

Arrhythmias: Presentation and Associated Disease

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What is the purpose of history taking?

Tachyarrhythmias

- Ventricular

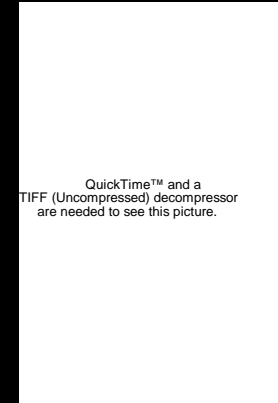
- Ventricular tachycardia (VT)
- Ventricular fibrillation (VF)
- Ventricular premature beats

- Atrial

- Atrial fibrillation (AF)
- Atrial flutter
- Atrio-ventricular nodal re-entrant tachycardia (AVNRT)
- Atrioventricular re-entrant tachycardia (AVRT)
- Atrial tachycardia (AT)
- Sinus tachycardia
- Inappropriate sinus tachycardia
- Atrial premature beats

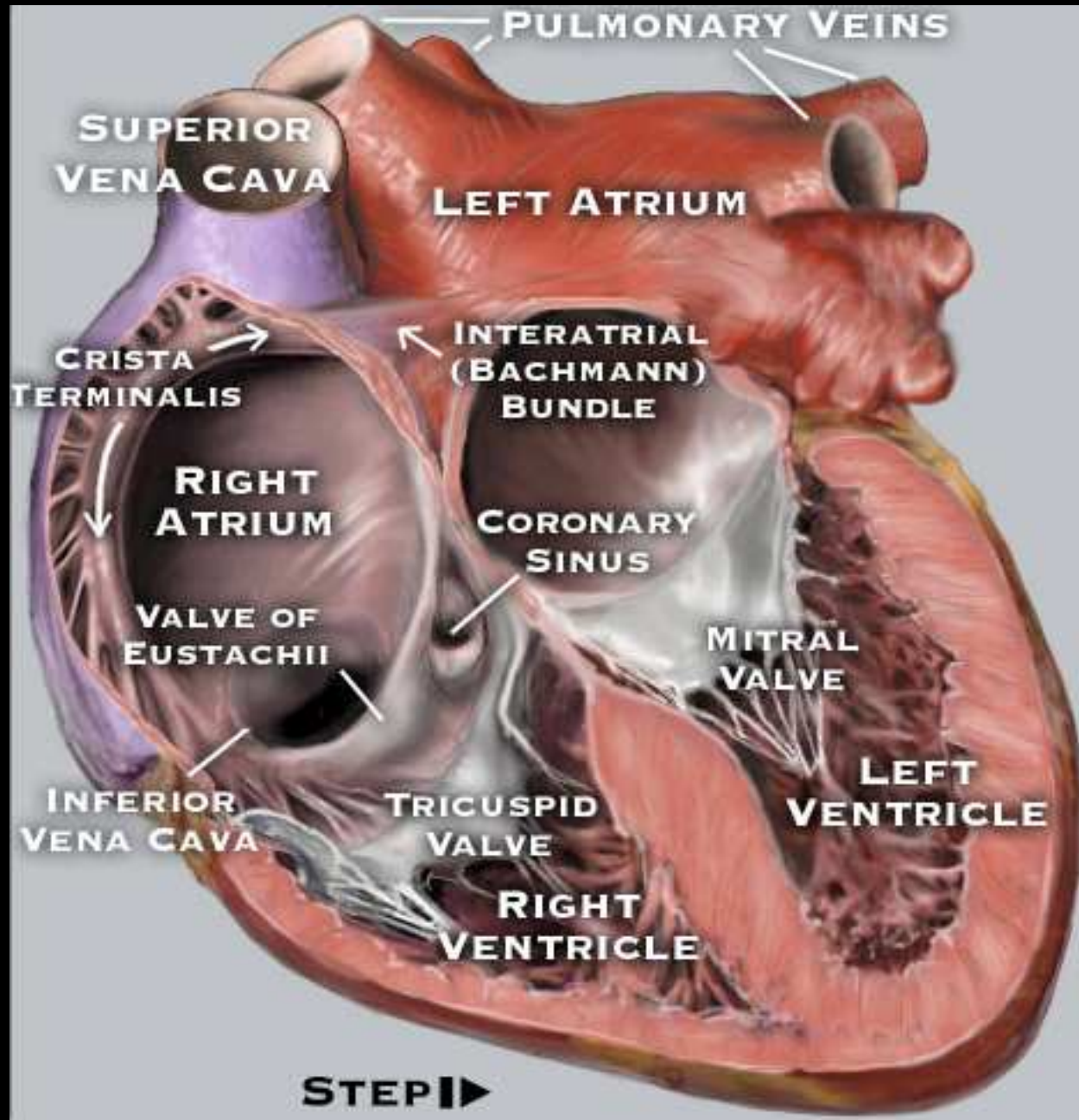
Bradyarrhythmias

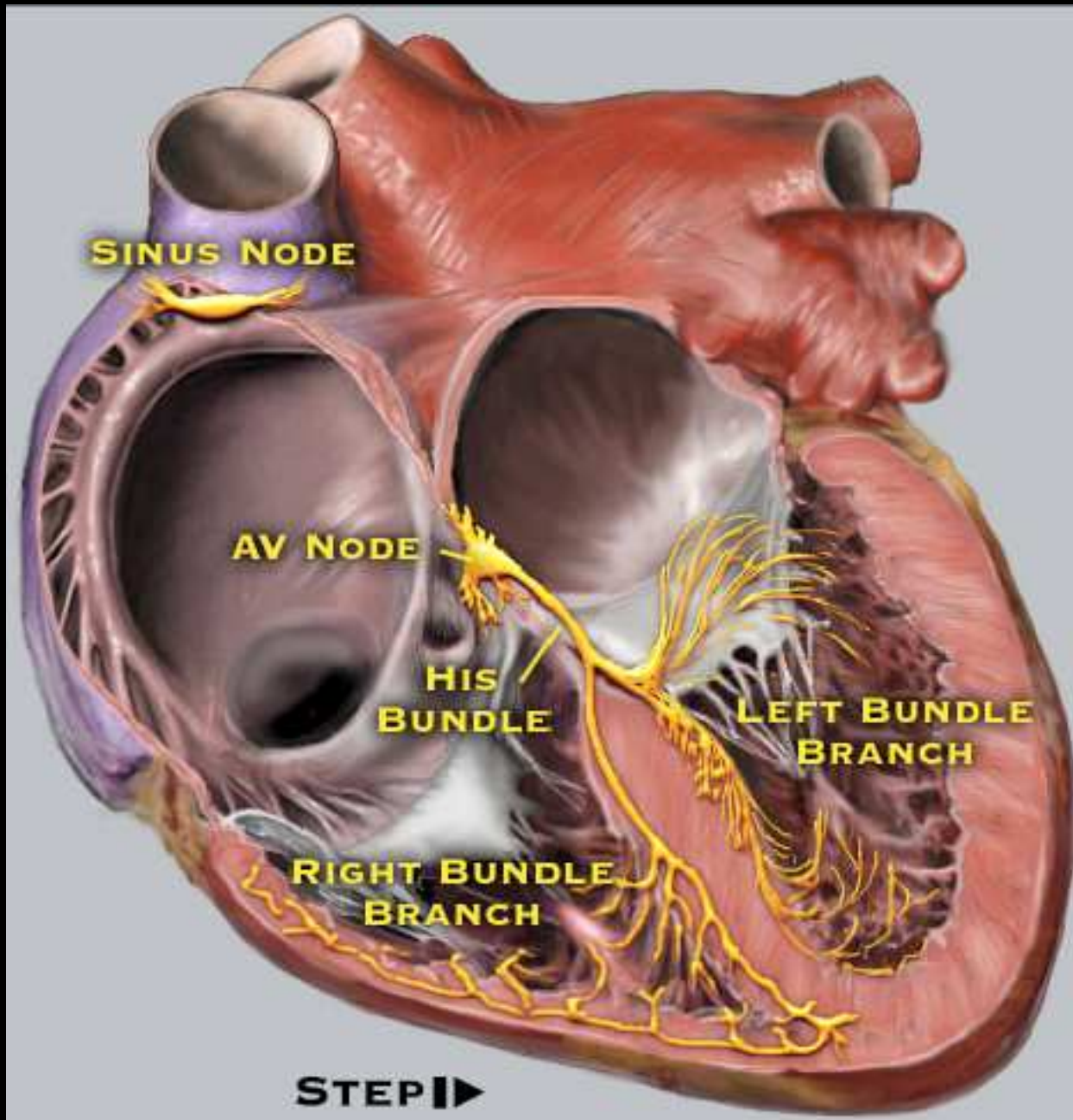
- Sinus bradycardia
- Sinus arrest
- Sick sinus syndrome
- Carotid sinus hypersensitivity
- 1st degree heart block
- 2nd degree heart block
- 3rd degree heart block



Key Points

- Age
- Symptoms
 - Asymptomatic/ Syncope/ Palpitations/ Chest pain/ Dyspnoea
- 1st time or recurrent?
- Situation
 - Anger / Fright/ Exercise/ Sleep/ Micturition
- Mode of onset
 - Gradual or rapid
- Mode of termination
 - With a valsalva/ vagal manouevres
- Drug history
 - Anti-arrhythmics/ Stimulants/ Antibiotics- consult the BNF
 - Toxicity- accidental overdose
- Family history
- History of structural heart disease





Narrow complex tachycardias

Conduction is via the AV node and bundle of His

- Atrial arrhythmias

- Atrial Flutter
- Atrial Fibrillation
- Atrial tachycardia
- Inappropriate sinus tachycardia

- Supraventricular tachycardias

- Involves the AV node
- Atrio-ventricular re-entry tachycardia
- Atrioventricular nodal re-entry tachycardia

Atrial Fibrillation

- The commonest arrhythmia
 - 1% patients > 60yrs
 - 5% patients > 70rs
 - 10% patients >75yrs
- Presenting Features
 - May be asymptomatic
 - Vagally mediated AF
 - » Commoner at night; when having a large meal
 - Alcohol binges

Atrial Fibrillation

- Symptoms

- Tend to be due to the ventricular response as opposed to AF
 - » Exceptions
 - Mitral stenosis
 - Pulmonary hypertension
- Palpitations
- Increased heart rate
- Lethargy
- Dyspnoea
- Cardiac chest pain
- Features of TIA/ Stroke

