



Dr Patrick Kay

Interventional Cardiologist

Middlemore and Mercy Hospitals

Auckland

Saturday, June 10, 2017

(Room 4)

16:30 - 17:25 WS #168: Update on ECGs

17:35 - 18:30 WS #180: Update on ECGs (Repeated)

ECG Workshop

Patrick Kay MD PhD

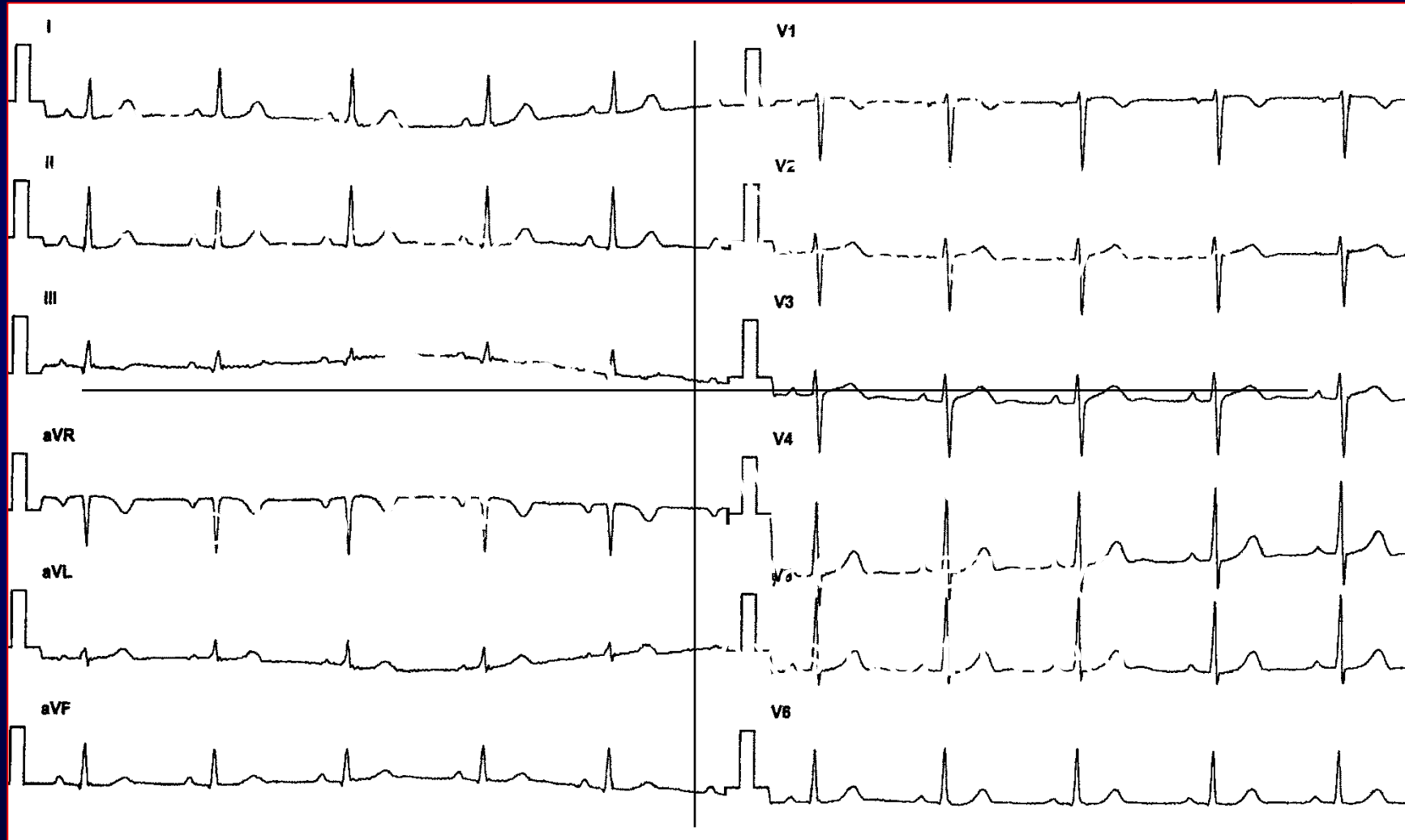
Interventional and General Cardiologist

Auckland

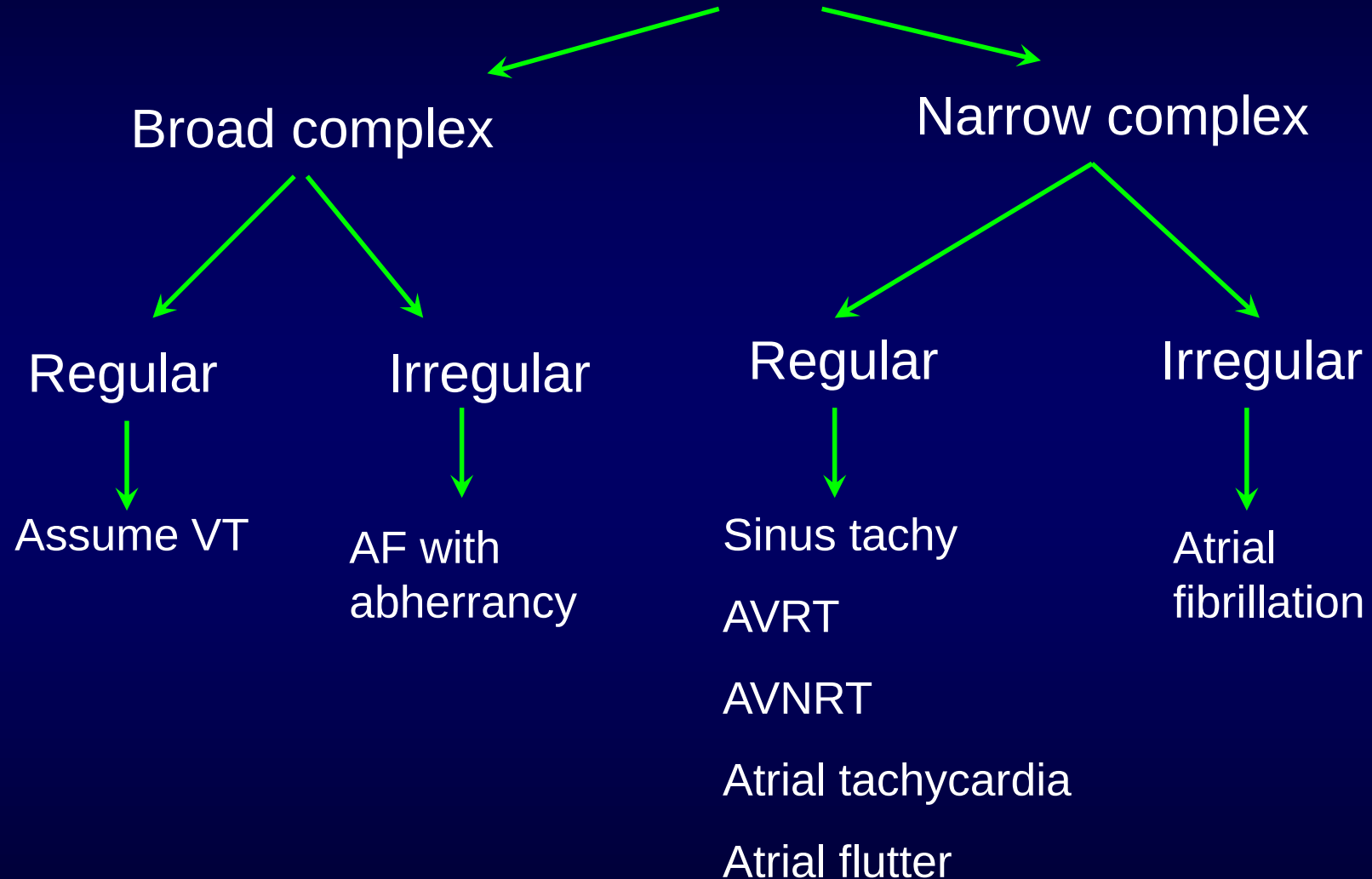
The ECG

- The normal ECG
- The ECG in ischaemia
- The bradycardias
- The tachycardias
- Miscellaneous

