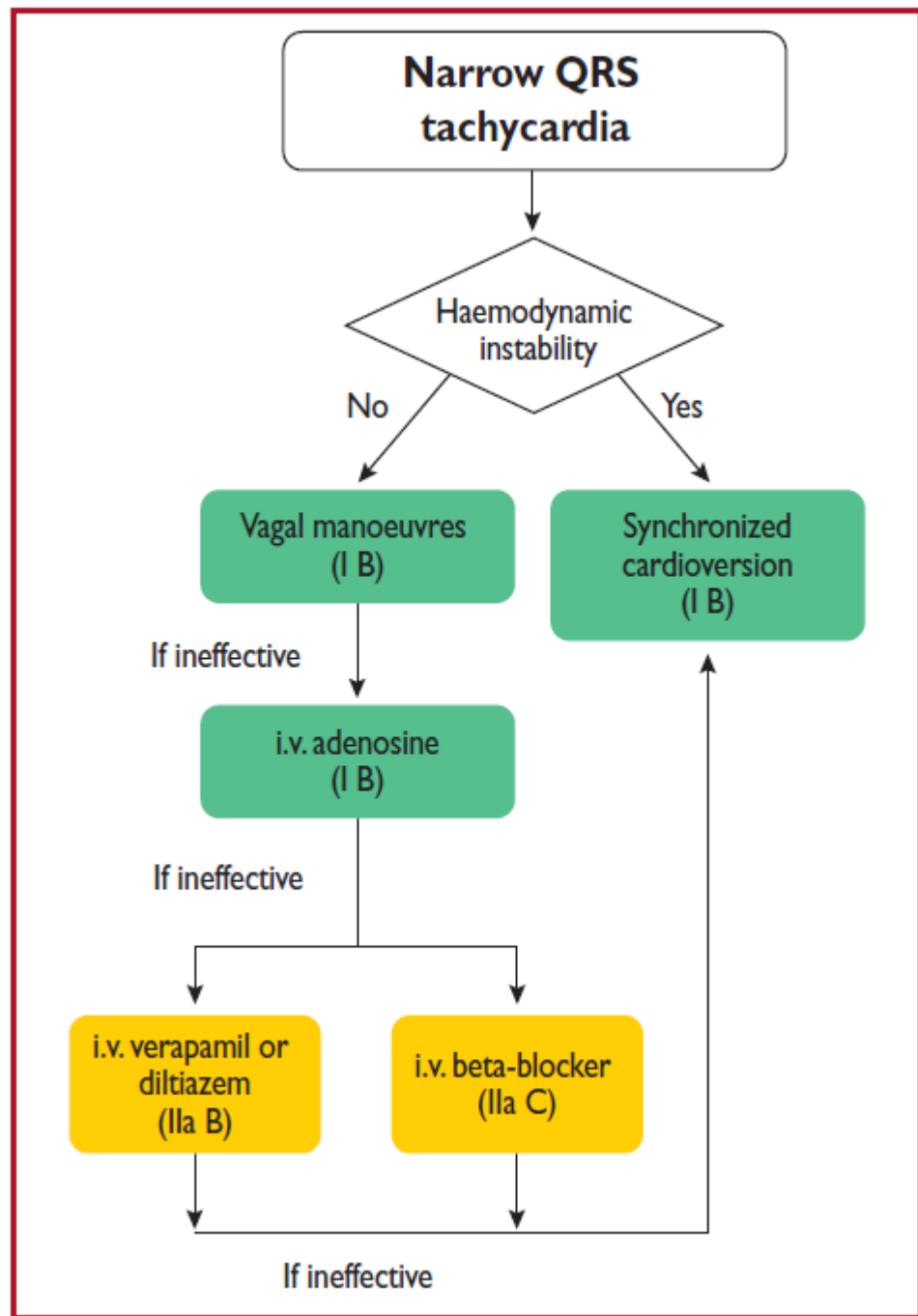
AVNRT
AVRT
Sinus nodal re-entry
Triggered focal AT
(DADs)

