

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

Developed in Partnership with the Heart Rhythm Society

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Citation

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[\[http://content.onlinejacc.org/article.aspx?doi=10.1016/j.jacc.2015.08.856\]](http://content.onlinejacc.org/article.aspx?doi=10.1016/j.jacc.2015.08.856)

and *Circulation*

[\[http://circ.ahajournals.org/lookup/doi/10.1161/CIR.0000000000000311\]](http://circ.ahajournals.org/lookup/doi/10.1161/CIR.0000000000000311)

The full-text guidelines are also available on the following Web sites: ACC (www.acc.org) and AHA (my.americanheart.org)

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Scope of the Guideline

- Supersedes the “2003 ACC/AHA/ESC Guideline for the Management of Patients with Supraventricular Arrhythmias”
- Addresses regular as well as irregular SVT (such as atrial flutter with irregular ventricular response and multifocal atrial tachycardia) but does not include atrial fibrillation
- Aimed at the adult population (≥ 18 years of age) and gives no specific recommendations for pediatric patients
- Emphasizes shared decision making with the patient whenever possible

Table 1. Applying Class of Recommendation and Level of Evidence



CLASS (STRENGTH) OF RECOMMENDATION	
CLASS I (STRONG)	Benefit >>> Risk
Suggested phrases for writing recommendations: <ul style="list-style-type: none"> ■ Is recommended ■ Is indicated/useful/effective/beneficial ■ Should be performed/administered/other ■ Comparative-Effectiveness Phrases†: <ul style="list-style-type: none"> ○ Treatment/strategy A is recommended/indicated in preference to treatment B ○ Treatment A should be chosen over treatment B 	
CLASS IIa (MODERATE)	Benefit >> Risk
Suggested phrases for writing recommendations: <ul style="list-style-type: none"> ■ Is reasonable ■ Can be useful/effective/beneficial ■ Comparative-Effectiveness Phrases†: <ul style="list-style-type: none"> ○ Treatment/strategy A is probably recommended/indicated in preference to treatment B ○ It is reasonable to choose treatment A over treatment B 	
CLASS IIb (WEAK)	Benefit ≥ Risk
Suggested phrases for writing recommendations: <ul style="list-style-type: none"> ■ May/might be reasonable ■ May/might be considered ■ Usefulness/effectiveness is unknown/unclear/uncertain or not well established 	
CLASS III: No Benefit (MODERATE) <i>(Generally, LOE A or B use only)</i>	Benefit = Risk
Suggested phrases for writing recommendations: <ul style="list-style-type: none"> ■ Is not recommended ■ Is not indicated/useful/effective/beneficial ■ Should not be performed/administered/other 	
CLASS III: Harm (STRONG)	Risk > Benefit
Suggested phrases for writing recommendations: <ul style="list-style-type: none"> ■ Potentially harmful ■ Causes harm ■ Associated with excess morbidity/mortality ■ Should not be performed/administered/other 	

LEVEL (QUALITY) OF EVIDENCE‡	
LEVEL A	
<ul style="list-style-type: none"> ■ High-quality evidence‡ from more than 1 RCTs ■ Meta-analyses of high-quality RCTs ■ One or more RCTs corroborated by high-quality registry studies 	
LEVEL B-R	(Randomized)
<ul style="list-style-type: none"> ■ Moderate-quality evidence‡ from 1 or more RCTs ■ Meta-analyses of moderate-quality RCTs 	
LEVEL B-NR	(Nonrandomized)
<ul style="list-style-type: none"> ■ Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies ■ Meta-analyses of such studies 	
LEVEL C-LD	(Limited Data)
<ul style="list-style-type: none"> ■ Randomized or nonrandomized observational or registry studies with limitations of design or execution ■ Meta-analyses of such studies ■ Physiological or mechanistic studies in human subjects 	
LEVEL C-EO	(Expert Opinion)
Consensus of expert opinion based on clinical experience	

COR and LOE are determined independently (any COR may be paired with any LOE).

A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

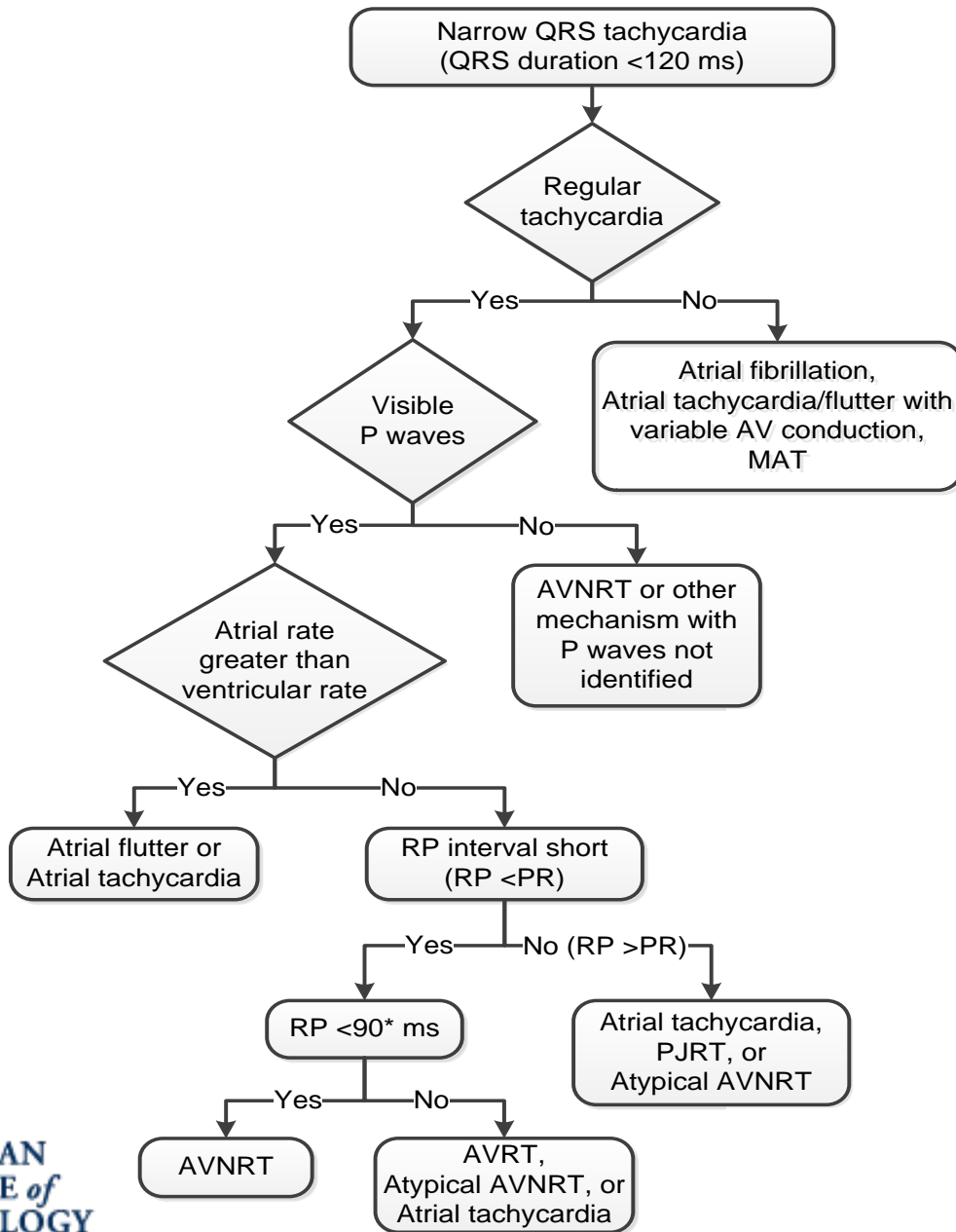
* The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).

† For comparative-effectiveness recommendations (COR I and IIa; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

‡ The method of assessing quality is evolving, including the application of standardized, widely used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee.

COR indicates Class of Recommendation; EO, expert opinion; LD, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; and RCT, randomized controlled trial.

Differential Diagnosis for Adult Narrow QRS Tachycardia



Patients with junctional tachycardia may mimic the pattern of slow-fast AVNRT and may show AV dissociation and/or marked irregularity in the junctional rate.

*RP refers to the interval from the onset of surface QRS to the onset of visible P wave (note that the 90-ms interval is defined from the surface ECG, as opposed to the 70-ms ventriculoatrial interval that is used for intracardiac diagnosis).

AV indicates atrioventricular; AVNRT, atrioventricular nodal reentrant tachycardia; AVRT, atrioventricular reentrant tachycardia; ECG, electrocardiogram; MAT, multifocal atrial tachycardia; and PJRT, permanent form of junctional reentrant tachycardia. Modified with permission from Blomström-Lundqvist et al.

General Principles

Principles of Medical Therapy

Acute Treatment

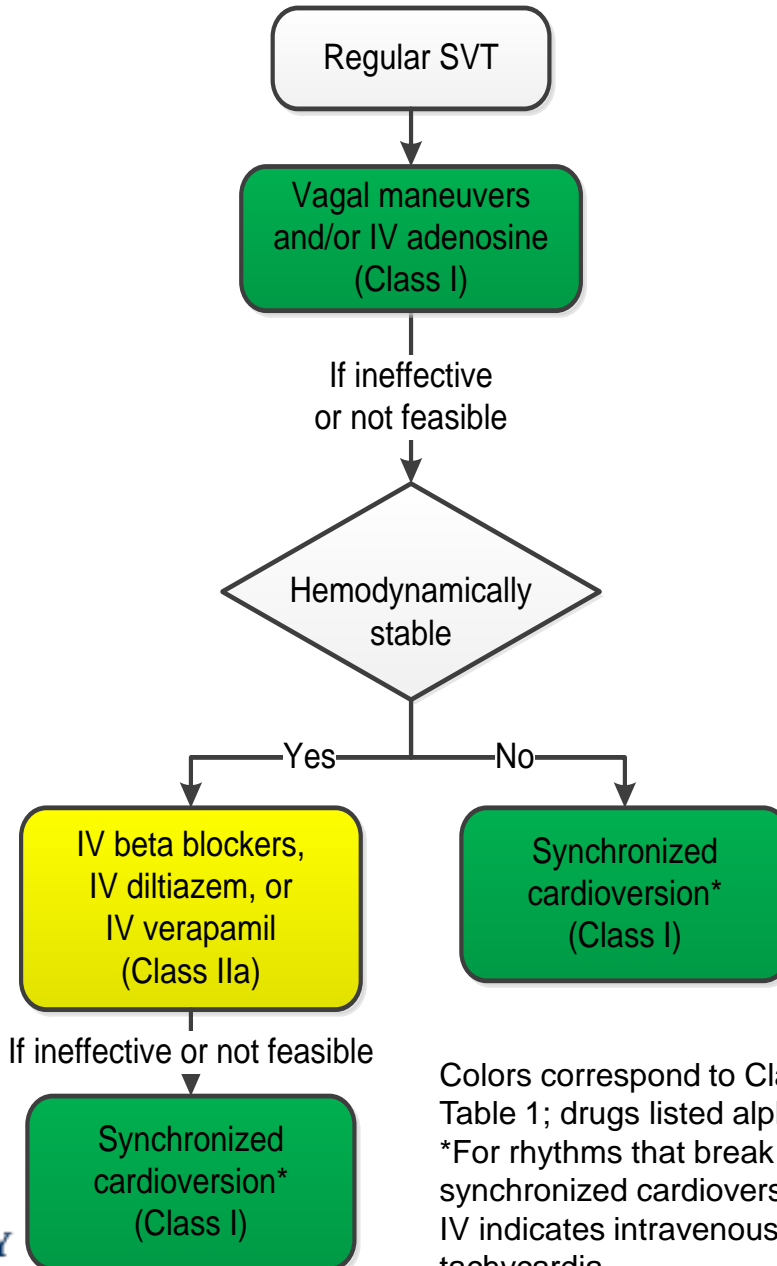
Principles of Medical Therapy – Acute Treatment