Atrial Fibrillation

- Associated conditions

- Thyrotoxicosis
- Hypertension
- Heart failure
- Valve disease

- Drugs

- Adenosine
- Digoxin

- Miscellaneous

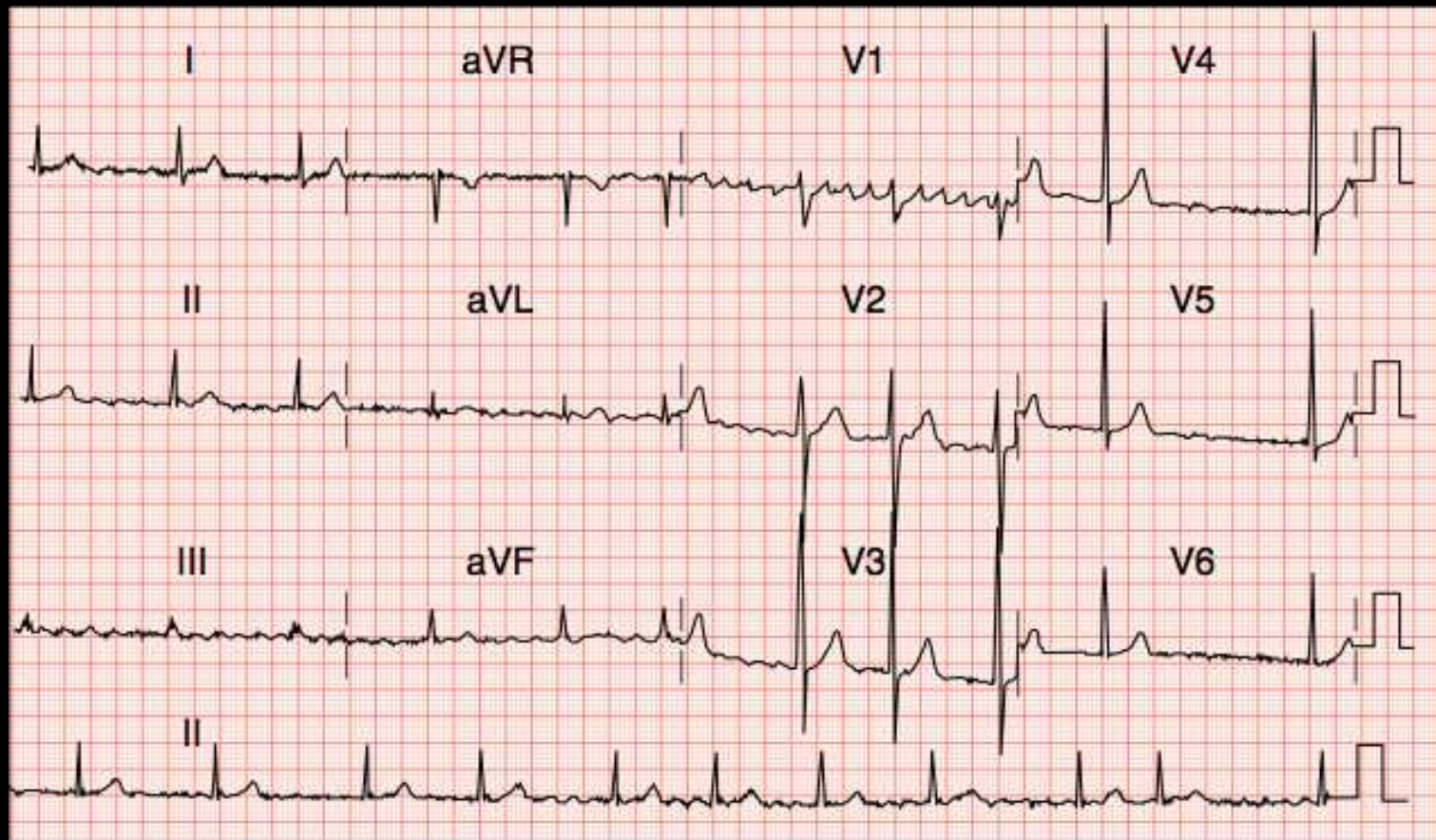
- Chest infection/ Surgery/ Cholecystitis etc

Atrial Fibrillation

Examination

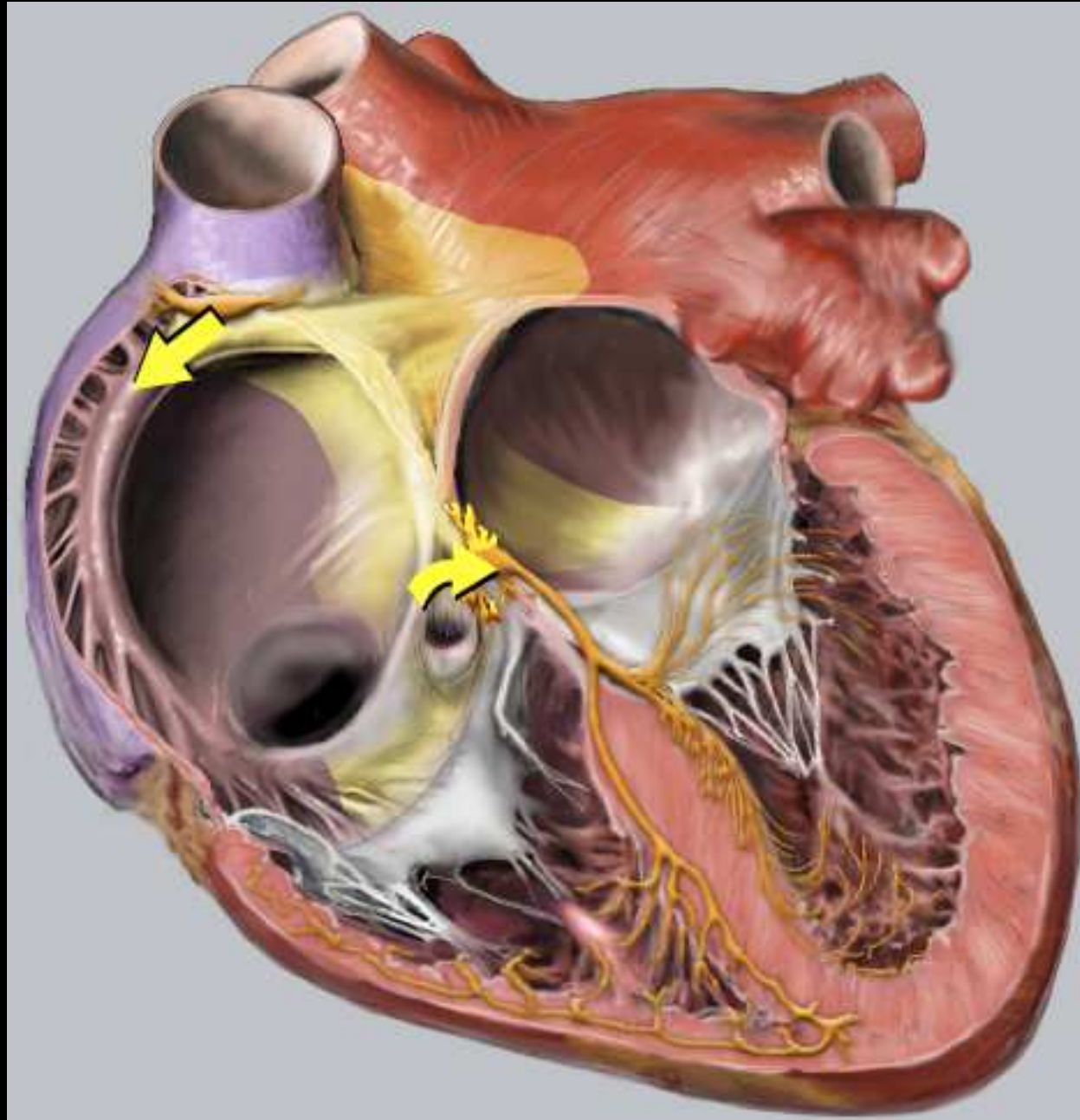
- Irregular irregular pulse
- At high ventricular rates there may be a pulse deficit
 - » ie pulse at the apex is higher than the *palpated* rate at the wrist
- Hypertension
- Absence of A wave in the JVP
- Variation of the intensity of S1

Atrial Fibrillation



Atrial Flutter

- A macro re-entrant arrhythmia
 - Anatomical barrier
 - Zone of slow conduction
- Typical atrial flutter
 - Contained within the right atrium
 - Constrained anteriorly by the tricuspid valve
 - Constrained posteriorly by the crista terminalis and eustachian ridge
 - Travels in a counterclockwise direction around the atrium
- Atypical atrial flutters
 - Counterclockwise flutter
 - ASD/ scar related flutter
 - Perimitral flutter



Atrial Flutter

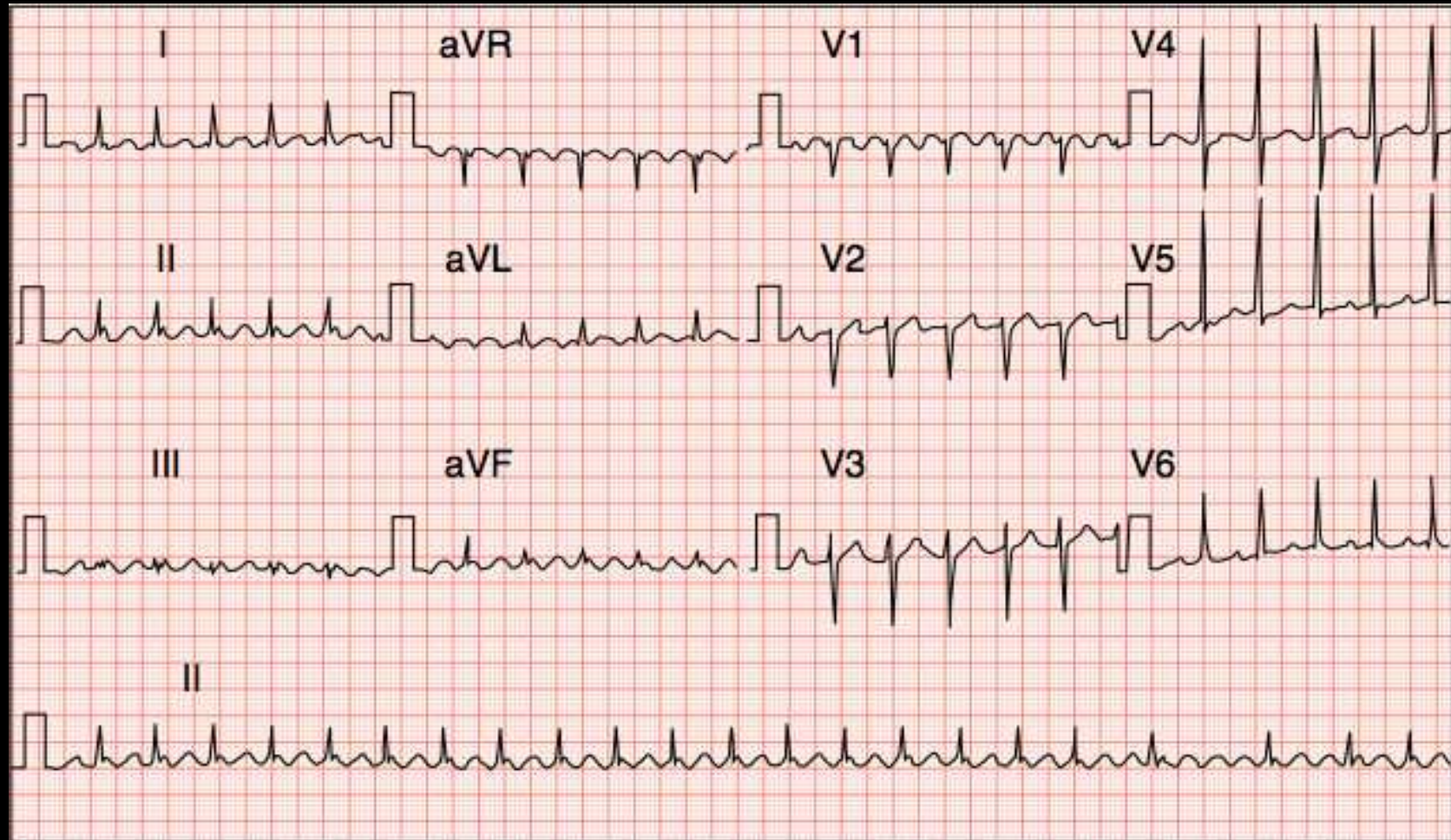
- Tends to occur in middle age
 - Probably due to atrial dilatation
- Pulmonary embolism
 - Commonly presents with a sinus tachycardia
- Associated valve disease
 - Mitral or Tricuspid disease
 - Atrial septal defects
 - Chronic ventricular failure
- Toxic and Metabolic conditions
 - Alcohol/ thyrotoxicosis/ pericarditis
- Previous ablation

