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New ESC Guidelines for the Management of Supraventricular Tachycardia

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Introduction

Supraventricular Tachycardia (SVT) is defined as a rapid arrhythmia which originates from the atria of the heart, with an atrial rate over 100 beats per minute at rest. SVTs usually present as regular narrow-complex tachycardia, except for Atrial Fibrillation (AF) and multifocal atrial tachycardia which are usually irregular. They can also present as wide-complex tachycardia in case of a co-existing bundle branch block or an antegradely conducting accessory pathway. Despite this, wide-complex tachycardia should be considered as ventricular tachycardia until proved otherwise. Conventionally, all tachyarrhythmias except for ventricular tachycardia and AF are considered SVTs. The traditional classification of SVTs is summarized in **Table 1** (published by the European Society of Cardiology [ESC]).

Atrial tachycardias
Sinus tachycardia - Physiological sinus tachycardia - Inappropriate sinus tachycardia (IST) - Sinus nodal re-entrant tachycardia
Focal AT
Multifocal AT
Macro-re-entrant atrial tachycardia (MRAT) - CTI-dependent MRAT o Typical atrial flutter ▪ counter-clockwise (common) ▪ or clockwise (reverse) o Other CTI-dependent MRAT - Non-CTI-dependent MRAT o Right atrial MRAT o Left atrial MRAT
Atrial fibrillation (AF)
AV junctional tachycardias
AV-nodal re-entrant tachycardia (AVNRT) - typical - atypical
Non-re-entrant junctional tachycardia - Junctional ectopic or focal junctional tachycardia (JET) - Other non-re-entrant variants
AV re-entrant tachycardia (AVRT)
- Orthodromic (including PJRT) - Antidromic (with retrograde conduction through the AV-node or rarely over another pathway)

AF = Atrial Fibrillation, AT = Atrial Tachycardia; MRAT = Macro-Re-Entrant Atrial Tachycardia; CTI = Cavotricuspid Isthmus, AV = Atrioventricular; AVNRT = Atrioventricular Nodal Re-Entrant Tachycardia; AVRT = Atrioventricular Re-Entrant Tachycardia; IST = Inappropriate Sinus Tachycardia; JET = Junctional Ectopic Tachycardia; PJRT = Permanent Junctional Reciprocating Tachycardia.

Table 1. Conventional classification of supraventricular tachycardias. (Table cited from the original ESC SVT guidelines of Brugada, et. al) [1].

The new guidelines for the management of SVT were presented by the ESC in September 2019, providing a long-awaited update after 16 years. Recommendations by the ESC for the management of AF was published in 2016 in separate guidelines in 2016.

Acute management of SVT

Hemodynamically unstable patients presenting with a narrow-complex tachycardia should undergo an immediate synchronized direct-current cardioversion (Class I B). If the patient is stable, vagal maneuvers and intravenous administration of adenosine is recommended in the acute evaluation and management of patients with sustained forms of SVT (Class I B).
Amiodarone and digoxin are no longer mentioned for the acute therapy of narrow-complex regular tachycardia.

Catheter ablation

The key message of the new guidelines is that based on the increase in world-wide experience and supporting literature, catheter ablation is now provided a Class I B recommendation in almost all types of symptomatic SVTs, and even a Class I A recommendation in case of typical atrial flutter. It is now the first line therapy for chronic management of most types of SVTs, as it has become a broadly established therapy with convincing outcomes, high efficacy and very low risks, and it has revolutionized the therapy of SVT due to major technical developments over the years.
The only exceptions are inappropriate sinus tachycardia and multifocal atrial tachycardia, where conservative management (medical therapy or treatment of the underlying disease) is recommended as first line therapy.

Antiarrhythmic drug therapy

I The guidelines also refine the suggestions for the use of antiarrhythmic drug therapy, as most of the previously used medications have been downgraded based on the currently available data considering the safety and efficacy of these agents. The recommendations suggest that, with the exception of beta-blockers and calcium channel blockers, most medications used to treat SVTs are proarrhythmic, and should be avoided if possible.
Previously used antiarrhythmic drugs, such as digoxin, sotalol, quinidine, disopyramide or procainamide have been completely put aside in the new recommendations.
The guidelines considering long term pharmacological therapy for SVT include the following recommendations:

1. For the management of **inappropriate sinus tachycardia** verapamil/diltiazem, as well as catheter ablation are no longer recommended, and should only be considered if drug therapy is ineffective. Ivabradine (Class IIa B) or beta-blocker (Class IIa C) as monotherapy, or both agents together should now be considered in symptomatic patients (Class IIa).