COR	LOE	Recommendations
I	B-R	Vagal maneuvers are recommended for acute treatment in patients with regular SVT.
I	B-R	Adenosine is recommended for acute treatment in patients with regular SVT.
I	B-NR	Synchronized cardioversion is recommended for acute treatment in patients with hemodynamically unstable SVT when vagal maneuvers or adenosine are ineffective or not feasible.
I	B-NR	Synchronized cardioversion is recommended for acute treatment in patients with hemodynamically stable SVT when pharmacological therapy is ineffective or contraindicated.

Principles of Medical Therapy – Acute Treatment (cont'd)

COR	LOE	Recommendations
IIa	B-R	Intravenous diltiazem or verapamil can be effective for acute treatment in patients with hemodynamically stable SVT.
IIa	C-LD	Intravenous beta blockers are reasonable for acute treatment in patients with hemodynamically stable SVT.

Acute Treatment of Regular SVT of Unknown Mechanism



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically.
*For rhythms that break or recur spontaneously, synchronized cardioversion is not appropriate.
IV indicates intravenous; and SVT, supraventricular tachycardia.

Principles of Medical Therapy

Ongoing Management

Principles of Medical Therapy - Ongoing Management

COR	LOE	Recommendations
I	B-R	Oral beta blockers, diltiazem, or verapamil is useful for ongoing management in patients with symptomatic SVT who do not have ventricular pre-excitation during sinus rhythm.
I	B-NR	EP study with the option of ablation is useful for the diagnosis and potential treatment of SVT.
I	C-LD	Patients with SVT should be educated on how to perform vagal maneuvers for ongoing management of SVT.

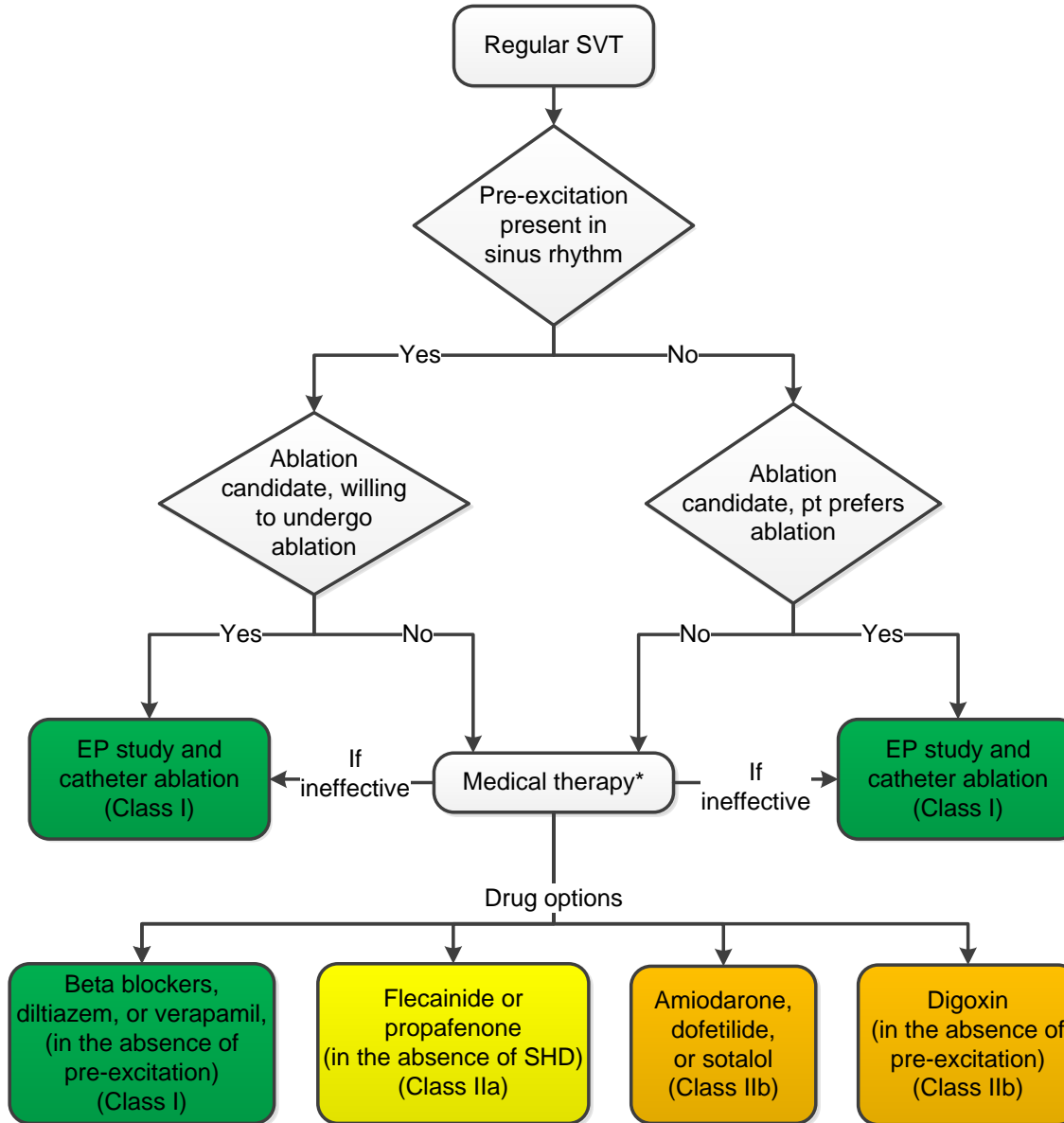
Principles of Medical Therapy – Ongoing Management (cont'd)

COR	LOE	Recommendations
IIa	B-R	Flecainide or propafenone is reasonable for ongoing management in patients without structural heart disease or ischemic heart disease who have symptomatic SVT and are not candidates for, or prefer not to undergo, catheter ablation.
IIb	B-R	Sotalol may be reasonable for ongoing management in patients with symptomatic SVT who are not candidates for, or prefer not to undergo, catheter ablation.
IIb	B-R	Dofetilide may be reasonable for ongoing management in patients with symptomatic SVT who are not candidates for, or prefer not to undergo, catheter ablation and in whom beta blockers, diltiazem, flecainide, propafenone, or verapamil are ineffective or contraindicated.

Principles of Medical Therapy – Ongoing Management (cont'd)

COR	LOE	Recommendations
IIb	C-LD	Oral amiodarone may be considered for ongoing management in patients with symptomatic SVT who are not candidates for, or prefer not to undergo, catheter ablation and in whom beta blockers, diltiazem, dofetilide, flecainide, propafenone, sotalol, or verapamil are ineffective or contraindicated.
IIb	C-LD	Oral digoxin may be reasonable for ongoing management in patients with symptomatic SVT without pre-excitation who are not candidates for, or prefer not to undergo, catheter ablation.

Ongoing Management of SVT of Unknown Mechanism



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically.
 *Clinical follow-up without treatment is also an option.
 EP indicates electrophysiological; pt, patient; SHD, structural heart disease (including ischemic heart disease); SVT, supraventricular tachycardia; and VT, ventricular tachycardia.

Sinus Tachyarrhythmias

Sinus Tachyarrhythmias

Ongoing Management

Inappropriate Sinus Tachyarrhythmias – Ongoing Management

COR	LOE	Recommendations
I	C-LD	Evaluation for and treatment of reversible causes are recommended in patients with suspected IST.
IIa	B-R	Ivabradine is reasonable for ongoing management in patients with symptomatic IST.
IIb	C-LD	Beta blockers may be considered for ongoing management in patients with symptomatic IST.
IIb	C-LD	The combination of beta blockers and ivabradine may be considered for ongoing management in patients with IST.