Atrial Flutter

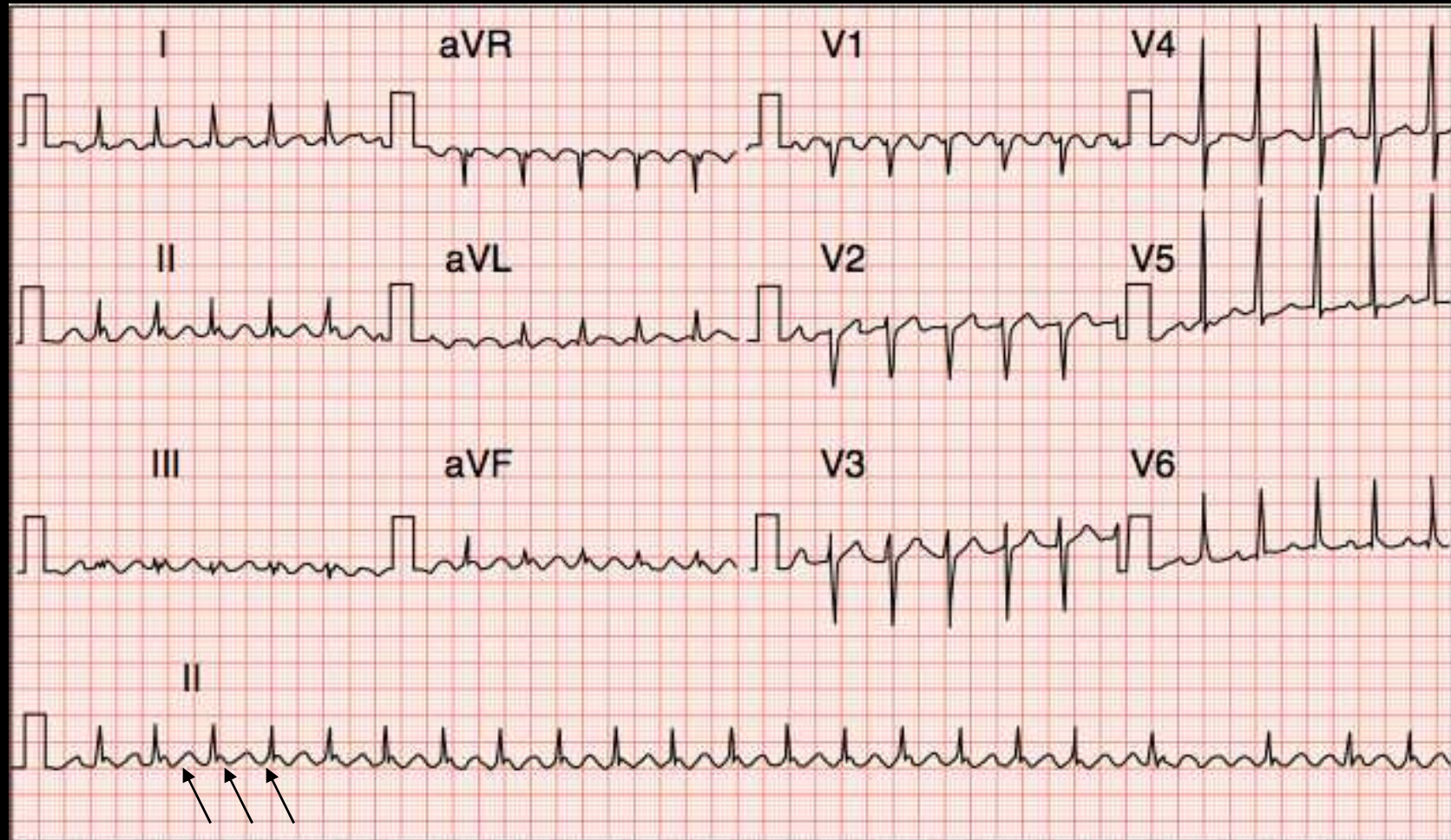
Examination

- Rarely helpful in establishing the diagnosis
- Regular pulse (150bpm- 2:1, 75bpm 4:1- can be slower)
- May see rapid, regular flutter waves in the JVP
- Heart sounds
 - Constant intensity of S1 *if* relationship of flutter waves to QRS is constant
- Carotid massage or adenosine
 - Allows flutter waves to be seen more easily
 - Ventricular rate will increase when CSM is stopped

