

## TACHYARRHYTHMIAS AND WAYS TO RESOLVING THEM

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**Annotation.** Tachyarrhythmias are a group of heart rhythm disorders characterized by rapid heartbeat (HR over 100 bpm). They can be of both supraventricular and ventricular origin, ranging from benign to life-threatening forms. This article discusses the main types of tachyarrhythmias, their pathophysiology, clinical manifestations, diagnostic methods, as well as modern approaches to drug and interventional therapy.

**Keywords:** tachyarrhythmia, supraventricular tachycardia, ventricular tachycardia, ablation, antiarrhythmics, heart rate.

**Introduction.** Tachyarrhythmias are a form of arrhythmia in which the heart rate is abnormally high. These disorders can be episodic or constant, symptomatic or asymptomatic, and have varying degrees of life-threatening effects. Their timely diagnosis and correct treatment are critically important, especially in structural heart diseases. With the development of cardiology, new effective methods for monitoring and eliminating tachyarrhythmias have emerged, including radiofrequency ablation, modern antiarrhythmic drugs, and devices such as implantable cardioverter-defibrillators (ICDs).

**Classification of tachyarrhythmias****Supraventricular tachyarrhythmias (SVT)**

- **Sinus tachycardia**

Physiological response to stress, anemia, thyrotoxicosis, etc.

- **Paroxysmal supraventricular tachycardia (PSVT)**

Occurs as a result of re-entry mechanisms (eg, AV nodal reciprocating tachycardia)

- **Atrial fibrillation**

Ordered atrial activity with heart rate ~250–350/min

- **Atrial fibrillation (AF)**

Chaotic electrical activity of the atria (discussed separately in other works)

**Ventricular tachyarrhythmias**

- **Ventricular tachycardia (VT)**

Potentially life-threatening condition, especially in coronary artery disease, cardiomyopathy

- **Ventricular fibrillation (VF)**

The cause of most sudden cardiac deaths

- **Polymorphic ventricular tachycardia (including torsades de pointes)**

Associated with prolongation of the QT interval

### **Pathophysiology of tachyarrhythmias**

Basic mechanisms:

1. **Increased automatism** - for example, with sinus tachycardia
2. **Trigger activity** - postdepolarizations, especially with prolonged QT
3. **Re-entry** (repeated entry of the excitation wave) is the most common

mechanism of SVT and VT

### **Predisposing factors:**

- Electrolyte disturbances
- Myocardial ischemia
- Structural changes (hypertrophy, fibrosis)
- Genetic syndromes (Brugada, long QT)

### **Diagnostics**

Diagnosis of tachyarrhythmia includes:

- **ECG** (at rest, under load, daily monitoring)
- **EFS (electrophysiological study)** - invasive rhythm mapping
- **Laboratory tests** - to exclude metabolic causes
- **Echocardiography** - to assess structural abnormalities
- **Cardiac MRI** - if myocarditis or cardiomyopathy is suspected

### **Clinical manifestations**

Symptoms depend on the type of tachyarrhythmia and the presence of concomitant diseases:

- Heartbeat
- Dyspnea
- Chest pain
- Fainting
- Dizziness
- In severe cases, cardiac arrest

### **Approaches to the treatment of tachyarrhythmias**

#### **Non-drug assistance**

- **Treatment of PSVT:** Valsalva maneuver, carotid sinus massage
- **Cardioversion:** for hemodynamic instability or VF
- **Defibrillation:** for VF, unstable polymorphic VT

#### **Drug therapy**

##### **Antiarrhythmic drugs**

- **Class I** - sodium channel blockers (propafenone, flecainide)
- **Class II** -  $\beta$ -blockers (metoprolol, bisoprolol)
- **Class III** - potassium channel blockers (amiodarone, sotalol)
- **Class IV** - calcium channel blockers (verapamil, diltiazem)

The choice depends on the type of arrhythmia, the presence of coronary artery disease, LV function and concomitant conditions.

**Additional funds:**

- **Magnesium** - for torsades de pointes
- **Anticoagulants** - for atrial fibrillation/flutter
- **Correction of electrolytes - potassium, magnesium**

**Invasive treatment methods**

**Catheter ablation**

- **Indications:** refractory PSVT, atrial flutter, VT in ICM
- High efficiency (up to 95% with PSVT)
- Methods: radiofrequency, cryoablation

**Implantable devices**

- **ICD** - in case of previous VF or VT with high risk
- **CRT (cardiac resynchronization therapy)** - for CHF and blocks with AF/VT
- **Portable rhythm recorders** - for seizure diagnosis

**Specific syndromes and their therapy**

**WPW (Wolff-Parkinson-White) syndrome**

- The reason is the additional path (Kent's bundle)
- Risk: atrioventricular tachycardia, AF with transition to the ventricles
- Treatment: Ablation of the accessory pathway

**Long QT syndrome**

- Hereditary or drug-induced
- Risk of torsades de pointes
- Treatment: beta blockers, QT correction, ICD for high risk

**Brugada syndrome**

- Congenital disorder with high risk of VF
- Diagnosis: specific changes on ECG
- Treatment: ICD, avoidance of triggers

**Prevention and rehabilitation**

- Correction of arterial pressure, CHF, ischemic heart disease
- Treatment of the underlying disease
- Elimination of provoking factors: alcohol, stimulants, stress
- Continuous monitoring and correction of therapy
- Patient-centered education

**Conclusion.** Tachyarrhythmias are a diverse and clinically significant group of rhythm disorders that require a differentiated approach. Modern cardiology has a wide range of tools for diagnosing and treating these conditions: from drug correction to high-tech ablation procedures and device implantation. Successful treatment depends on accurate classification of arrhythmia, risk assessment and individual selection of a strategy.

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