Nonsinus Focal Atrial Tachycardia and MAT

Nonsinus Focal Atrial Tachycardia and MAT

Focal Atrial Tachycardia Acute Treatment

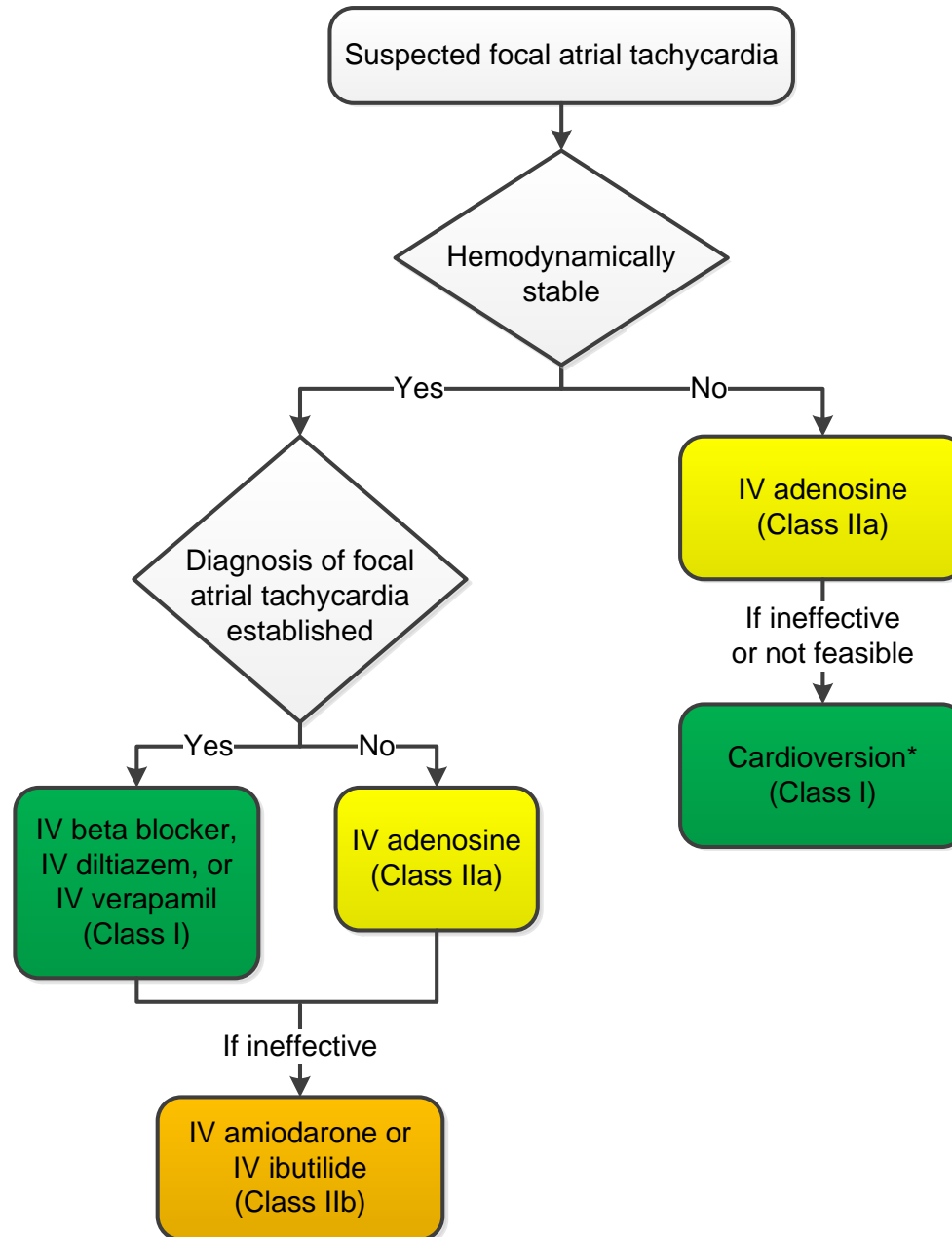
Nonsinus Focal Atrial Tachycardia and MAT – Focal Atrial Tachycardia Acute Treatment

COR	LOE	Recommendations
I	C-LD	Intravenous beta blockers, diltiazem, or verapamil is useful for acute treatment in hemodynamically stable patients with focal AT.
I	C-LD	Synchronized cardioversion is recommended for acute treatment in patients with hemodynamically unstable focal AT.
Ila	B-NR	Adenosine can be useful in the acute setting to either restore sinus rhythm or diagnose the tachycardia mechanism in patients with suspected focal AT.

Nonsinus Focal Atrial Tachycardia and MAT – Focal Atrial Tachycardia Acute Treatment (cont'd)

COR	LOE	Recommendations
IIb	C-LD	Intravenous amiodarone may be reasonable in the acute setting to either restore sinus rhythm or slow the ventricular rate in hemodynamically stable patients with focal AT.
IIb	C-LD	Ibutilide may be reasonable in the acute setting to restore sinus rhythm in hemodynamically stable patients with focal AT.

Acute Treatment of Suspected Focal Atrial Tachycardia



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically. *For rhythms that break or recur spontaneously, synchronized cardioversion is not appropriate. IV indicates intravenous.

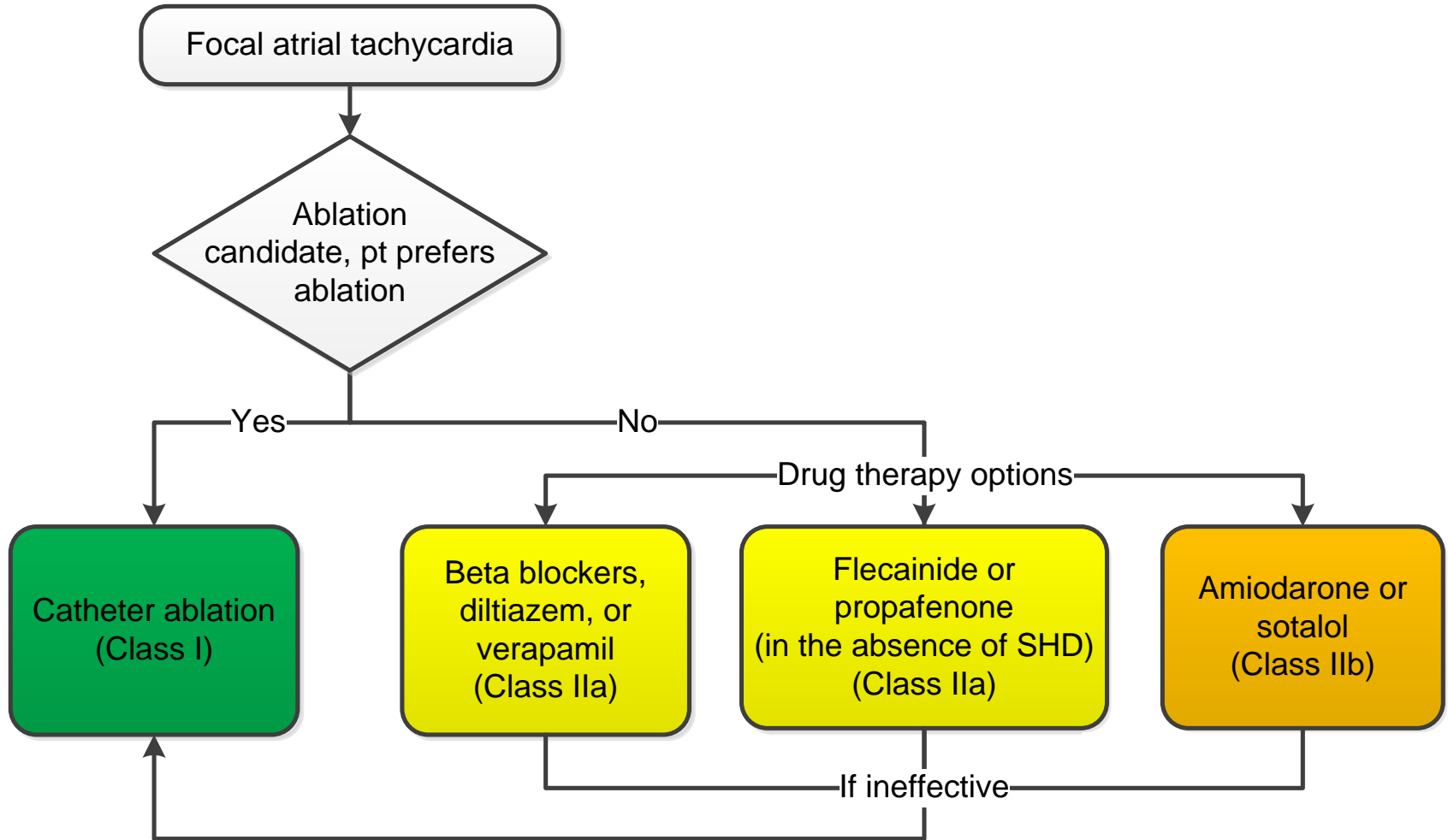
Nonsinus Focal Atrial Tachycardia and MAT

Focal Atrial Tachycardia Ongoing Management

Nonsinus Focal Atrial Tachycardia and MAT – Focal Atrial Tachycardia Ongoing Management

COR	LOE	Recommendations
I	B-NR	Catheter ablation is recommended in patients with symptomatic focal AT as an alternative to pharmacological therapy.
IIa	C-LD	Oral beta blockers, diltiazem, or verapamil are reasonable for ongoing management in patients with symptomatic focal AT.
IIa	C-LD	Flecainide or propafenone can be effective for ongoing management in patients without structural heart disease or ischemic heart disease who have focal AT.
IIb	C-LD	Oral sotalol or amiodarone may be reasonable for ongoing management in patients with focal AT.

Ongoing Management of Focal Atrial Tachycardia



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically. Pt indicates patient; and SHD, structural heart disease (including ischemic heart disease).

Nonsinus Focal Atrial Tachycardia and MAT

Multifocal Atrial Tachycardia Acute Treatment

COR	LOE	Recommendation
IIa	C-LD	Intravenous metoprolol or verapamil can be useful for acute treatment in patients with MAT.

Nonsinus Focal Atrial Tachycardia and MAT

Multifocal Atrial Tachycardia Ongoing Management

Nonsinus Focal Atrial Tachycardia and MAT – Multifocal Atrial Tachycardia Ongoing Management

COR	LOE	Recommendations
IIa	B-NR	Oral verapamil (<i>Level of Evidence: B-NR</i>) or diltiazem (<i>Level of Evidence: C-LD</i>) is reasonable for ongoing management in patients with recurrent symptomatic MAT.
	C-LD	
IIa	C-LD	Metoprolol is reasonable for ongoing management in patients with recurrent symptomatic MAT.