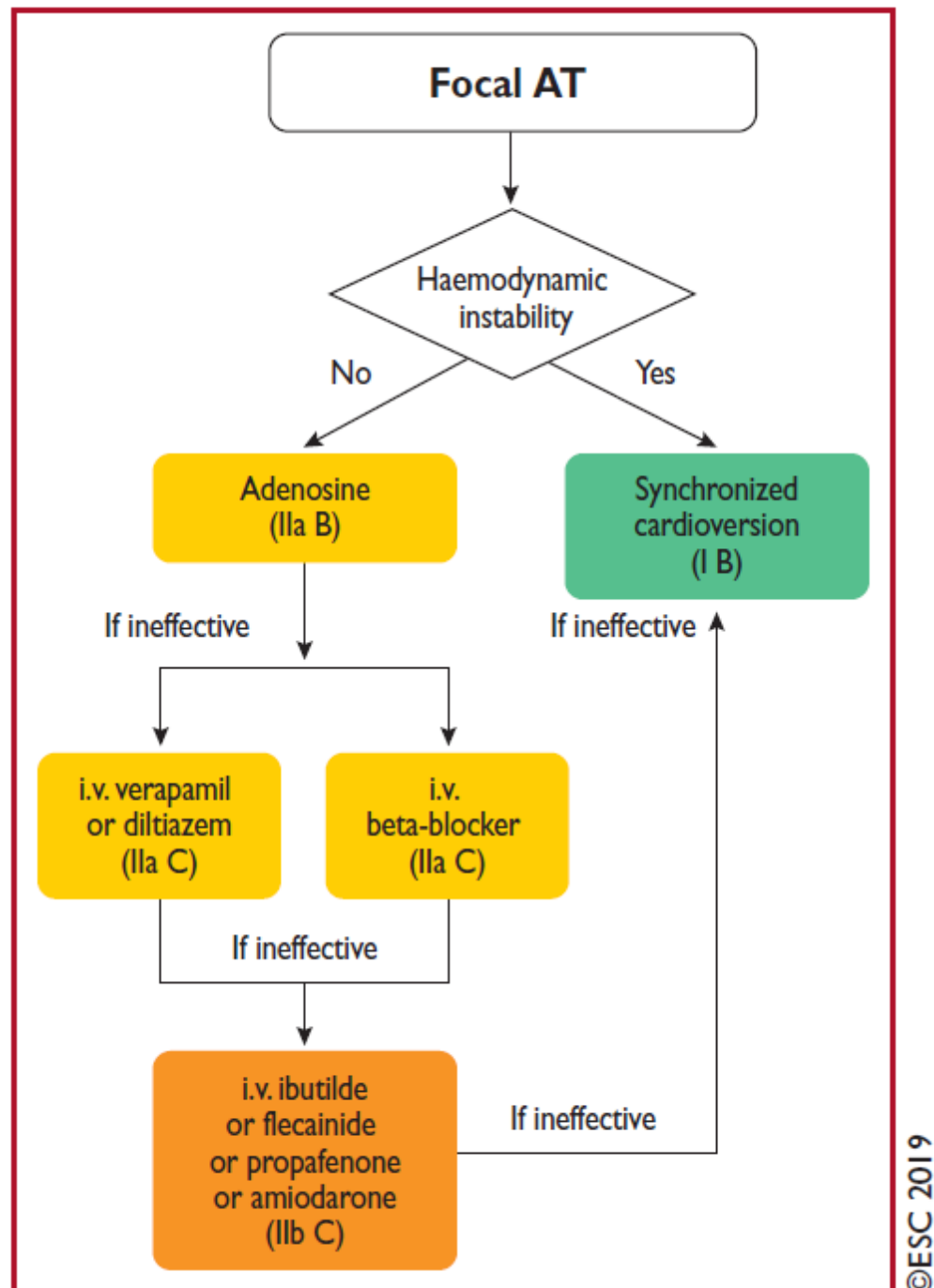
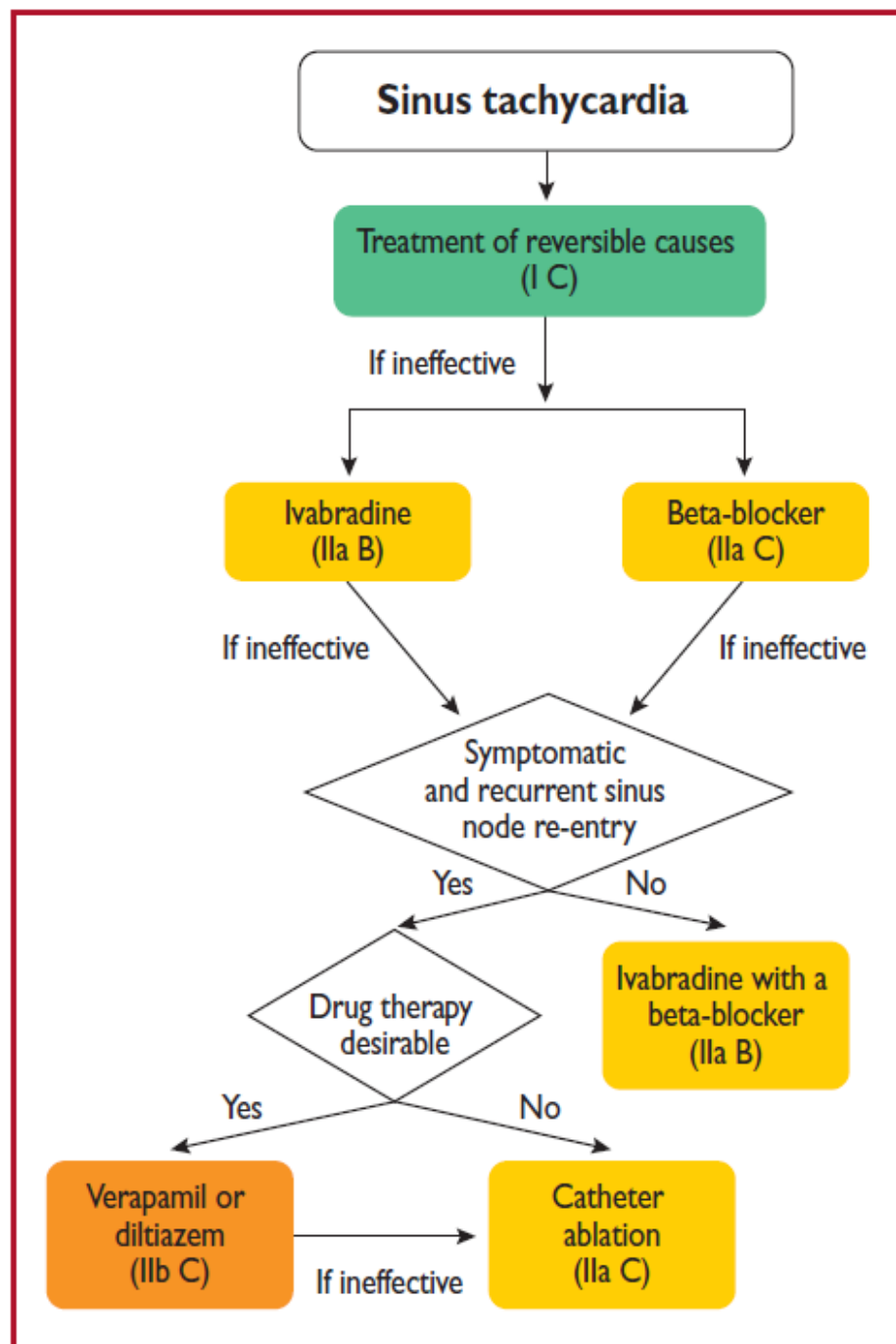
Persisting atrial
tachycardia with
transient high-grade
AV block

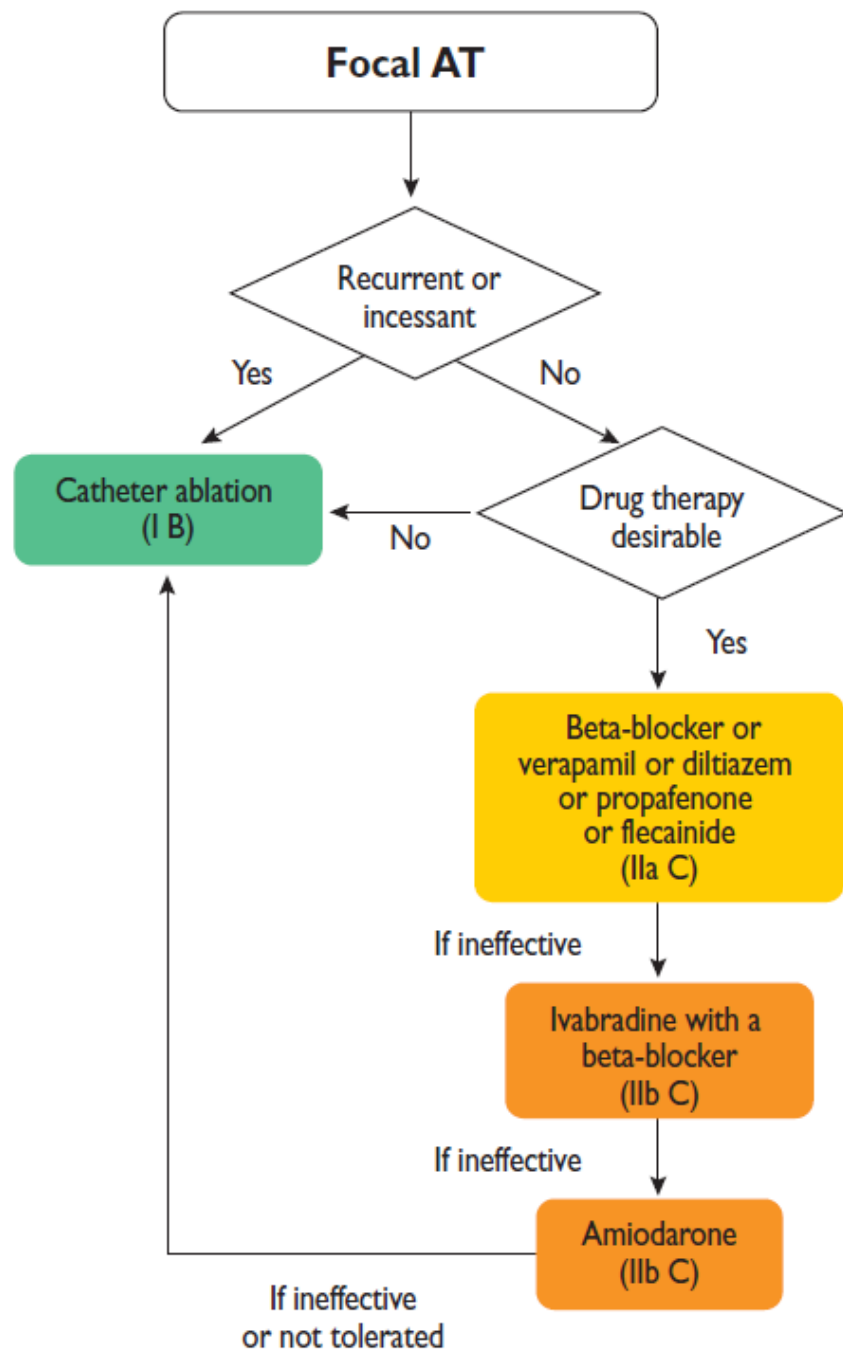
Atrial flutter
Micro-re-entrant
focal AT