The normal ECG

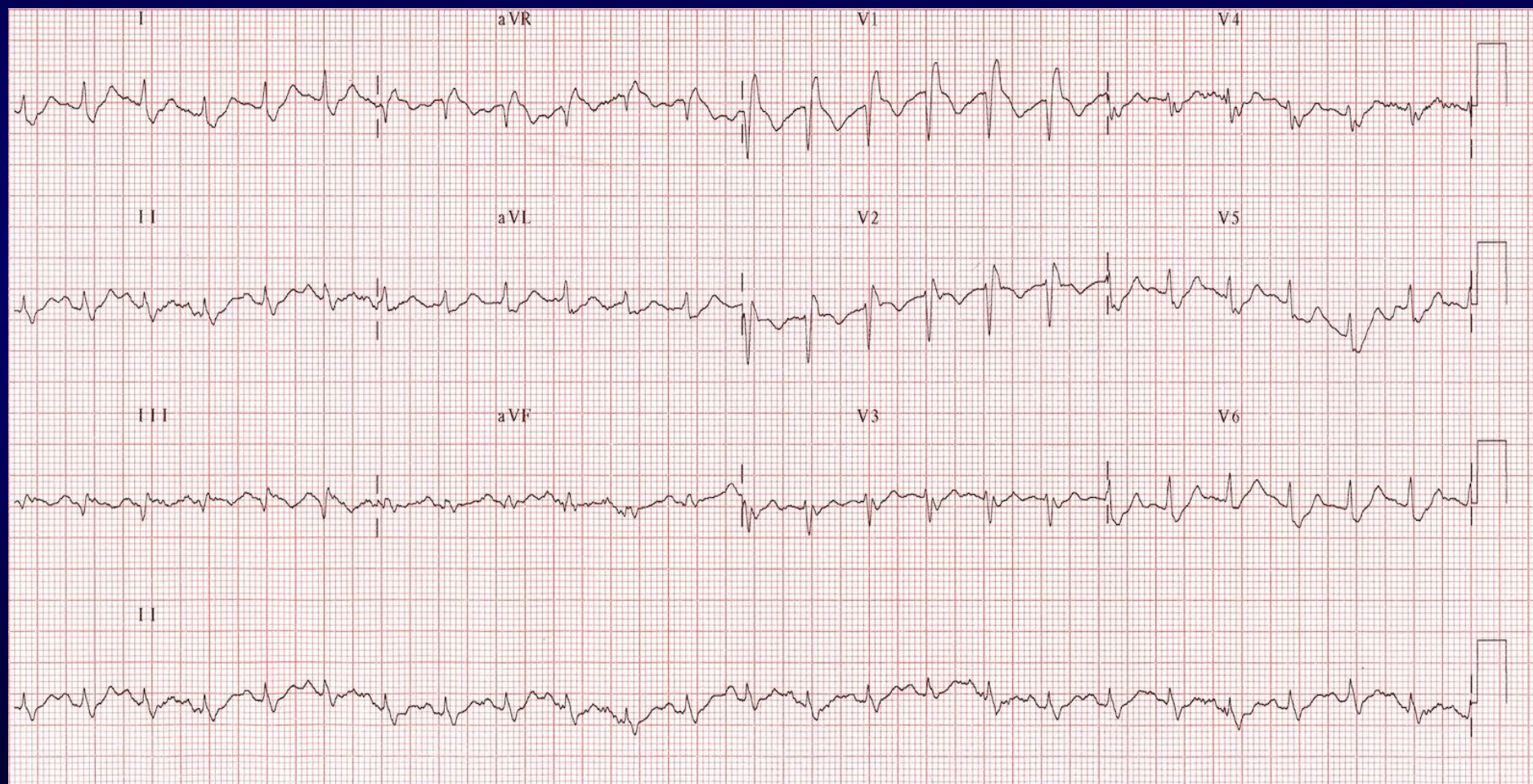


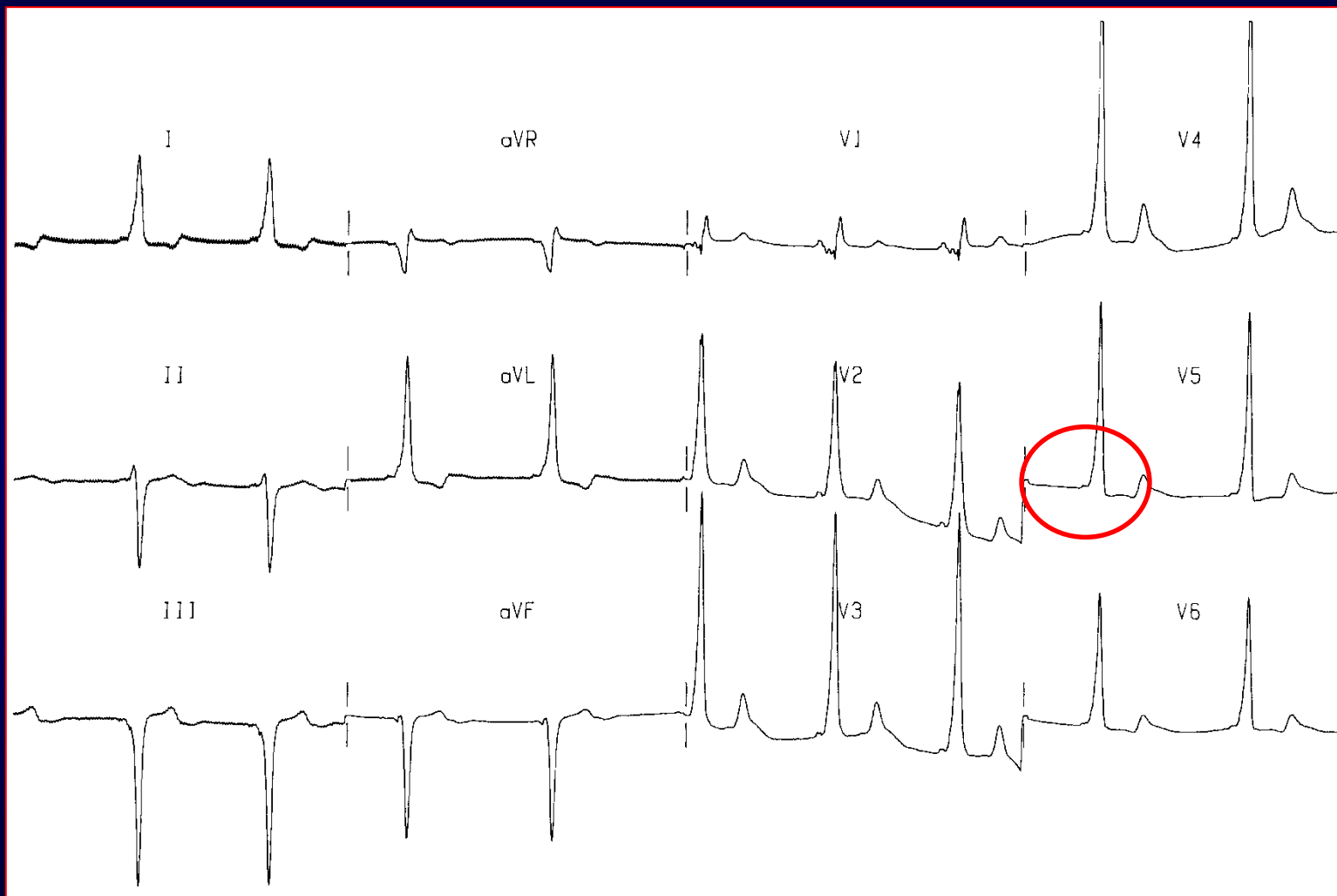
The tachycardias - HR > 100

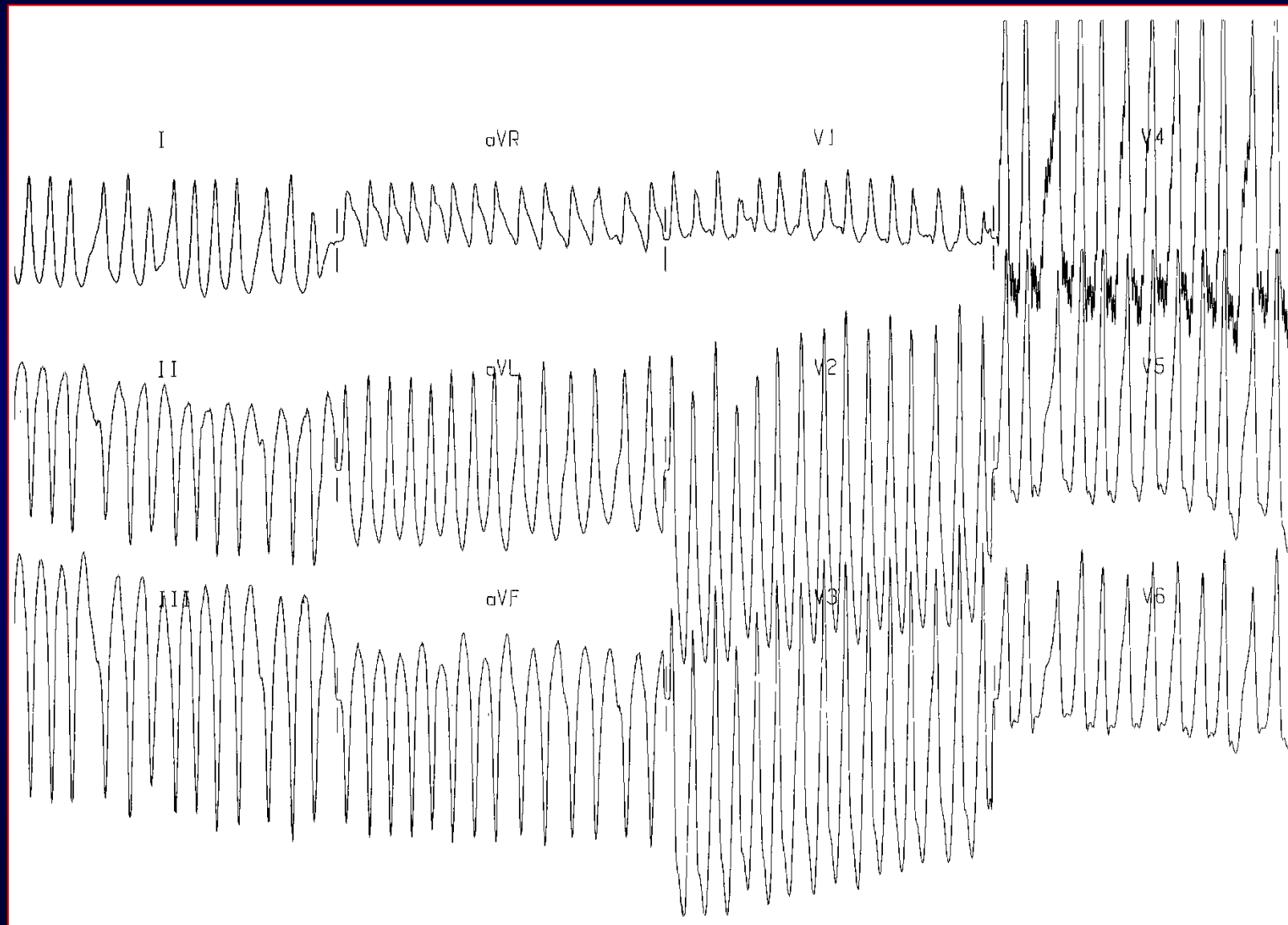


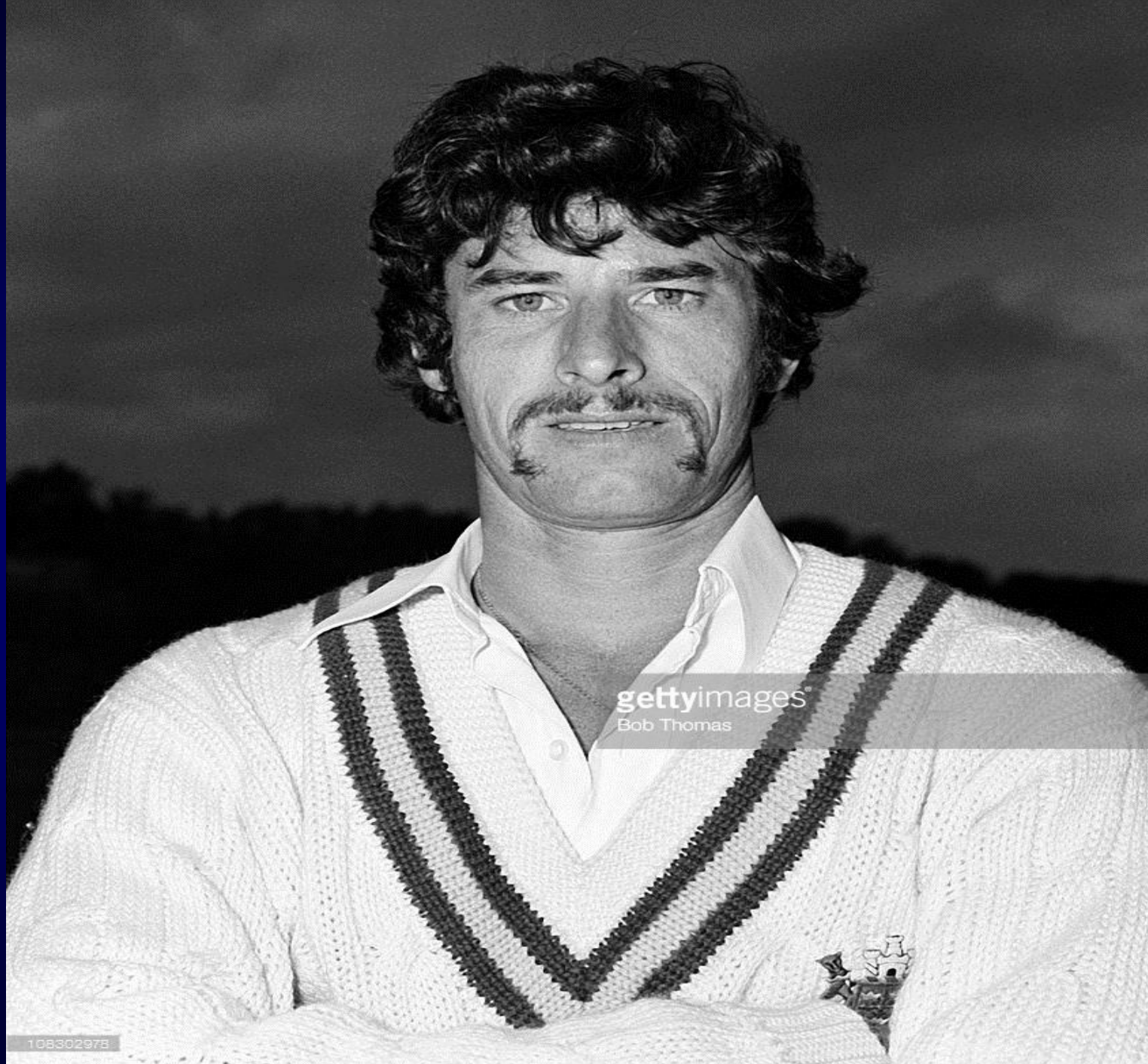
Scenario

- 66 yr old female air travel AK-CHCH one week ago. Dyslipidemic. Hypertensive.
- Car – CHCH-DN then back to Picton
- Flew from Nelson to AK
- Admitted with chest pain, SOB and small troponin rise.



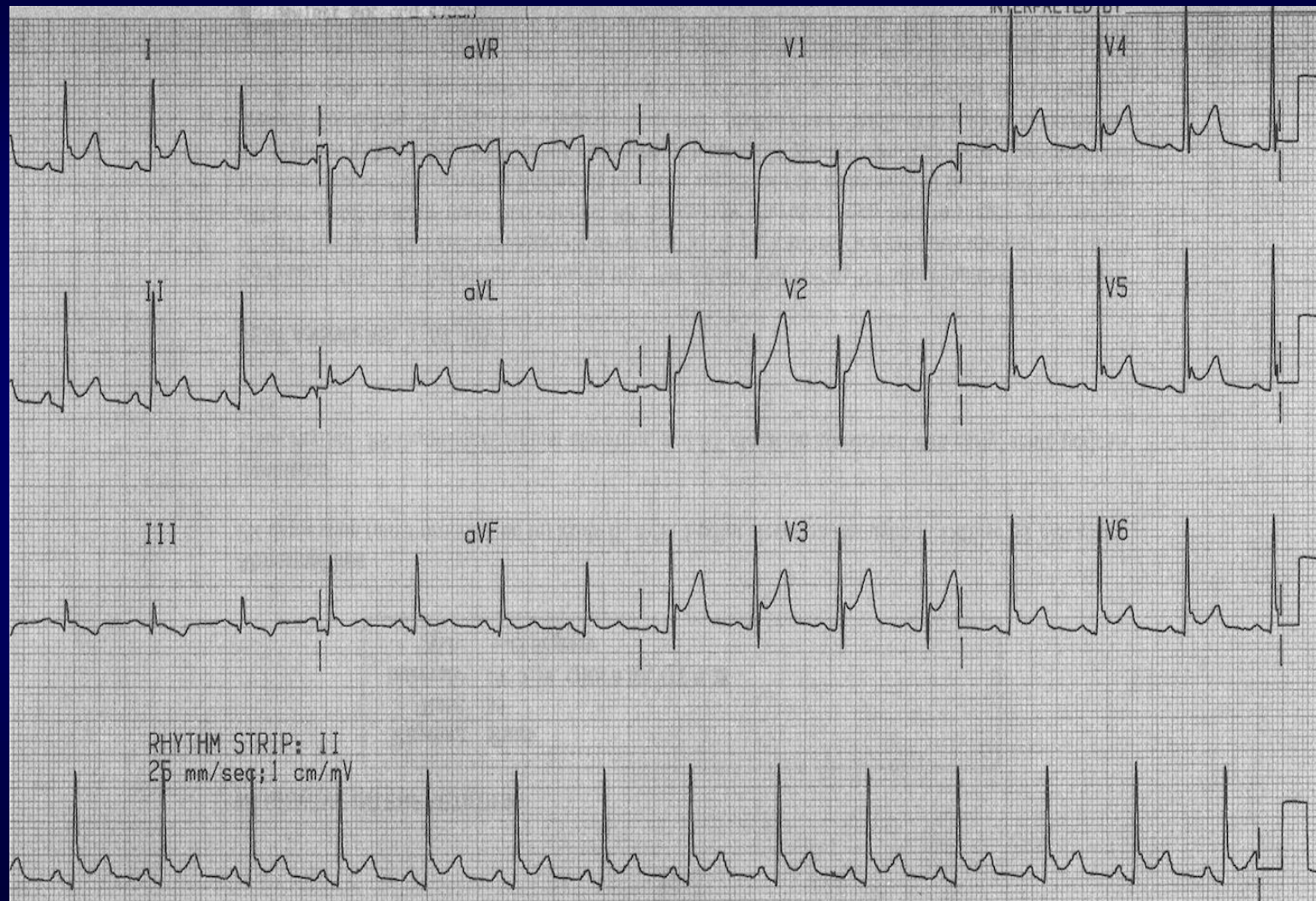






gettyimages
Bob Thomas

108302978



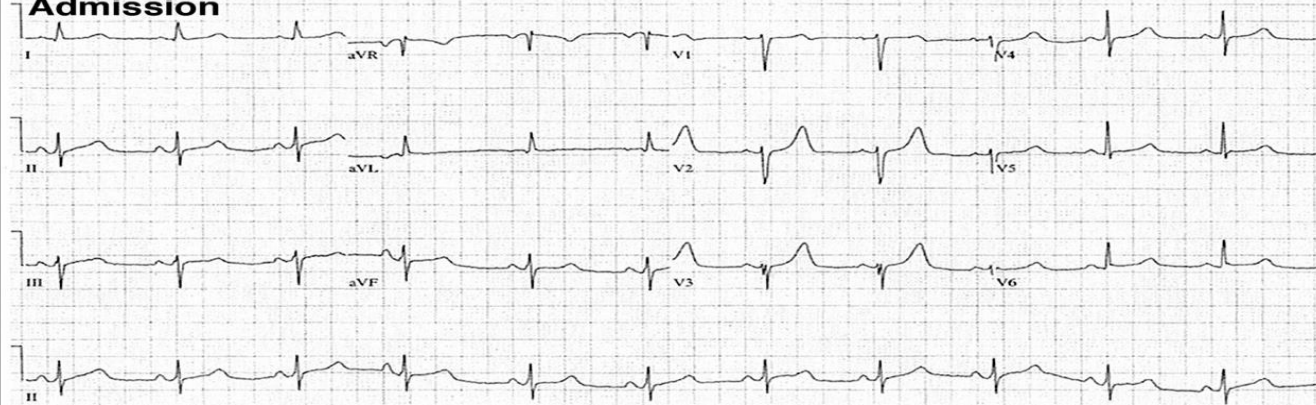
What are these objects ?



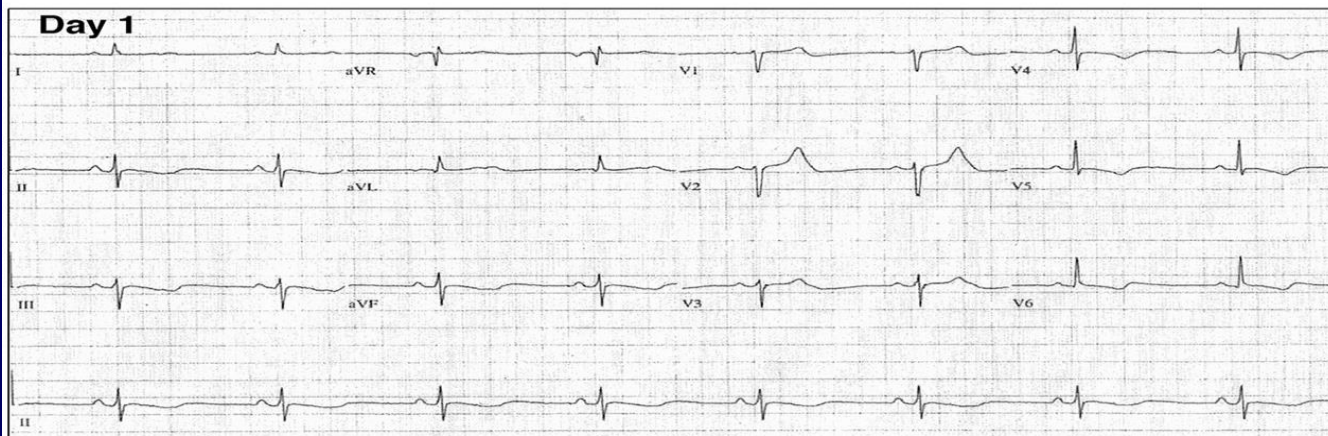
Scenario

- 38 G5P3
- Caesar – 3 litre blood loss – resus
20 mins later...3 litre blood loss
- Blood/products given. CVP=20.
- BP = 60/-
- Adrenaline, noradrenaline, milrinone, vasopressin
- “the more adrenaline I give the worse she gets....”