Atrioventricular Nodal Reentrant Tachycardia

Atrioventricular Nodal Reentrant Tachycardia

Acute Treatment

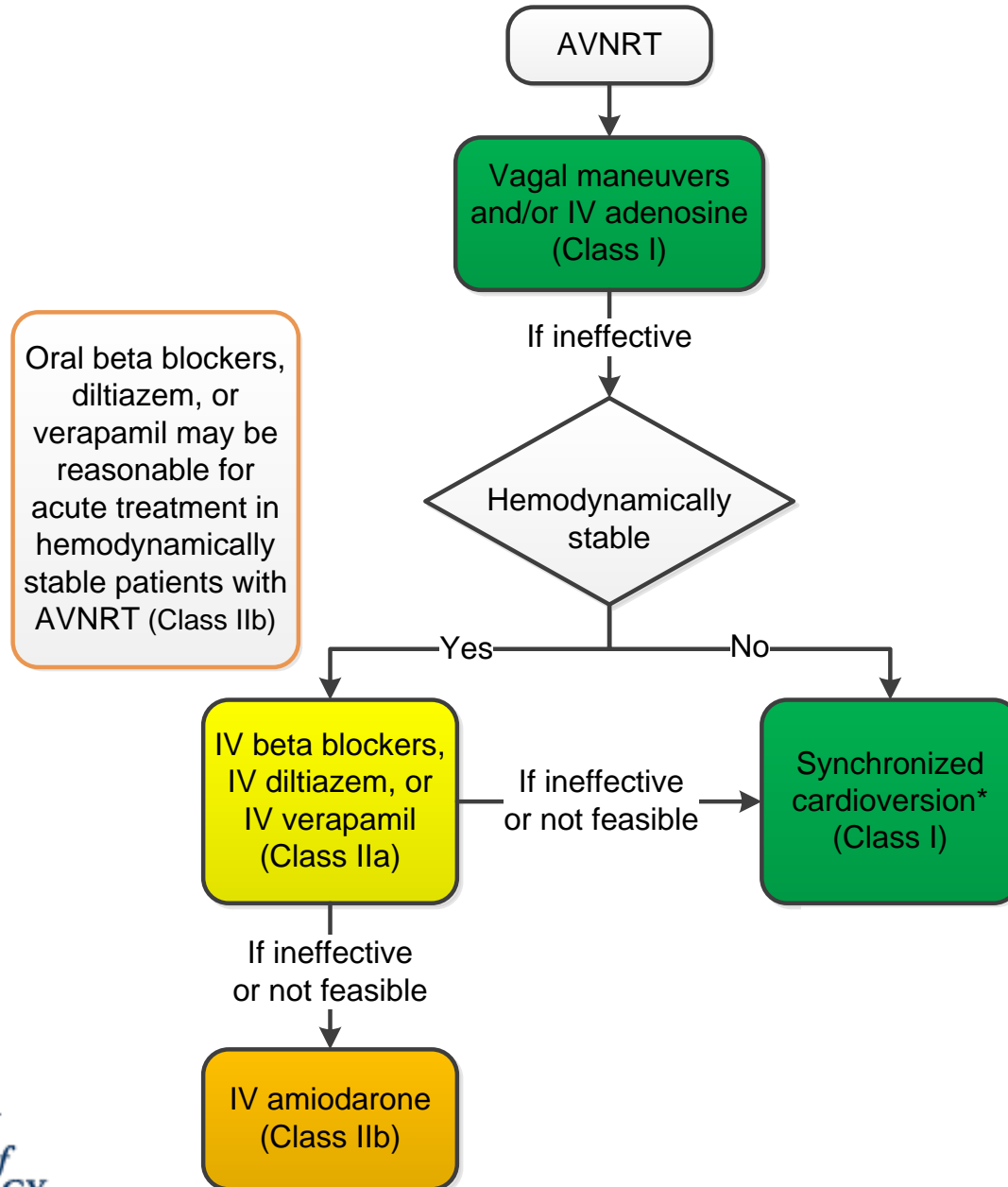
Atrioventricular Nodal Reentrant Tachycardia – Acute Treatment

COR	LOE	Recommendations
I	B-R	Vagal maneuvers are recommended for acute treatment in patients with AVNRT.
I	B-R	Adenosine is recommended for acute treatment in patients with AVNRT.
I	B-NR	Synchronized cardioversion should be performed for acute treatment in hemodynamically unstable patients with AVNRT when adenosine and vagal maneuvers do not terminate the tachycardia or are not feasible.
I	B-NR	Synchronized cardioversion is recommended for acute treatment in hemodynamically stable patients with AVNRT when pharmacological therapy does not terminate the tachycardia or is contraindicated.

Atrioventricular Nodal Reentrant Tachycardia – Acute Treatment (cont'd)

COR	LOE	Recommendations
IIa	B-R	Intravenous beta blockers, diltiazem, or verapamil are reasonable for acute treatment in hemodynamically stable patients with AVNRT.
IIb	C-LD	Oral beta blockers, diltiazem, or verapamil may be reasonable for acute treatment in hemodynamically stable patients with AVNRT.
IIb	C-LD	Intravenous amiodarone may be considered for acute treatment in hemodynamically stable patients with AVNRT when other therapies are ineffective or contraindicated.

Acute Treatment of AVNRT



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically.
 *For rhythms that break or recur spontaneously, synchronized cardioversion is not appropriate.
 AVNRT indicates atrioventricular nodal reentrant tachycardia; and IV, intravenous.

Atrioventricular Nodal Reentrant Tachycardia

Ongoing Management

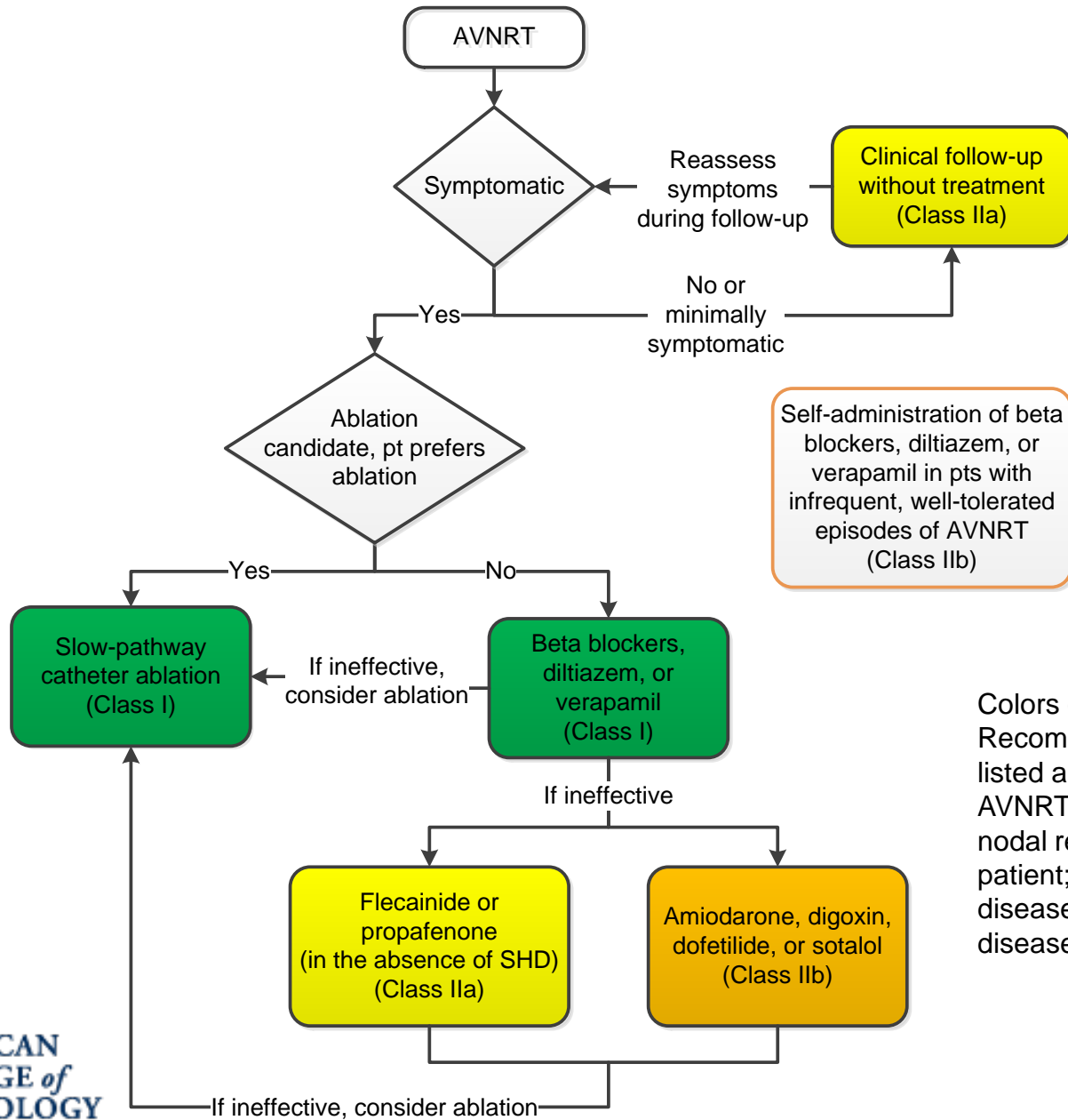
Atrioventricular Nodal Reentrant Tachycardia – Ongoing Management

COR	LOE	Recommendations
I	B-R	Oral verapamil or diltiazem is recommended for ongoing management in patients with AVNRT who are not candidates for, or prefer not to undergo, catheter ablation.
I	B-RN	Catheter ablation of the slow pathway is recommended in patients with AVNRT.
I	B-NR	Oral beta blockers are recommended for ongoing management in patients with AVNRT who are not candidates for, or prefer not to undergo, catheter ablation.
IIa	B-NR	Flecainide or propafenone is reasonable for ongoing management in patients without structural heart disease or ischemic heart disease who have AVNRT and are not candidates for, or prefer not to undergo, catheter ablation and in whom beta blockers, diltiazem, or verapamil are ineffective or contraindicated.

Atrioventricular Nodal Reentrant Tachycardia – Ongoing Management (cont'd)

COR	LOE	Recommendations
IIa	B-NR	Clinical follow-up without pharmacological therapy or ablation is reasonable for ongoing management in minimally symptomatic patients with AVNRT.
IIb	B-R	Oral sotalol or dofetilide may be reasonable for ongoing management in patients with AVNRT who are not candidates for, or prefer not to undergo, catheter ablation.
IIb	B-R	Oral digoxin or amiodarone may be reasonable for ongoing treatment of AVNRT in patients who are not candidates for, or prefer not to undergo, catheter ablation.
IIb	C-LD	Self-administered (“pill-in-the-pocket”) acute doses of oral beta blockers, diltiazem, or verapamil may be reasonable for ongoing management in patients with infrequent, well-tolerated episodes of AVNRT.

Ongoing Management of AVNRT



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically. AVNRT indicates atrioventricular nodal reentrant tachycardia; pt, patient; and SHD, structural heart disease (including ischemic heart disease).

Manifest and Concealed Accessory Pathways

Manifest and Concealed Accessory Pathways

Management of Patients With Symptomatic Manifest or Concealed Accessory Pathways

Symptomatic Manifest or Concealed Accessory Pathways – Acute Treatment

COR	LOE	Recommendations
I	B-R	Vagal maneuvers are recommended for acute treatment in patients with orthodromic AVRT.
I	B-R	Adenosine is beneficial for acute treatment in patients with orthodromic AVRT.
I	B-NR	Synchronized cardioversion should be performed for acute treatment in hemodynamically unstable patients with AVRT if vagal maneuvers or adenosine are ineffective or not feasible.
I	B-NR	Synchronized cardioversion is recommended for acute treatment in hemodynamically stable patients with AVRT when pharmacological therapy is ineffective or contraindicated.

