HEARTBEAT HAVOC !

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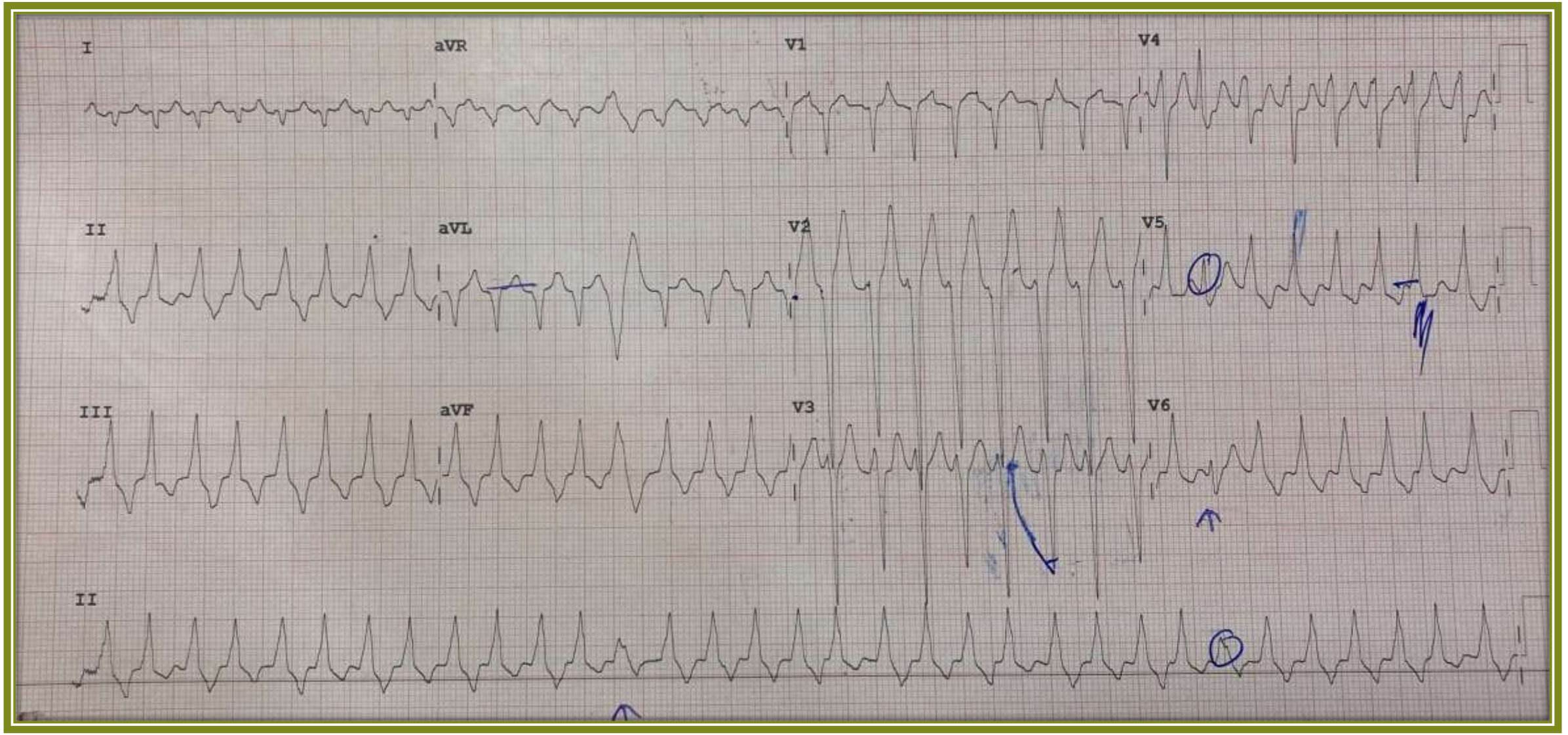
Patient presentation

- **42 year old , Male**
- **Complaints :** Palpitations over 2 days.
- **Initial Assessment :**
- Airway : Patent
- Respiratory rate - 20/min , Saturation - 96 % on room air.
- Pulse rate - 213 bpm , Blood Pressure: 110/70 mm Hg, CRT <3 sec.
- BSL : 149 mg/dl.
- GCS : 15/15.