Table 9 Summary of key electrocardiographic criteria that suggest ventricular tachycardia rather than supraventricular tachycardia in wide complex tachycardia

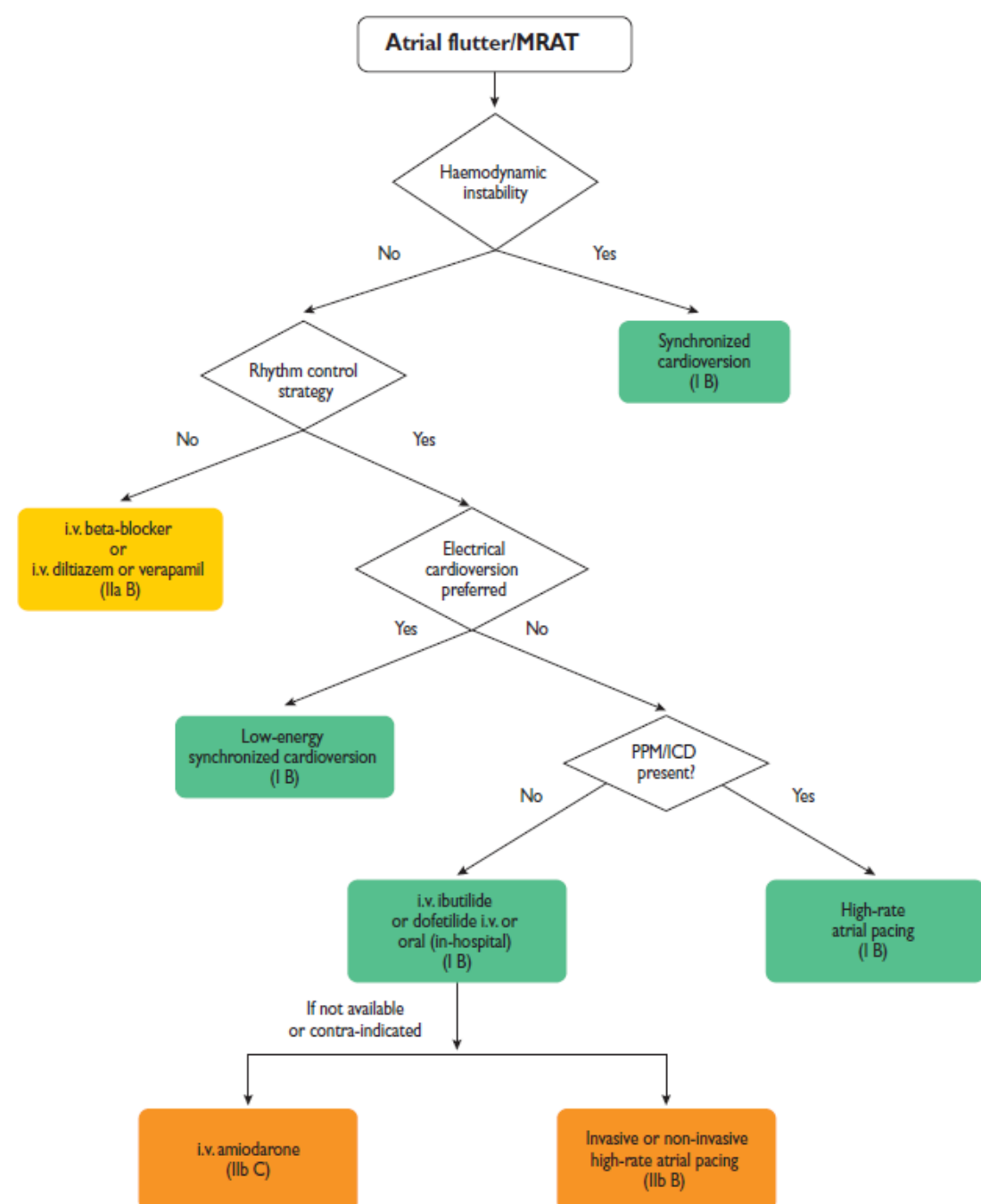
AV dissociation	Ventricular rate > atrial rate
Fusion/capture beats	Different QRS morphology from that of tachycardia
Chest lead negative concordance	All precordial chest leads negative
RS in precordial leads	- Absence of RS in precordial leads - RS >100 ms in any lead^a
QRS complex in aVR	• Initial R wave • Initial R or Q wave >40 ms • Presence of a notch of a predominantly negative complex
QRS axis -90 to $\pm 180^\circ$	Both in the presence of RBBB and LBBB morphology
R wave peak time in lead II	R wave peak time ≥ 50 ms
RBBB morphology	Lead V1: Monophasic R, Rsr', biphasic qR complex, broad R (>40 ms), and a double-peaked R wave with the left peak taller than the right (the so-called 'rabbit ear' sign) Lead V6: R:S ratio <1 (rS, QS patterns)
LBBB morphology	Lead V1: Broad R wave, slurred or notched-down stroke of the S wave, and delayed nadir of S wave Lead V6: Q or QS wave