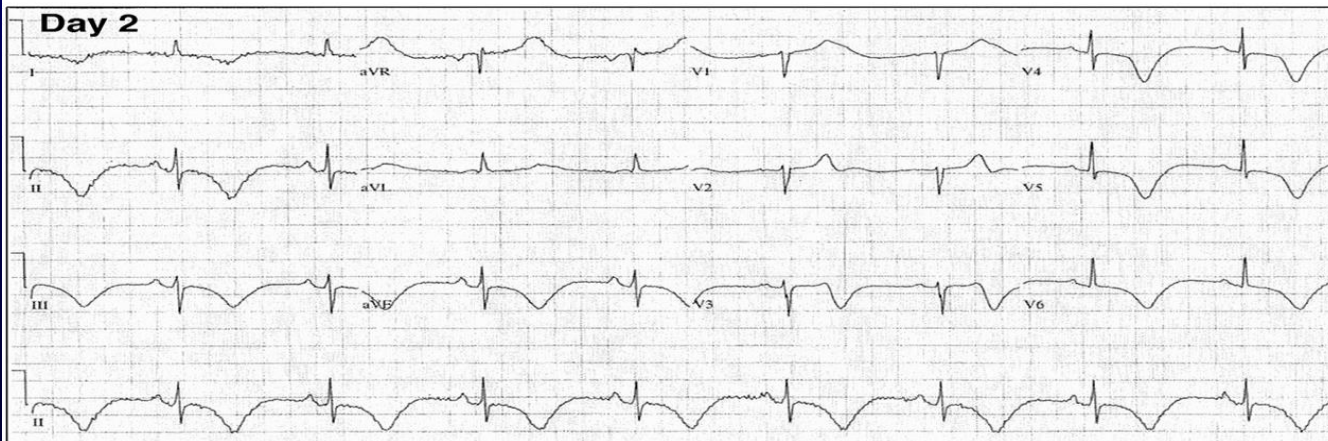
Admission

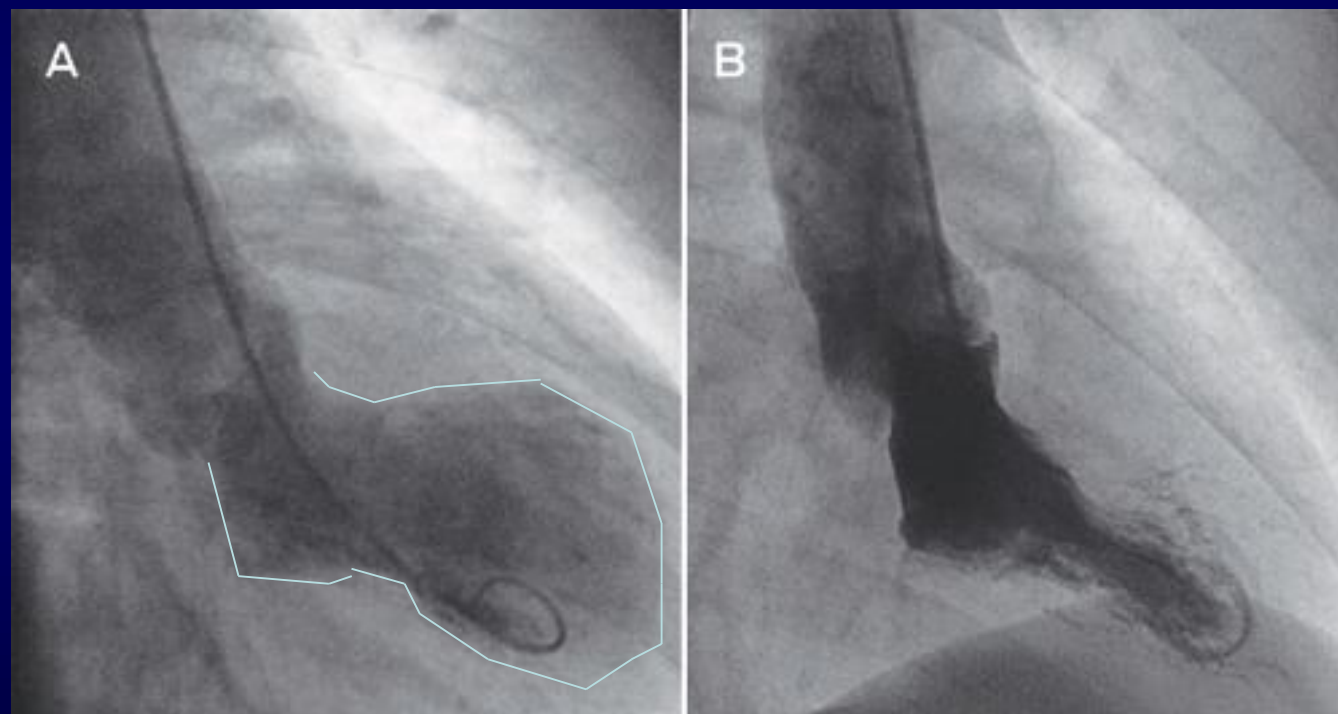


Day 1

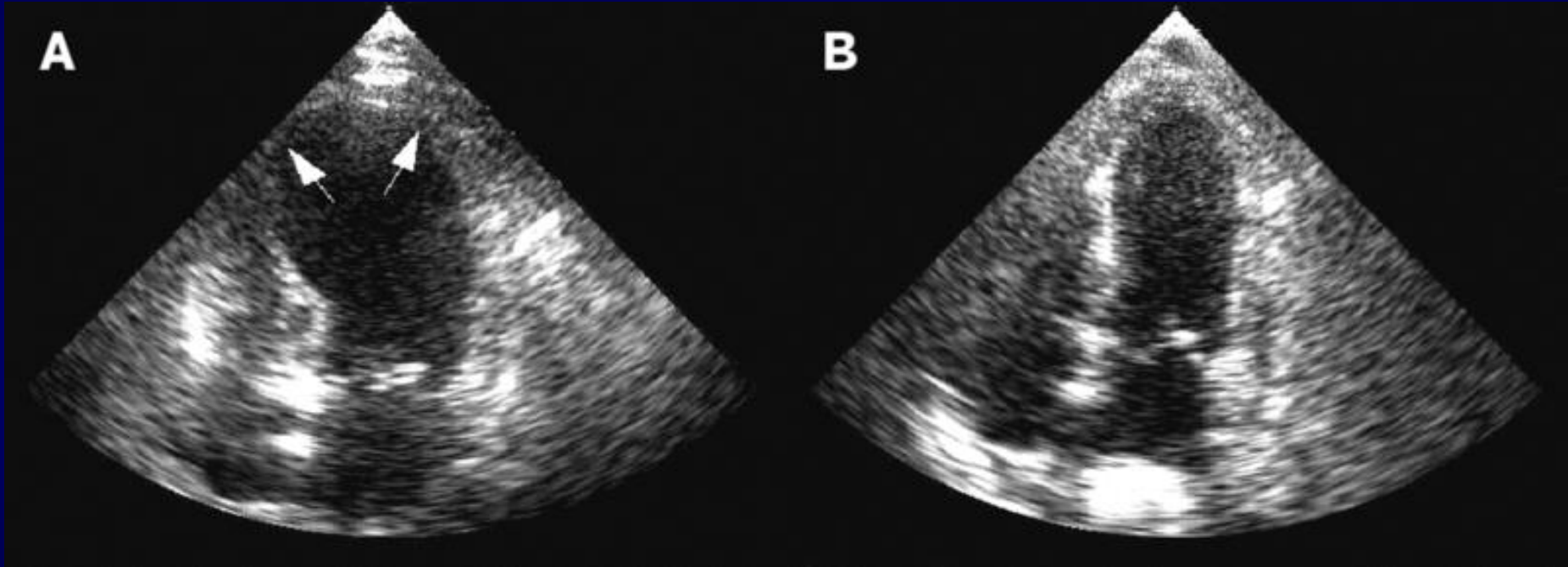


Day 2





Normal



Our Patient

Normal

Management

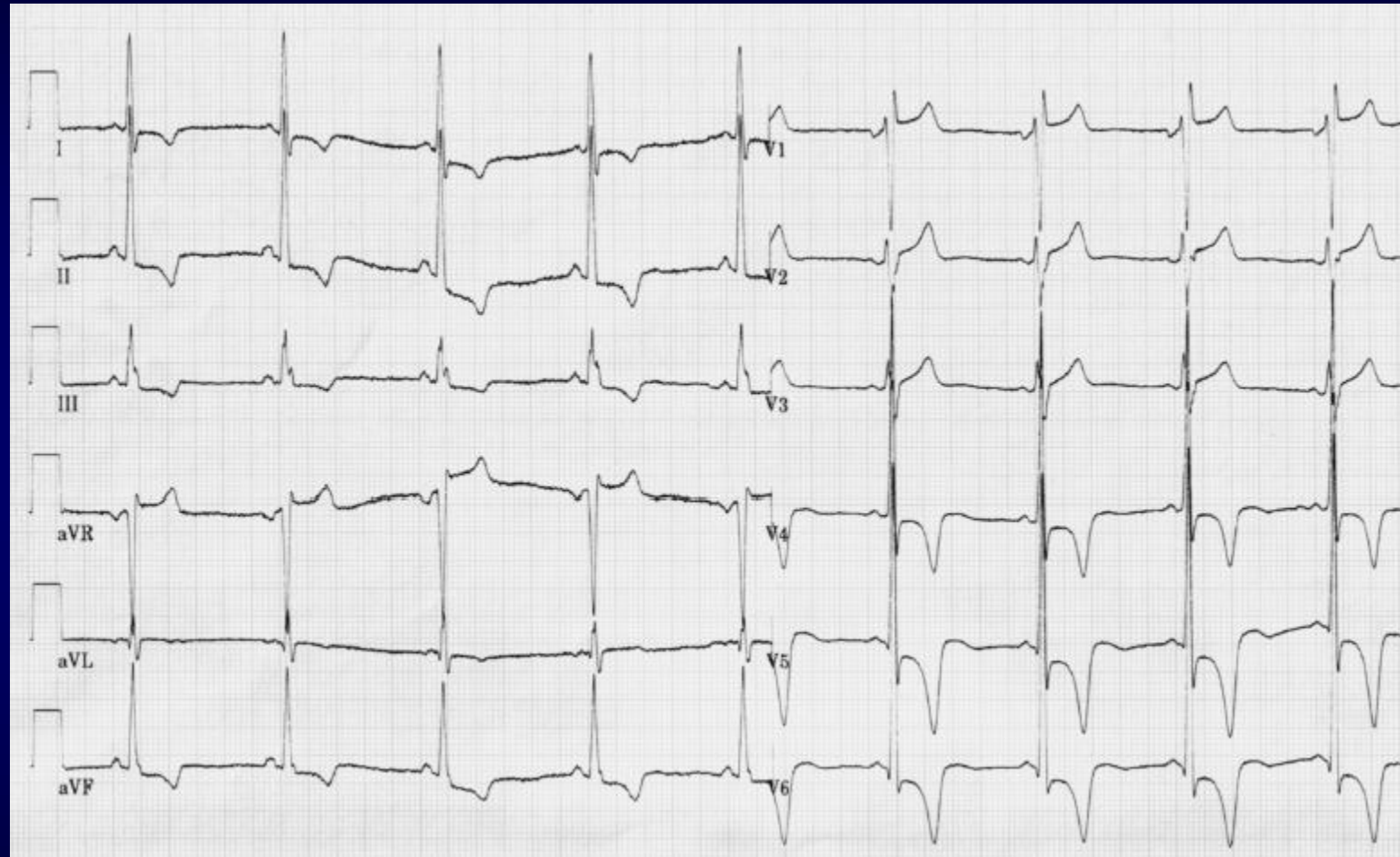
1.

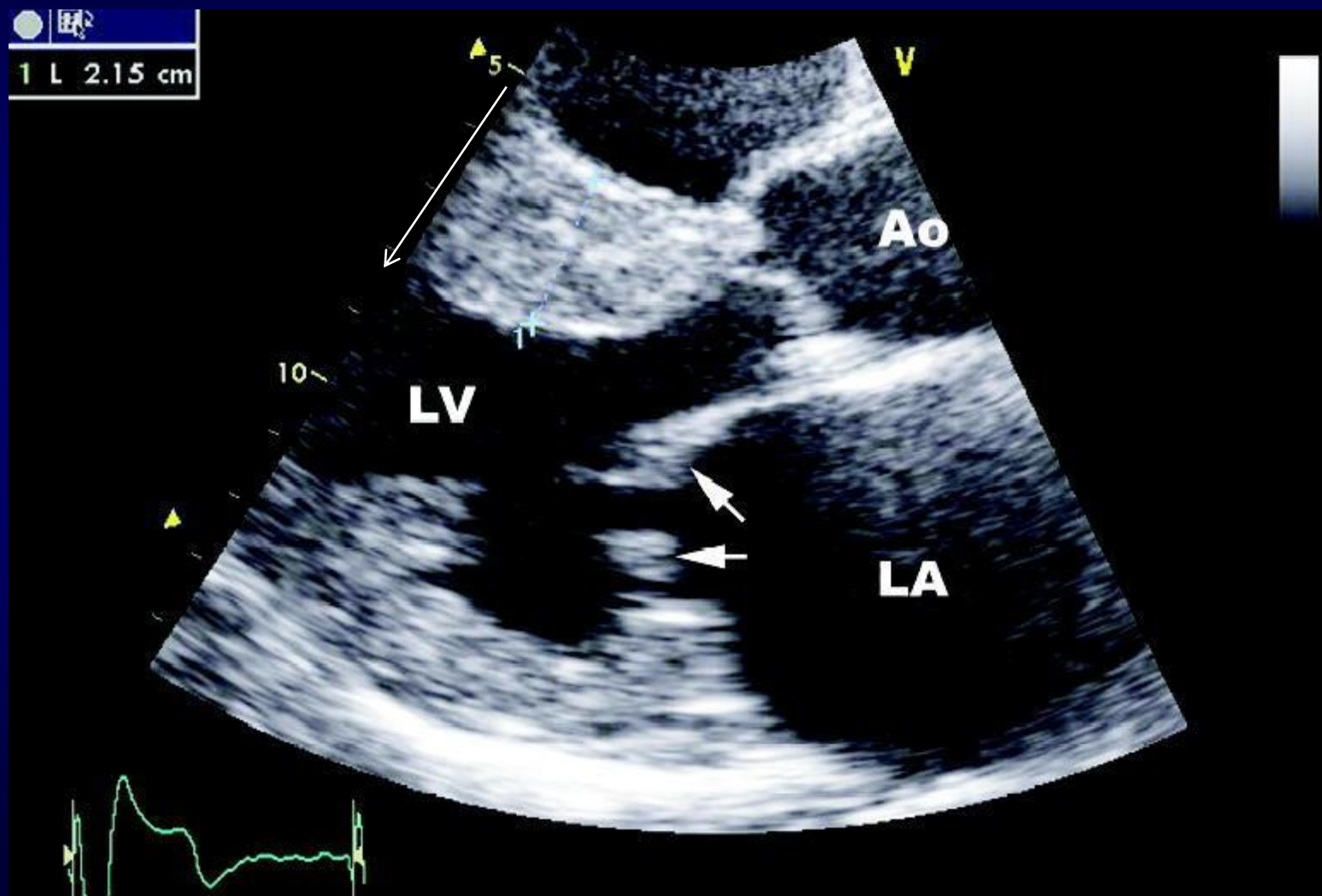


2. Do urgent angiogram
3. ECMO
4. Continue to support. It will all be better in the morning.

Scenario

- 48 yr male
- Dyslipidemic, Hypertensive, Proteinuric 4+
- CVA 2 years ago. Full recovery.
- Presents SOB, CP, Palpitations
- Troponin positive
- Angiogram normal

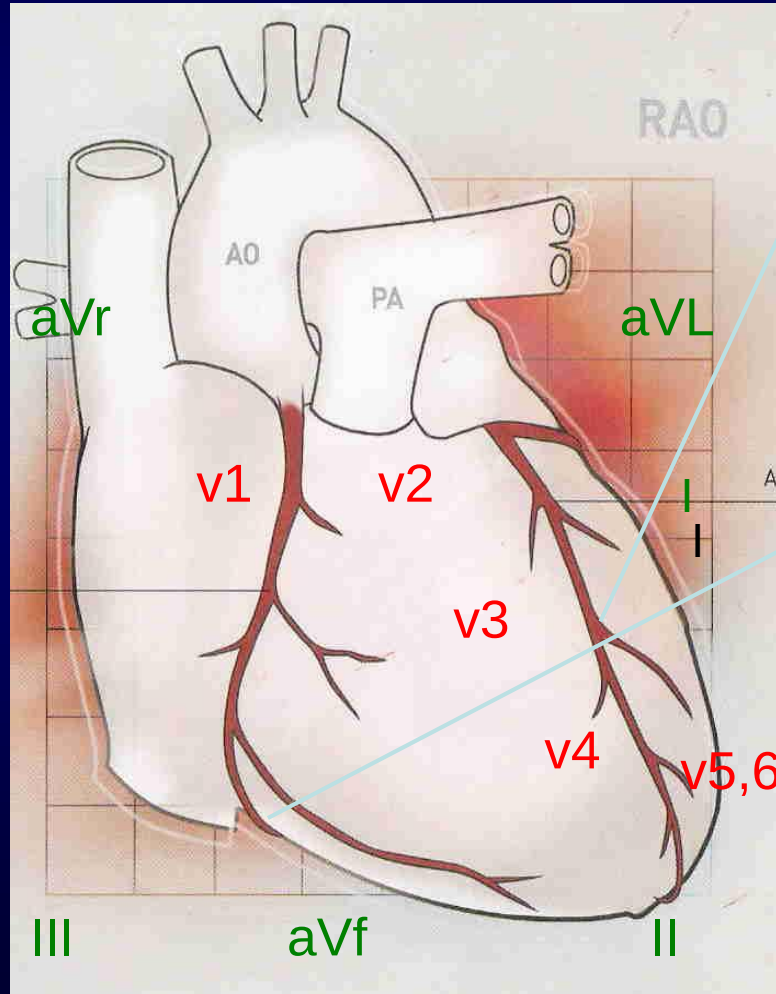




Ischaemic heart disease

- Acute coronary syndromes
 - Chest pain suggestive of myocardial ischaemic
 - ECG changes suggestive of ischaemia
 - ST depression / ST elevation / T wave changes
 - Rise and fall in cardiac biomarker above preset diagnostic level

Coronaries and limb leads

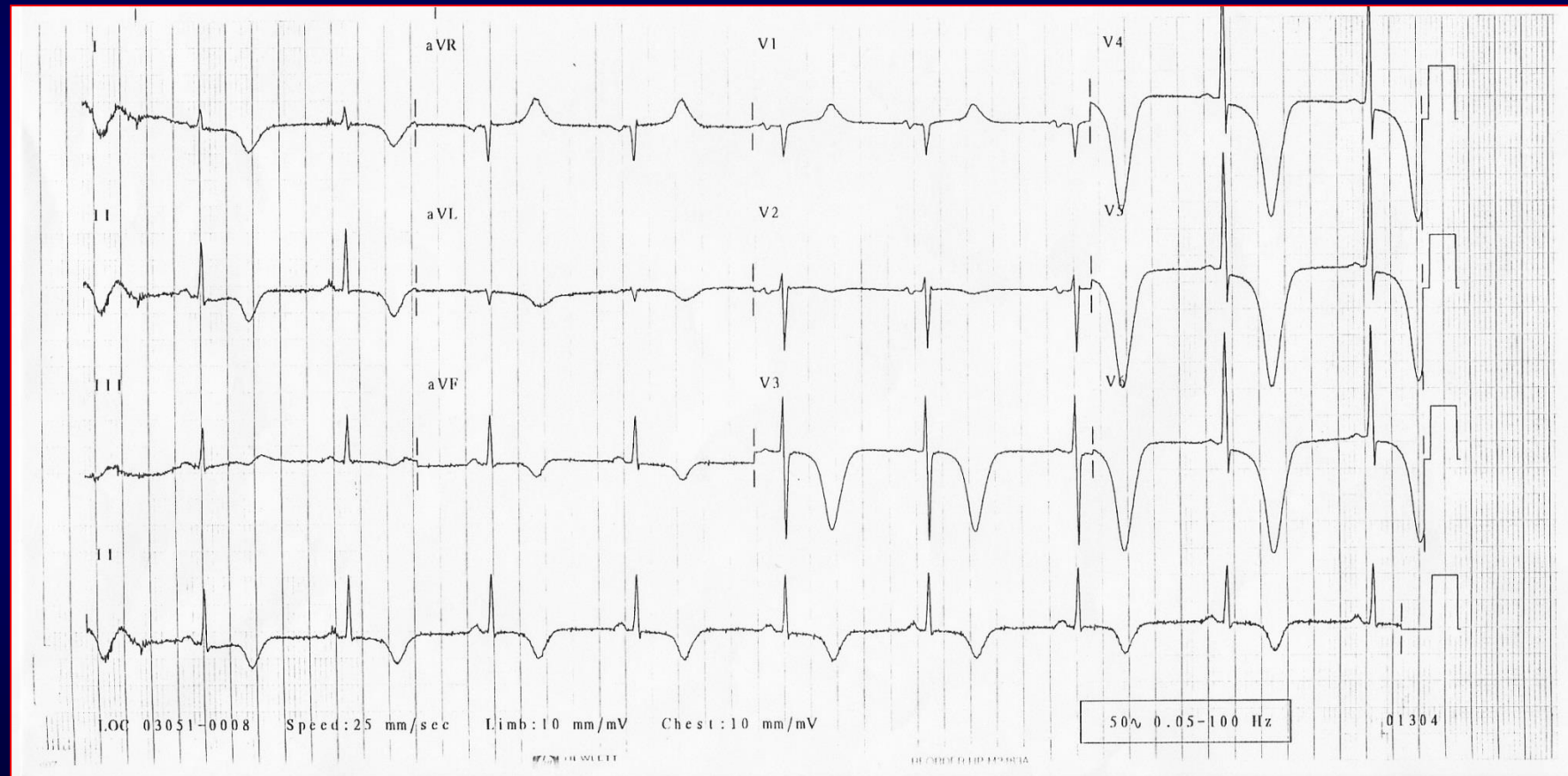


- LAD
 - Anteroseptal: V1-V4
 - Anterolateral : V4,5,6, I, aVL
 - High Lateral: I, aVL
- RCA
 - Inferior: II, III, aVf
 - Look at vR4
 - If large dominant RCA with big postero-lateral: II, III, aVf and V4-V6
- Circumflex
 - V4-V6, I, aVL
 - If large and dominant: V4-V6, I, aVL PLUS II, III and aVF

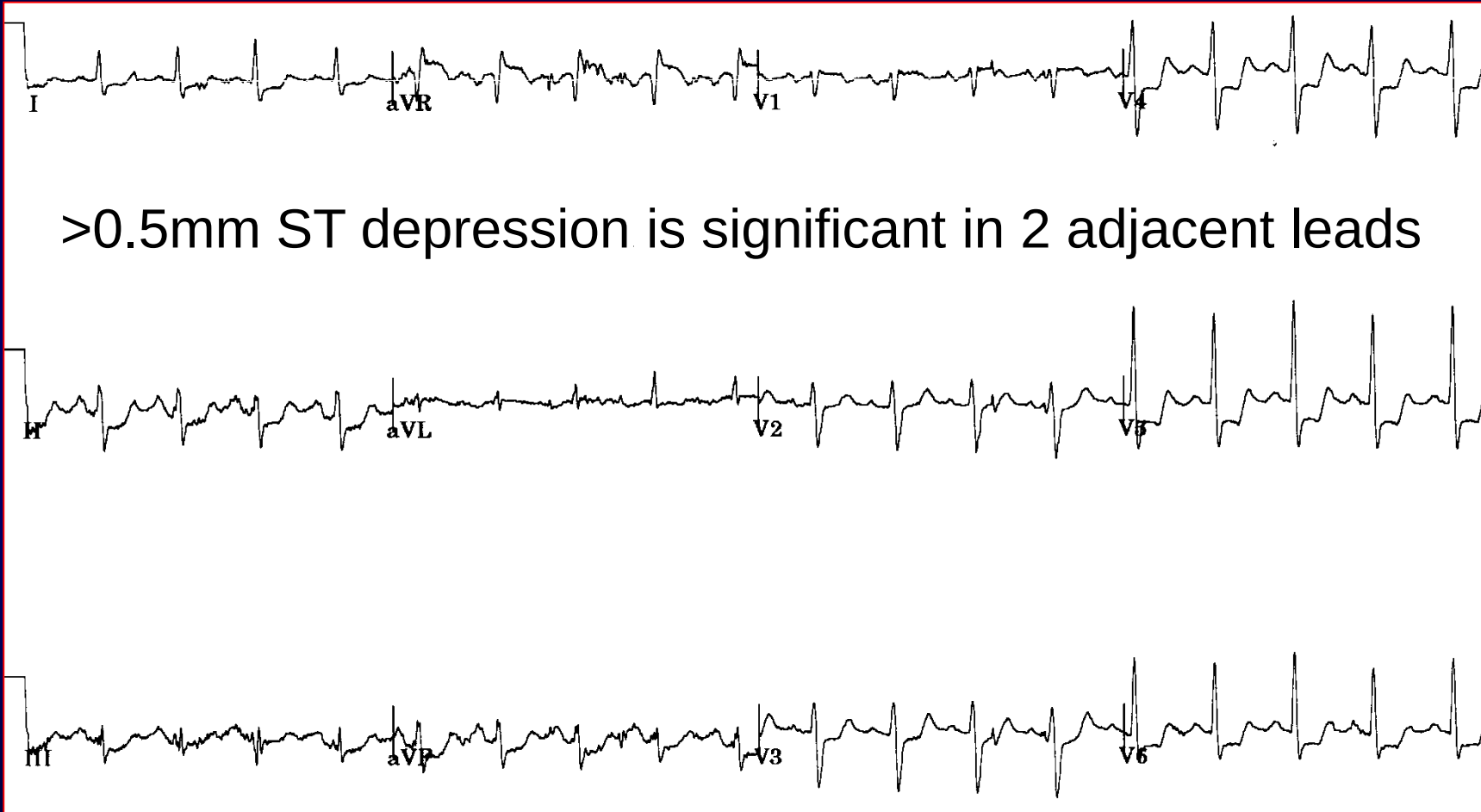
ST elevation

- >2 mm ST elevation in 2 contiguous leads in $v2-v5$
- ≥ 1 mm ST elevation in 2 contiguous limb leads or true apical leads – $v5 / 6$

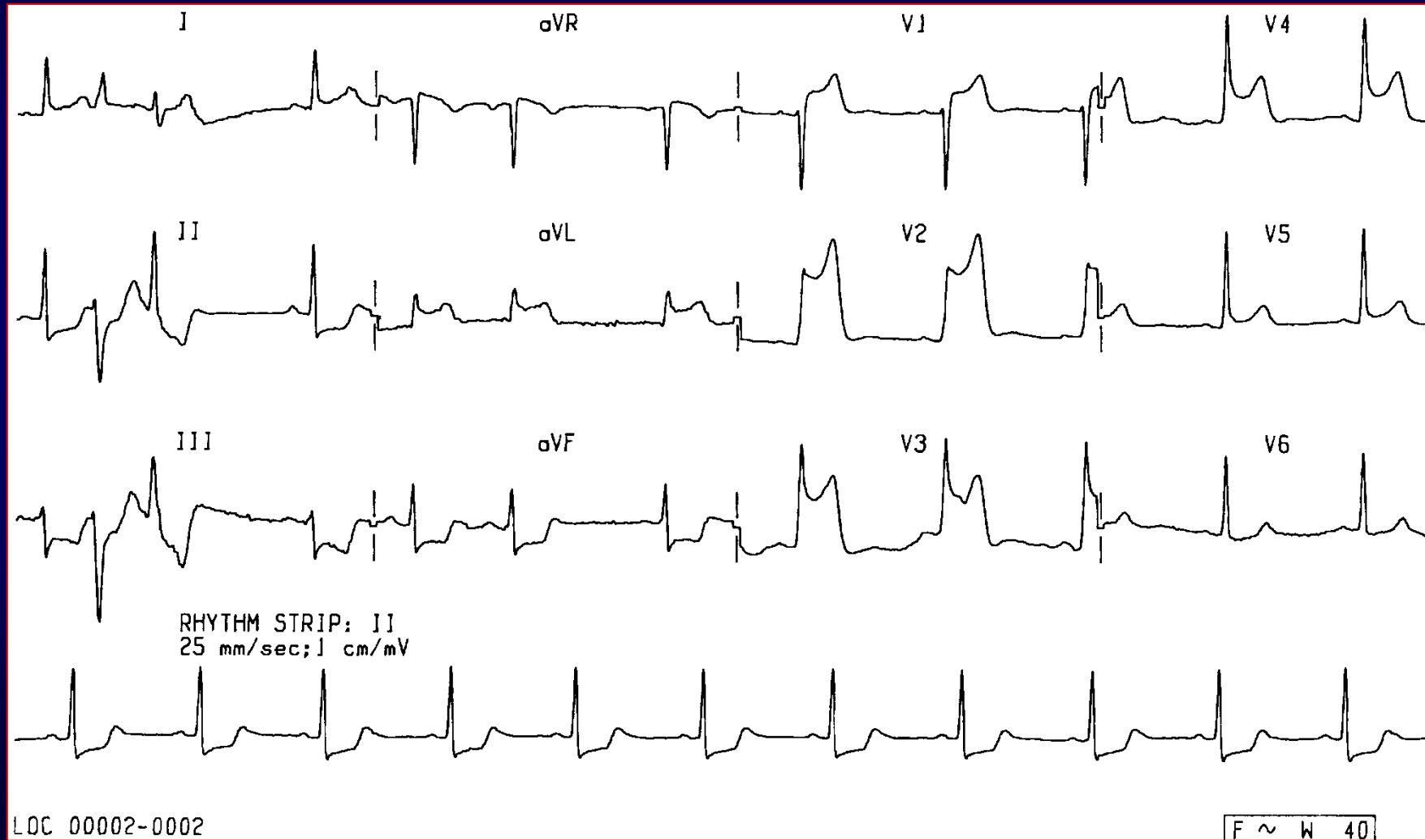
T wave inversion-why?