ECG on presentation



Supraventricular Tachycardia

Initial Management In The Triage

Vagal Maneuver

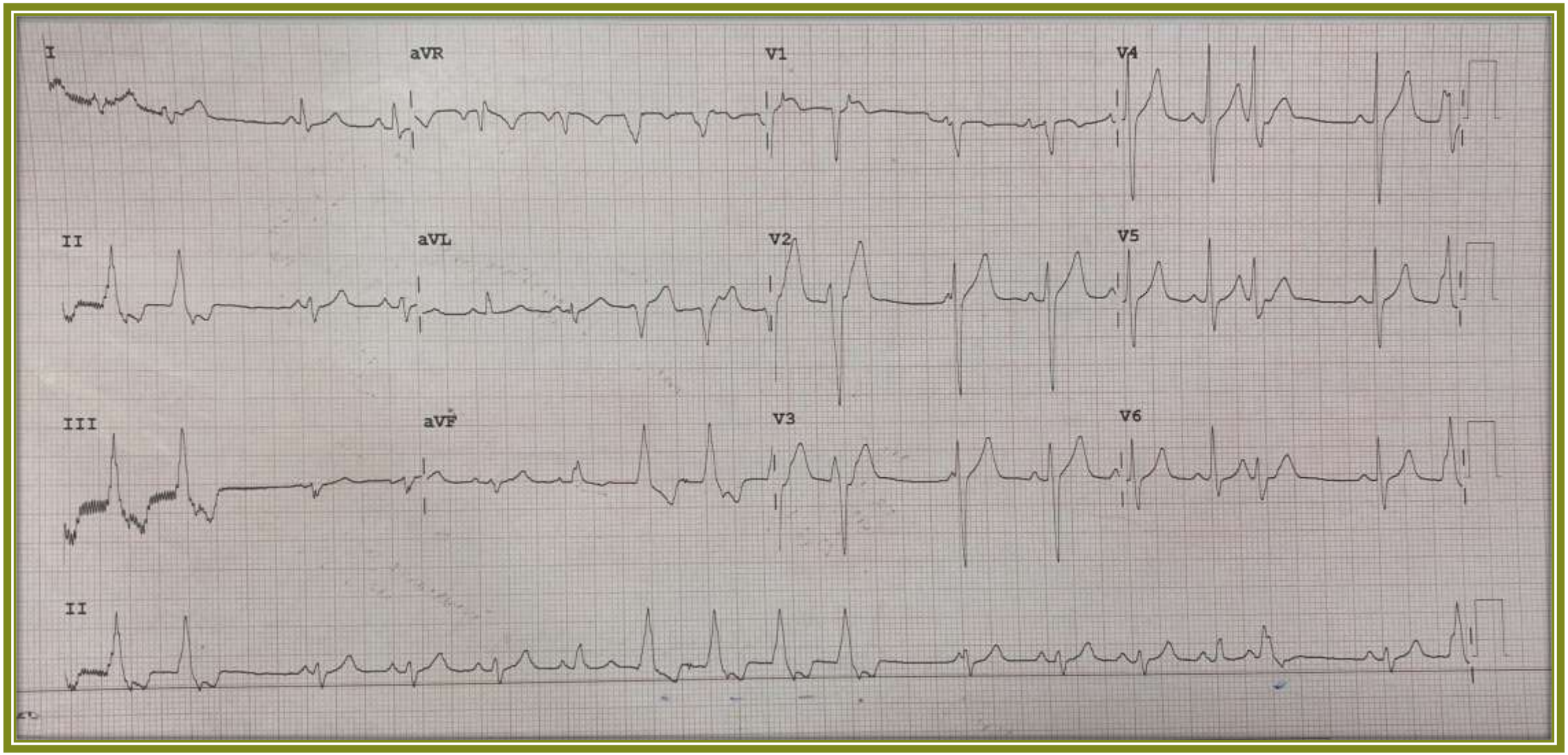
Ineffective

Inj Adenosine 6 mg iv stat

Decrease of heart rate to 130 / min,
BP of 90/60 mmHg.

ECG : Sinus Rhythm with Multiple VPCs.

Post Adenosine ECG



Sinus Rhythm with VPCs

Diagnostic Workup

- **Troponin I** : Positive.
- **BNP** : Positive.
- **VBG** : Within normal limits.
- **POCUS 2D Echocardiogram** : Fair LV function, No RWMA, No RA/RV dilatation.

Course Through His Stay In The EM ICU

Within a few minutes patient had 1 episode of ventricular tachycardia.

Cardioverted.

Rhythm : Sinus tachycardia with VPCs.

Heart Rate : 125/min.

BP : 80/50 mmHg.

Inj **Noradrenaline** started at 8 mg / 50 cc NS @ 3.7 ml/hr.

Another VT episode 15 minutes later.

Cardioverted

Sinus rhythm with VPCs. Heart rate - 150/min , BP of 100/70 mmHg on vasopressor support.

Inj Amiodarone initiated with a 150 mg dose bolus and an infusion started thereafter.

Infusion : 1 mg/min for 6 hours, followed by 0.5 mg/min for the next 18 hours.

Past History

- 10 years ago he had a similar arrhythmic episode , for which he was treated in an outside hospital – **EP study** was performed which was suggestive of **Idiopathic Ventricular Tachycardia**, after which he underwent **radiofrequency ablation** and was discharged on **anti arrhythmic medications.**