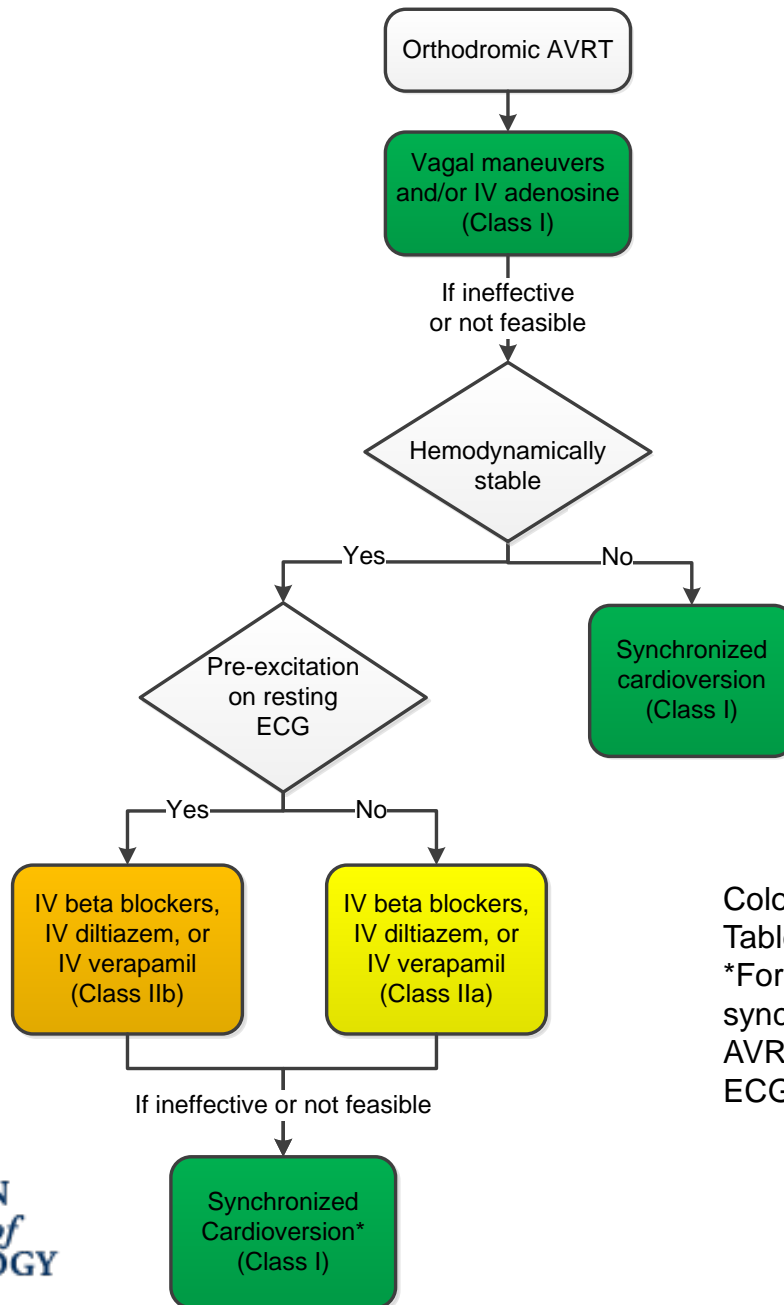
Symptomatic Manifest or Concealed Accessory Pathways – Acute Treatment (cont'd)

COR	LOE	Recommendations
I	B-NR	Synchronized cardioversion should be performed for acute treatment in hemodynamically unstable patients with pre-excited AF.
I	C-LD	Ibutilide or intravenous procainamide is beneficial for acute treatment in patients with pre-excited AF who are hemodynamically stable.
IIa	B-R	Intravenous diltiazem, verapamil (<i>Level of Evidence: B-R</i>) or beta blockers (<i>Level of Evidence: C-LD</i>) can be effective for acute treatment in patients with orthodromic AVRT who do not have pre-excitation on their resting ECG during sinus rhythm.
	C-LD	

Symptomatic Manifest or Concealed Accessory Pathways – Acute Treatment (cont'd)

COR	LOE	Recommendations
IIb	B-R	Intravenous beta blockers, diltiazem, or verapamil might be considered for acute treatment in patients with orthodromic AVRT who have pre-excitation on their resting ECG and have not responded to other therapies .
III: Harm	C-LD	Intravenous digoxin, intravenous amiodarone, intravenous or oral beta blockers, diltiazem, and verapamil are potentially harmful for acute treatment in patients with pre-excited AF.

Acute Treatment of Orthodromic AVRT



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically.

*For rhythms that break or recur spontaneously, synchronized cardioversion is not appropriate. AVRT indicates atrioventricular reentrant tachycardia; ECG, electrocardiogram; and IV, intravenous.

Manifest and Concealed Accessory Pathways

Management of Patients With Symptomatic Manifest or Concealed Accessory Pathways

Symptomatic Manifest or Concealed Accessory Pathways – Ongoing Management

COR	LOE	Recommendations
I	B-NR	Catheter ablation of the accessory pathway is recommended in patients with AVRT and/or pre-excited AF.
I	C-LD	Oral beta blockers, diltiazem, or verapamil are indicated for ongoing management of AVRT in patients without pre-excitation on their resting ECG.
IIa	B-R	Oral flecainide or propafenone is reasonable for ongoing management in patients without structural heart disease or ischemic heart disease who have AVRT and/or pre-excited AF and are not candidates for, or prefer not to undergo, catheter ablation.

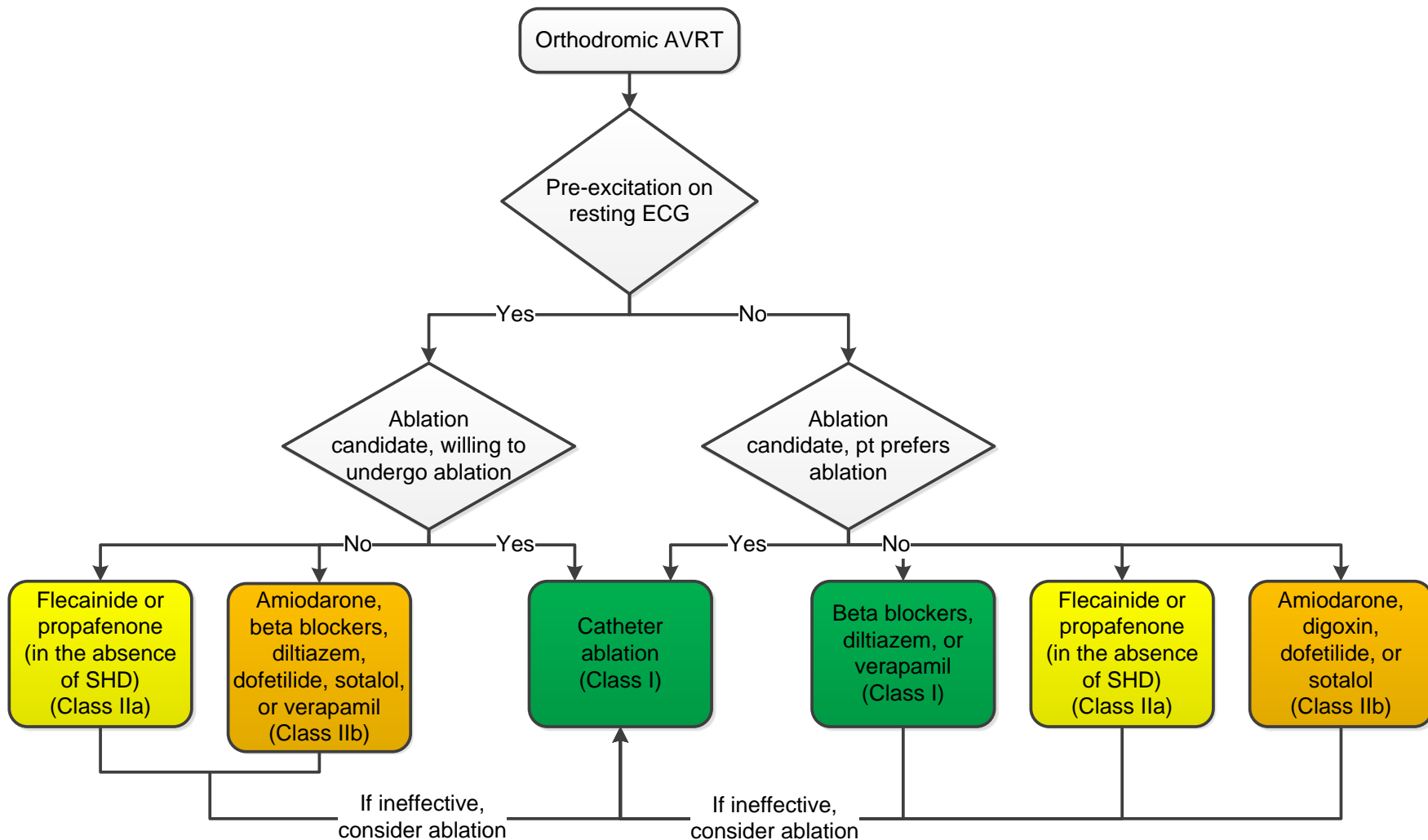
Symptomatic Manifest or Concealed Accessory Pathways – Ongoing Management (cont'd)

COR	LOE	Recommendations
IIb	B-R	Oral dofetilide or sotalol may be reasonable for ongoing management in patients with AVRT and/or pre-excited AF who are not candidates for, or prefer not to undergo, catheter ablation.
IIb	C-LD	Oral amiodarone may be considered for ongoing management in patients with AVRT and/or pre-excited AF who are not candidates for, or prefer not to undergo, catheter ablation and in whom beta blockers, diltiazem, flecainide, propafenone, and verapamil are ineffective or contraindicated.

Symptomatic Manifest or Concealed Accessory Pathways – Ongoing Management (cont'd)

COR	LOE	Recommendations
IIb	C-LD	Oral beta blockers, diltiazem, or verapamil may be reasonable for ongoing management of orthodromic AVRT in patients with pre-excitation on their resting ECG who are not candidates for, or prefer not to undergo, catheter ablation.
IIb	C-LD	Oral digoxin may be reasonable for ongoing management of orthodromic AVRT in patients without pre-excitation on their resting ECG who are not candidates for, or prefer not to undergo, catheter ablation.
III: Harm	C-LD	Oral digoxin is potentially harmful for ongoing management in patients with AVRT or AF and pre-excitation on their resting ECG.

Ongoing Management of Orthodromic AVRT



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically.

AVRT indicates atrioventricular reentrant tachycardia; ECG, electrocardiogram; pt, patient; and SHD, structural heart disease (including ischemic heart disease).

Management of Asymptomatic Pre-Excitation

Asymptomatic Patients With Pre-Excitation

COR	LOE	Recommendations
I	B-NR ^{SR}	In asymptomatic patients with pre-excitation, the findings of abrupt loss of conduction over a manifest pathway during exercise testing in sinus rhythm (<i>Level of Evidence: B-NR</i>) ^{SR} or intermittent loss of pre-excitation during ECG or ambulatory monitoring (<i>Level of Evidence: C-LD</i>) ^{SR} are useful to identify patients at low risk of rapid conduction over the pathway.
	C-LD ^{SR}	
Ia	B-NR ^{SR}	An EP study is reasonable in asymptomatic patients with pre-excitation to risk-stratify for arrhythmic events.
Ia	B-NR ^{SR}	Catheter ablation of the accessory pathway is reasonable in asymptomatic patients with pre-excitation if an EP study identifies a high risk of arrhythmic events, including rapidly conducting pre-excited AF.