Atrial Flutter

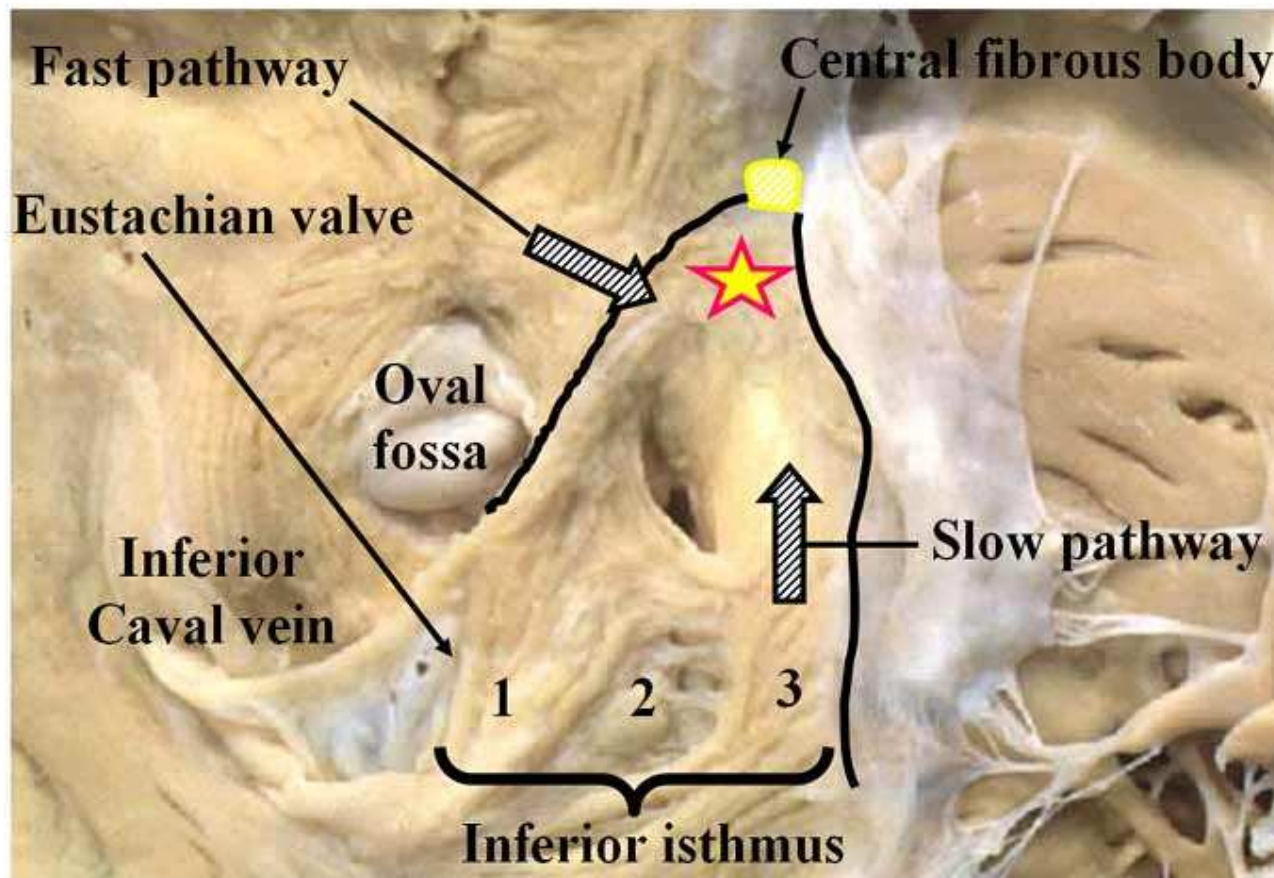


Atrial Flutter

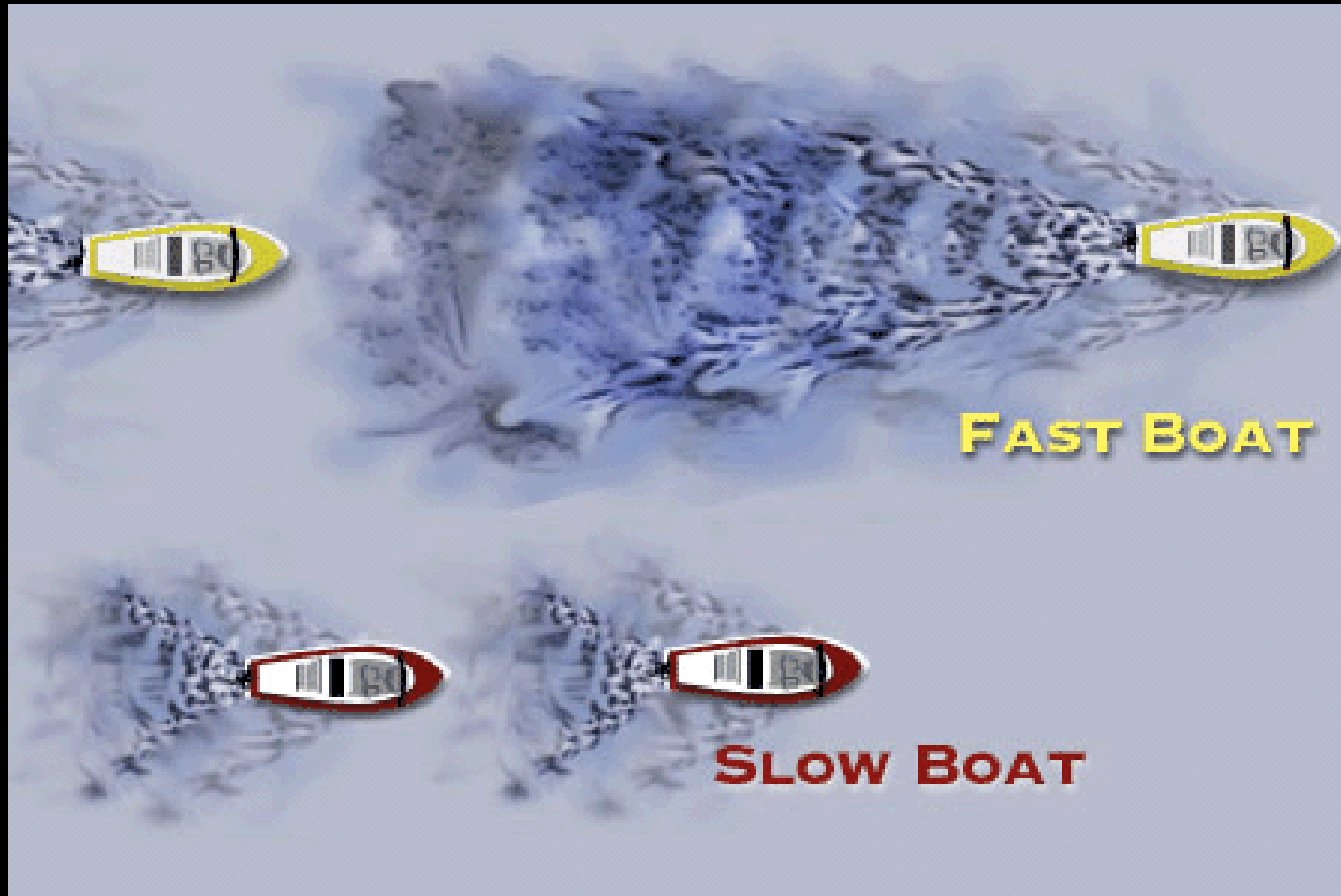


AVNRT

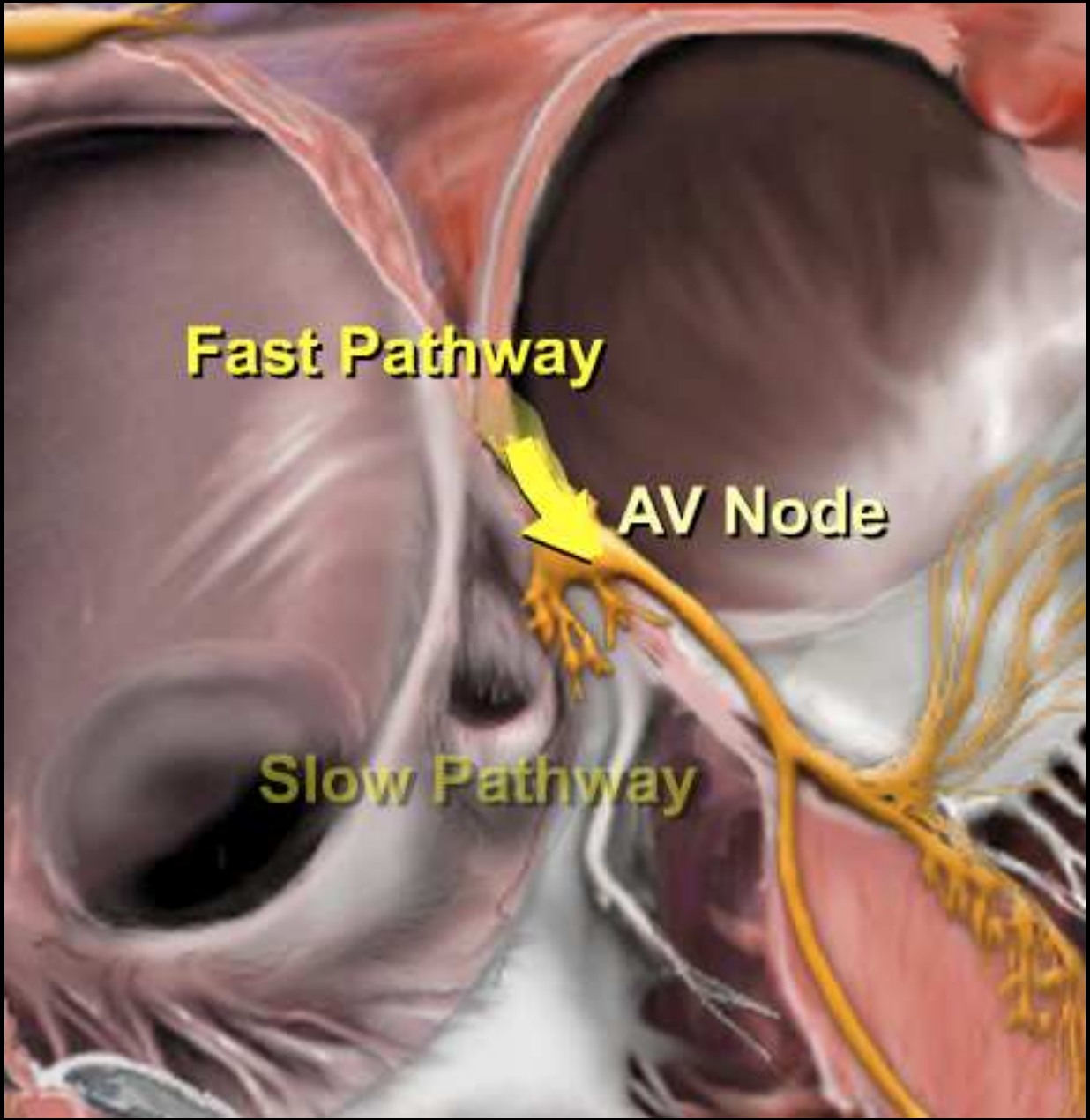
- Commonest supraventricular arrhythmia
 - ie dependent upon the AV node