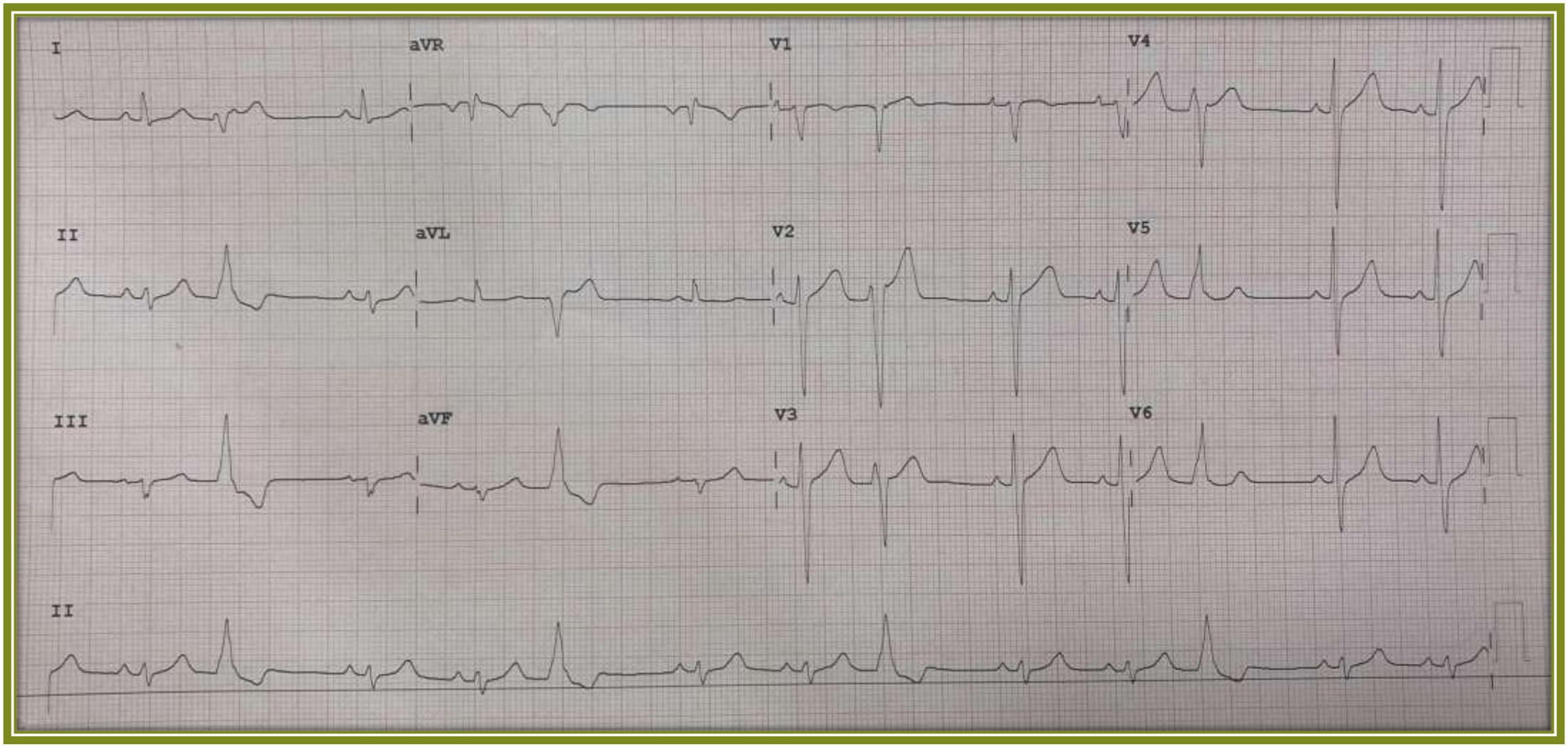
- He was **non compliant** to his medications for the past few months of arrival to the ED.

Negative History

- No significant familial history.
- No addiction history.

- During his stay in EM ICU over the next 13 hours , the patient had intermittent episodes of paroxysmal VTs , which resolved spontaneously.

- He was eventually shifted under the Department of Cardiology for further management.



ECG after his 13 hour stay in EM : Sinus rhythm with VPCs with a controlled rate.