Asymptomatic Patients With Pre-Excitation (cont'd)

COR	LOE	Recommendations
IIa	B-NR ^{SR}	Catheter ablation of the accessory pathway is reasonable in asymptomatic patients if the presence of pre-excitation precludes specific employment (such as with pilots).
IIa	B-NR ^{SR}	Observation, without further evaluation or treatment, is reasonable in asymptomatic patients with pre-excitation.

Manifest and Concealed Accessory Pathways

Risk Stratification of Symptomatic Patients With Manifest Accessory Pathways

Risk Stratification of Symptomatic Patients With Manifest Accessory Pathways

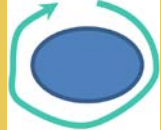
COR	LOE	Recommendations
I	B-NR	In symptomatic patients with pre-excitation, the findings of abrupt loss of conduction over the pathway during exercise testing in sinus rhythm (<i>Level of Evidence: B-NR</i>) or intermittent loss of pre-excitation during ECG or ambulatory monitoring (<i>Level of Evidence: C-LD</i>) are useful for identifying patients at low risk of developing rapid conduction over the pathway.
	C-LD	
I	B-NR	An EP study is useful in symptomatic patients with pre-excitation to risk-stratify for life-threatening arrhythmic events.

Atrial Flutter

Classification of Atrial Flutter / Atrial Tachycardias

Macroreentrant Atrial Tachycardia/Atrial Flutter

- Constant regular P-wave/flutter wave morphology
- Rate typically >250 bpm*
- Mechanism: Macroreentry



Focal Atrial Tachycardia

- Discrete P waves with isoelectric segment
- Rate typically 100–250 bpm*
- Mechanisms: Microreentry or automaticity




Diagram summarizing types of ATs often encountered in patients with a history of atrial fibrillation, including those seen after catheter or surgical ablation procedures. P-wave morphologies are shown for common types of atrial flutter; however, the P-wave morphology is not always a reliable guide to the re-entry circuit location or to the distinction between common atrial flutter and other macroreentrant ATs. *Exceptions to P-wave morphology and rate are common in scarred atria. AT indicates atrial tachycardia; and ECG, electrocardiogram. Reproduced with permission from January et al.

Cavotricuspid Isthmus Dependent

- Right atrial reentry dependent on conduction through the cavotricuspid isthmus
- Can be cured by ablation creating conduction block in the cavotricuspid isthmus

Not Cavotricuspid Isthmus Dependent (“Atypical Atrial Flutter”)

- Reentry that is not dependent on conduction through the cavotricuspid isthmus
- The circuit is usually defined by atrial scars from prior heart surgery, ablation, or idiopathic
- Location determines ablation approach and risks
- Multiple reentry circuits can be present

Typical Atrial Flutter

Counterclockwise Atrial Flutter

ECG flutter waves*:

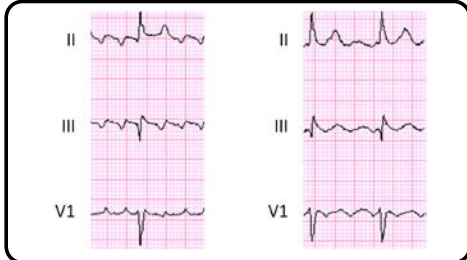
- Negative in II, III, aVF
- Positive in V1

Clockwise Atrial Flutter (reverse typical Atrial Flutter)

ECG flutter waves*:

- Positive in II, III, aVF
- Negative in V1

V1 typically opposite in polarity to inferior leads




Right Atrial

Example: Reentry around healed surgical incision in the free wall of the right atrium after repair of congenital heart disease

Left Atrial

- Perimitral flutter
- Left atrial roof dependent flutter
- Others

ECG*: Atypical flutter suggested by P-wave polarity that does not fit typical atrial flutter (e.g., concordant P-wave polarity between V1 and inferior leads)



Atrial Flutter

Acute Treatment

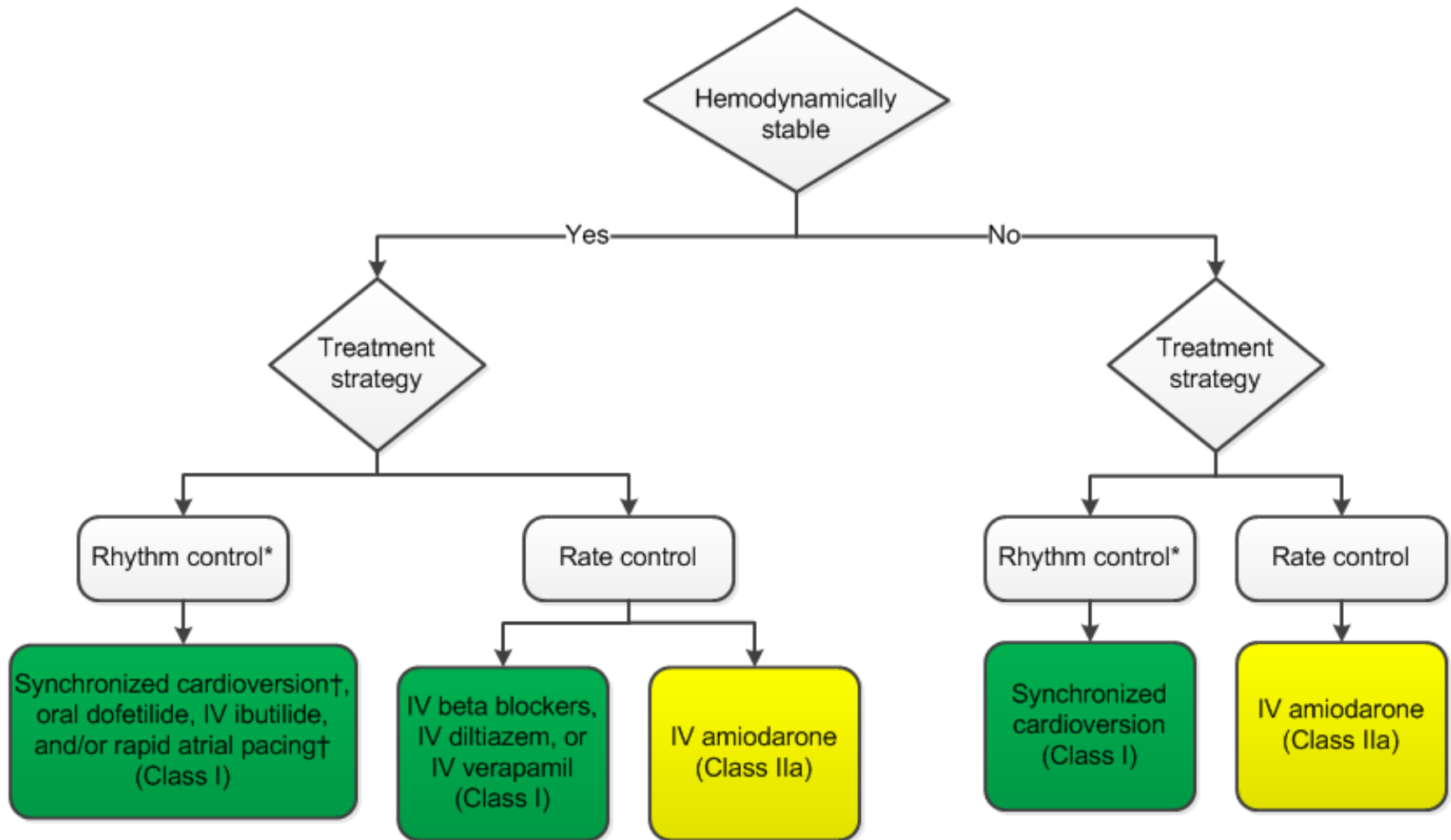
Atrial Flutter – Acute Treatment

COR	LOE	Recommendations
I	A	Oral dofetilide or intravenous ibutilide is useful for acute pharmacological cardioversion in patients with atrial flutter.
I	B-R	Intravenous or oral beta blockers, diltiazem, or verapamil are useful for acute rate control in patients with atrial flutter who are hemodynamically stable.
I	B-NR	Elective synchronized cardioversion is indicated in stable patients with well-tolerated atrial flutter when a rhythm-control strategy is pursued.
I	B-NR	Synchronized cardioversion is recommended for acute treatment of patients with atrial flutter who are hemodynamically unstable and do not respond to pharmacological therapies.

Atrial Flutter – Acute Treatment (cont'd)

COR	LOE	Recommendations
I	C-LD	Rapid atrial pacing is useful for acute conversion of atrial flutter in patients who have pacing wires in place as part of a permanent pacemaker or implantable cardioverter-defibrillator or for temporary atrial pacing after cardiac surgery.
I	B-NR	Acute antithrombotic therapy is recommended in patients with atrial flutter to align with recommended antithrombotic therapy for patients with AF.
Ila	B-R	Intravenous amiodarone can be useful for acute control of the ventricular rate (in the absence of pre-excitation) in patients with atrial flutter and systolic heart failure, when beta blockers are contraindicated or ineffective.

Acute Treatment of Atrial Flutter



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically.

*Anticoagulation as per guideline is mandatory.

†For rhythms that break or recur spontaneously, synchronized cardioversion or rapid atrial pacing is not appropriate.

IV indicates intravenous.

Atrial Flutter

Ongoing Management

Atrial Flutter – Ongoing Management

COR	LOE	Recommendations
I	B-R	Catheter ablation of the CTI is useful in patients with atrial flutter that is either symptomatic or refractory to pharmacological rate control.
I	C-LD	Beta blockers, diltiazem, or verapamil are useful to control the ventricular rate in patients with hemodynamically tolerated atrial flutter.
I	C-LD	Catheter ablation is useful in patients with recurrent symptomatic non-CTI-dependent flutter after failure of at least 1 antiarrhythmic agent.
I	B-NR	Ongoing management with antithrombotic therapy is recommended in patients with atrial flutter to align with recommended antithrombotic therapy for patients with AF.