AVNRT



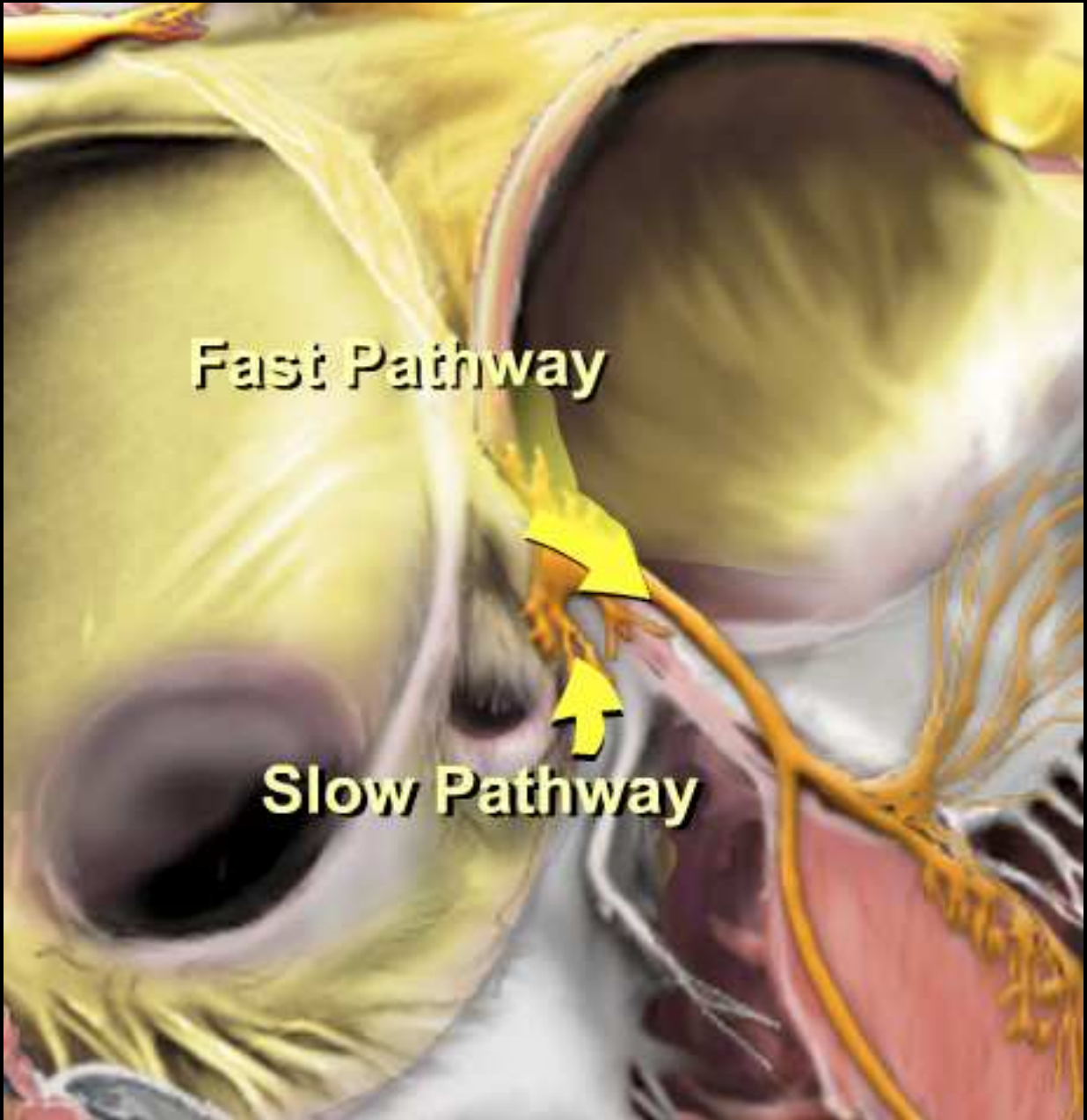
Normal Sinus Beat



Fast Pathway

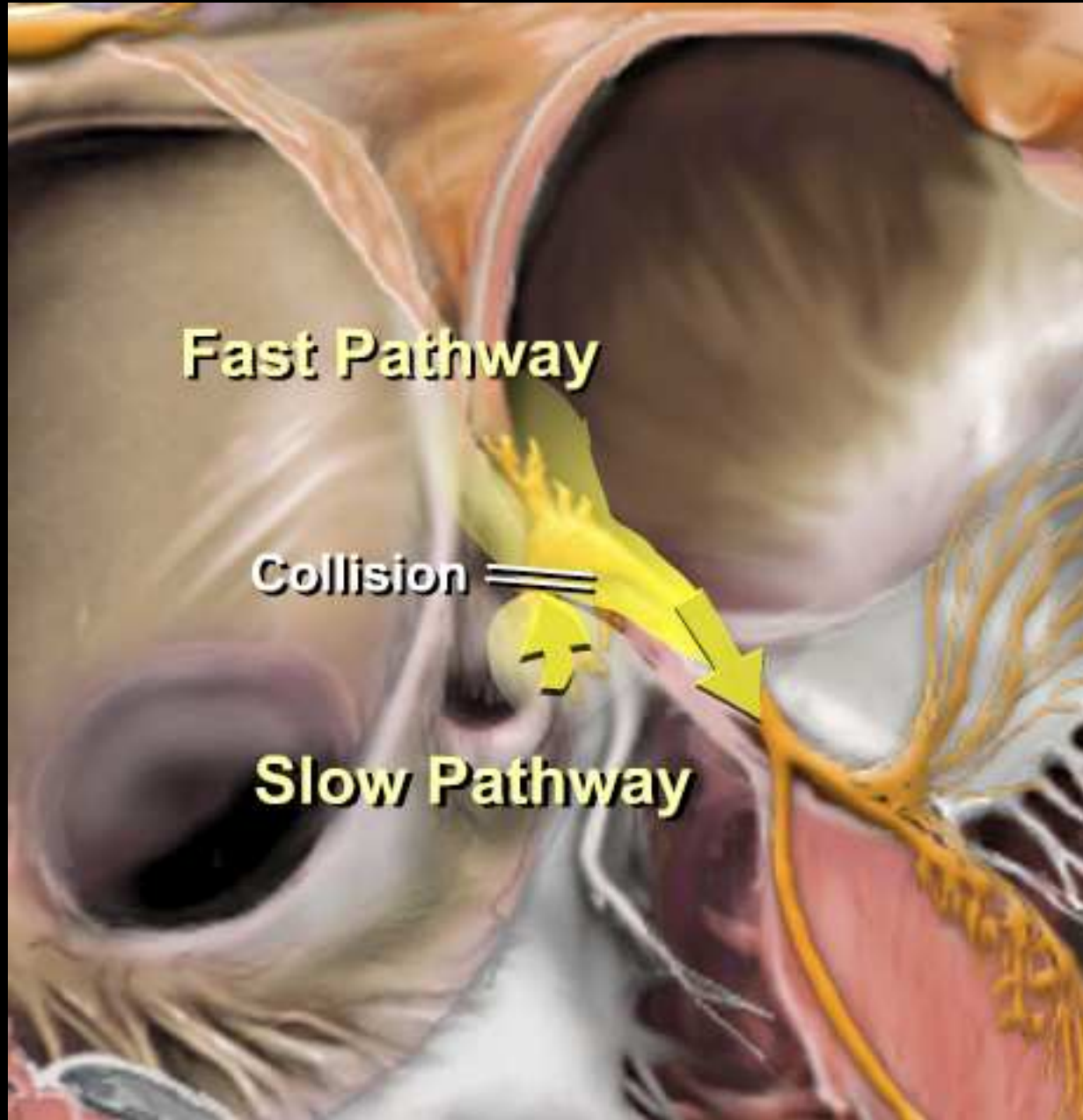
AV Node

Slow Pathway



Fast Pathway

Slow Pathway

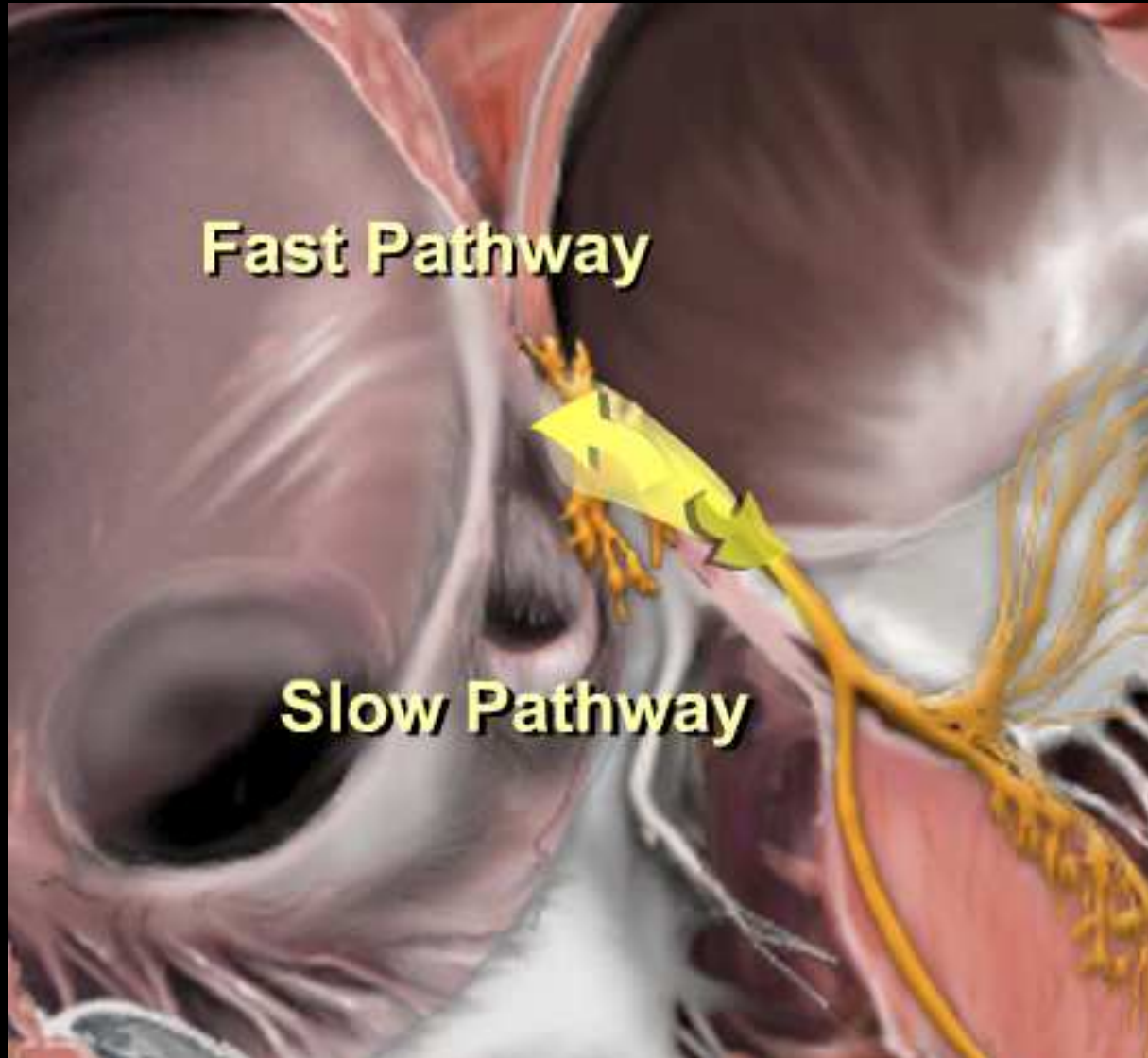


Initiation of AVNRT

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Fast Pathway

Slow Pathway

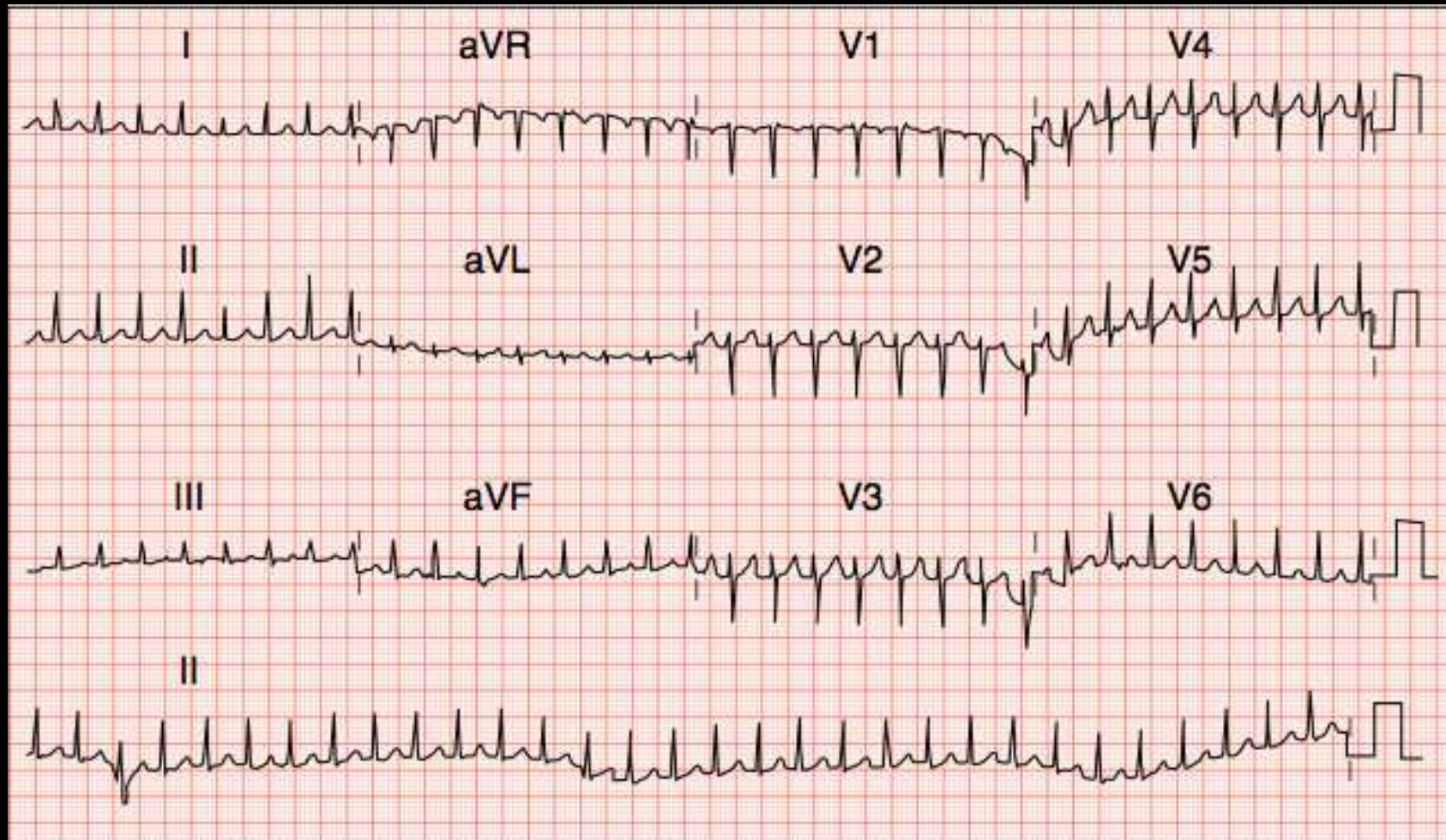


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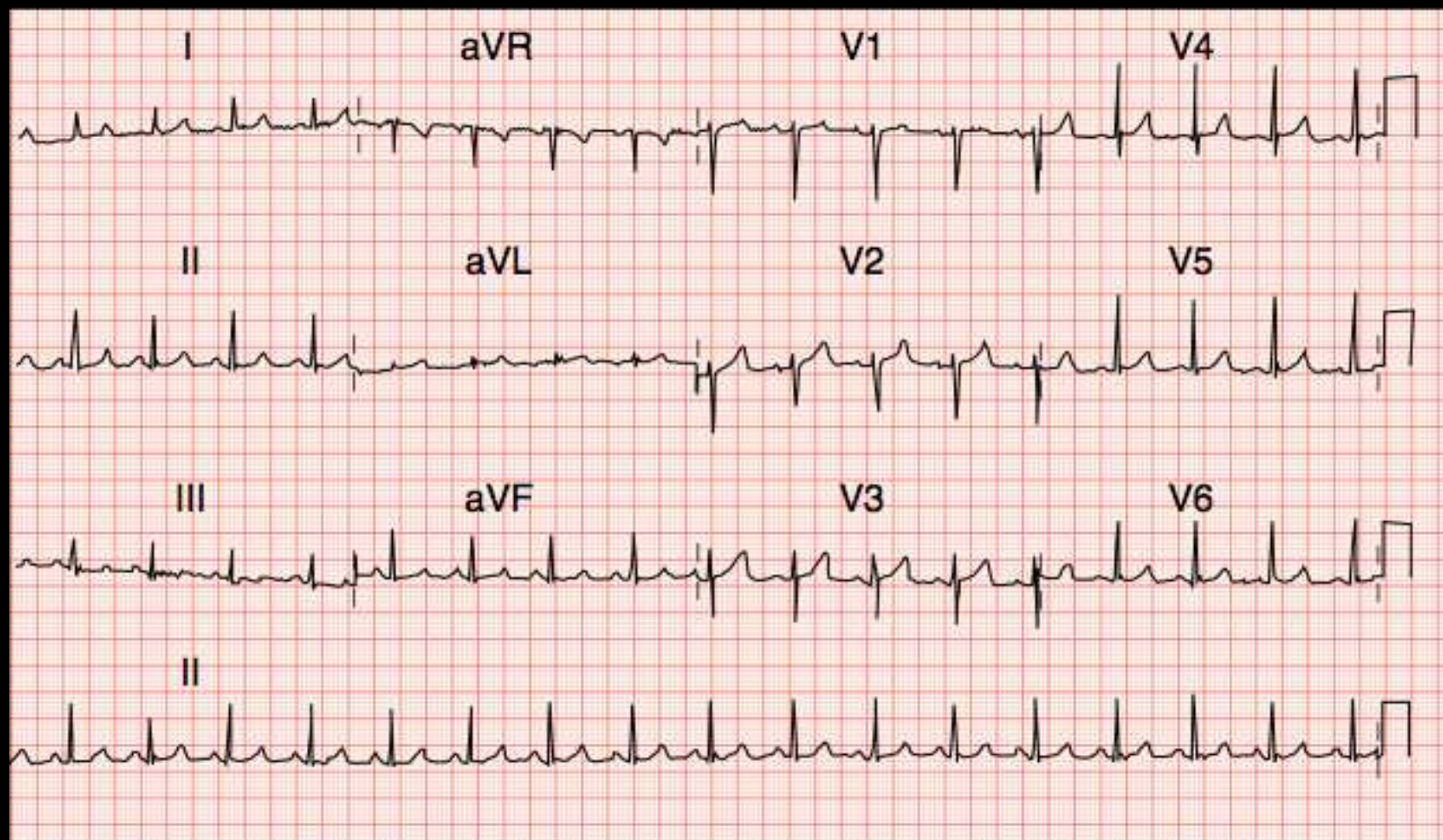
AVNRT

- Typically 3rd and 4th Decade
- Recurrent palpitations
- RAPID onset and RAPID offset
- Patient may feel an ectopic beat to initiate/ terminate the arrhythmia
- Vagal manoeuvres to terminate the arrhythmia
- Anxiety/ breathless/ palpitations
 - Syncope (due to high rate or due to transient asystole at termination)