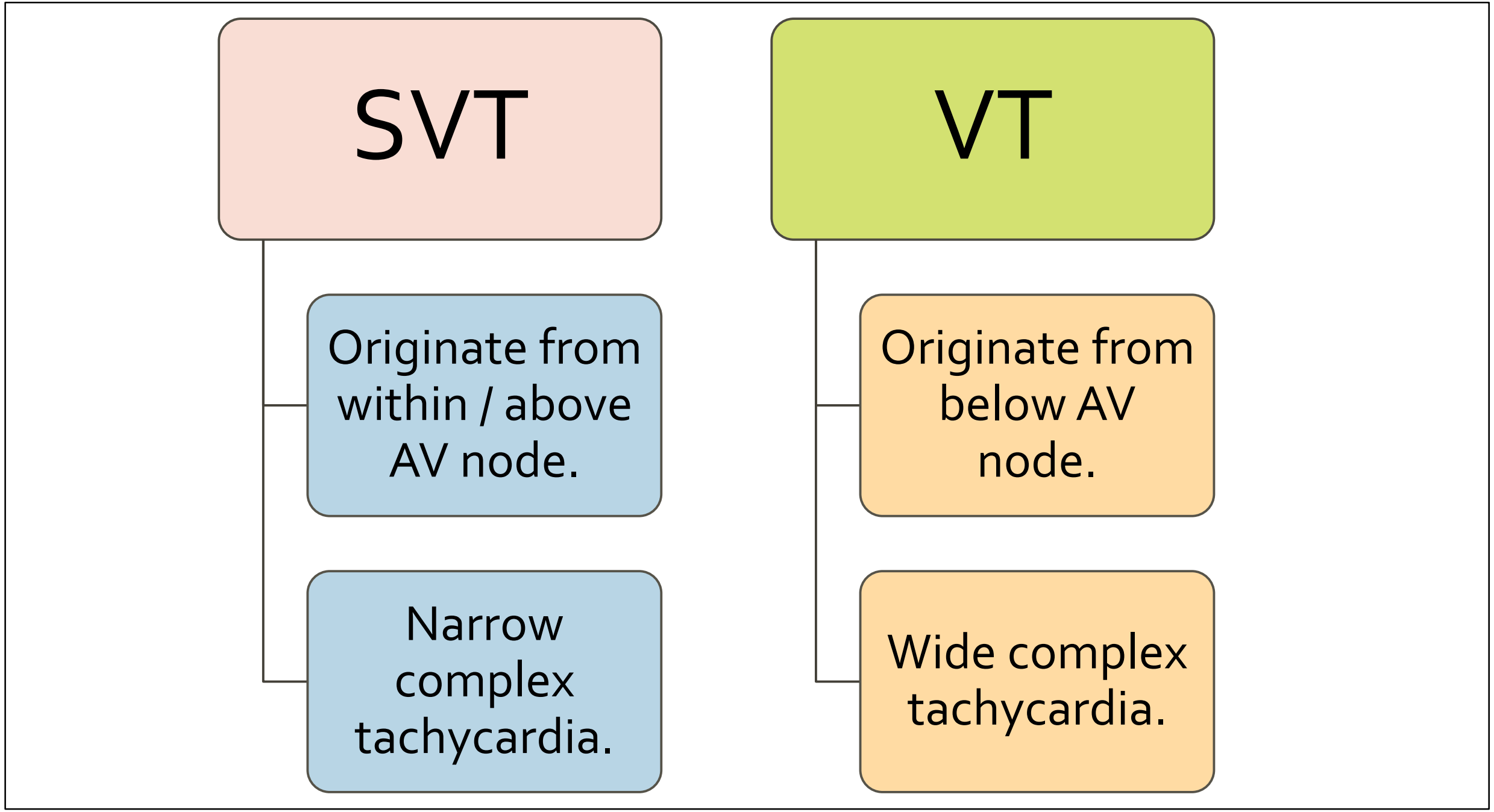
DIAGNOSIS

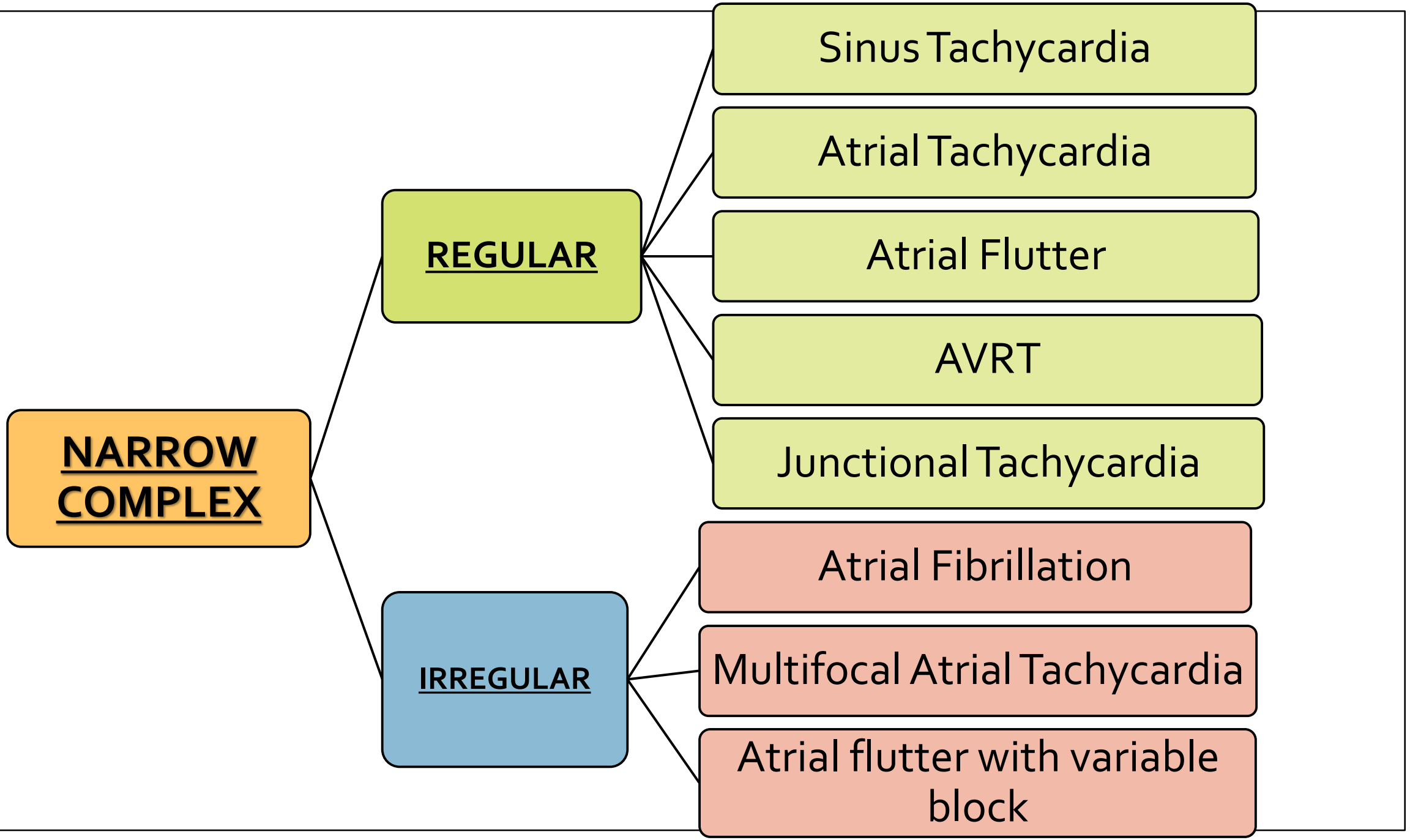
- The patient underwent a thorough workup in the CCU (Cardiac MRI, PET CT, Cardiac Biopsy) where he was diagnosed with **Cardiac Sarcoidosis**.