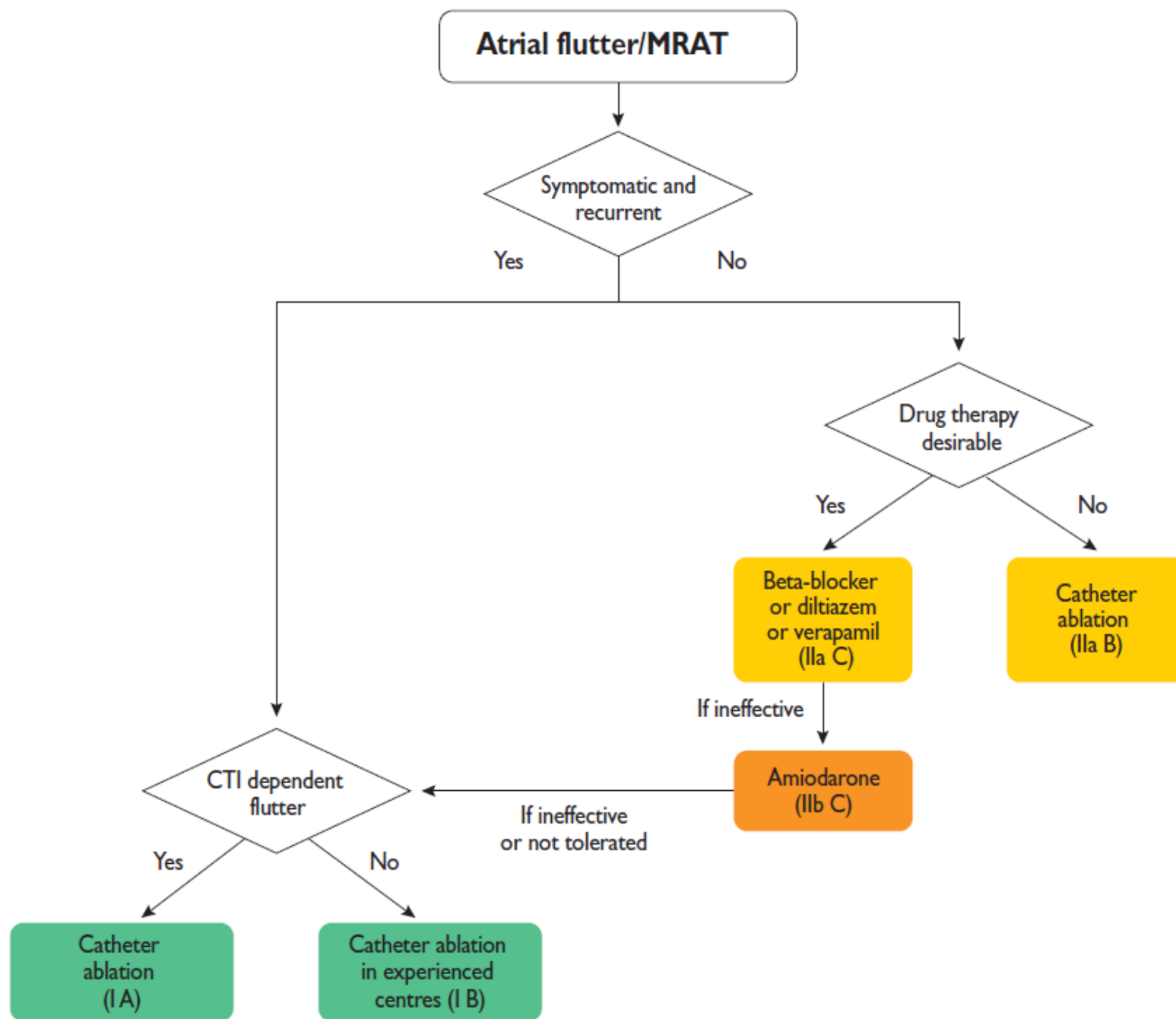


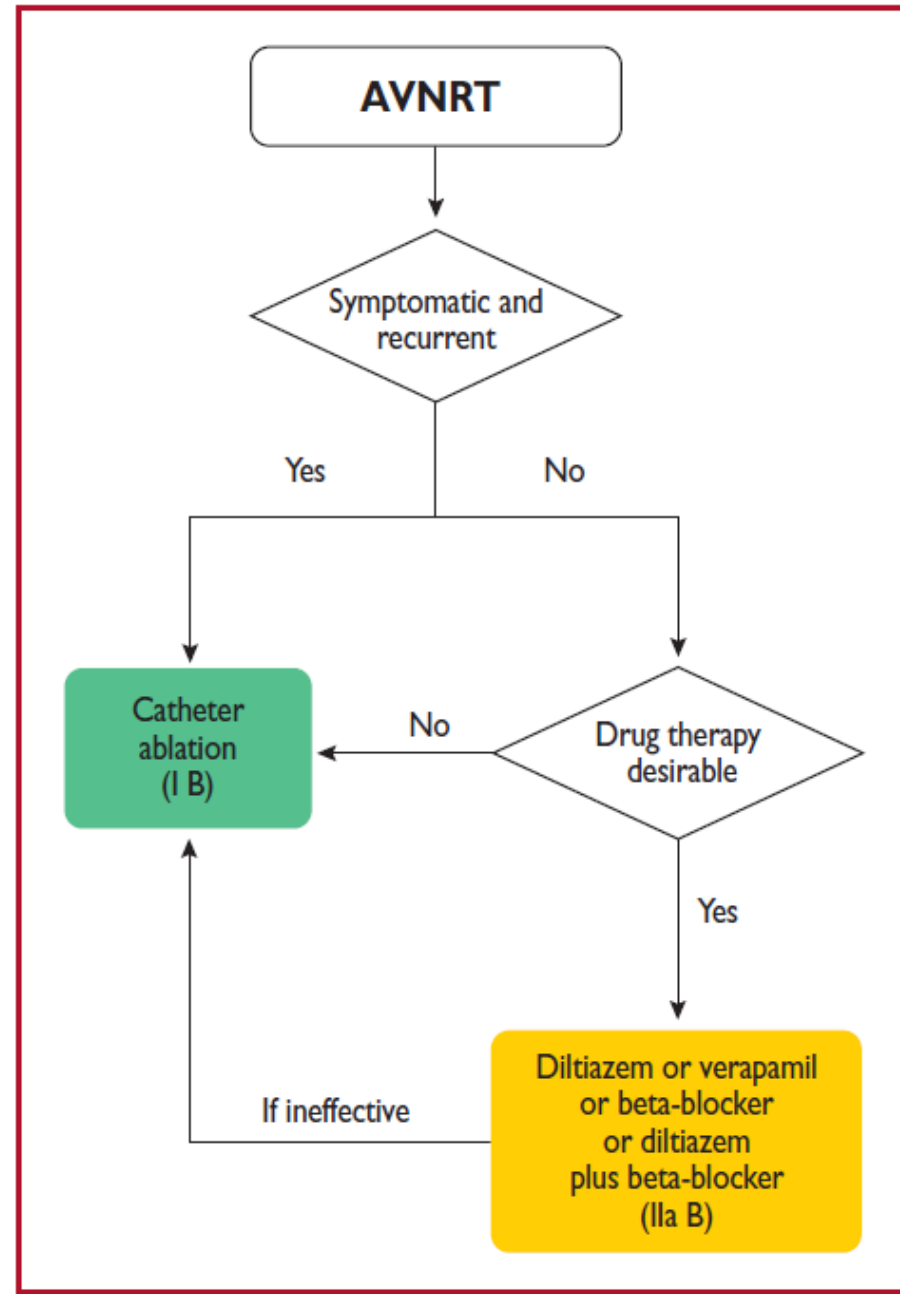
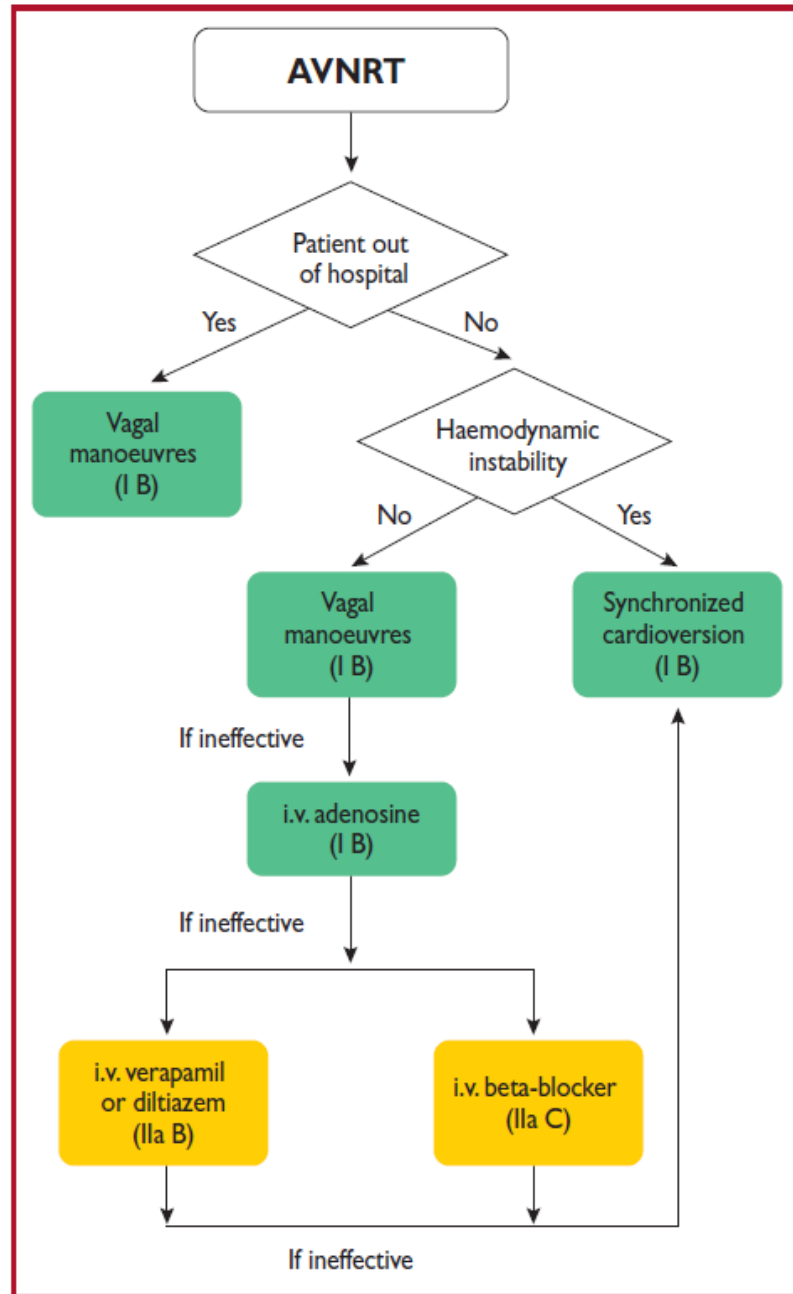