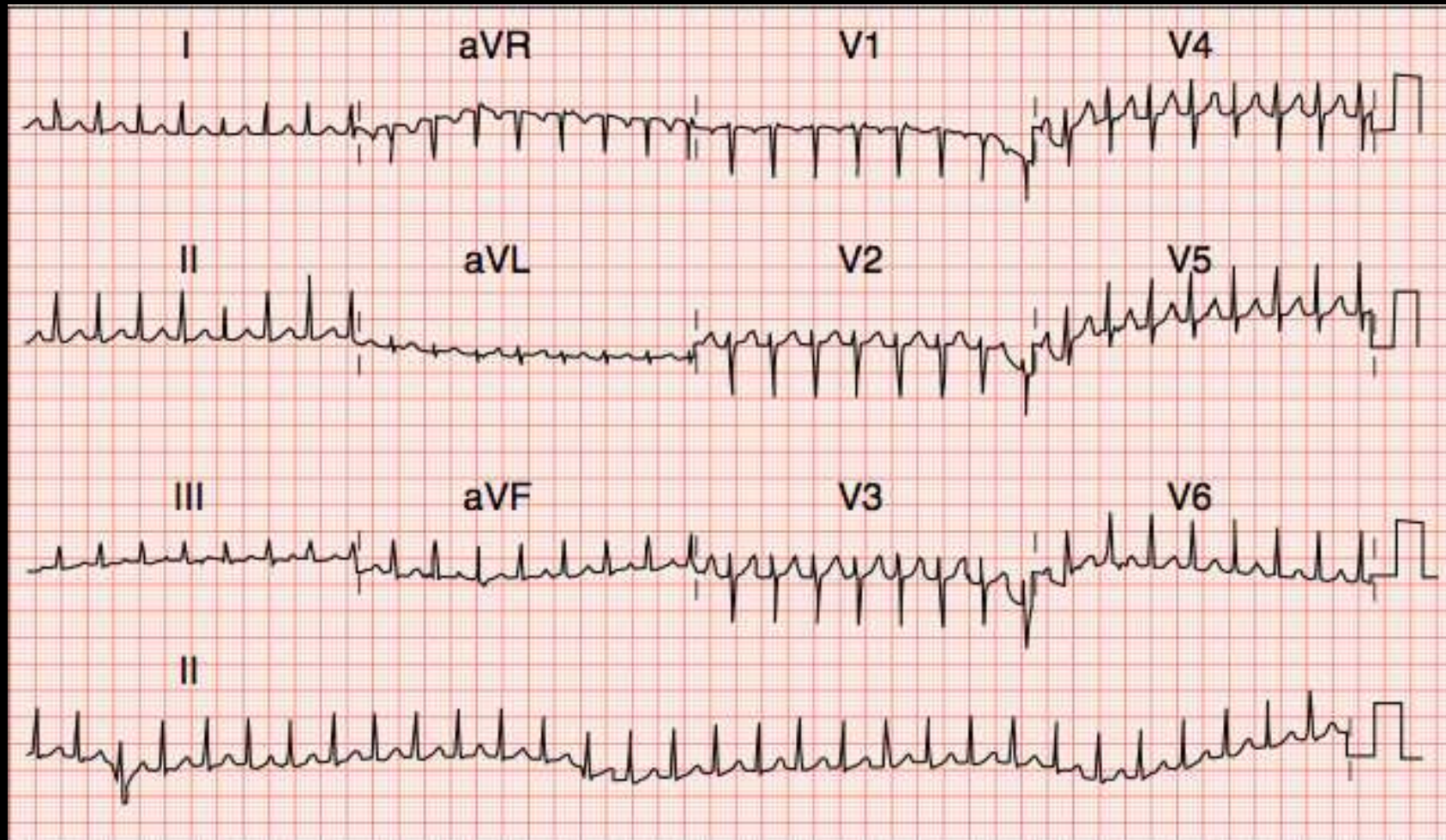
AVNRT



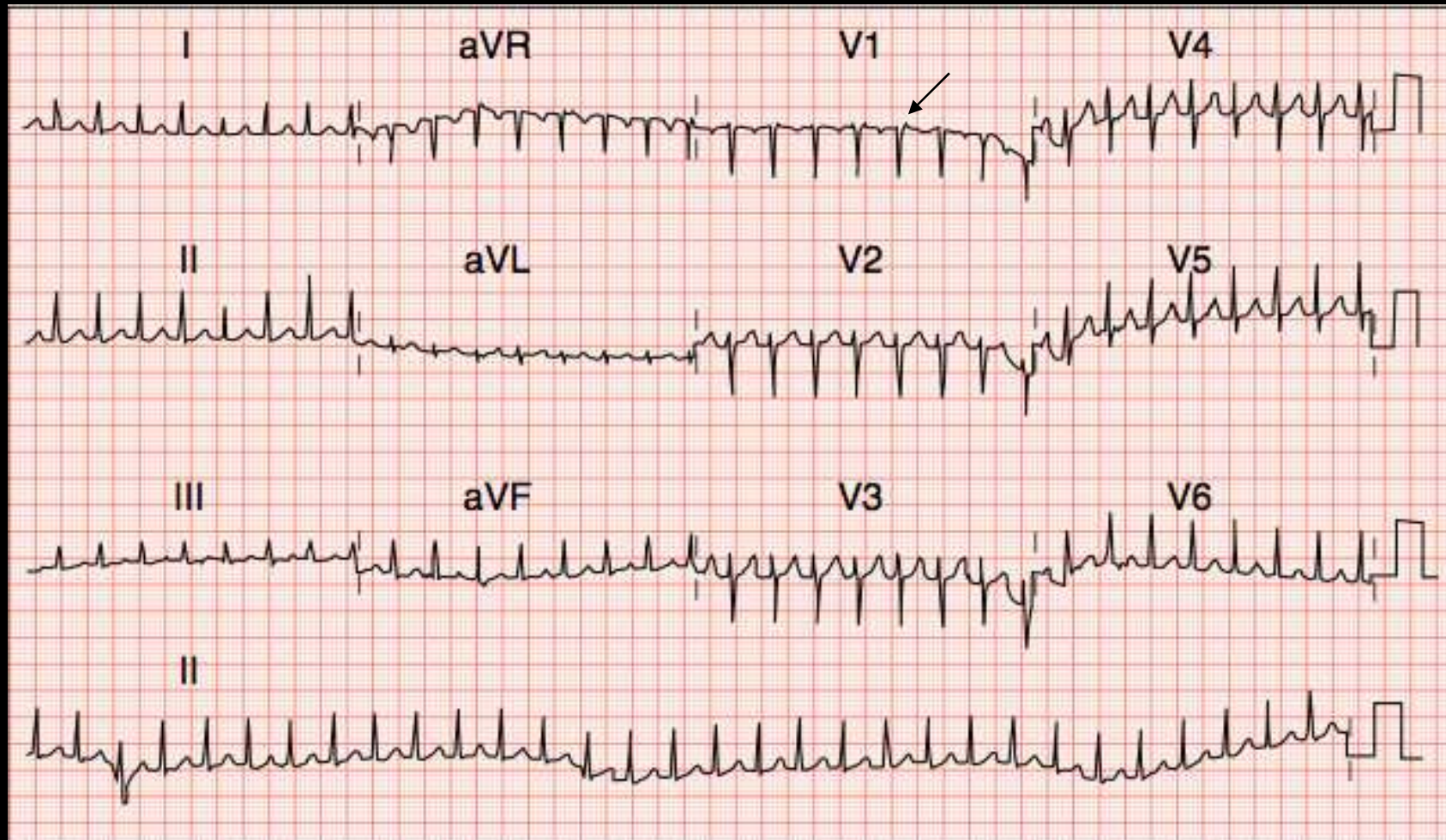
AVNRT



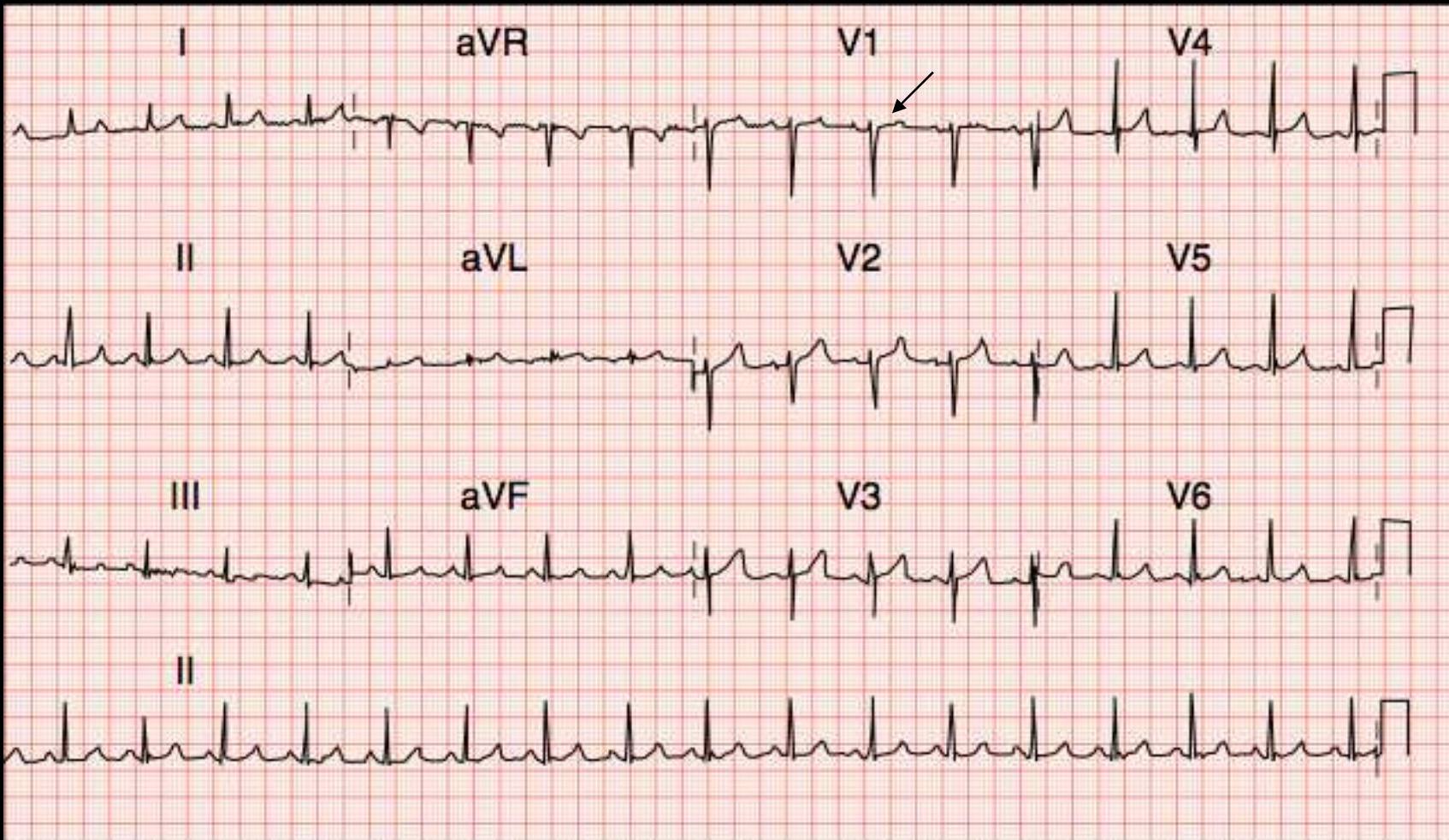
AVNRT



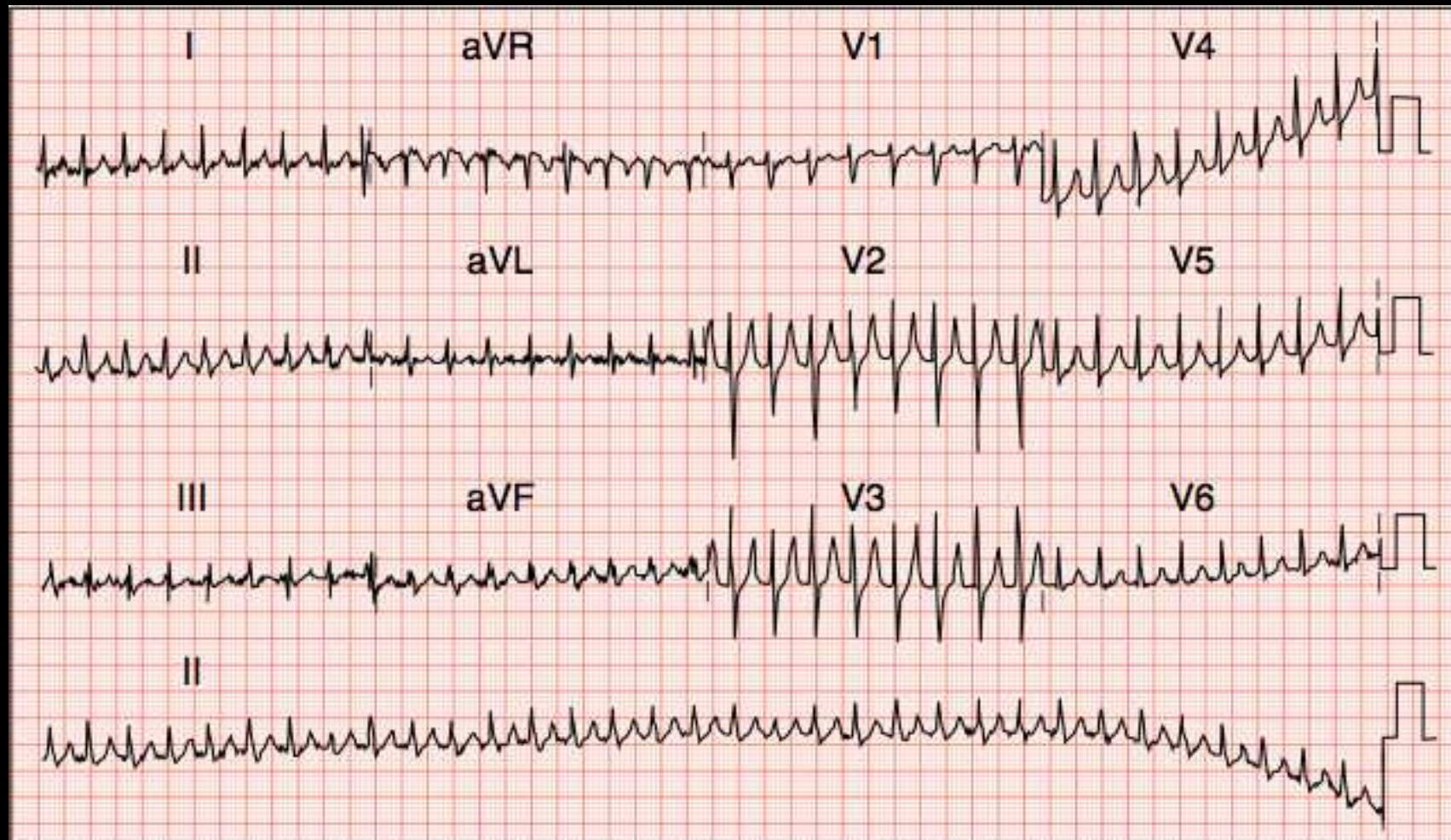
AVNRT



AVNRT



AVNRT



AVRT

- Due to an accessory pathway
 - Patients can have multiple pathways
- Accessory pathways may conduct
 - Antegradely
 - Retrogradely
 - Combination of the two
- Wolf- Parkinson -White Syndrome
 - Short PR interval ($<120\text{ms}$)
 - Delta wave
 - Palpitations and narrow complex tachycardia

Definitions

- Orthodromic
 - Conduction travels in the normal direction (ie A to V)
- Antidromic
 - Conduction travels in an abnormal direction (ie V to A)
- Manifest
 - An accessory pathway that conducts antegradely
- Concealed
 - An accessory pathway that conducts retrogradely
- Latent
 - An accessory pathway that conducts antegradely, but the refractory period exceeds the sinus cycle length

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AVRT

Presentation

- Young patient typically 3rd to 4th decade
- May be asymptomatic- part of a medical
- RAPID onset and RAPID offset