2. For the acute therapy **of focal atrial tachycardia** (AT) procainamide, sotalol, and digoxin are no longer recommended; instead of these agents, verapamil, diltiazem or beta-blockers should be considered (Class IIa C).

3. Catheter ablation is primarily recommended as a long-term treatment strategy for both recurrent symptomatic **focal AT** (Class I B) and **atrial flutter** (Class I A). In case catheter ablation is not desired or not successful, beta-blockers, verapamil or diltiazem should be considered as a chronic pharmacological therapy (Class IIa C). Flecainide or propafenone are also possible alternatives as an antiarrhythmic drug therapy for focal AT (Class IIa C). Amiodarone should only be considered as a last option (Class IIb C); sotalol and disopyramide are no longer recommended.

4. For the management of **multifocal AT**, treatment of the underlying condition is recommended as a first line therapy (Class I C). This condition is often associated with pulmonary disease, coronary heart disease, hypomagnesaemia or theophylline therapy. Verapamil, diltiazem, or selective beta-blockers should be considered as long-term medical therapy (Class IIa B). Atrioventricular nodal ablation followed by biventricular or His-bundle pacing (as an ‘ablate and pace’ strategy) should be considered for patients with tachycardiomyopathy due to recurrent multifocal AT, which are refractory to drug therapy (Class IIa C).

5. Dofetilide, sotalol, flecainide, propafenone, procainamide, quinidine, and disopyramide are no longer recommended for the chronic management of **atrial flutter** in the new guidelines. Amiodarone might be considered but strictly in cases of heart failure or significant structural heart disease if other agents fail (Class IIb C). Patients with atrial flutter without atrial fibrillation (AF) should be considered for anticoagulation, but the threshold for initiation has not been established (Class IIa C).

6. In symptomatic and recurrent cases of atrioventricular and atrioventricular nodal reentrant tachycardia (AVNRT and AVRT) catheter ablation should be primarily recommended (Class I B). In case an ablation is not desired, pharmacological therapy with beta-blockers or calcium channel blockers (verapamil or diltiazem) might be an option (Class II B). Amiodarone, sotalol, flecainide, propafenone, and the ‘pill-in-the-pocket’ approach are no longer mentioned in the new guidelines for the therapy of AVNRT or AVRT.

In patients presenting with pre-excitation and AF an urgent synchronized DC cardioversion is recommended, especially if the patient is hemodynamically unstable (Class I B). Intravenous ibutilide or procainamide should be considered for

pharmacological conversion (Class IIa B), with a recommendation of an early synchronized DC cardioversion if drug therapy fails to convert or control the tachycardia (Class I B). Atrioventricular-node modulating agents (adenosine, verapamil, diltiazem, beta-blockers or digoxin) should definitely be avoided because of a risk of ventricular fibrillation.

Asymptomatic pre-excitation syndrome

The new SVT guidelines also provide a detailed recommendation considering the management of patients with asymptomatic pre-excitation. Performance of an electrophysiological study (EPS) to risk-stratify individuals with asymptomatic pre-excitation should definitely be considered in all cases (Class IIa B).

Patients who are competitive athletes or who have a high-risk occupation should undergo an EPS with isoproterenol for risk stratification (Class I B). Catheter ablation is recommended for cases with high risk properties in the EPS (Class I B). Catheter ablation may be considered for patients with asymptomatic pre-excitation who have low risk features in the EPS, in consideration of the patient's preferences and if the procedure is performed in an experienced center (IIb C). If asymptomatic low-risk patients do not prefer to undergo a catheter ablation, clinical follow-up is suggested (IIa B).

Treatment of SVT in pregnancy

SVTs are linked to a higher risk of complications during pregnancy, and specific recommendations are provided for treating pregnant women with SVTs in the new guidelines. All antiarrhythmic drugs should be avoided within the first trimester of pregnancy (Class I C). If the patient has a known condition of recurrent symptomatic SVTs, catheter ablation is recommended for women before planning a pregnancy, if possible (Class I C).