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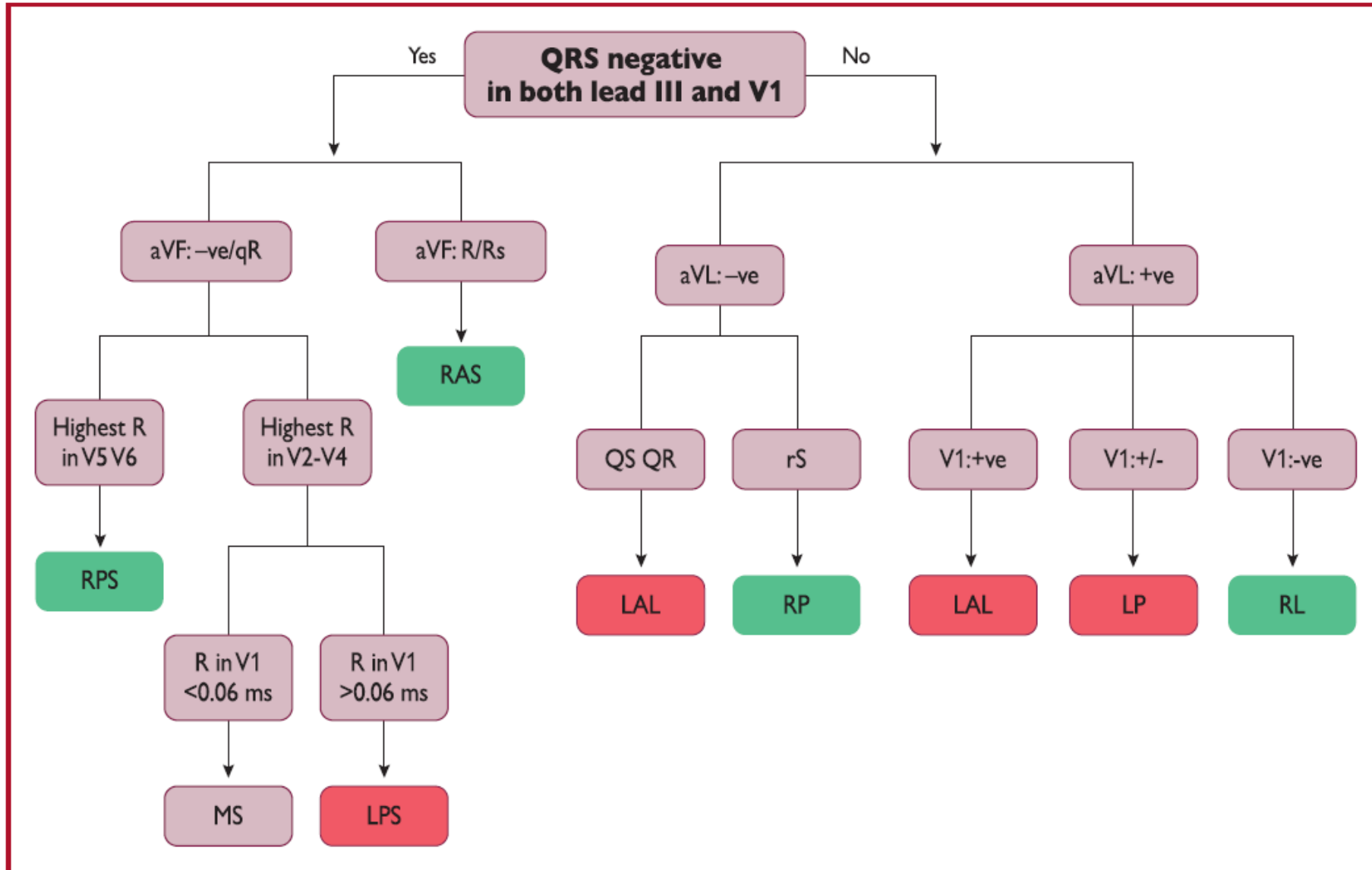