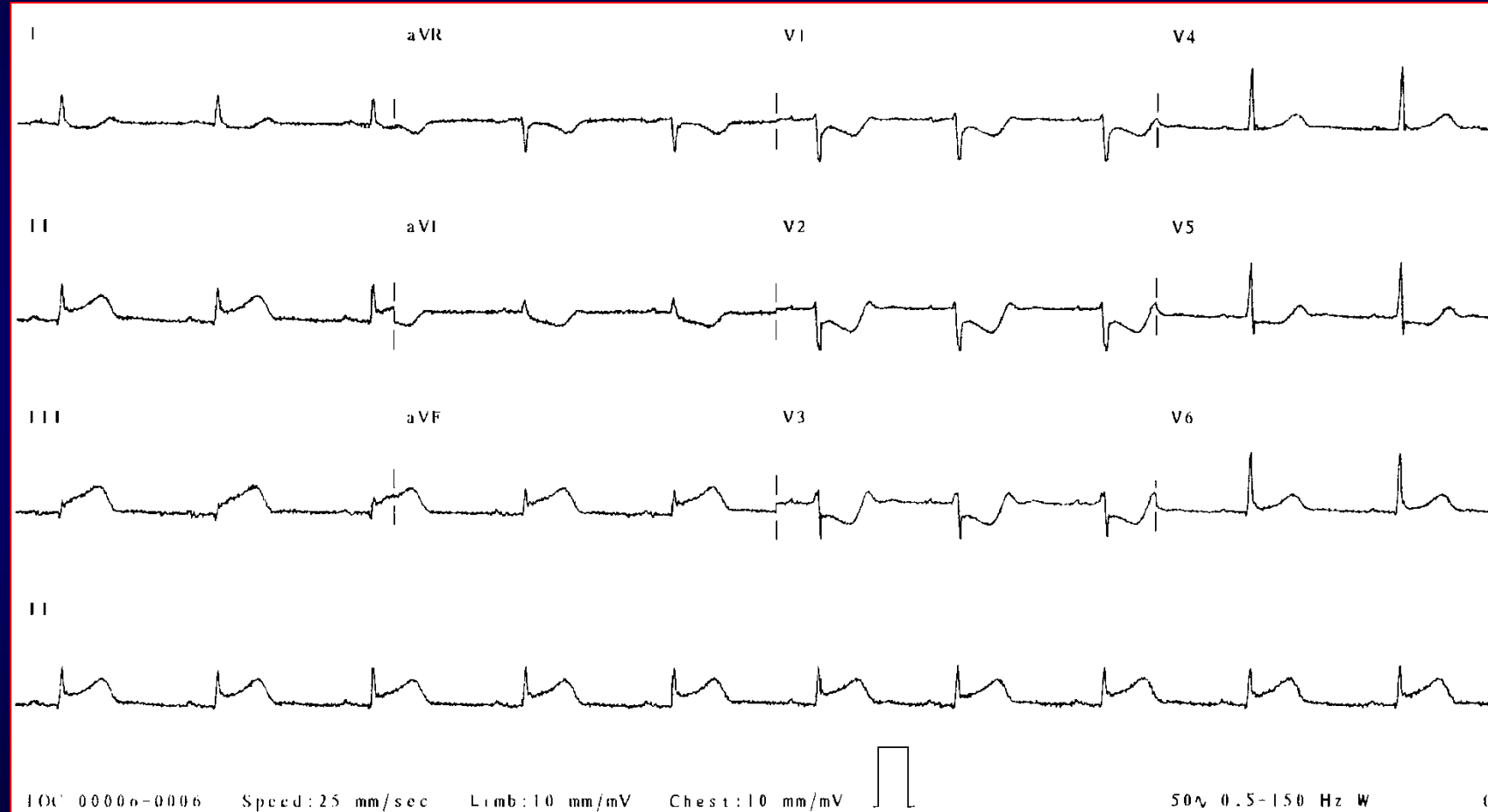
ST depression



MI



MI



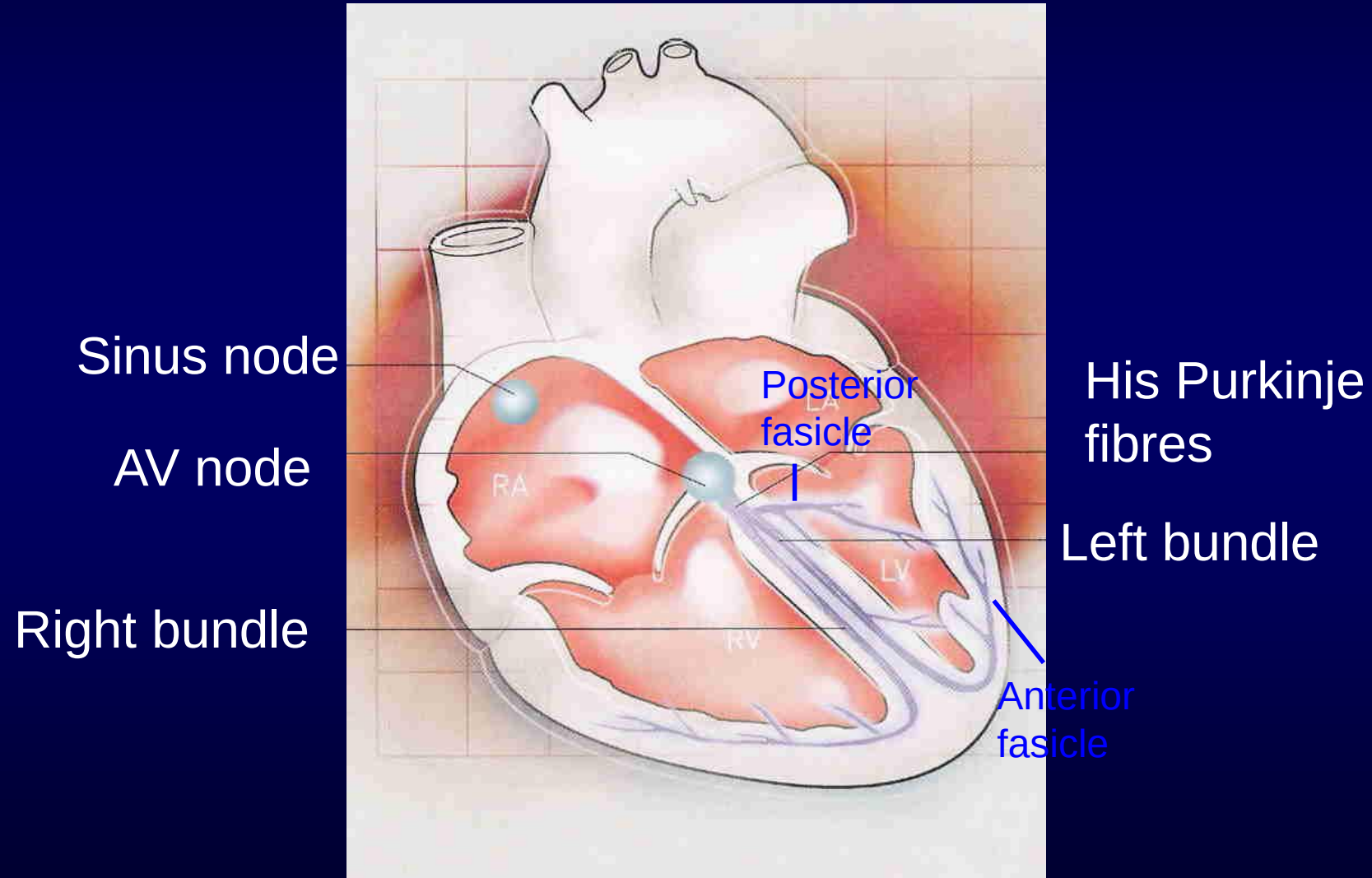
Is this an MI?



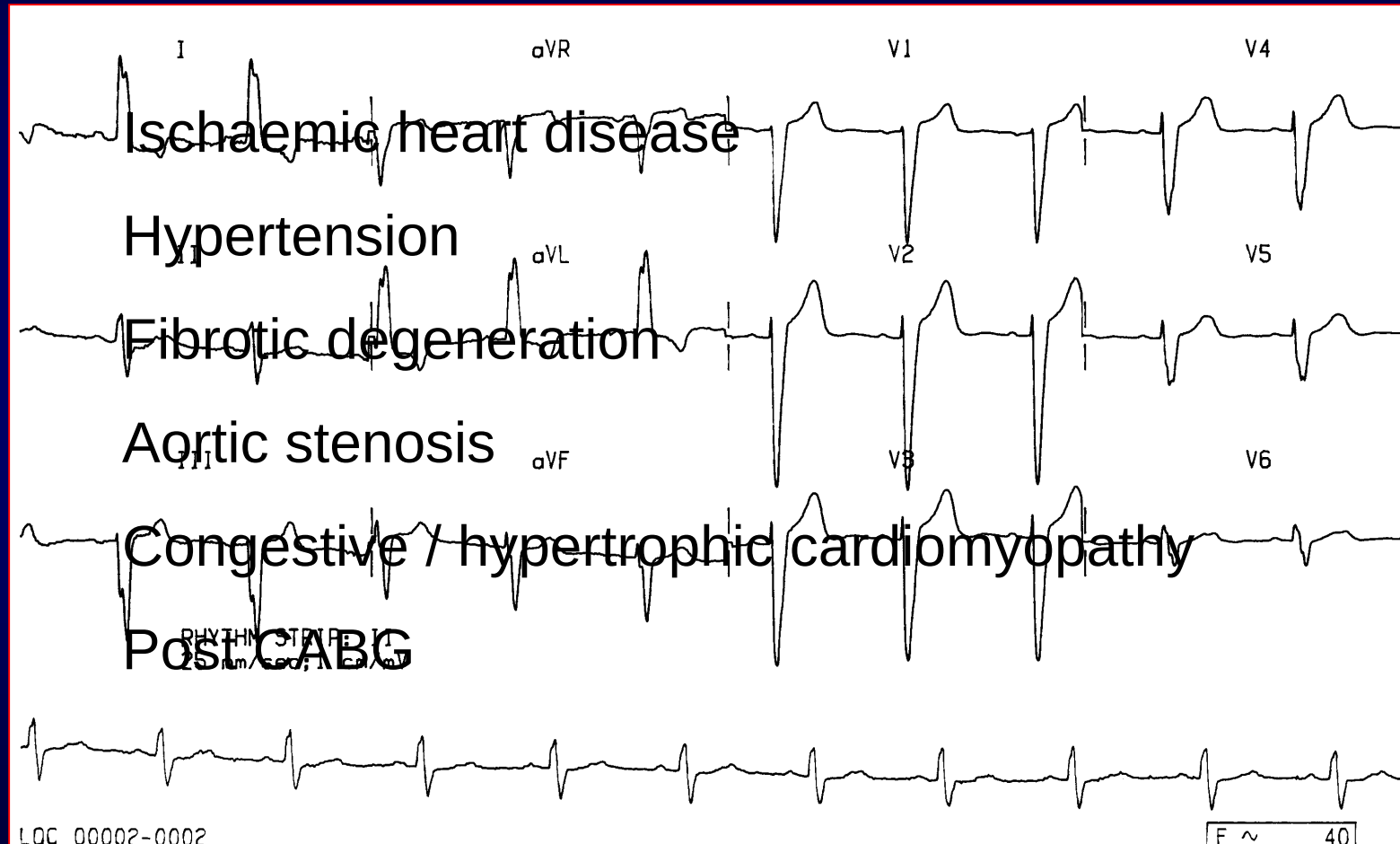
Treatment

- ST elevation
 - Aspirin, Ticagrelor/Clopidogrel, primary PCI or fibrinolysis/delayed secondary PCI
- Non ST elevation
 - Aspirin, Ticagrelor/Clopidogrel, low molecular weight heparin, PCI / CABG, statin. Angiography < 48 hours.

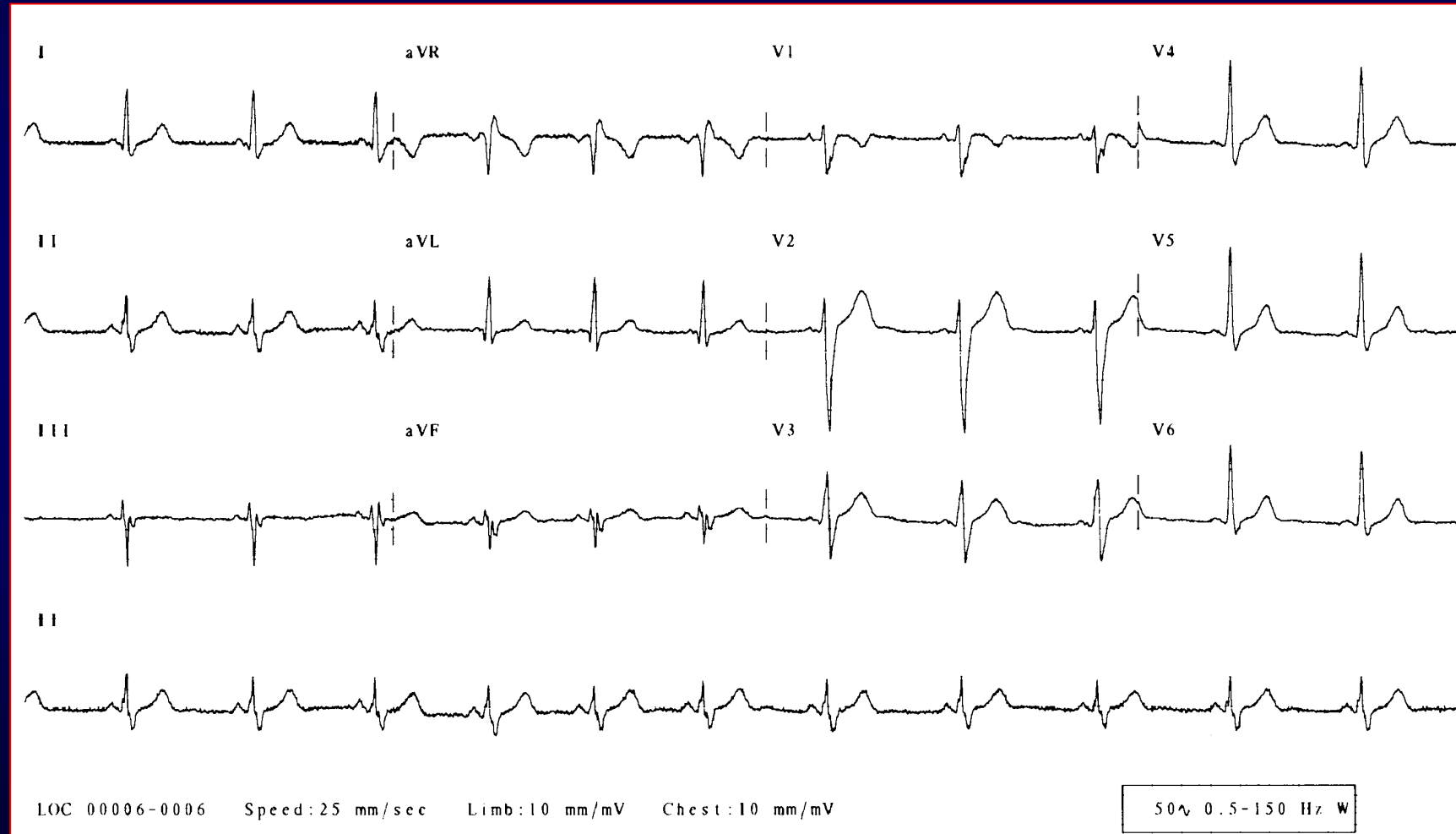
The Heart's Conducting System - The Bundles