It is important information that pregnant women with persistent arrhythmias, if drug therapy is ineffective, contraindicated or not desirable, can now be treated with catheter ablation using new techniques that avoid exposing themselves or their fetus to harmful levels of radiation.

Treatment of SVT in pregnancy

The publication of the 2019 ESC SVT guidelines was a much-needed update considering the vast amount of literature and the development of invasive electrophysiology in the treatment of SVTs over the years. The most important changes in comparison to the guidelines of 2003 are summarized in Table 2 (published by the ESC).

In summary, catheter ablation is the best therapy option in most types of SVTs, with a high success and low complication rate, and it can lead to a significant improvement in quality of life of patients with SVT.

Keywords: Guidelines, Arrhythmia, Supraventricular, Tachycardia, Atrial, Futter, Atrioventricular, Re-entrant, Focal, Macro-re-entrant, Junctional, Nodal, Pre-excitation, Catheter, Ablation

Abbreviations: AF: Atrial Fibrillation; AT: Atrial Tachycardia; AVRT: Atrioventricular Reentrant-Tachycardia; AVNRT: Atrioventricular Nodal Reentrant-Tachycardia; ESC: European Society of Cardiology; EPS: Electrophysiological Study; SVT: Supraventricular Tachycardia

References

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	2003	2019
Acute management of narrow QRS tachycardias		
Verapamil and diltiazem	**I**	**IIa**
Beta-blockers	**IIb**	**IIa**
Amiodarone and digoxin are not mentioned in the 2019 Guidelines		
Acute management of wide QRS tachycardias		
Procainamide	**I**	**IIa**
Adenosine	**IIb**	**IIa**
Amiodarone	**I**	**IIb**
Sotalol and lidocaine are not mentioned in the 2019 Guidelines		
Therapy of inappropriate sinus tachycardia		
Beta-blockers	**I**	**IIa**
Verapamil/diltiazem and catheter ablation are not mentioned in the 2019 Guidelines		
Therapy of postural orthostatic tachycardia syndrome		
Salt and fluid intake	**IIa**	**IIb**
Head-up tilt sleep, compression stockings, selective beta-blockers, fludrocortisone, clonidine, methylphenidate, fluoxetine, erythropoietin, ergotamine/ octreotide, and phenobarbitone are not mentioned in the 2019 guidelines.		
Therapy of focal AT		
Acute		
Flecainide/propafenone	**IIa**	**IIb**

	2003	2019
Beta-blockers	**I**	**IIa**
Amiodarone	**IIa**	**IIb**
Procainamide, sotalol, and digoxin are not mentioned in the 2019 Guidelines		
Chronic		
Beta-blockers	**I**	**IIa**
Verapamil and diltiazem	**I**	**IIa**
Sotalol and disopyramide are not mentioned in the 2019 Guidelines		
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**
Digitalis is not mentioned in the 2019 Guidelines		
Chronic		
Dofetilide, sotalol, flecainide, propafenone, procainamide, quinidine, and disopyramide are not mentioned in the 2019 Guidelines		
Therapy of AVNRT		
Acute		
Amiodarone, sotalol, flecainide, and propafenone are not mentioned in the 2019 Guidelines		
Chronic		
Verapamil and diltiazem	**I**	**IIa**
Beta-blockers	**I**	**IIa**
Amiodarone, sotalol, flecainide, propafenone, and the 'pill-in-the pocket' approach are not mentioned in the 2019 Guidelines		
Therapy of AVRT		
Flecainide/propafenone	**IIa**	**IIb**
Beta-blockers	**IIb**	**IIa**
Amiodarone, sotalol, and the 'pill-in-the pocket' approach are not mentioned in the 2019 Guidelines		
SVT in pregnancy		
Verapamil	**IIb**	**IIa**
Catheter ablation	**IIb**	**IIa***
Sotalol, propranolol, quinidine, and procainamide are not mentioned in the 2019 Guidelines.		

*: when fluoroless ablation is available. AT = Atrial Tachycardia; AVNRT = Atrioventricular Nodal Re-Entrant Tachycardia; AVRT = Atrioventricular Re-Entrant Tachycardia

Table 2. Changes in SVT Guidelines recommendations since 2003. (Table cited from the original ESC SVT guidelines of Brugada, et. al) [1].

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