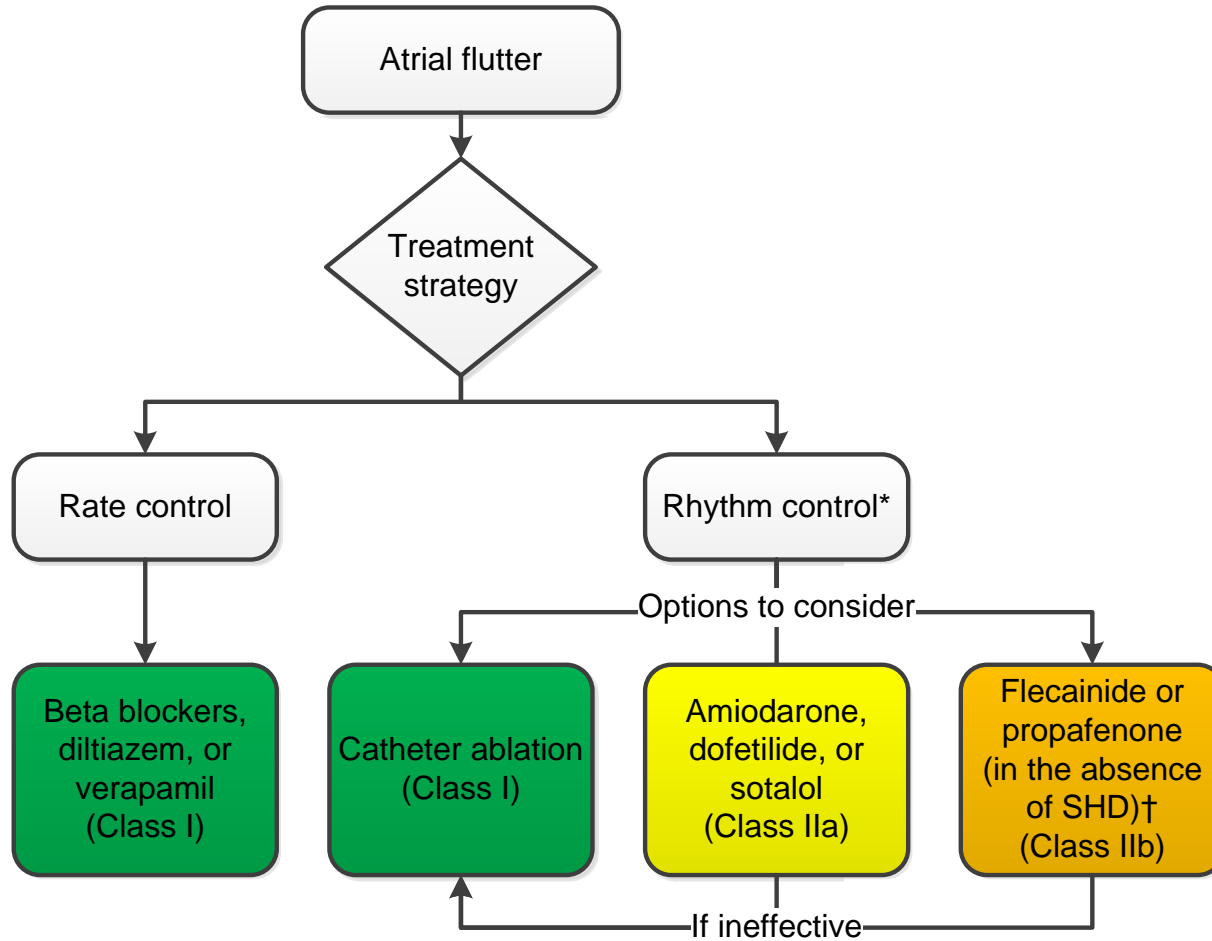
Atrial Flutter – Ongoing Management (cont'd)

COR	LOE	Recommendations
IIa	B-R	<p>The following drugs can be useful to maintain sinus rhythm in patients with symptomatic, recurrent atrial flutter, with the drug choice depending on underlying heart disease and comorbidities:</p> <ul style="list-style-type: none"> a. Amiodarone b. Dofetilide c. Sotalol
IIa	B-NR	<p>Catheter ablation is reasonable in patients with CTI-dependent atrial flutter that occurs as the result of flecainide, propafenone, or amiodarone used for treatment of AF.</p>
IIa	C-LD	<p>Catheter ablation of the CTI is reasonable in patients undergoing catheter ablation of AF who also have a history of documented clinical or induced CTI-dependent atrial flutter.</p>

Atrial Flutter – Ongoing Management (cont'd)

COR	LOE	Recommendations
IIa	C-LD	Catheter ablation is reasonable in patients with recurrent symptomatic non-CTI-dependent flutter as primary therapy, before therapeutic trials of antiarrhythmic drugs, after carefully weighing potential risks and benefits of treatment options.
IIb	B-R	Flecainide or propafenone may be considered to maintain sinus rhythm in patients without structural heart disease or ischemic heart disease who have symptomatic recurrent atrial flutter.
IIb	C-LD	Catheter ablation may be reasonable for asymptomatic patients with recurrent atrial flutter.

Ongoing Management of Atrial Flutter



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically.

*After assuring adequate anticoagulation or excluding left atrial thrombus by transesophageal echocardiography before conversion.

†Should be combined with AV nodal–blocking agents to reduce risk of 1:1 conduction during atrial flutter.

AV indicates atrioventricular; SHD, structural heart disease (including ischemic heart disease).

Junctional Tachycardia

Junctional Tachycardia – Acute Treatment

COR	LOE	Recommendations
IIa	C-LD	Intravenous beta blockers are reasonable for acute treatment in patients with symptomatic junctional tachycardia.
IIa	C-LD	Intravenous diltiazem, procainamide, or verapamil is reasonable for acute treatment in patients with junctional tachycardia.

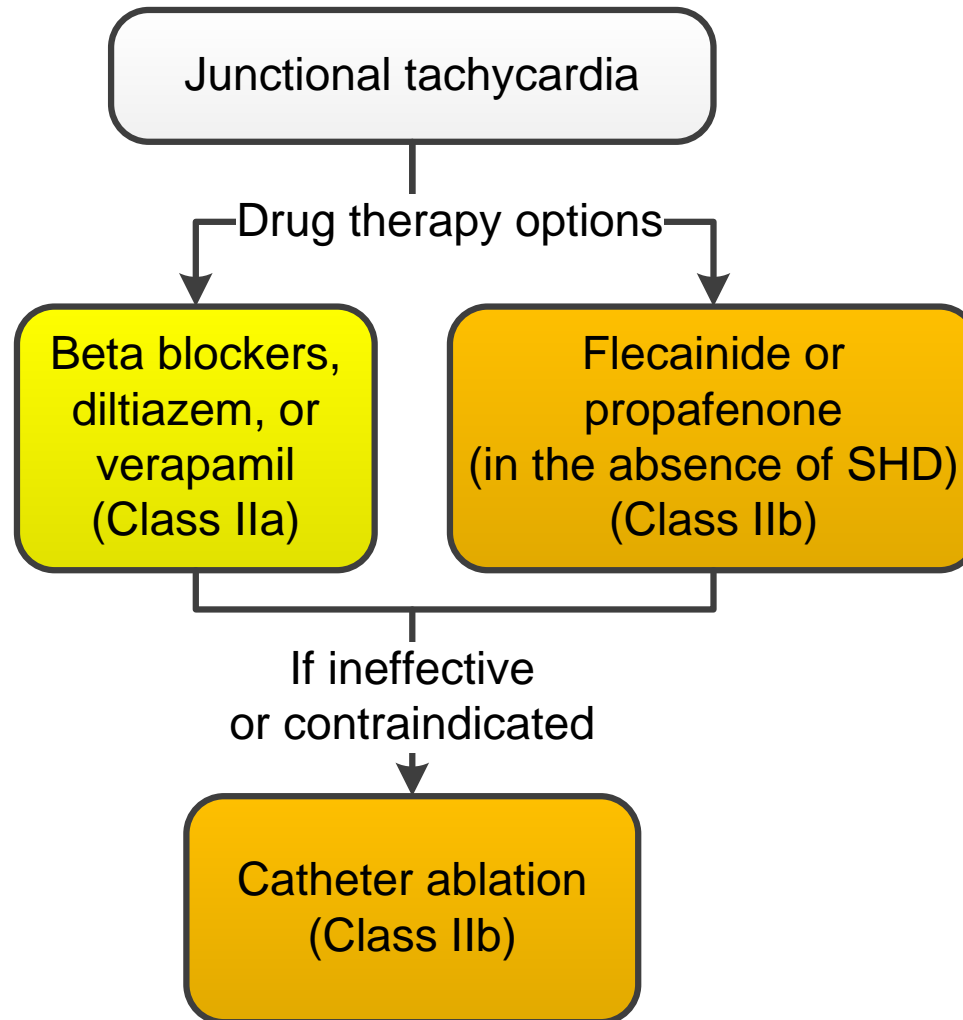
Junctional Tachycardia

Ongoing Management

Junctional Tachycardia – Ongoing Management

COR	LOE	Recommendations
IIa	C-LD	Oral beta blockers are reasonable for ongoing management in patients with junctional tachycardia.
IIa	C-LD	Oral diltiazem or verapamil is reasonable for ongoing management in patients with junctional tachycardia.
IIb	C-LD	Flecainide or propafenone may be reasonable for ongoing management in patients without structural heart disease or ischemic heart disease who have junctional tachycardia.
IIb	C-LD	Catheter ablation may be reasonable in patients with junctional tachycardia when medical therapy is not effective or contraindicated.

Ongoing Management of Junctional Tachycardia



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically.
SHD indicates structural heart disease (including ischemic heart disease).