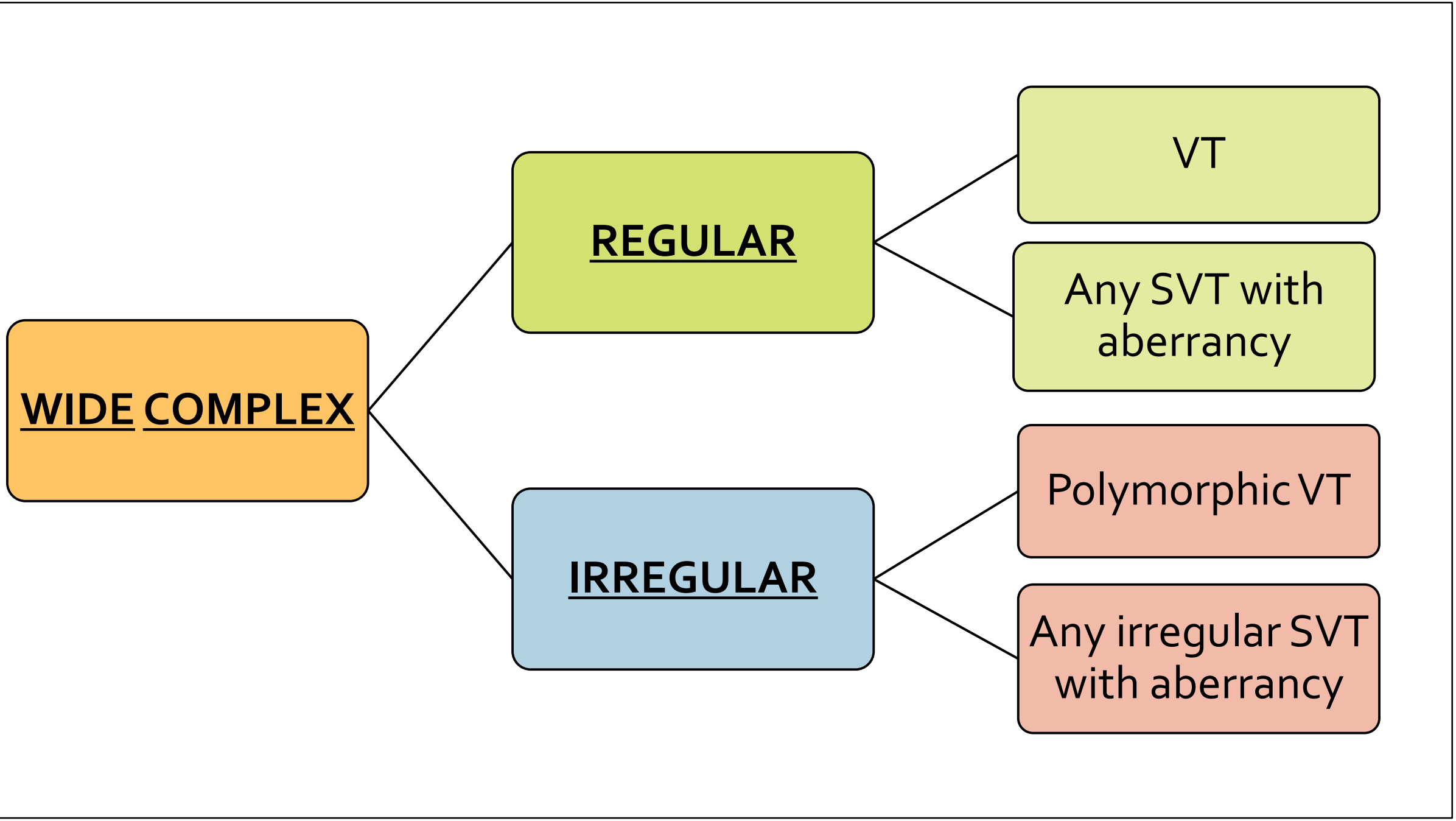
- **Treatment** given :

1. **Tab Prednisolone** 40 mg OD for the first 2 weeks and after 15 days tapered down to 20 mg OD.
2. **Tab Amiodarone** 200 mg BD.

TACHYDYSRRHYTHMIAS


SVT
Originate from within / above AV node.
Narrow complex tachycardia.
VT
Originate from below AV node.
Wide complex tachycardia.


NARROW COMPLEX
REGULAR
Sinus Tachycardia
Atrial Tachycardia
Atrial Flutter
AVRT
Junctional Tachycardia
IRREGULAR
Atrial Fibrillation
Multifocal Atrial Tachycardia
Atrial flutter with variable block


WIDE COMPLEX
REGULAR
IRREGULAR
VT
Any SVT with aberrancy
Polymorphic VT
Any irregular SVT with aberrancy

Ventricular Tachycardia

- **VT** is a wide complex tachycardia, defined as three or more consecutive beats at a rate of more than 100 per minute, arising from the ventricle.

- **Refractory VT** is defined as 3 or more sustained episodes of ventricular tachycardia (VT), or appropriate implantable cardioverter-defibrillator (ICD) shocks during a 24-hour period.