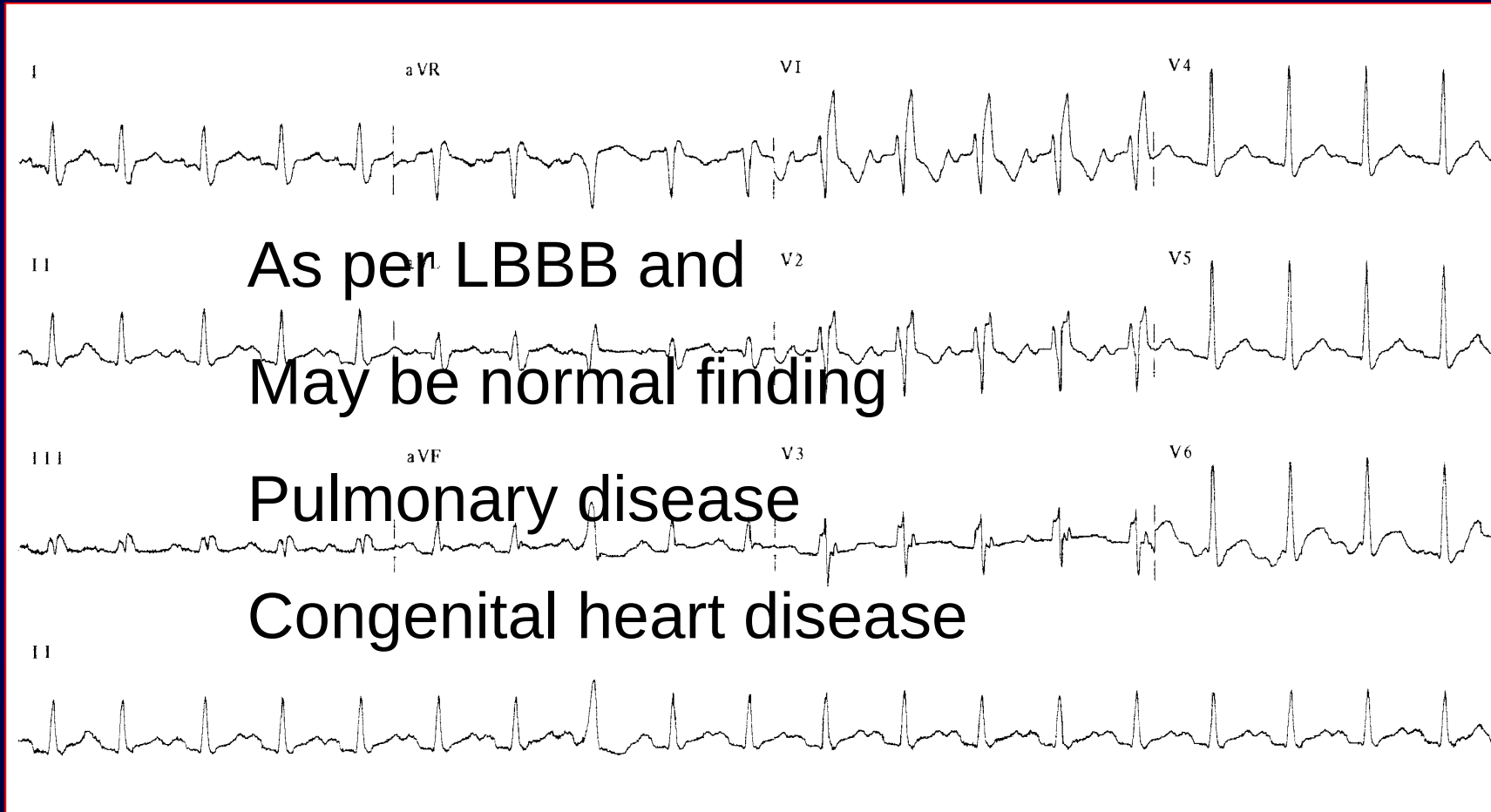
Left Bundle Branch Block



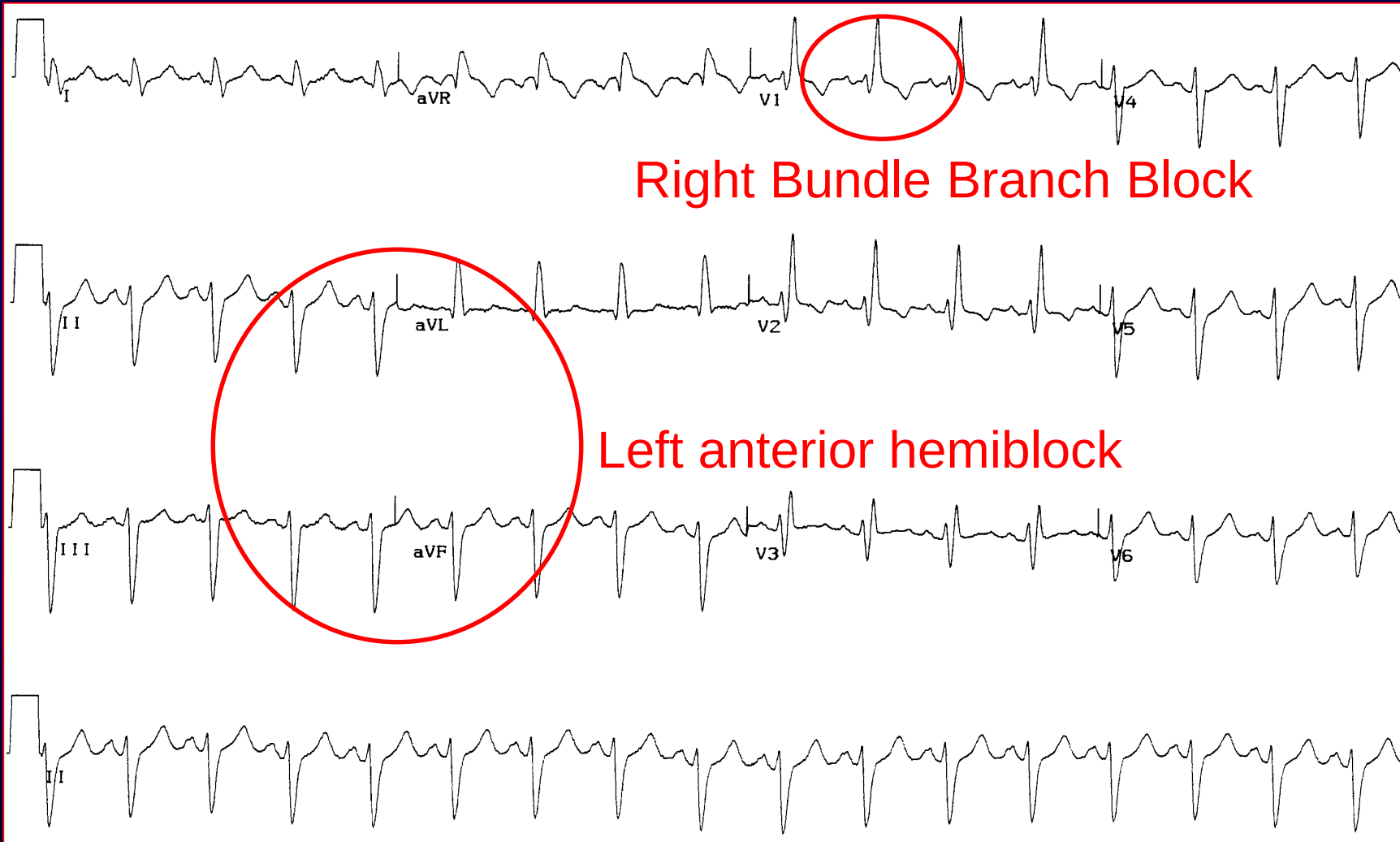
Partial RBBB



Right Bundle Branch Block



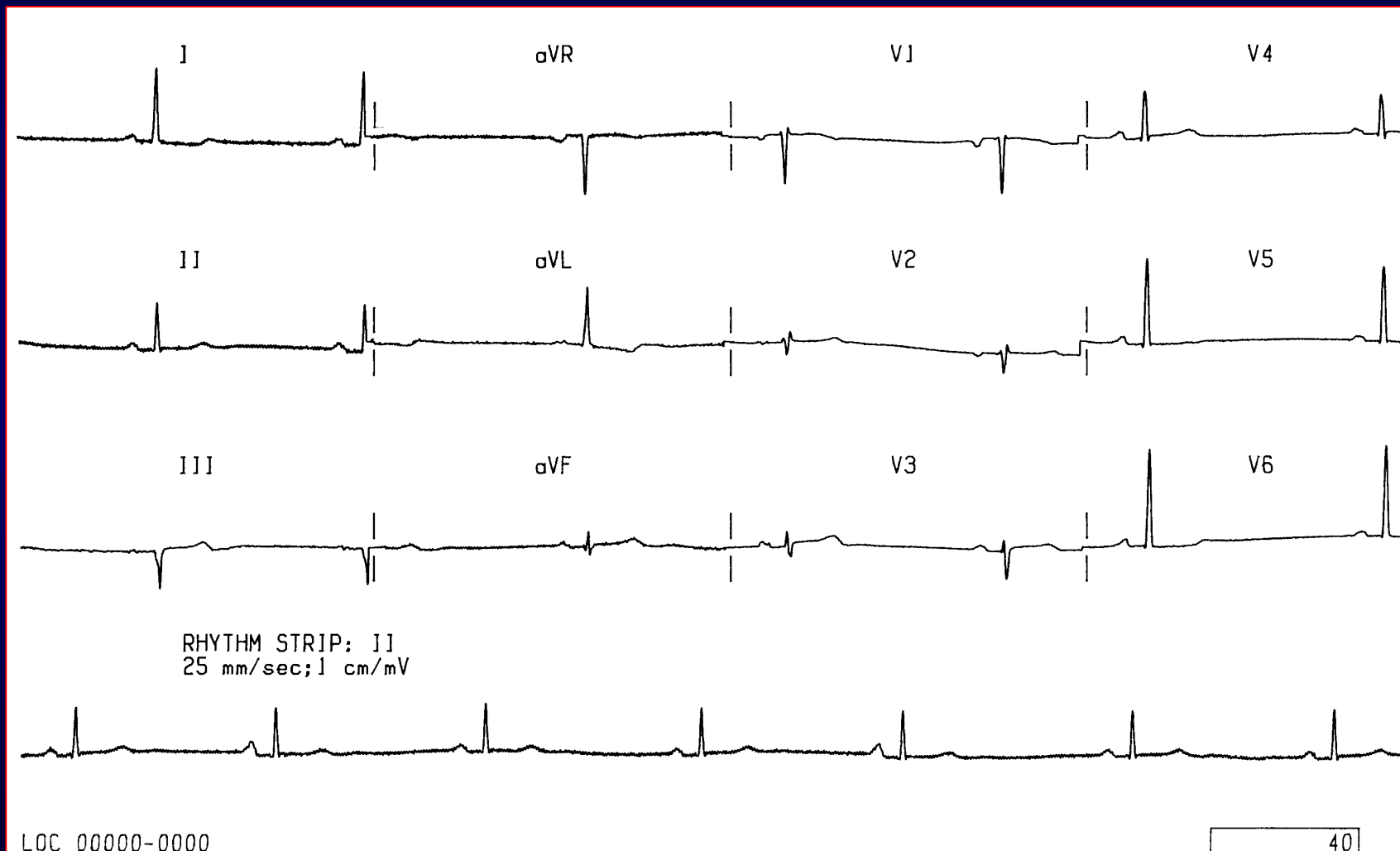
Bifascicular Block



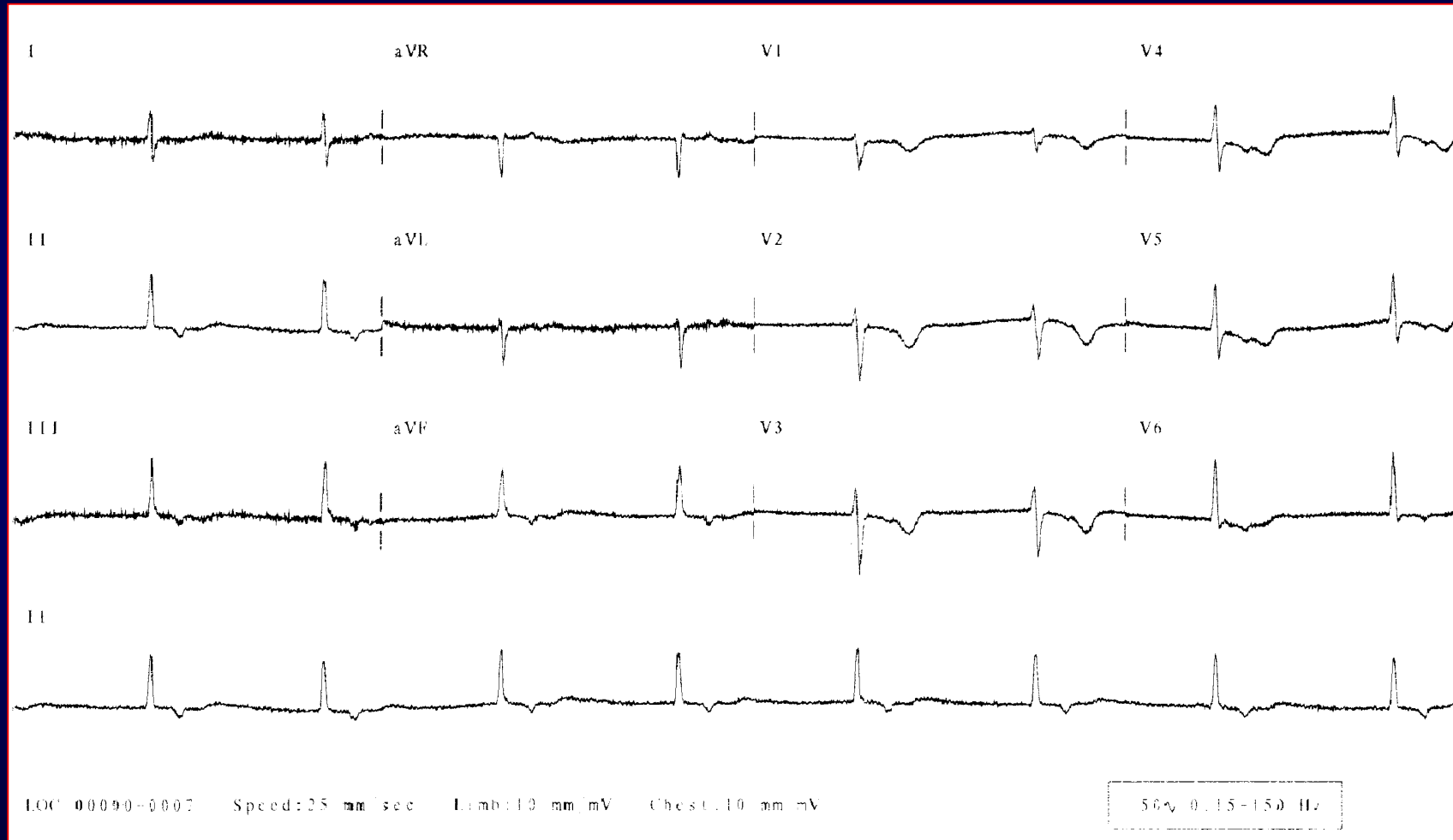
The Bradycardias (HR < 60)

- Is there AV association?
 - If no then either Mobitz II or CHB / high vagal tone with junctional escape rate > sinus rate
- Is the PR interval normal?
- Cause
 - High vagal tone / physiological, drugs, conducting tissue fibrosis / calcification, ischaemia, infection, infiltration, electrolytes , metabolic disease