- Patient may feel an ectopic beat to initiate/ terminate the arrhythmia
- Vagal manoeuvres to terminate the arrhythmia
- Anxiety/ breathless/ palpitations
 - Syncope (due to high rate or due to transient asystole at termination)

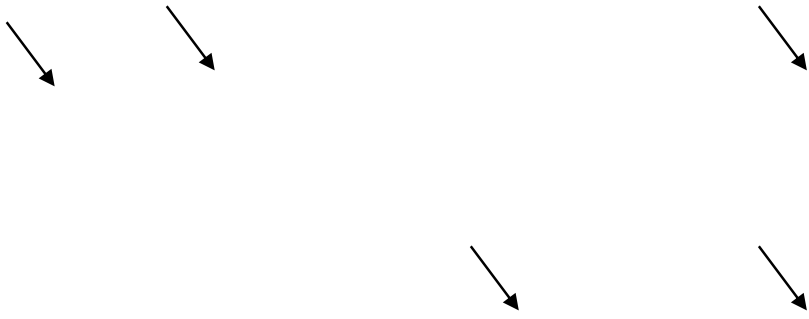
AVRT

- History of structural heart disease
 - Ebstein's anomaly
 - » Multiple right sided accessory pathways
- Family history
 - Higher prevalence in the children; especially if multiple accessory pathways
- Examination
 - Frequently normal

WPW

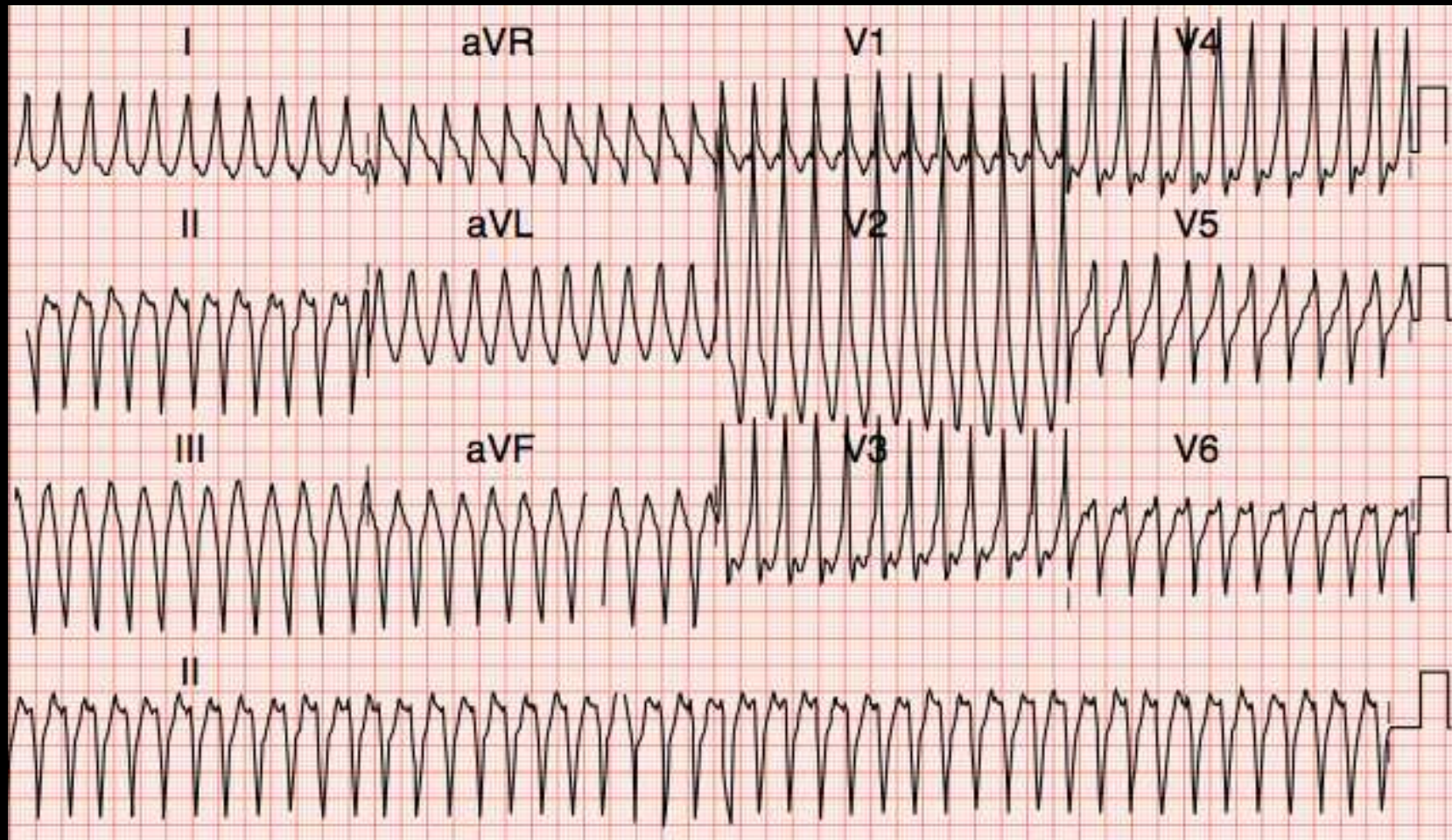
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WPW

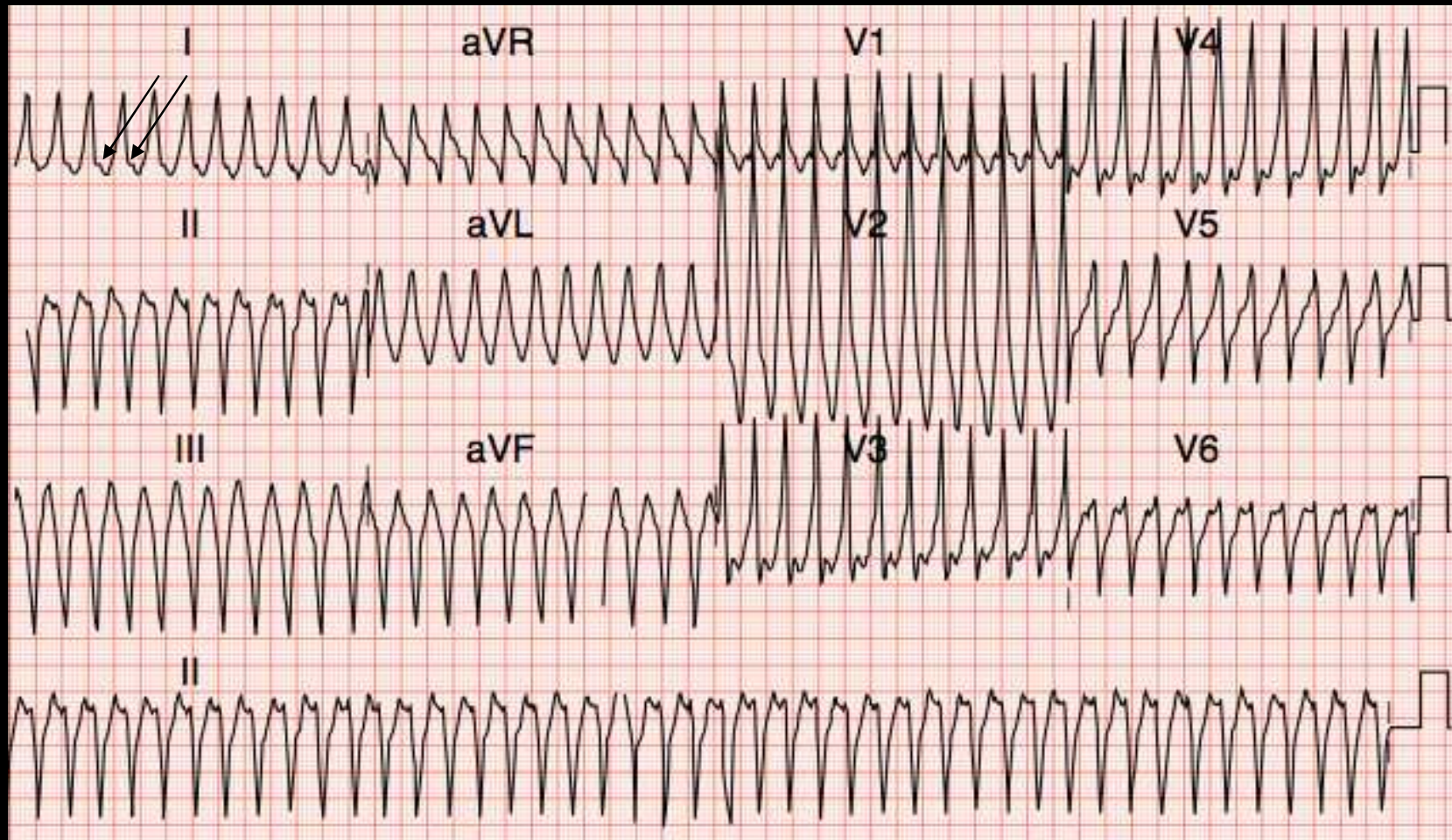


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AVRT



AVRT



Focal Atrial Tachycardia

- Typically older patients >6th decade
- Frequently have structural heart disease, pulmonary disease
- Symptoms are related to
 - Rate (120-250bpm)
 - Underlying heart disease
- Rapid initiation
 - Rate can increase over a few beats as the AV node “warms up”
- No consistent effect with vagal manoeuvres
- Digoxin / Alcohol/ Lung disease/ Metabolic derangements