Monomorphic VT

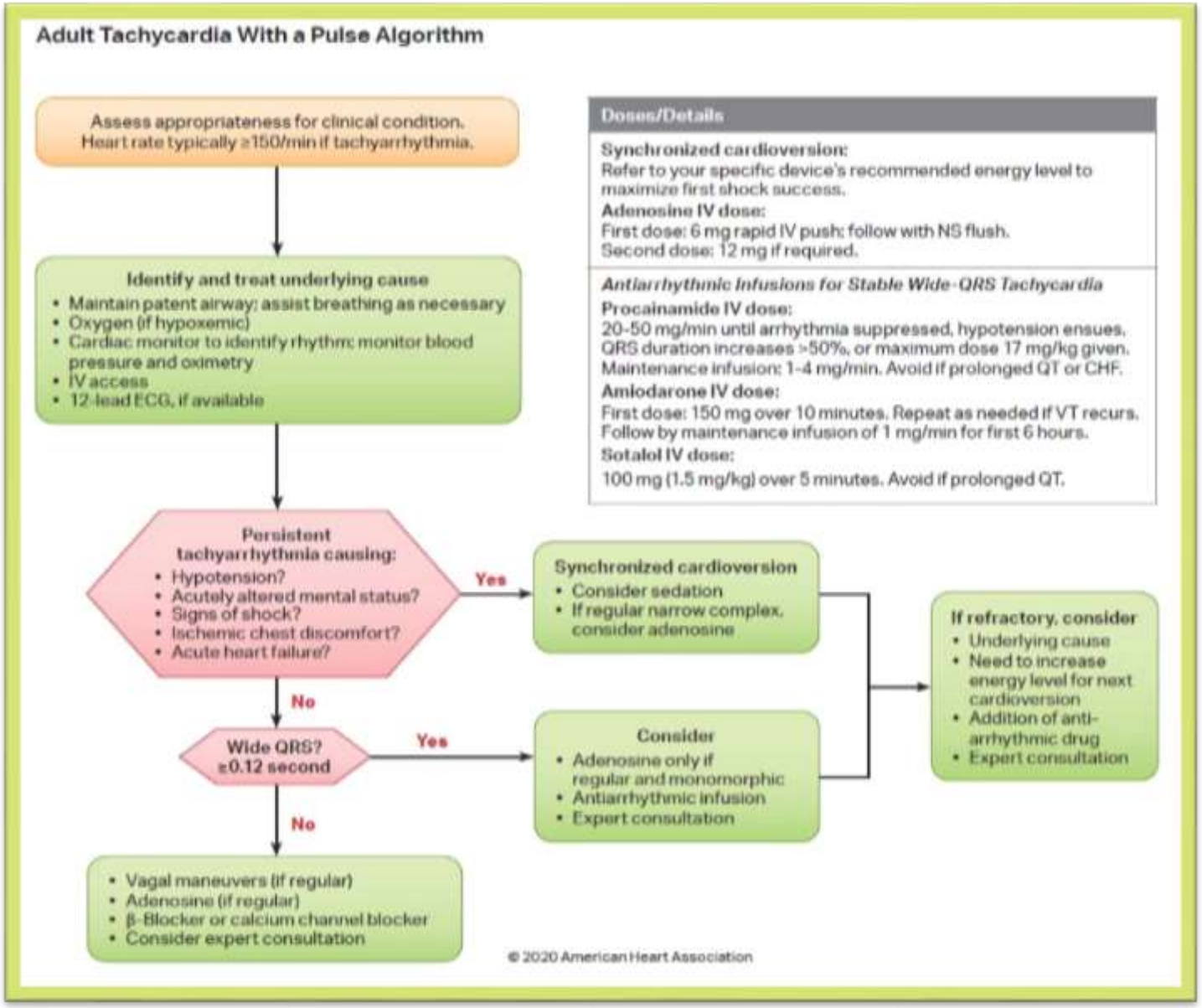
Single, stable QRS morphology with no beat-to-beat variation.

Polymorphic VT

Beat-to-beat variation in QRS shape and multiple QRS morphologies.

Causes

- Ischemic Heart Disease
- Electrolyte Imbalance
- Infiltrative Cardiomyopathy
- Ischemic / Non – Ischemic Cardiomyopathy
- Idiopathic Ventricular Tachycardia
- Inherited Cardiac Channelopathies
- Structural Heart Disease
- Digitalis Toxicity



ACLS Algorithm for Tachydysrrhythmias.

Idiopathic Ventricular Tachycardia

- Recently the overall incidence of idiopathic VT was found to be around 14/100,000 individuals, with similar rates between men and women.

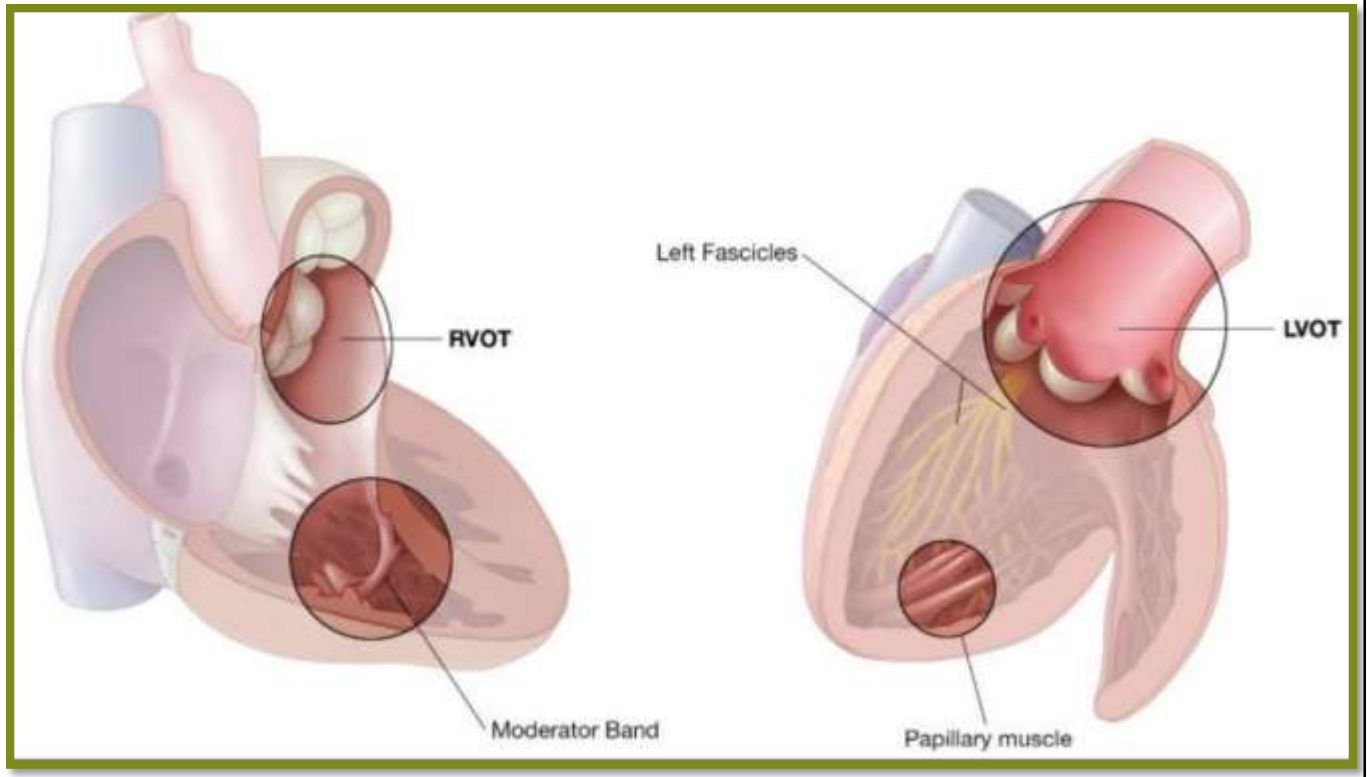
- In general, idiopathic VT carries a more benign prognosis relative to VT associated with structural heart disease, though it remains an important cause of morbidity and mortality in otherwise healthy individuals.