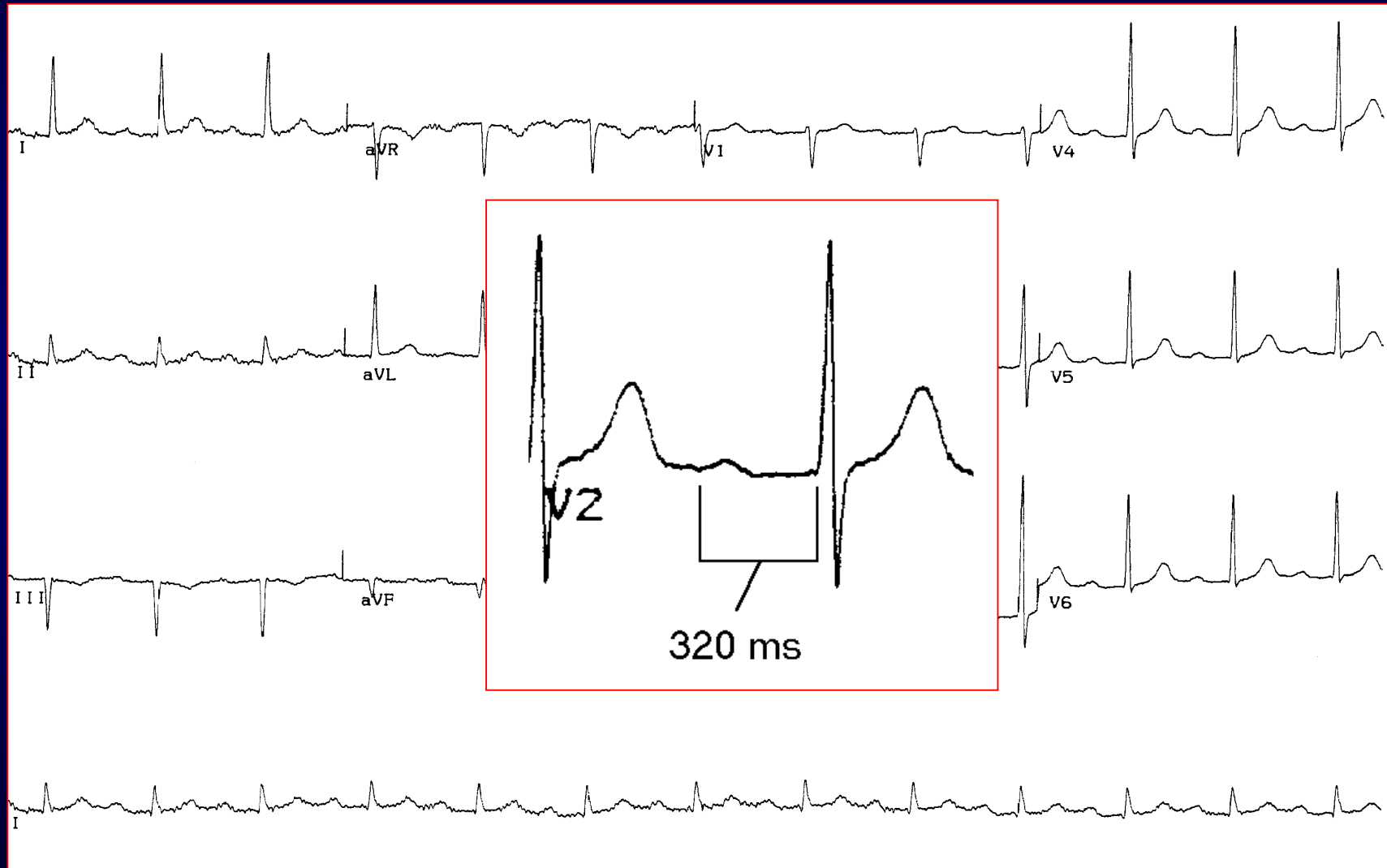
Sinus Bradycardia



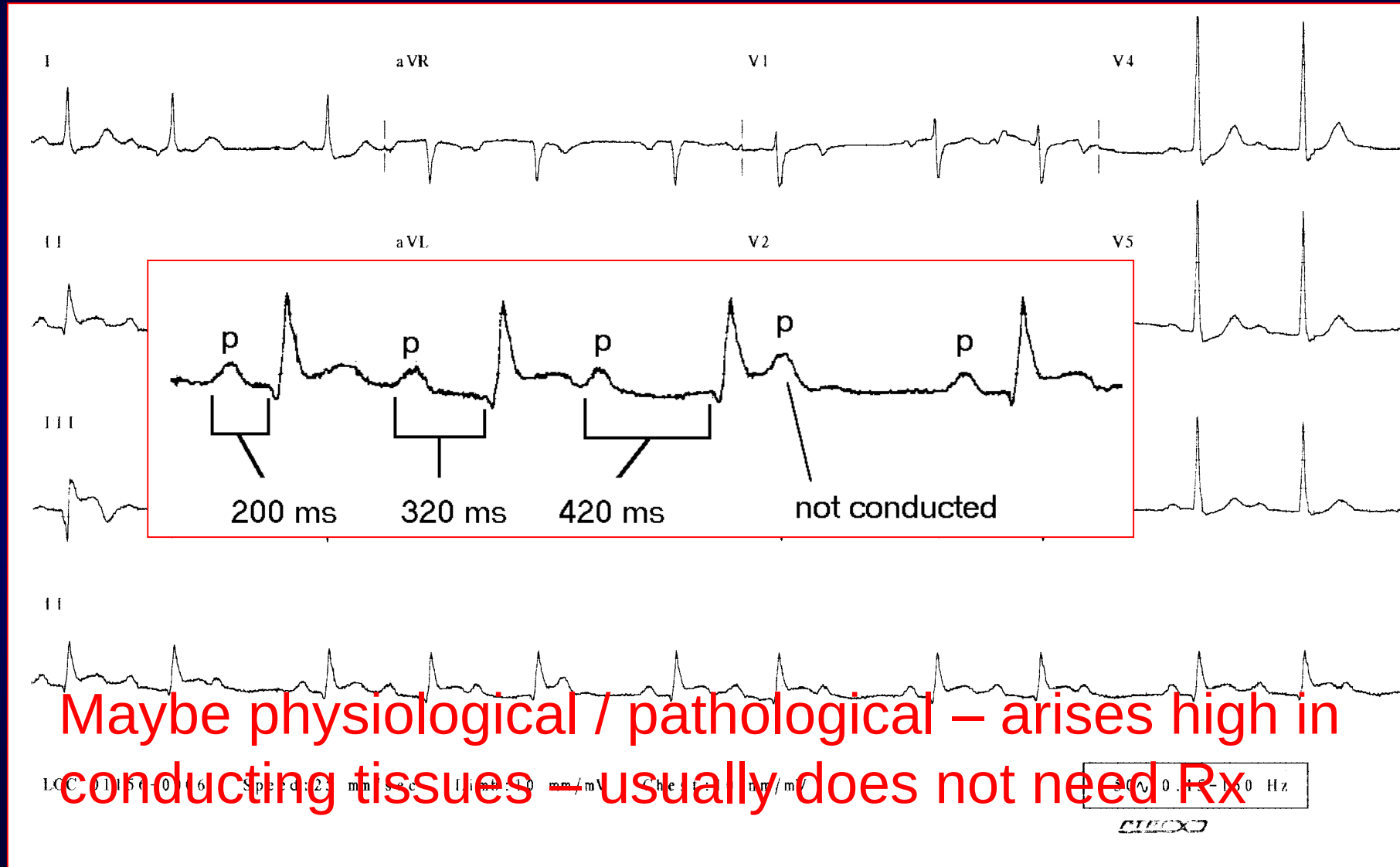
Junctional Bradycardia



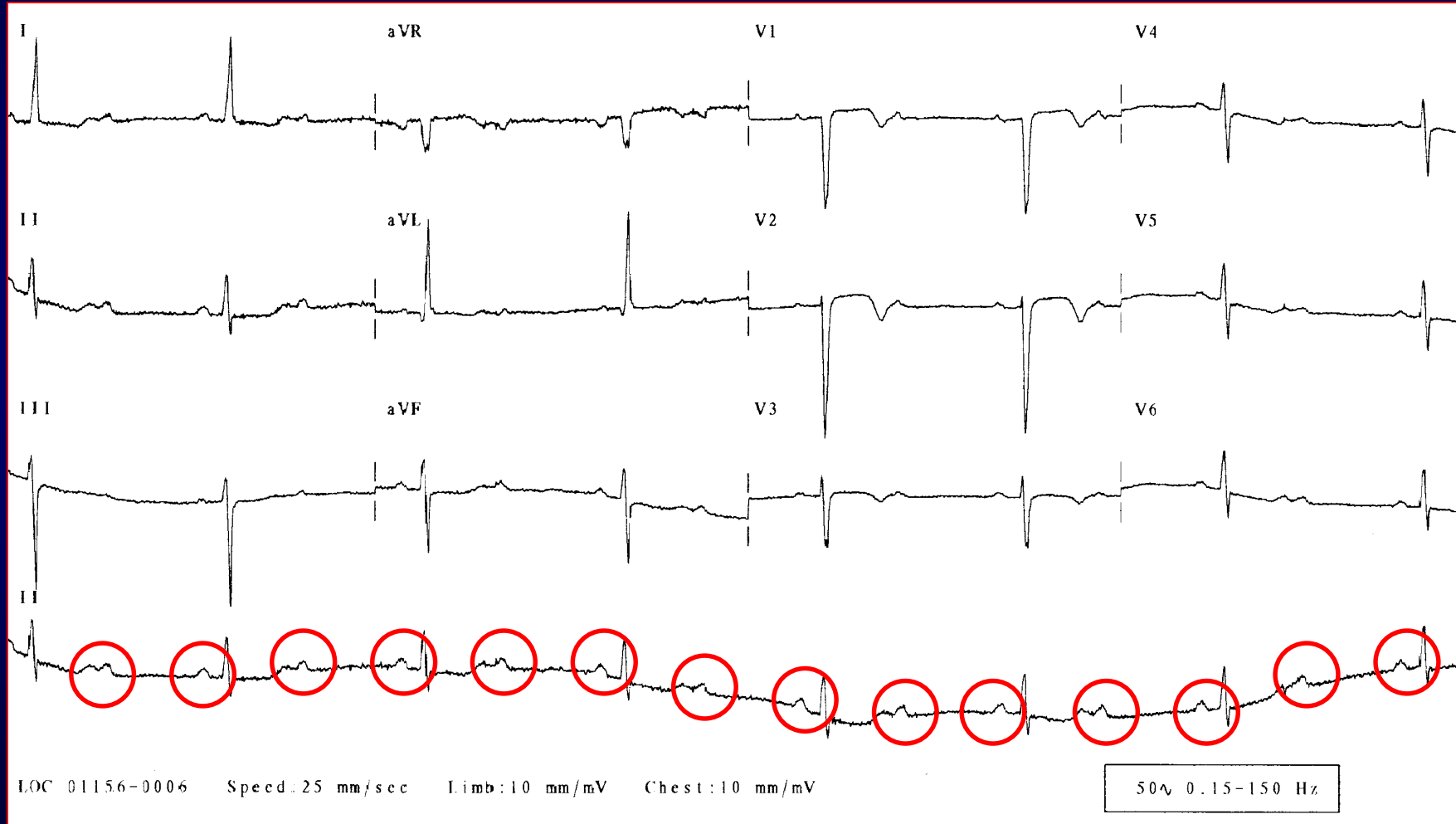
1st Degree AV Block



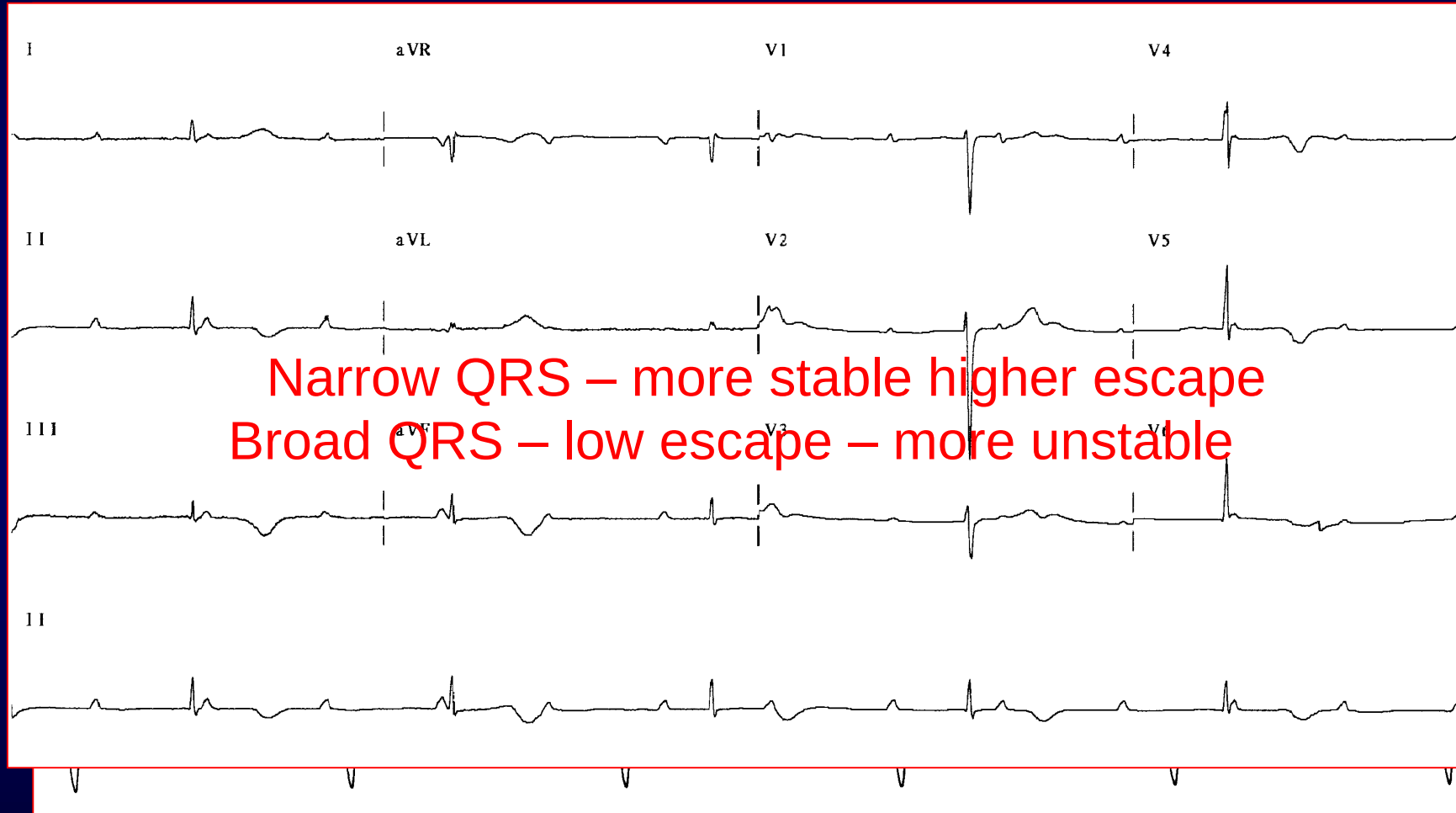
Wenckebach (Mobitz I)