Special Populations

Special Populations

Patients With Adult Congenital Heart Disease

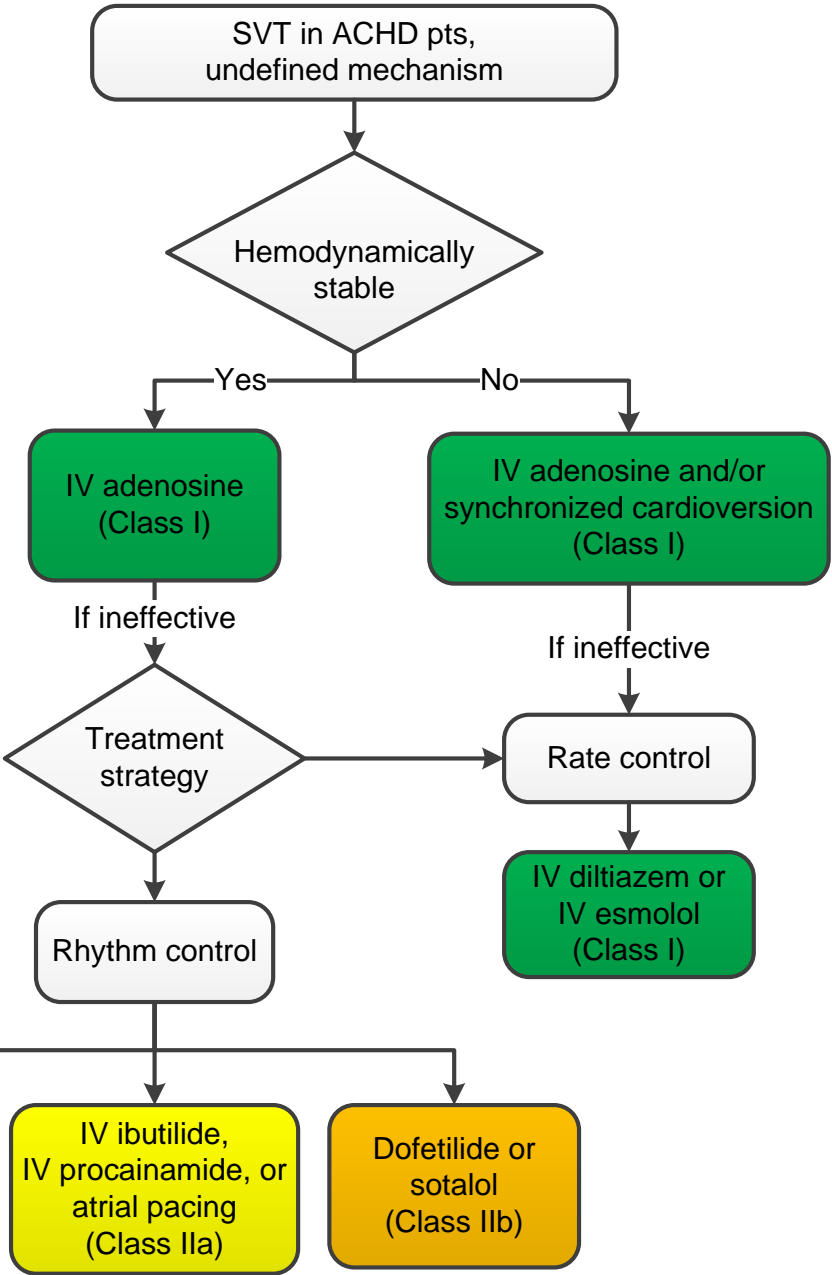
Adult Congenital Heart Disease – Acute Treatment

COR	LOE	Recommendations
I	C-LD	Acute antithrombotic therapy is recommended in ACHD patients who have AT or atrial flutter to align with recommended antithrombotic therapy for patients with AF.
I	B-NR	Synchronized cardioversion is recommended for acute treatment in ACHD patients and SVT who are hemodynamically unstable.
I	C-LD	Intravenous diltiazem or esmolol (with extra caution used for either agent, observing for the development of hypotension) is recommended for acute treatment in ACHD patients and SVT who are hemodynamically stable.
I	B-NR	Intravenous adenosine is recommended for acute treatment in ACHD patients and SVT.

Adult Congenital Heart Disease – Acute Treatment (cont'd)

COR	LOE	Recommendations
IIa	B-NR	Intravenous ibutilide or procainamide can be effective for acute treatment in patients and atrial flutter who are hemodynamically stable.
IIa	B-NR	Atrial pacing can be effective for acute treatment in ACHD patients and SVT who are hemodynamically stable and anticoagulated as per current guidelines for antithrombotic therapy in patients with AF.
IIa	B-NR	Elective synchronized cardioversion can be useful for acute termination of AT or atrial flutter in ACHD patients when acute pharmacological therapy is ineffective or contraindicated.
IIb	B-NR	Oral dofetilide or sotalol may be reasonable for acute treatment in ACHD patients and AT and/or atrial flutter who are hemodynamically stable.

Acute Treatment of SVT in ACHD Patients



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically.

*For rhythms that break or recur spontaneously, synchronized cardioversion is not appropriate. ACHD indicates adult congenital heart disease; IV, intravenous; and SVT, supraventricular tachycardia.

Special Populations

Patients With Adult Congenital Heart Disease

Adult Congenital Heart Disease – Ongoing Management

COR	LOE	Recommendations
I	C-LD	Ongoing management with antithrombotic therapy is recommended in ACHD patients and AT or atrial flutter to align with recommended antithrombotic therapy for patients with AF.
I	C-LD	Assessment of associated hemodynamic abnormalities for potential repair of structural defects is recommended in ACHD patients as part of therapy for SVT.
Ila	B-NR	Preoperative catheter ablation or intraoperative surgical ablation of accessory pathways or AT is reasonable in patients with SVT who are undergoing surgical repair of Ebstein anomaly.

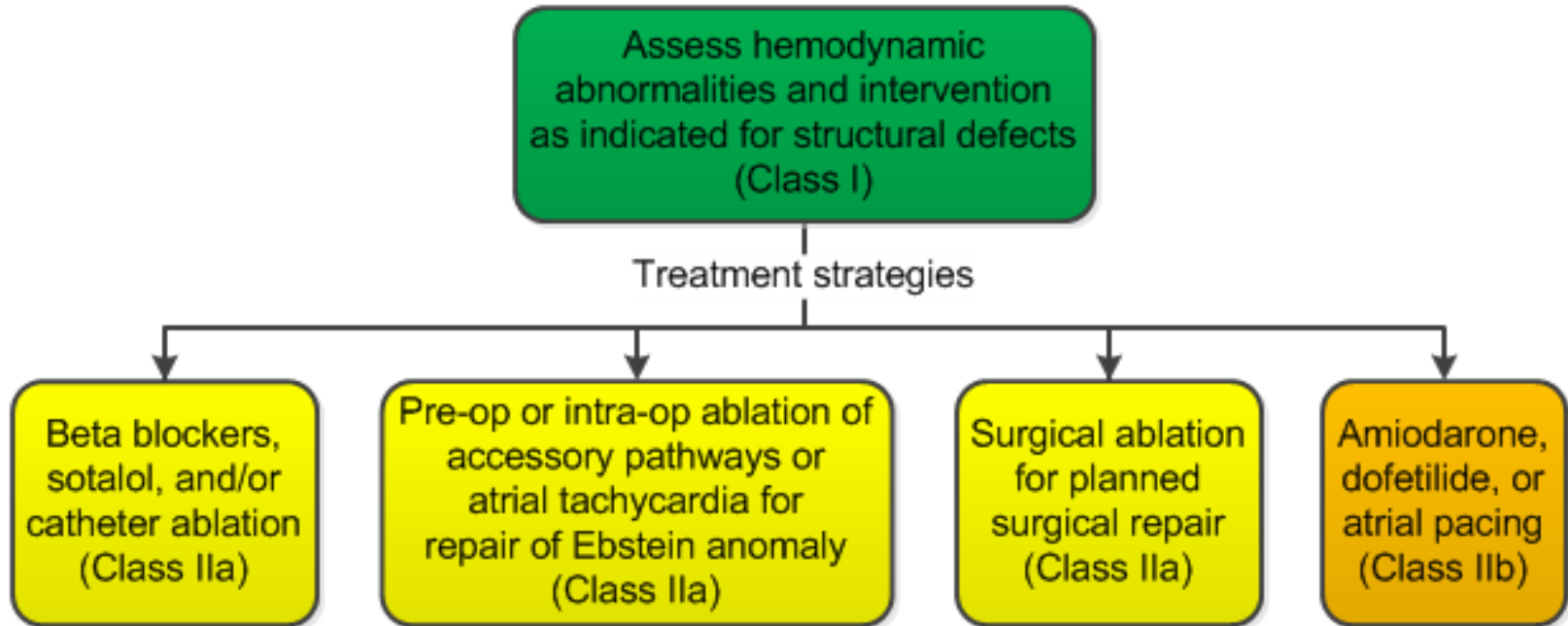
Adult Congenital Heart Disease – Ongoing Management (cont'd)

COR	LOE	Recommendations
IIa	B-NR	Oral beta blockers or sotalol therapy can be useful for prevention of recurrent AT or atrial flutter in ACHD patients.
IIa	B-NR	Catheter ablation is reasonable for treatment of recurrent symptomatic SVT in ACHD patients.
IIa	B-NR	Surgical ablation of AT or atrial flutter can be effective in ACHD undergoing planned surgical repair.
IIb	B-NR	Atrial pacing may be reasonable to decrease recurrences of AT or atrial flutter in ACHD patients and sinus node dysfunction.

Adult Congenital Heart Disease – Ongoing Management (cont'd)

COR	LOE	Recommendations
IIb	B-NR	Oral dofetilide may be reasonable for prevention of recurrent AT or atrial flutter in ACHD patients.
IIb	B-NR	Amiodarone may be reasonable for prevention of recurrent AT or atrial flutter in ACHD patients for whom other medications and catheter ablation are ineffective or contraindicated.
III: Harm	B-NR	Flecainide should not be administered for treatment of SVT in ACHD patients with significant ventricular dysfunction.

Ongoing Management of SVT in ACHD Patients



Colors correspond to Class of Recommendation in Table 1; drugs listed alphabetically. ACHD indicates adult congenital heart disease; intra-op, intraoperative; pre-op, preoperative; and SVT, supraventricular tachycardia.

Special Populations

Pregnancy

Pregnancy – Acute Treatment

COR	LOE	Recommendations
I	C-LD	Vagal maneuvers are recommended for acute treatment in pregnant patients with SVT.
I	C-LD	Adenosine is recommended for acute treatment in pregnant patients with SVT.
I	C-LD	Synchronized cardioversion is recommended for acute treatment in pregnant patients with hemodynamically unstable SVT when pharmacological therapy is ineffective or contraindicated.
Ila	C-LD	Intravenous metoprolol or propranolol is reasonable for acute treatment in pregnant patients with SVT when adenosine is ineffective or contraindicated.

Pregnancy – Acute Treatment (cont'd)

COR	LOE	Recommendations
IIb	C-LD	Intravenous verapamil may be reasonable for acute treatment in pregnant patients with SVT when adenosine and beta blockers are ineffective or contraindicated.
IIb	C-LD	Intravenous verapamil may be reasonable for acute treatment in pregnant patients with SVT when adenosine and beta blockers are ineffective or contraindicated.
IIb	C-LD	Intravenous amiodarone may be considered for acute treatment in pregnant patients with potentially life-threatening SVT when other therapies are ineffective or contraindicated.

Special Populations

Pregnancy

Pregnancy – Ongoing Management

COR	LOE	Recommendations
IIa	C-LD	<p>The following drugs, alone or in combination, can be effective for ongoing management in pregnant patients with highly symptomatic SVT:</p> <ul style="list-style-type: none"> a. Digoxin b. Flecainide c. Metoprolol d. Propafenone e. Propranolol f. Sotalol g. Verapamil
IIb	C-LD	<p>Catheter ablation may be reasonable in pregnant patients with highly symptomatic, recurrent, drug-refractory SVT with efforts toward minimizing radiation exposure.</p>
IIb	C-LD	<p>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.</p>

Special Populations

SVT in Older Populations

COR	LOE	Recommendation
I	B-NR	Diagnostic and therapeutic approaches to SVT should be individualized in patients more than 75 years of age to incorporate age, comorbid illness, physical and cognitive functions, patient preferences, and severity of symptoms.