Idiopathic Ventricular Tachycardia

Arises From
• Outflow tract – RVOT / LVOT. • Mitral / Tricuspid Annulus. • Fascicles of Left bundle branch.

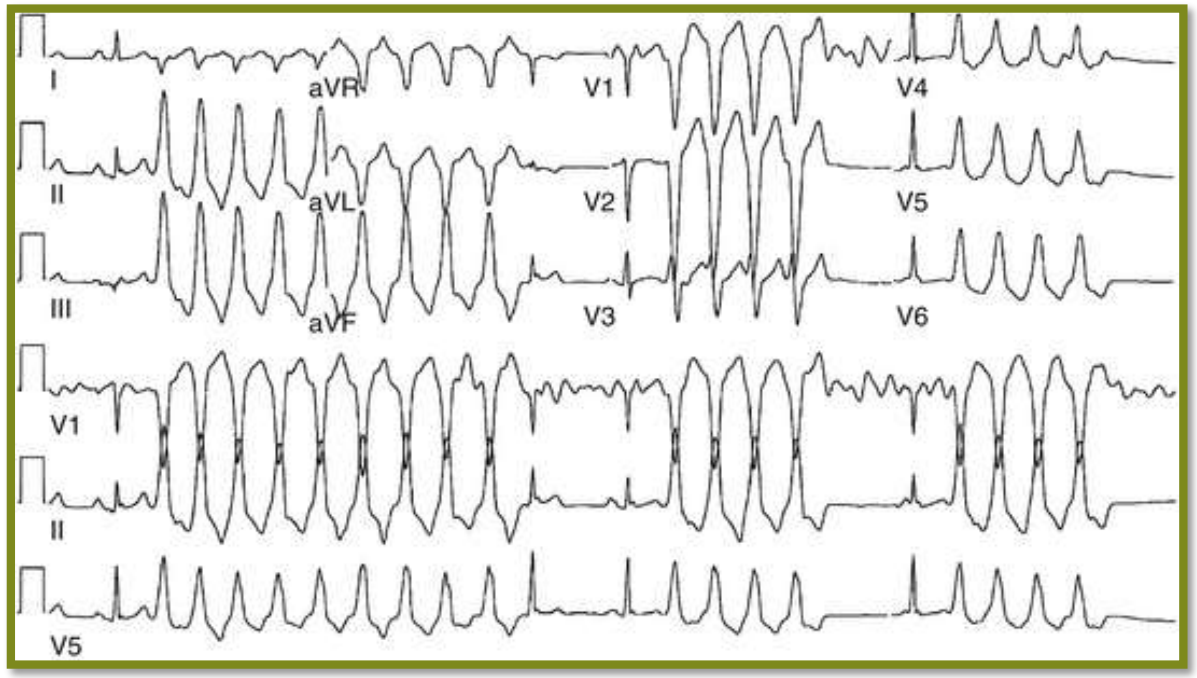
RVOT

- Most common location for idiopathic VT.
- Females > Males.
- Fluctuating female hormones, high adrenergic states can aggravate the arrhythmias.
- Cyclic AMP mediated, calcium-dependent, triggered activity is thought to be the mechanism of this arrhythmia.
- Given the dependency on cAMP signaling, adenosine may terminate these tachycardias, but beta-blockers or calcium channel blockers (CCB) are much more commonly used to prevent recurrence.



ECG findings in RVOT

- The classic RVOT-VT exhibits a left-bundle pattern (QS in V1) consistent with RV activation followed by LV activation. The inferior leads (II, III, and aVF) characteristically have tall R waves, while leads aVL and aVR will exhibit deep S.



TREATMENT OF IDIOPATHIC VT

1. CCBs
2. Beta Blockers
3. Anti Arrhythmic Medications
4. Radiofrequency Ablation

CARDIAC SARCOIDOSIS

- Cardiac sarcoidosis (CS) refers to granulomatous inflammation that affects the heart in isolation or as part of systemic sarcoidosis.
- Based on imaging and autopsy findings, CS occurs in approximately 25% of patients with sarcoidosis. Cardiac sarcoidosis is a rare condition with a generally poor prognosis.
- Cardiac sarcoidosis may present with symptoms of heart failure, sudden cardiac death, ventricular arrhythmia, myocardial infarction, or atrioventricular (AV) block; the **most common presentations** are conduction system disorders and heart failure.
- The **most important prognostic indicator** in patients with CS is left ventricle ejection fraction (LVEF).