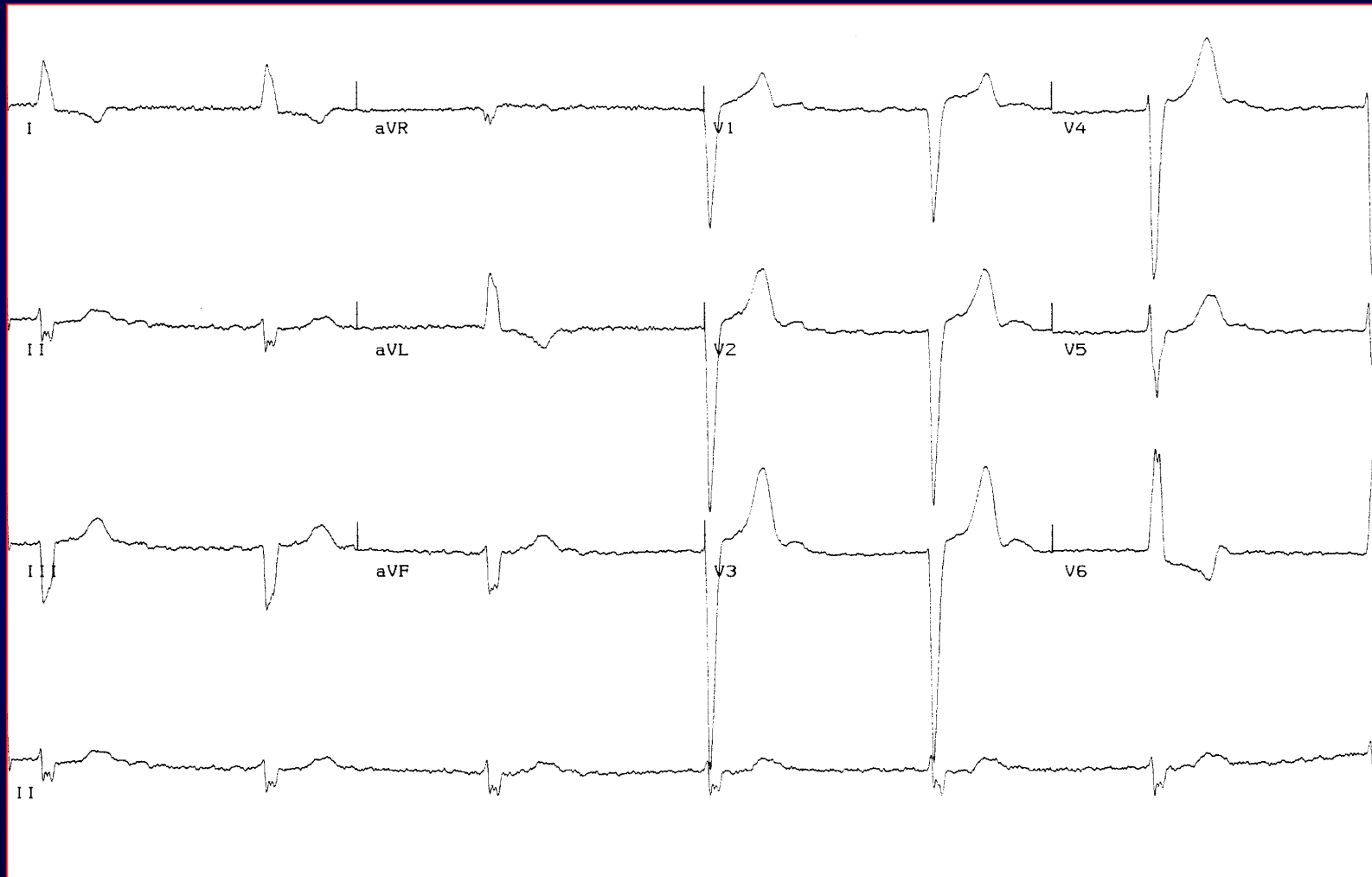
Mobitz II AV block



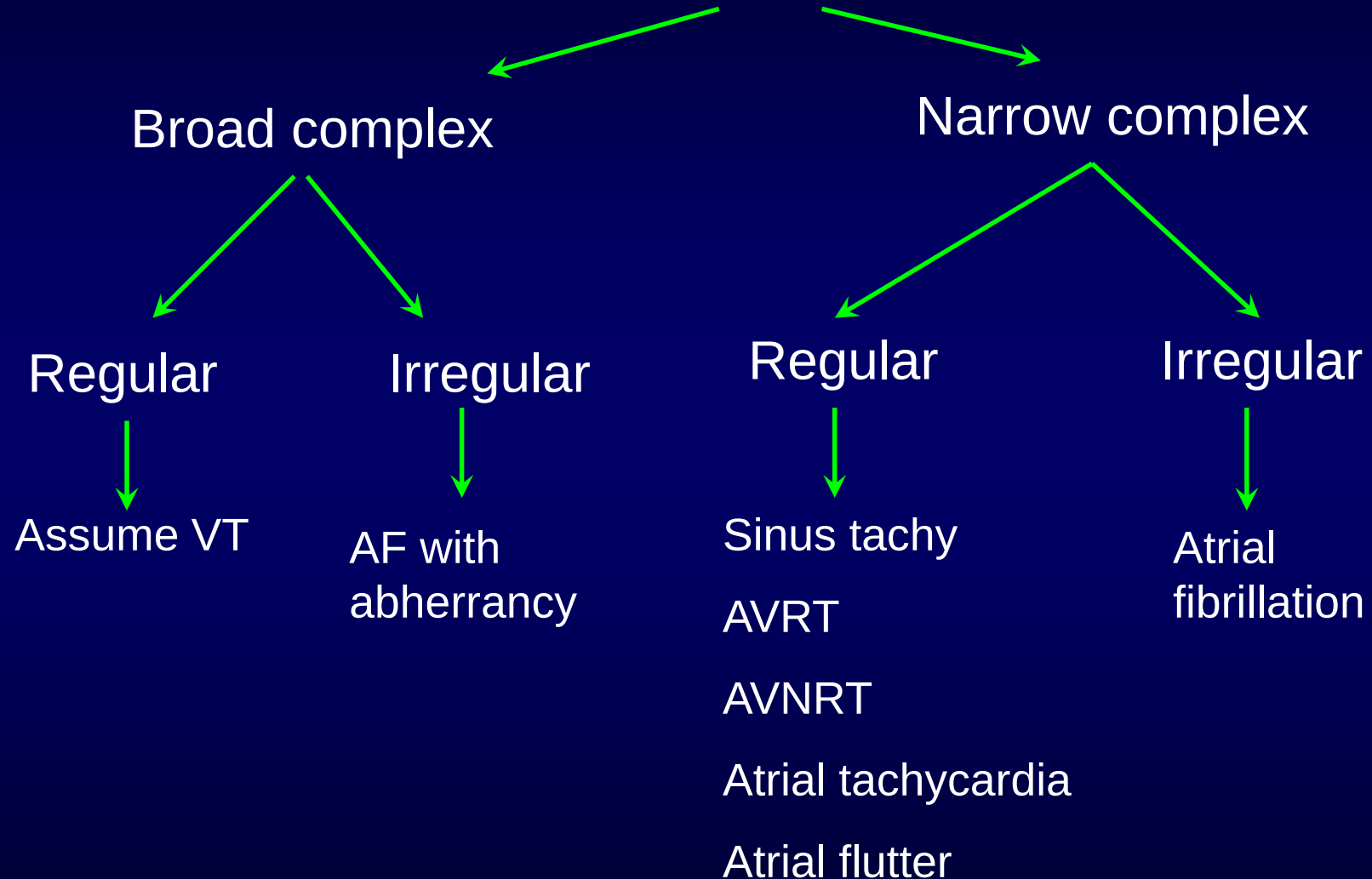
3rd Degree AVB – Complete Heart Block



AF and CHB



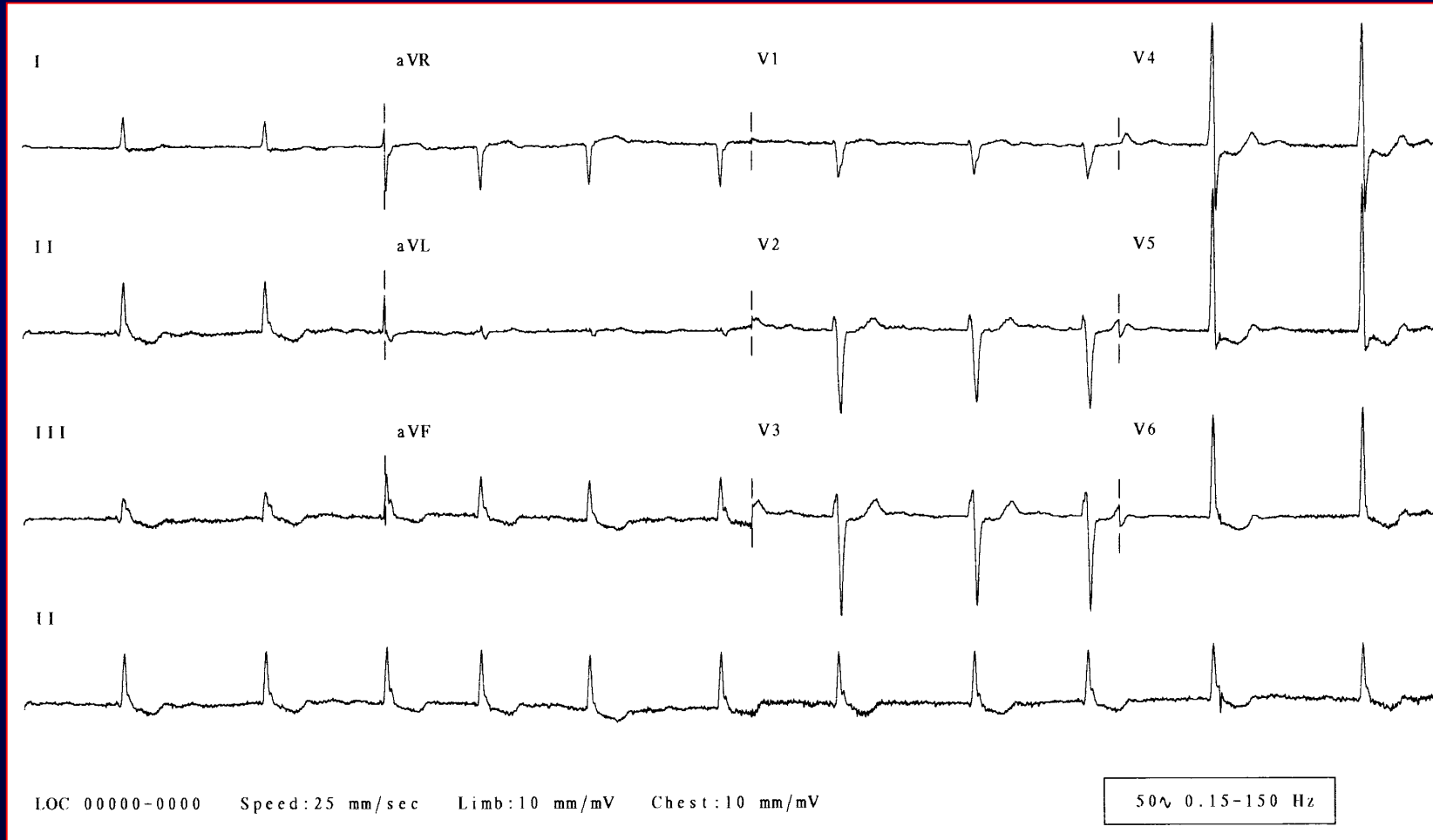
The tachycardias - HR > 100



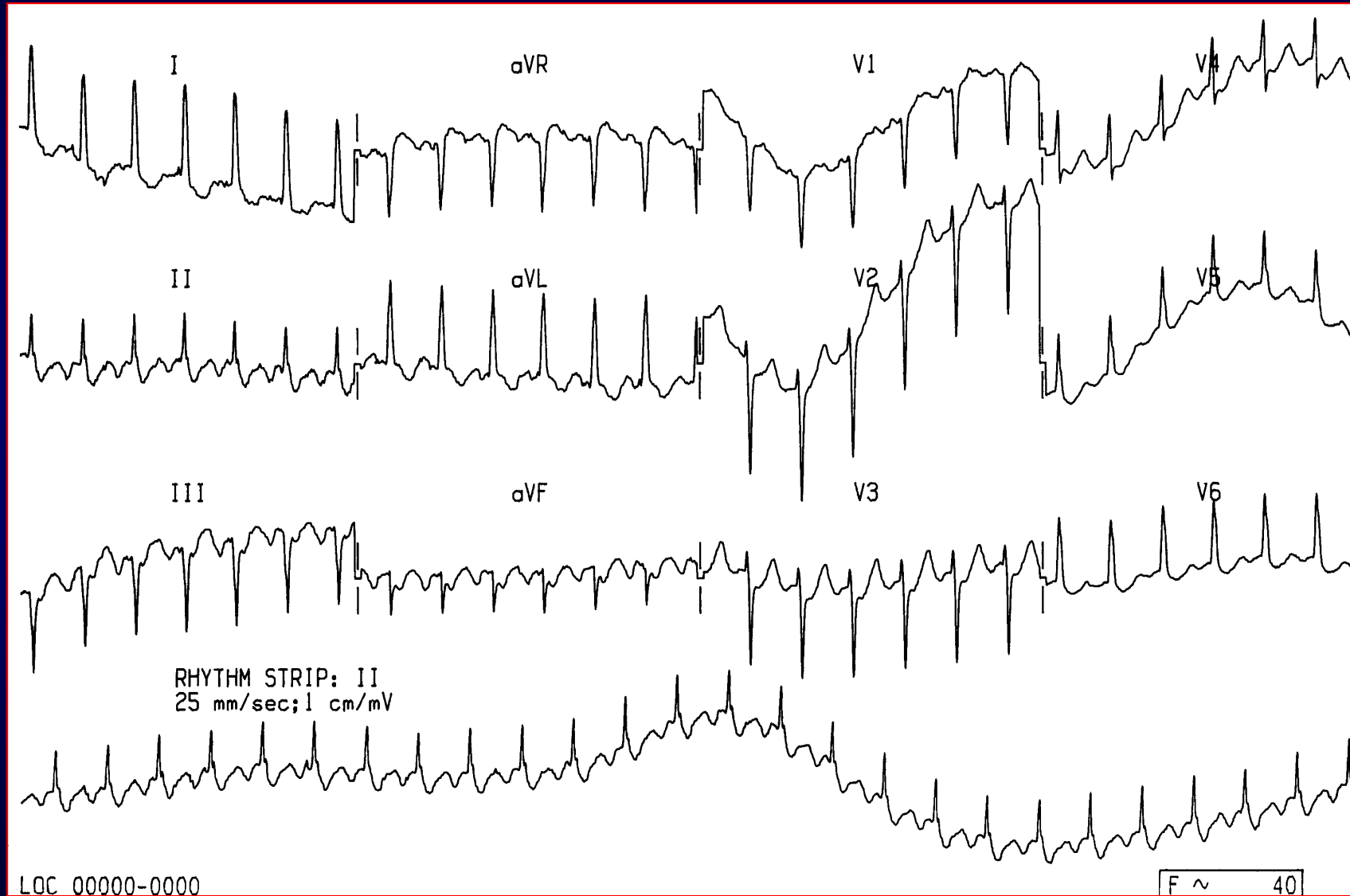
Sinus tachycardia



Atrial fibrillation



Atrial flutter

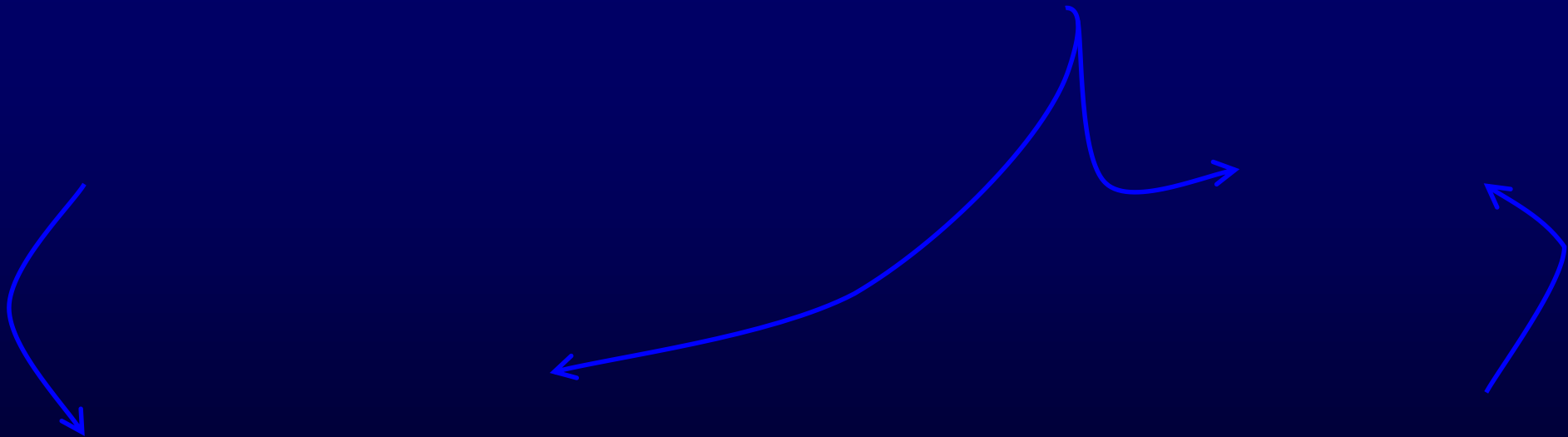


Treatment

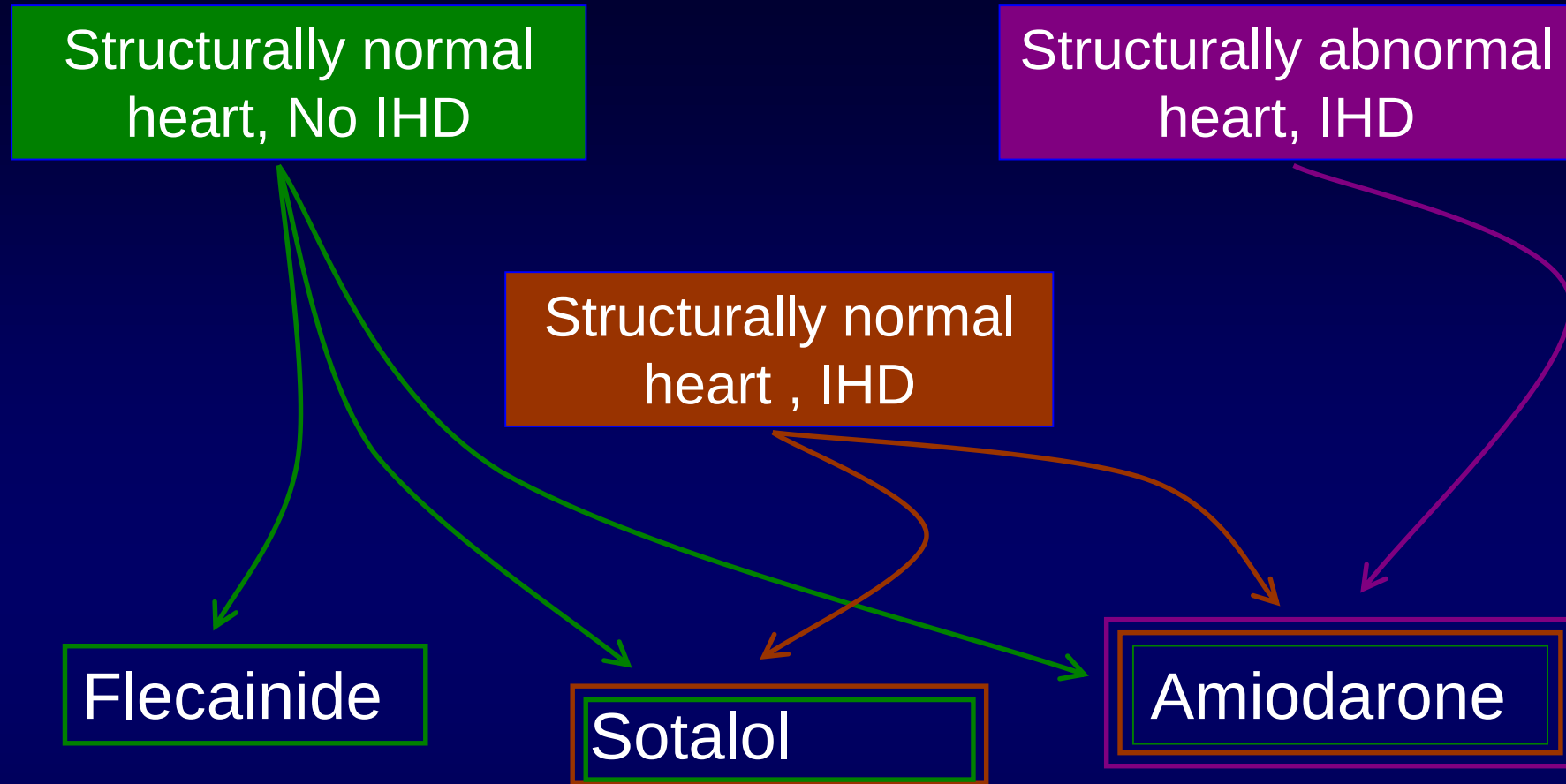
- Anticoagulate – Pradaxa vs warfarin
- Rate vs rhythm control
- Curative – ablation/PVI
 - Atrial flutter – >80% cured – may still get AF
 - Atrial fibrillation – >70% first attempt; high 80% 3rd attempt at PVI

Thromboembolic complications

Risk stratify-CHADSVASC



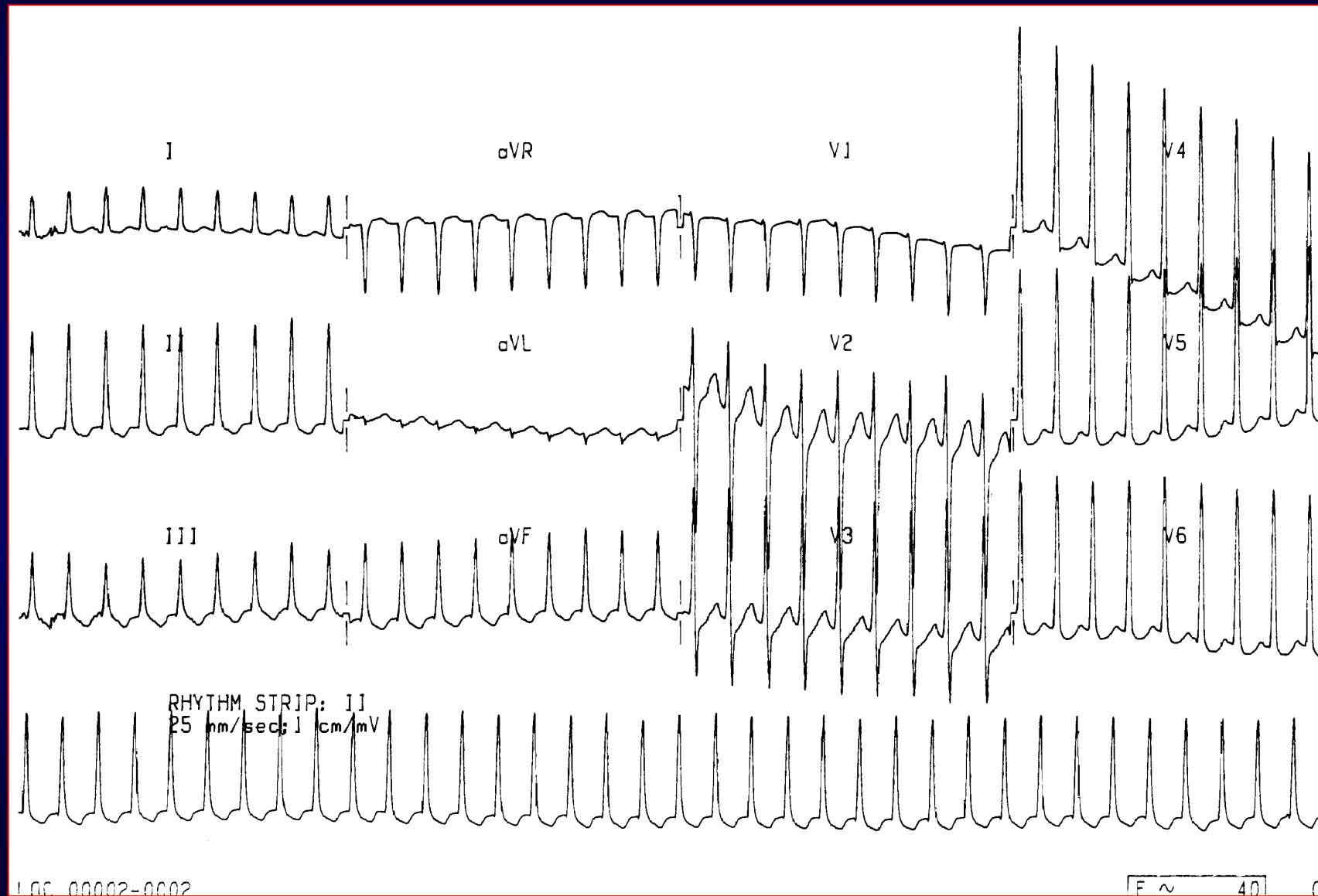
Anti-Arrhythmics



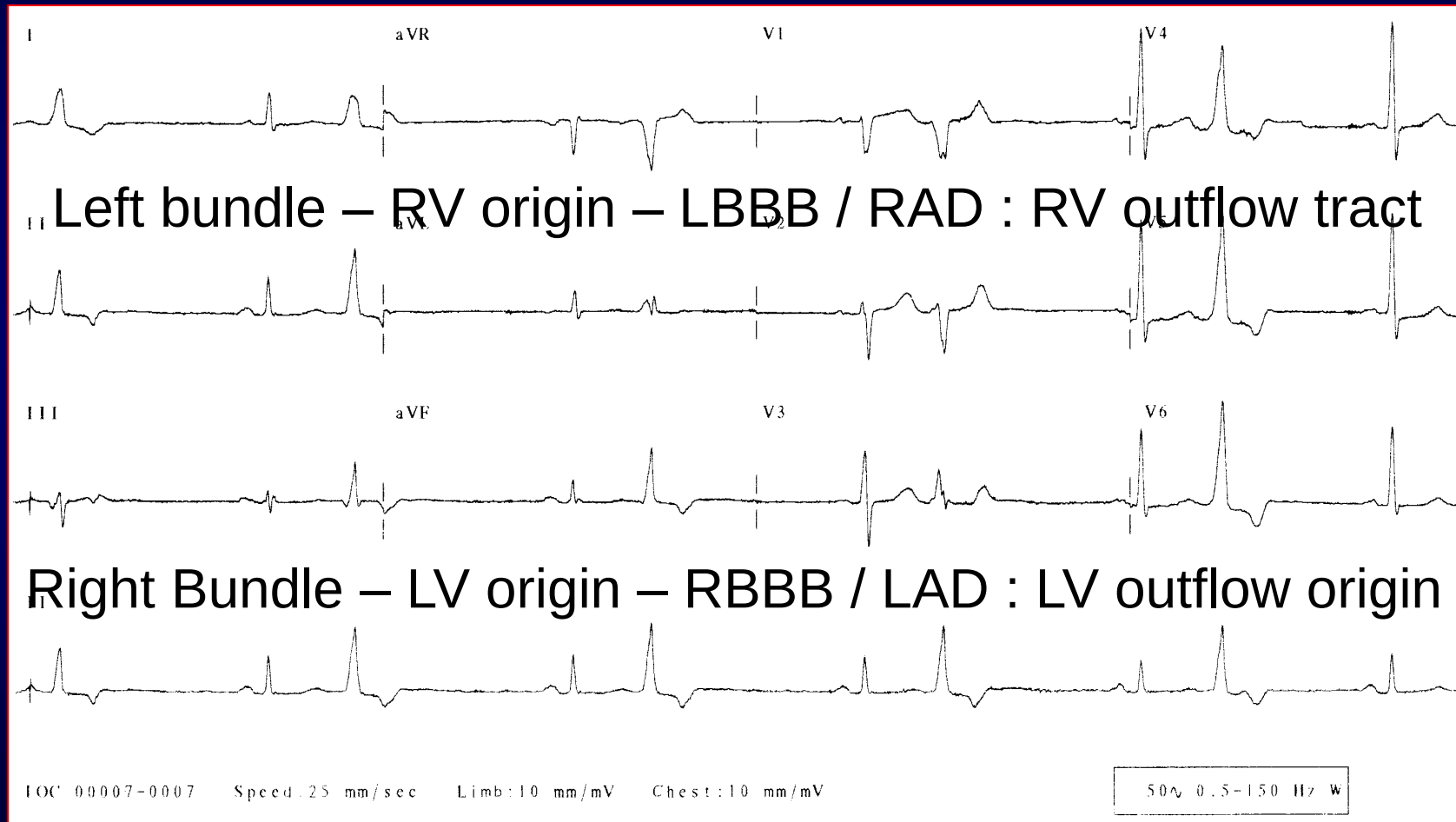
Structurally Abnormal Heart

- LV hypertrophy - >14mm
- LV dysfunction (LVEF <45%)
- Moderate or more valve disease