Figure 16 The St George's algorithm for the localization of accessory pathways.³⁹⁹ +ve = QRS complex-positive; -ve = QRS complex-negative; +/- = QRS complex equiphasic; AP = accessory pathway; LAL = left anterolateral; LP = left posterior; LPL = left posterolateral; LPS = left posteroseptal; MS = mid-septal; RAS = right anteroseptal; RL = right lateral; RP = right posterior; RPS = right posteroseptal.

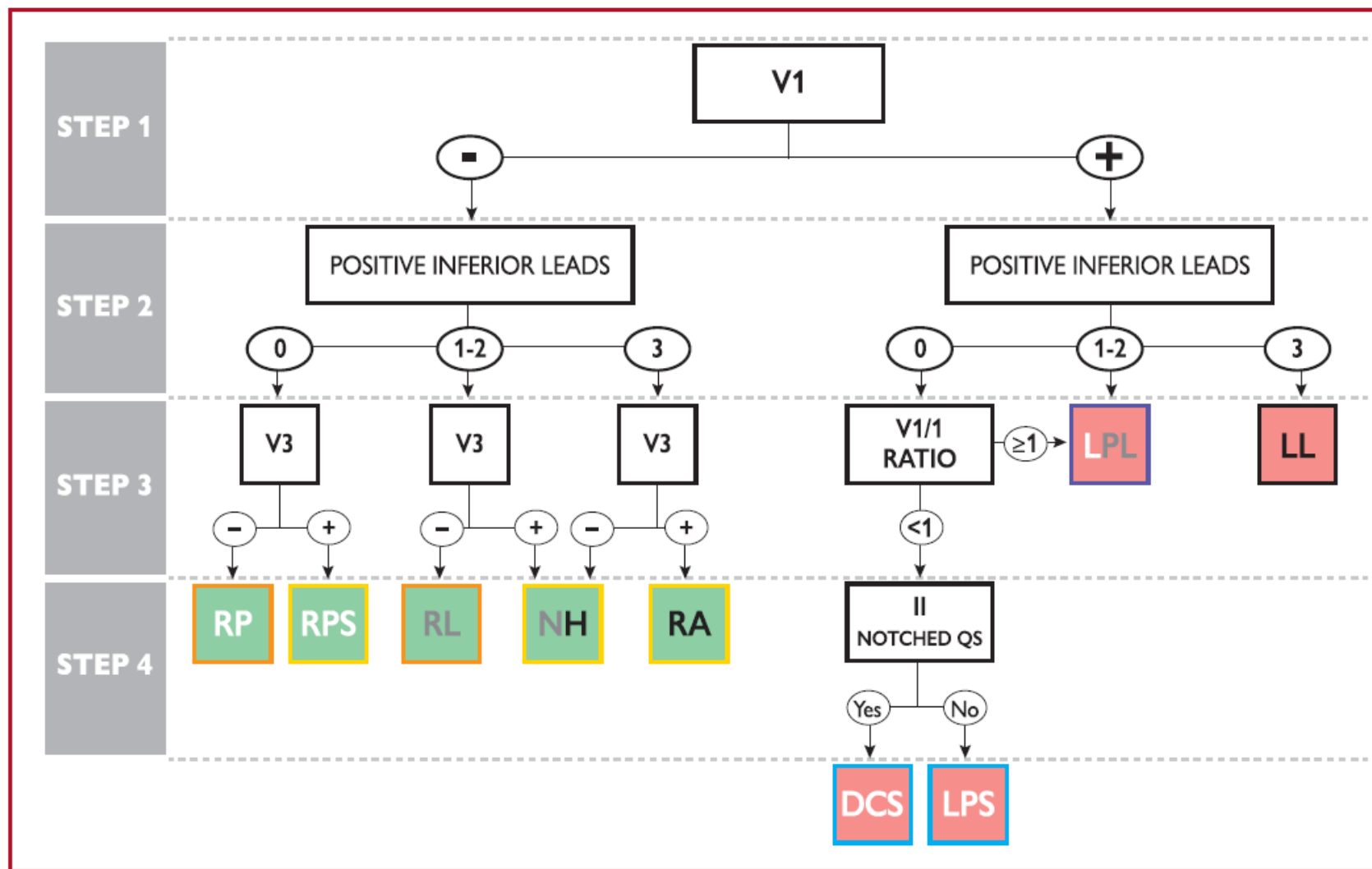


Figure 17 Localization of accessory pathways in the presence of maximum (spontaneous or evoked) pre-excitation.⁴⁰⁰ Accessory pathway locations are green when right-sided and red when left-sided. Left posterolateral accessory pathways can have 0, 1, or 2 inferior leads with positive polarity, whereas nodo-Hisian accessory pathways can have 1, 2, or 3 inferior leads with positive polarity. Right-sided accessory pathways are framed orange or yellow when the V3 lead is negative or positive, respectively. Left posterior accessory pathways are framed blue when the V1/I ratio is <1 or purple when V1/I ratio is ≥ 1 . AP = accessory pathway; DCS = deep coronary sinus; LL = left lateral; LPL = left posterolateral; LPS = left paraseptal; NH = nodo-Hisian; RA = right anterior; RL = right lateral; RP = right posterior; RPS = right paraseptal.