CAUSES

Environmental / Occupational Exposures

- Agricultural workers
- Firefighters
- Exposure to pesticides

Infective

- Chlamydophila pneumoniae
- Propionibacterium
- Mycobacteria

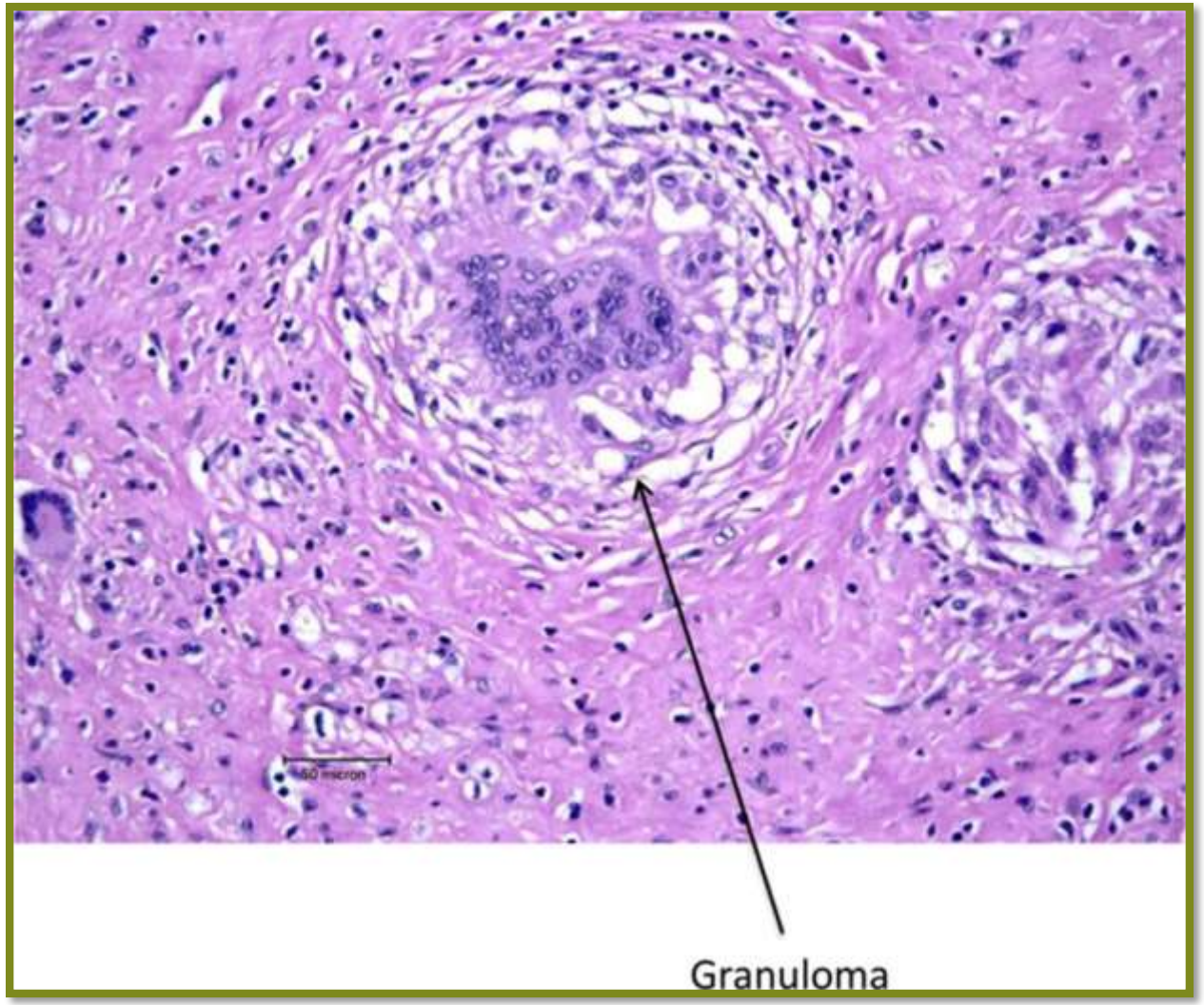
Others

- Genetic
- Undergone a heart-lung transplant
- Immune dysregulation factors

PATHOPHYSIOLOGY

- Some patients respond with minimal local inflammation, while others respond with extensive inflammation and fibrosis.
- Sarcoidosis is characterized by significant activation of macrophages and CD_4+ T cells. This activation increases the production of TNF-α, IFN-γ, and the expression of the amyloid A protein.
- **Noncaseating granulomas** : Commonly found in the interventricular septum and inferior left ventricle.

Granulomatous Lesion



TREATMENT

1. Immunomodulatory agents – Corticosteroids, Methotrexate.
2. Radiofrequency ablation.
3. Anti arrhythmic medications.
4. For CS with Atrial Fibrillation – Anti Coagulants.
5. Implantable cardioverter-defibrillator (ICD) may be an option for those requiring permanent pacing.
6. Other therapeutic agents - Azathioprine, cyclophosphamide, and leflunomide.
7. Immunologic therapies - Infliximab, adalimumab, and rituximab are considered third- or fourth-line agents in treating CS.

- The **Cardiac Sarcoidosis Multi-Center Randomized Controlled Trial (CHASM CS-RCT)** is currently being conducted to compare methotrexate with standard- and low-dose prednisone for the initial treatment of CS.

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THANK YOU !