Focal Atrial Tachycardia

- Regular pulse
 - Exceptions
 - » If atrial tachycardia is fast the AV node may Wenckebach (Mobitz Type I)
 - » If more than one focus (Multifocal atrial tachycardia)
- Check for signs of pulmonary disease
- Cannon A waves
- Variable S1

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Atrial Tachycardia

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Ventricular Tachycardia

- May be asymptomatic
- Heart rate is NOT a useful guide to the arrhythmia
- More likely if
 - Previous MI / History of IHD
 - Cardiac risk factors
- Sudden onset/ offset
- Is it recurrent?
- Do they have a pacemaker or an ICD
- Family History
 - Sudden cardiac death
 - Unexplained death
 - HOCM/ Long QT syndrome / Brugada

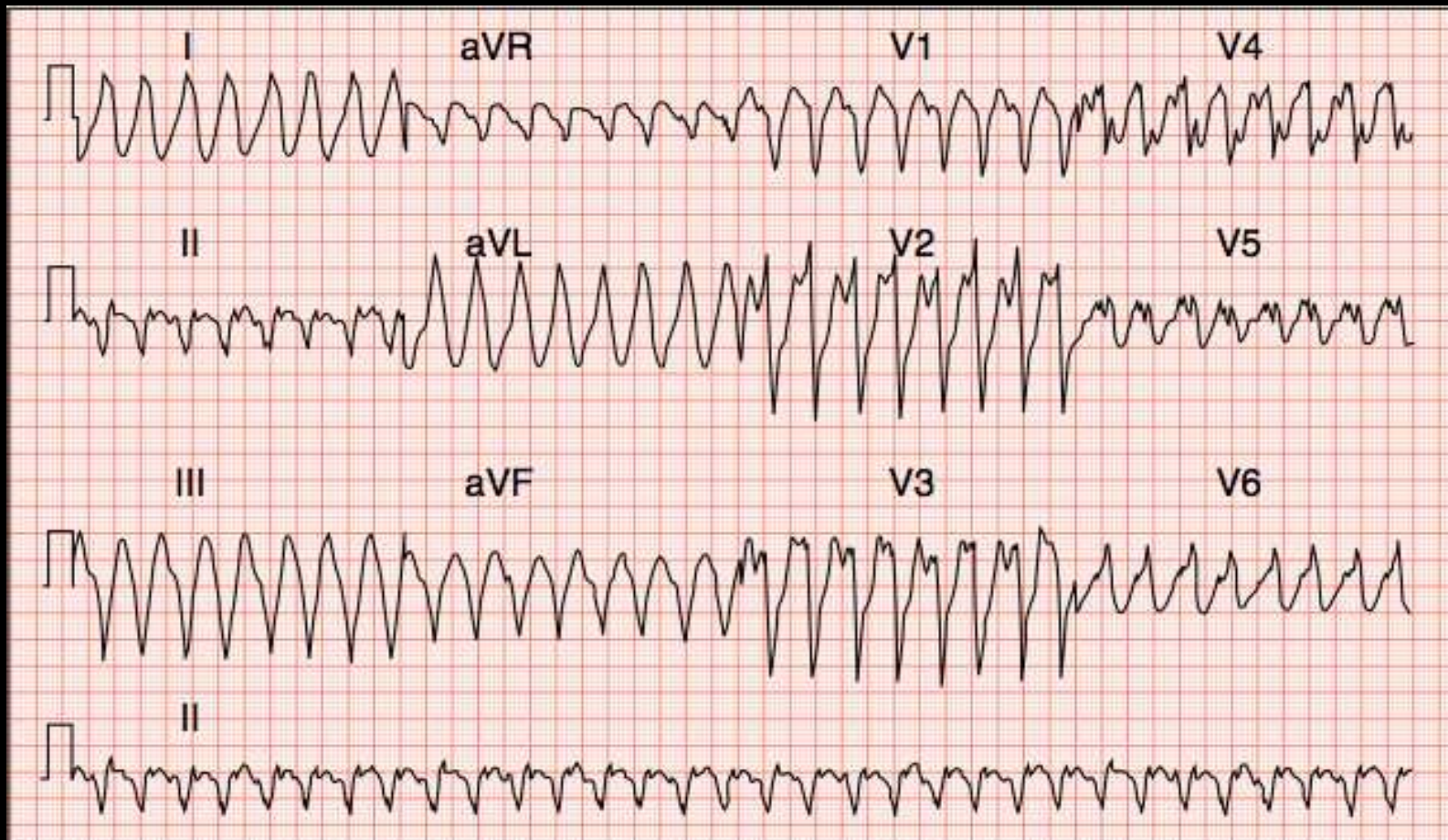
Physical Examination

- Is the patient compromised?
 - DC cardioversion if any doubt
- Assess the JVP
 - Cannon A waves ?
- Assess the praecordium
 - Pacemaker/ ICD/ Median sternotomy scar / LV Heave/ Double apical impulse?
- Auscultate
 - Variable S1; Ejection systolic murmur

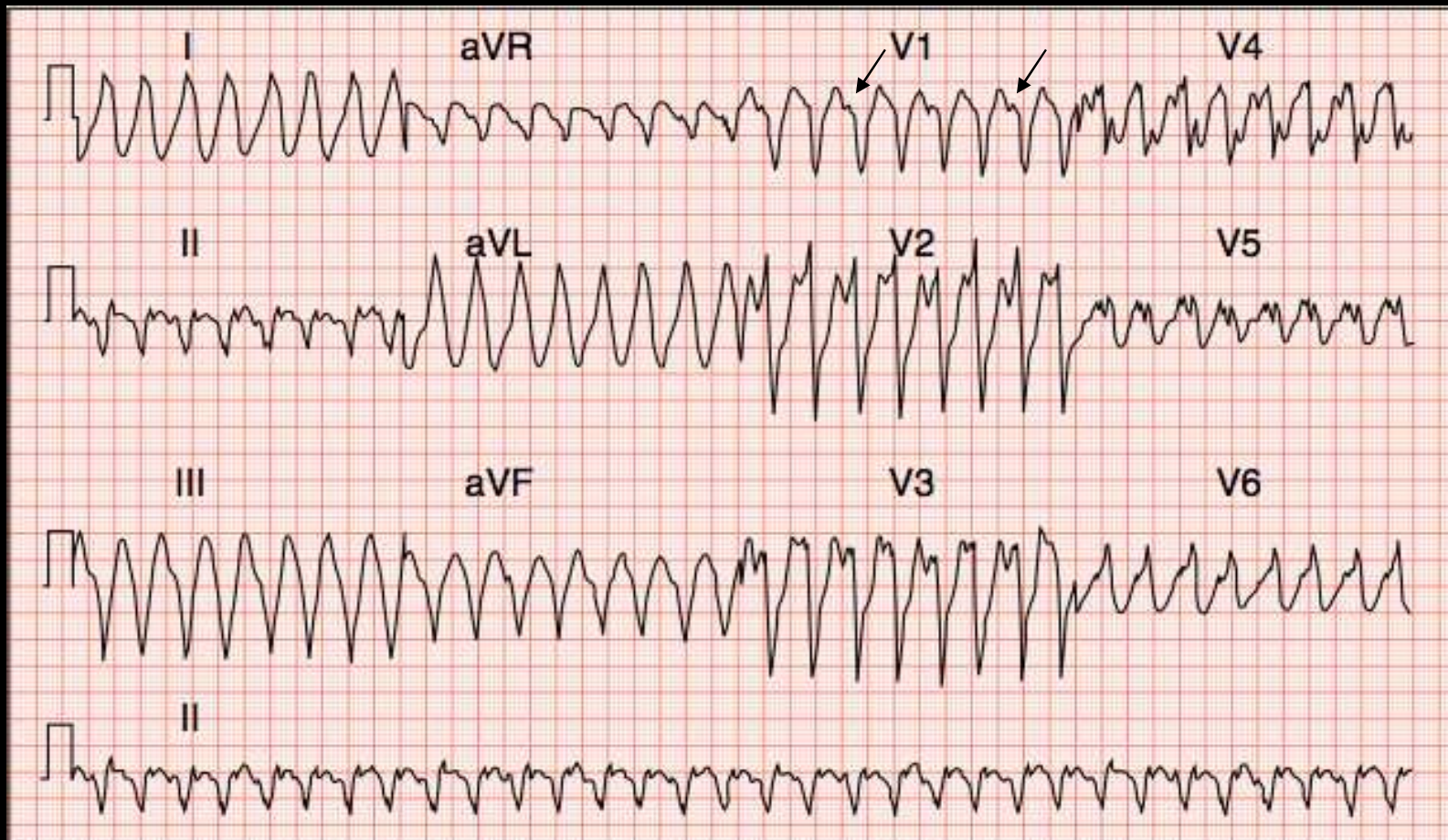
ECG Findings- VT

- Regular broad complex tachycardia (QRS > 120ms)
 - Normally RBBB >140ms
 - LBBB >160ms
- Evidence of A-V Dyssynchrony
- Fusion beats
- Capture beats
- Concordance
- If a 12 lead in sinus rhythm is available
 - ?Q waves; Delta waves; RBBB and ST Elevation

Ventricular Tachycardia



Ventricular Tachycardia



Right Ventricular Outflow Tract Tachycardia (RVOT VT)

- Young patients
- Athletic
- Occur during exercise
- Can be terminated by vagal manoeuvres

- ECG Findings
 - LBBB morphology in V1
 - Inferior axis

Brugada Syndrome

- Due to a mutation in a sodium channel (SCN5A)
- 1st presentation may be failed sudden cardiac death
- Family history
- ECG
 - Right bundle branch block
 - ST elevation in the anterior precordial chest leads (V1-3)
- No evidence of structural heart disease

Ventricular Fibrillation

- No cardiac output
 - DC Cardioversion
- Normally cause is evident
 - Myocardial ischaemia
 - Cardiomyopathy- DCM/ HCM/ HOCM
 - Torsade de pointes and causes of long QT syndrome
 - Brugada syndrome
 - Commotio Cordis

Summary

- The arrhythmia must be seen in the context of the patient
 - Not just the ECG
- The state of the patient will depend on the heart rate and underlying heart disease *not* the arrhythmia per se
- The age of the patient, and associated disease can guide the provisional differential diagnosis before seeing the ECG
- Examine for signs of AV dissociation

Key Points

- Age
- Symptoms
 - Asymptomatic/ Syncope/ Palpitations/ Chest pain/ Dyspnoea
- 1st time or recurrent?
- Situation
 - Anger / Fright/ Exercise/ Sleep/ Micturition
- Mode of onset
 - Gradual or rapid
- Mode of termination
 - With a valsalva/ vagal manouevres
- Drug history
 - Anti-arrhythmics/ Stimulants/ Antibiotics- consult the BNF
 - Toxicity- accidental overdose
- Family history
- History of structural heart disease

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