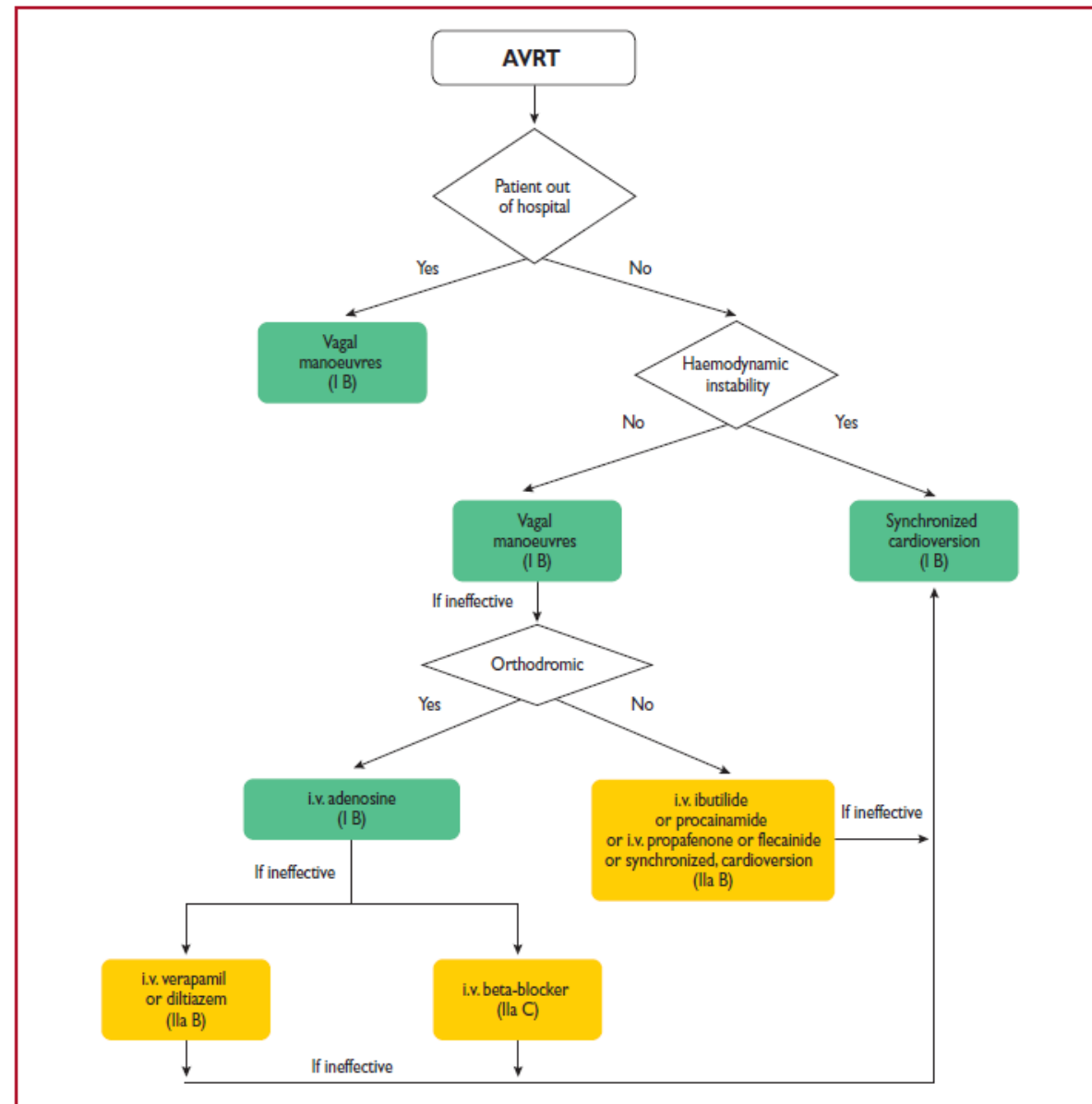
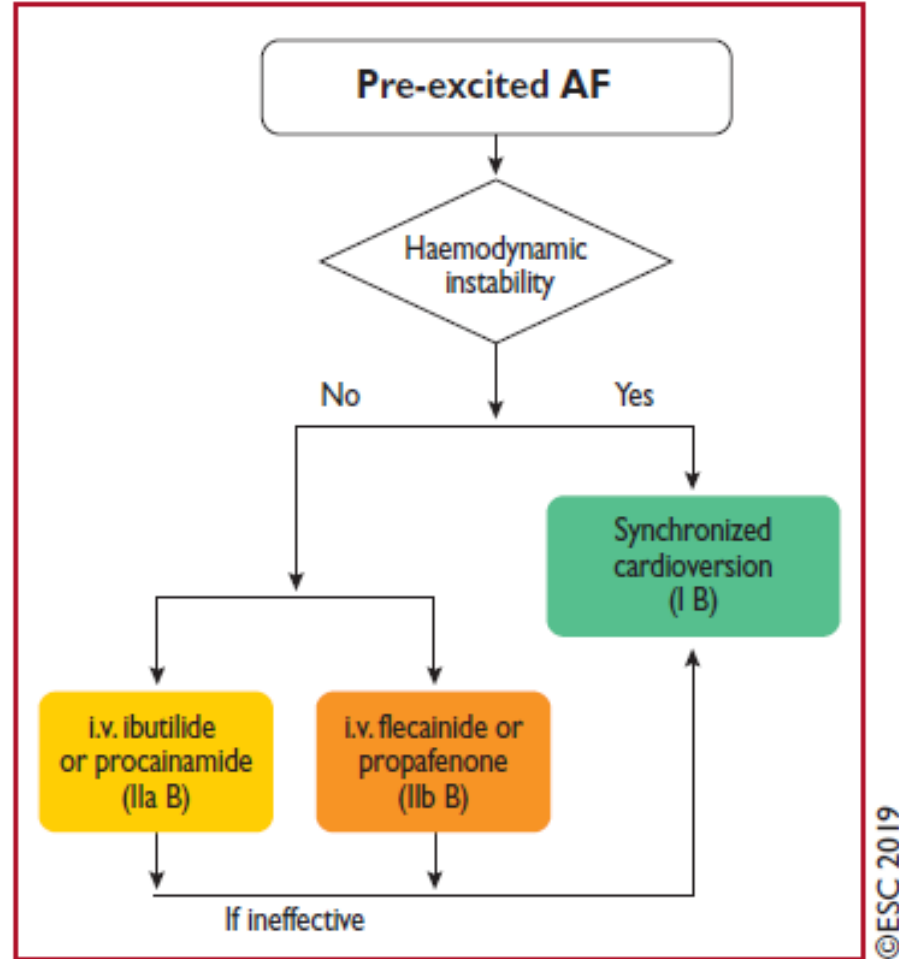
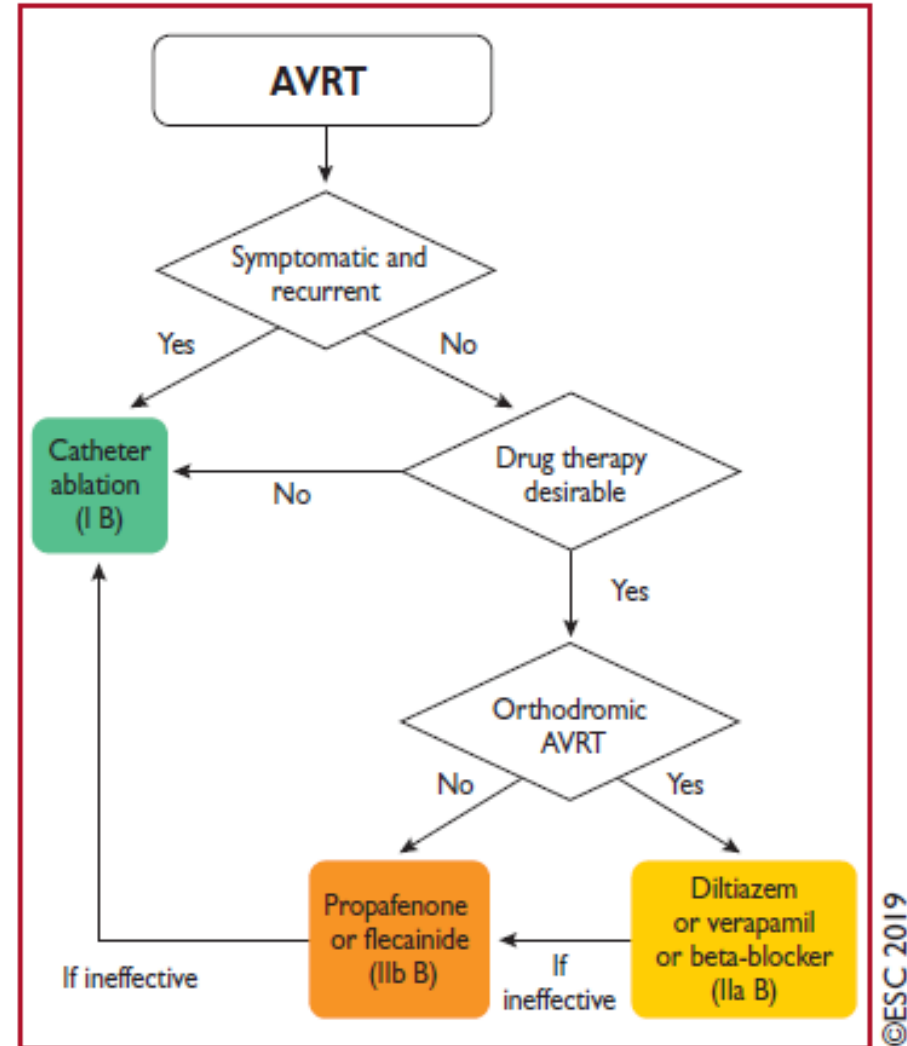


Figure 19 Acute therapy of atrioventricular re-entrant tachycardia.
AVRT = atrioventricular re-entrant tachycardia; i.v. = intravenous.



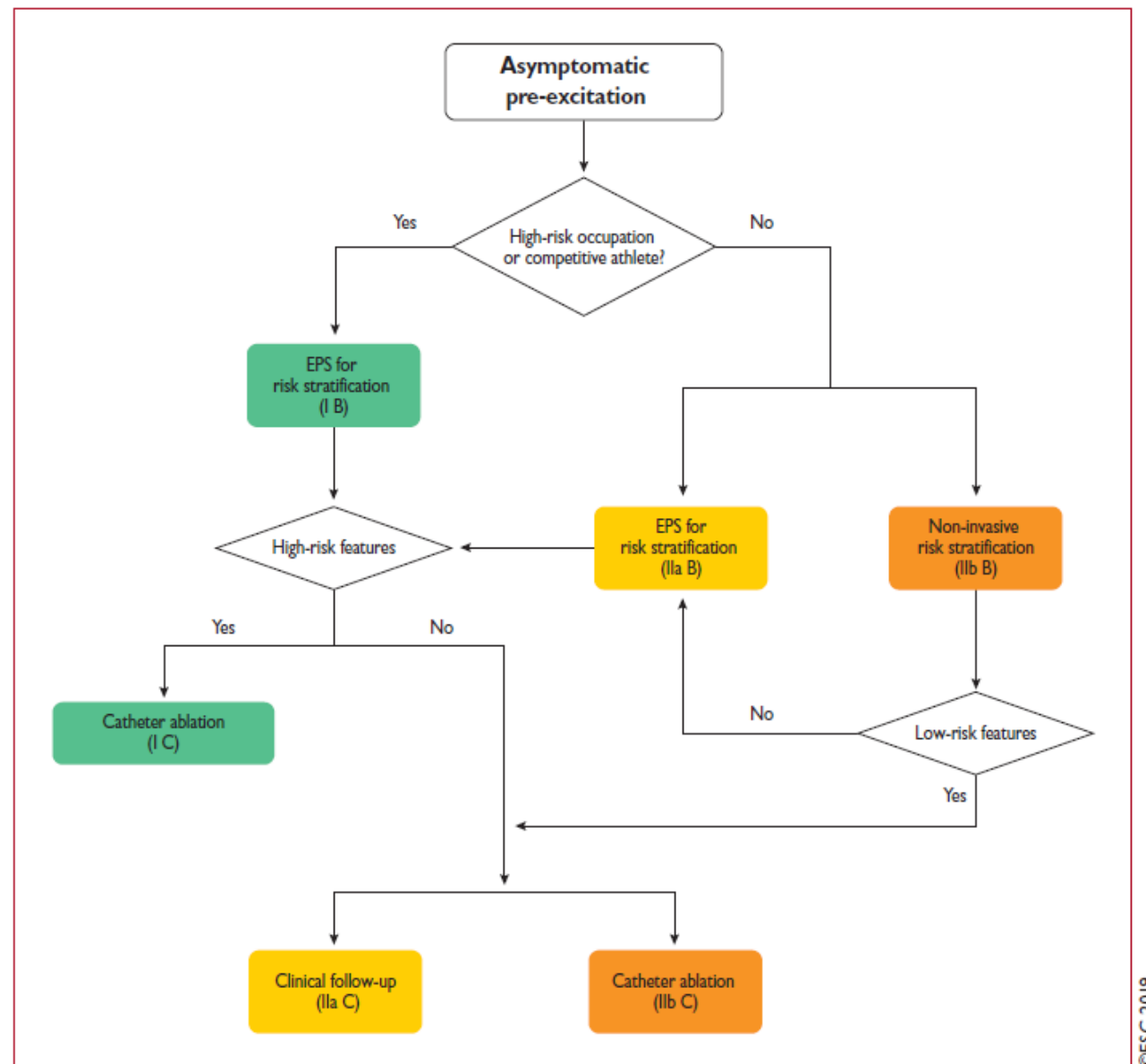
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Figure 20 Acute therapy of pre-excited atrial fibrillation.
AF = atrial fibrillation; i.v. = intravenous.



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Figure 21 Chronic therapy of atrioventricular re-entrant tachycardia.
AVRT = atrioventricular re-entrant tachycardia.



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Figure 22 Risk stratification and therapy of patients with asymptomatic pre-excitation. High-risk features at electrophysiology study are shortest pre-excited RR interval during atrial fibrillation ≤ 250 ms, accessory pathway effective refractory period ≤ 250 ms, multiple accessory pathways, and inducible atrioventricular re-entrant tachycardia. Low-risk features at non-invasive risk stratification are induced or intermittent loss of pre-excitation on exercise or drug testing, resting electrocardiogram, and ambulatory electrocardiogram monitoring. EPS = electrophysiology study.