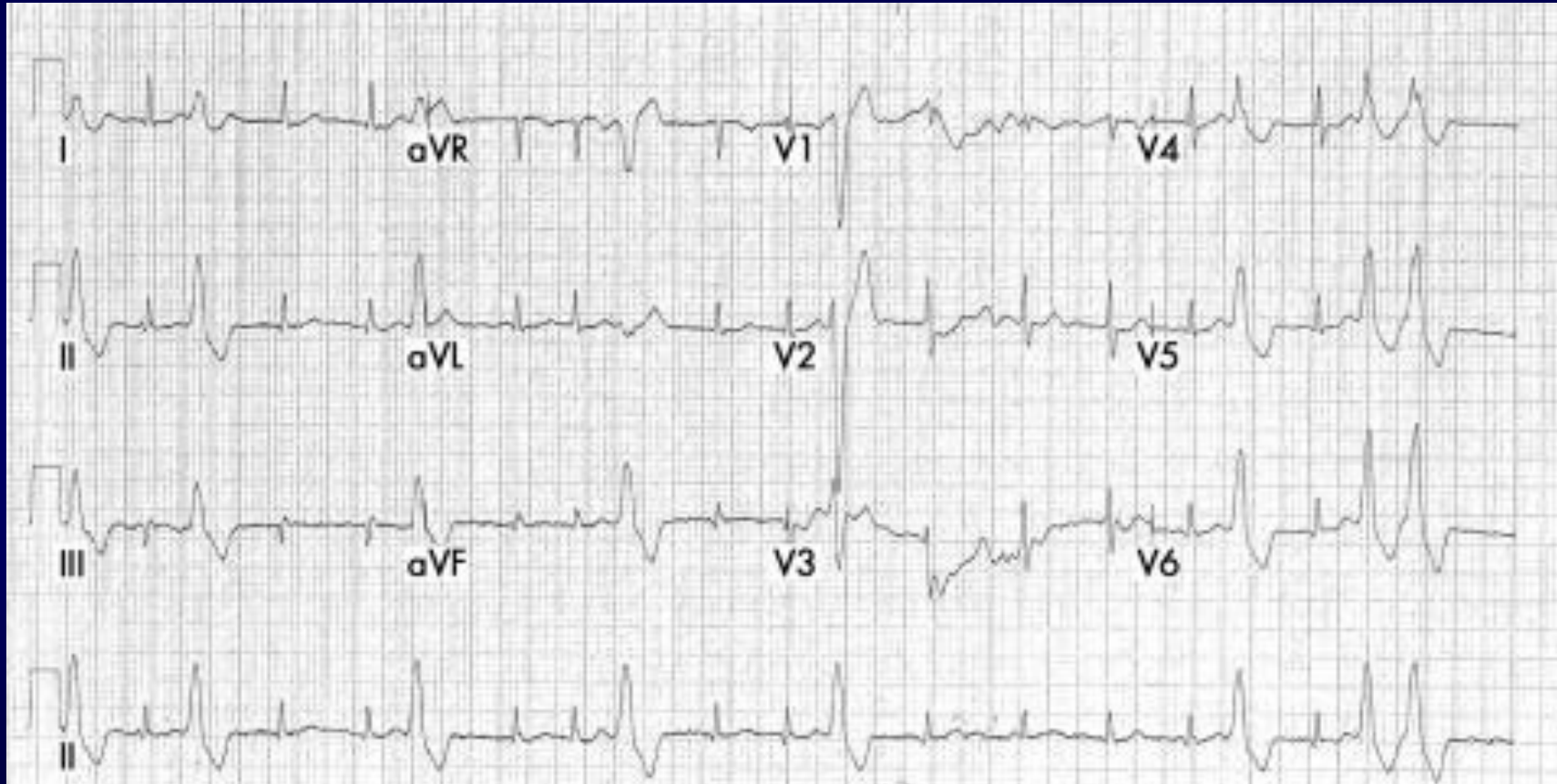
Paroxysmal SVT (AVNRT)



Ventricular Ectopics / Bigemini



RVOT ectopy



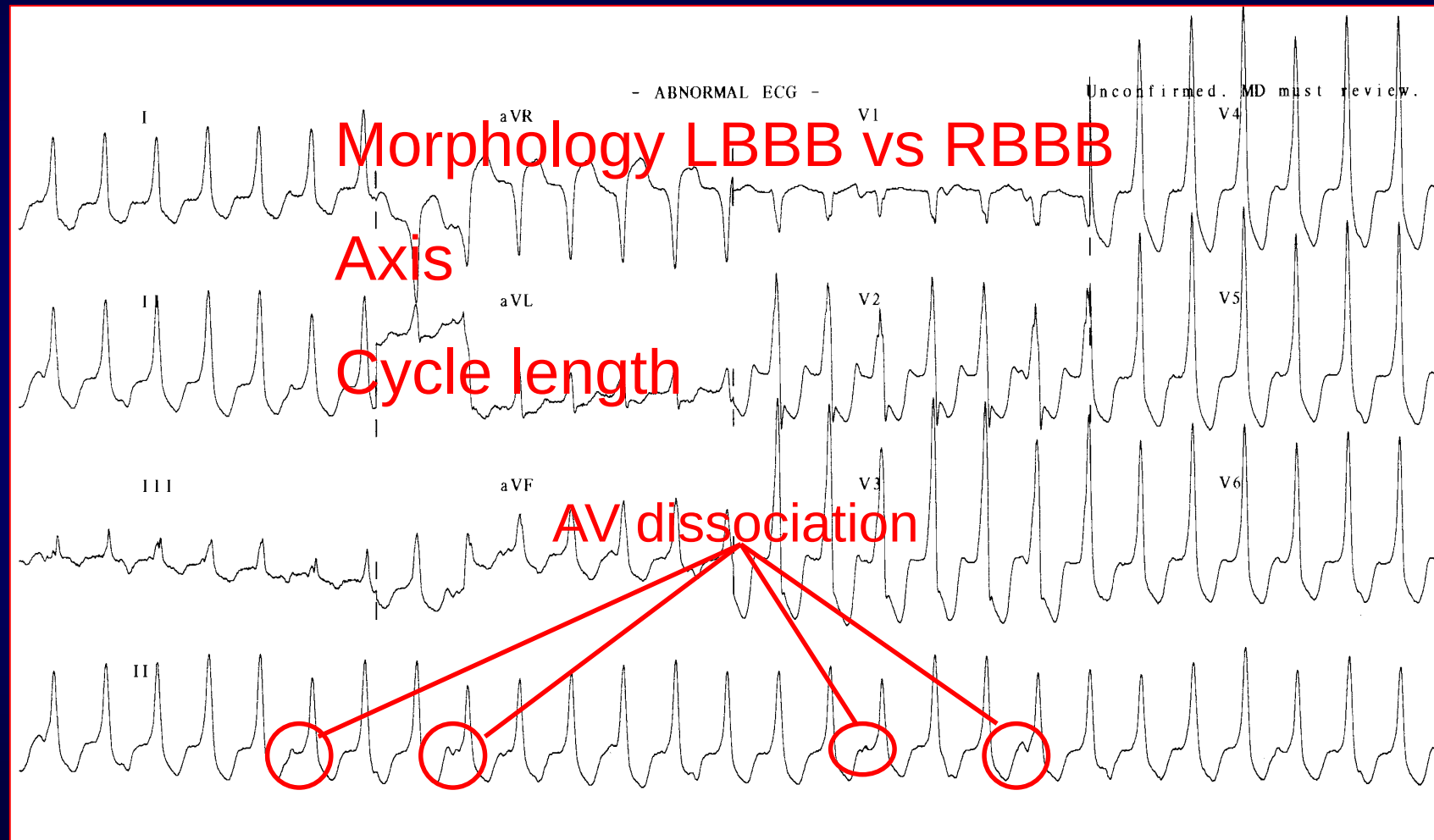
Premature ventricular complex-induced cardiomyopathy

- Several studies have demonstrated an association between frequent PVCs and a potentially reversible cardiomyopathy, which in selected patients resolves after catheter ablation. The number of PVCs/24h that is associated with impaired LV function has generally been reported at burdens above 15 – 25% of the total cardiac beats, though this may be as low as 10%.
- However, since PVCs may be the result of an underlying cardiomyopathy, it may be difficult to prospectively determine which of these sequences is operative in a given patient.
- Importantly, the vast majority of patients with frequent PVCs will not go on to develop cardiomyopathy but currently available data do not allow for accurate risk prediction.
- A recent longitudinal study followed 239 patients with frequent PVCs (>1000 per day) and no SHD [echo and magnetic resonance imaging (MRI)] for 5.6 years with no adverse cardiac events and no decline in overall LV ejection fraction (LVEF).

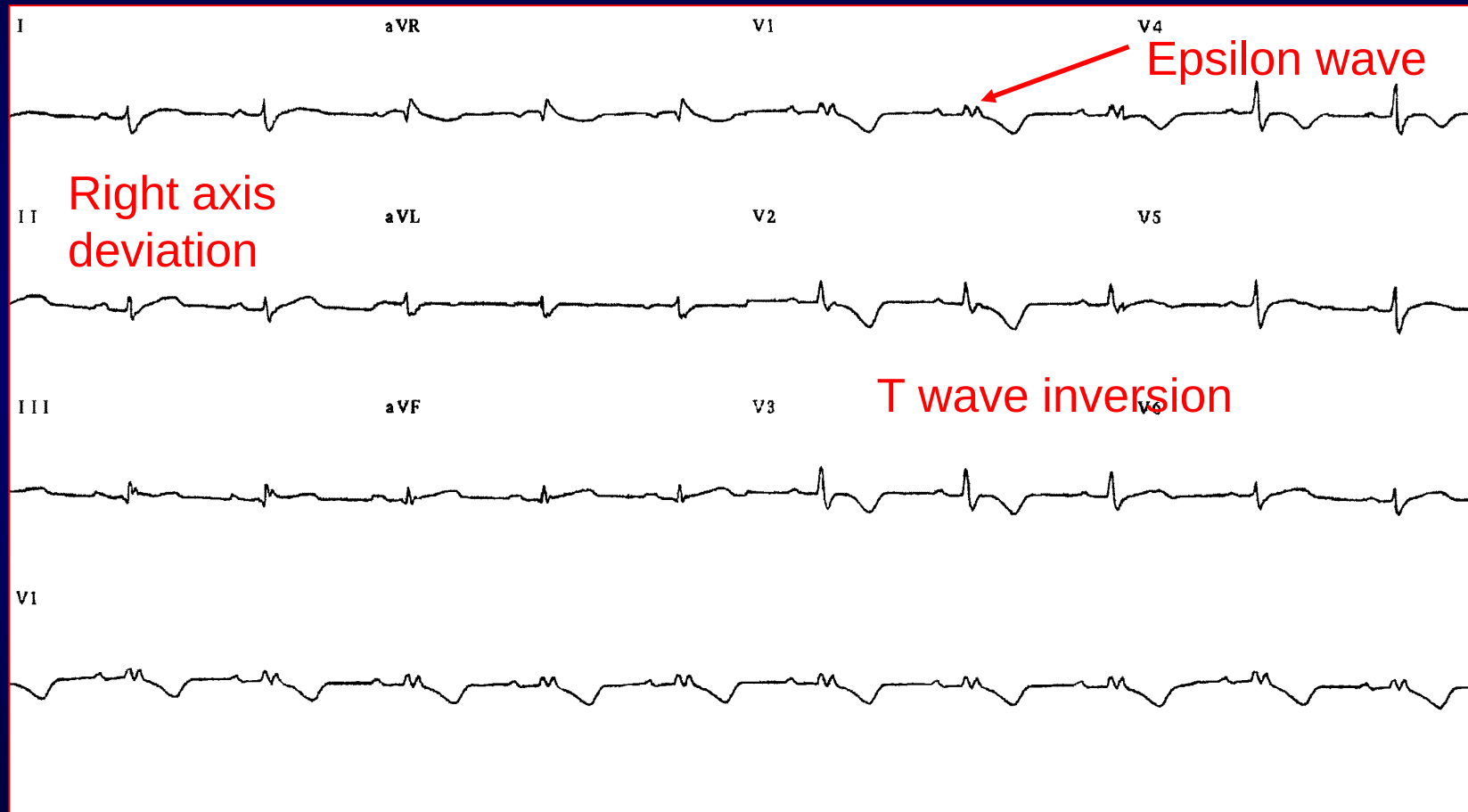
Features suggestive of VT

- AV dissociation
- Positive concordance
- Fusion beats — supraventricular beats getting through
- Capture beats — VT starting
- Wayward axis
- Very broad complex ($>140\text{msec}$)
- Same morphology as VEs / change from SR
- Previous MI

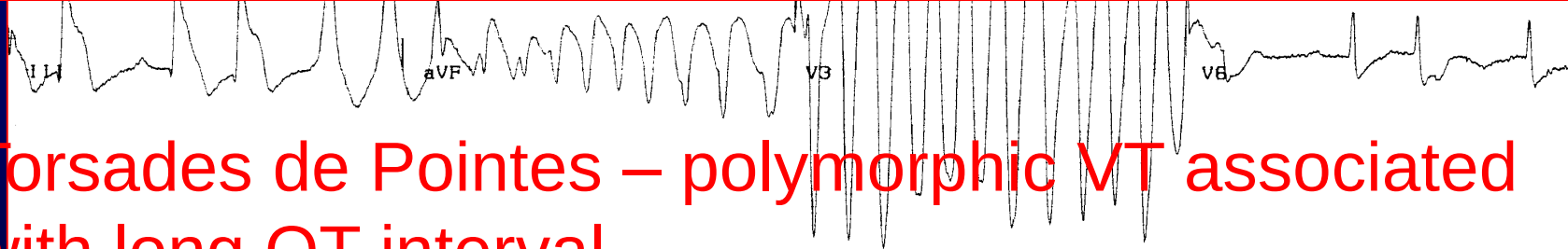
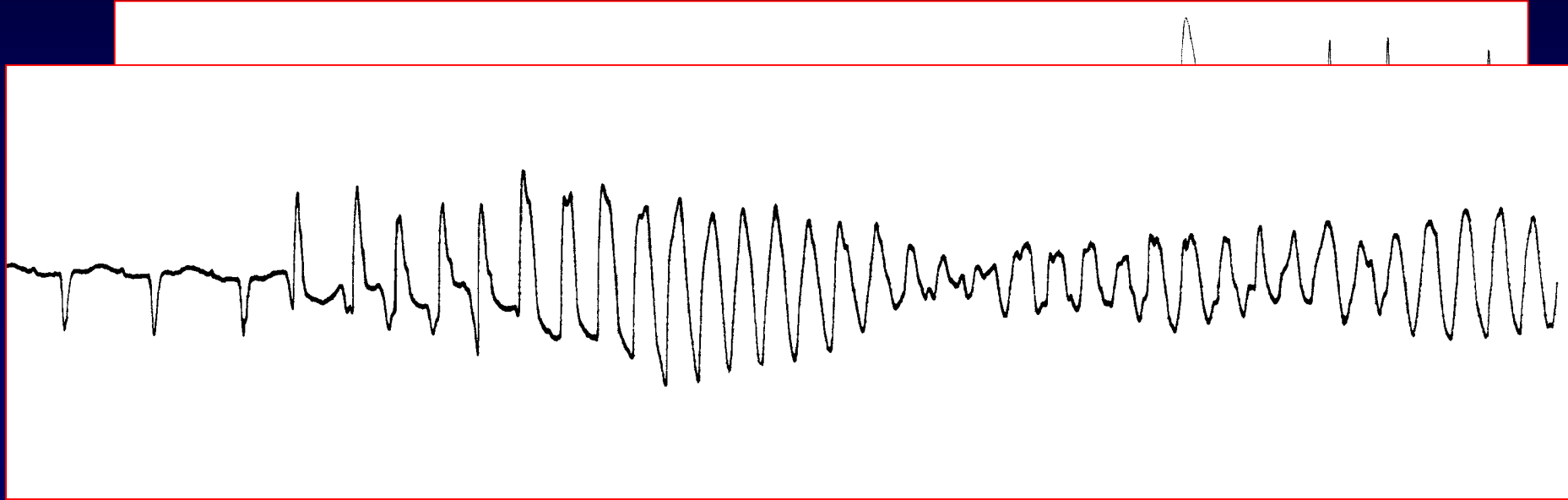
Monomorphic VT



ARVD



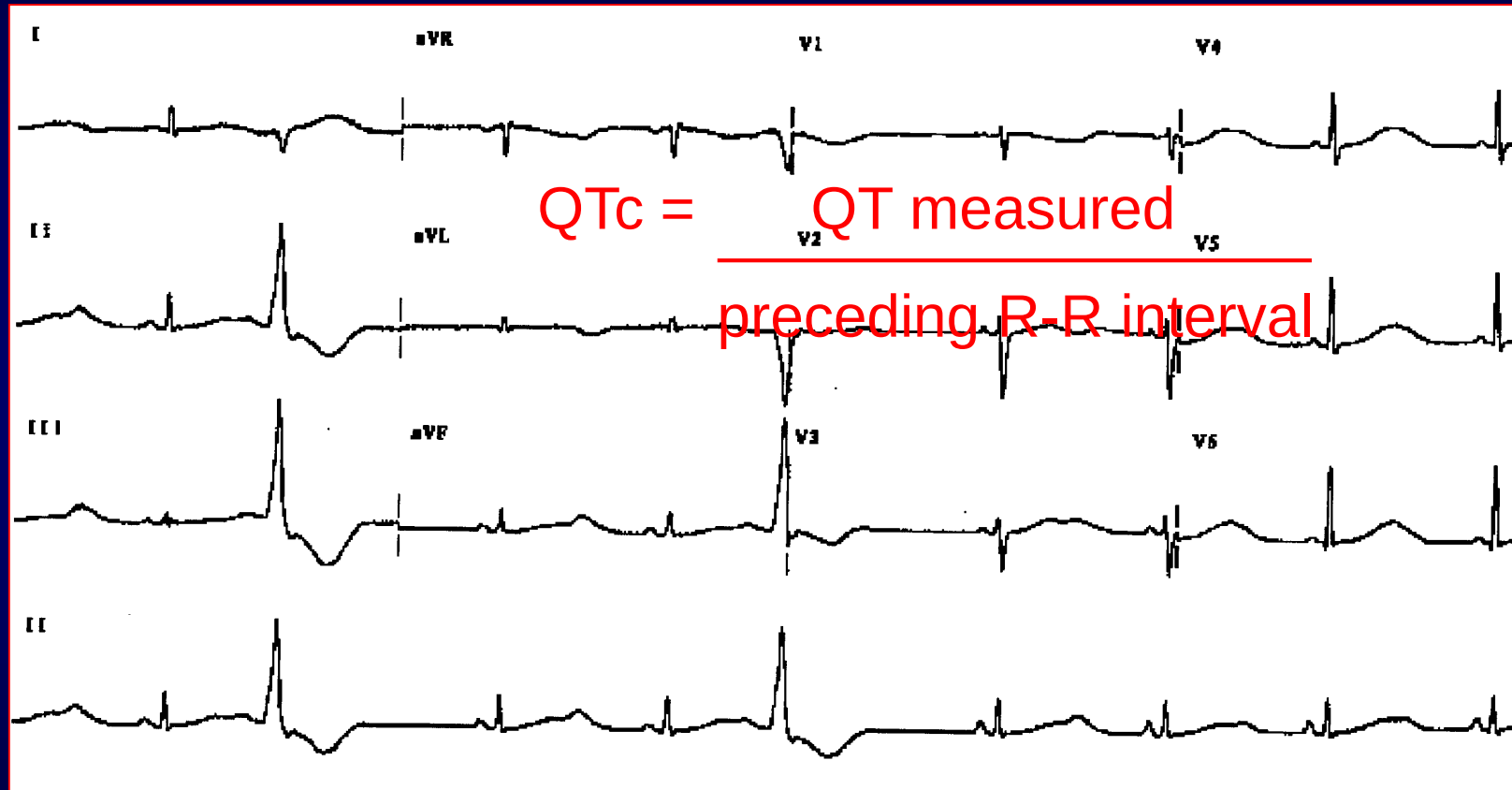
Polymorphic VT



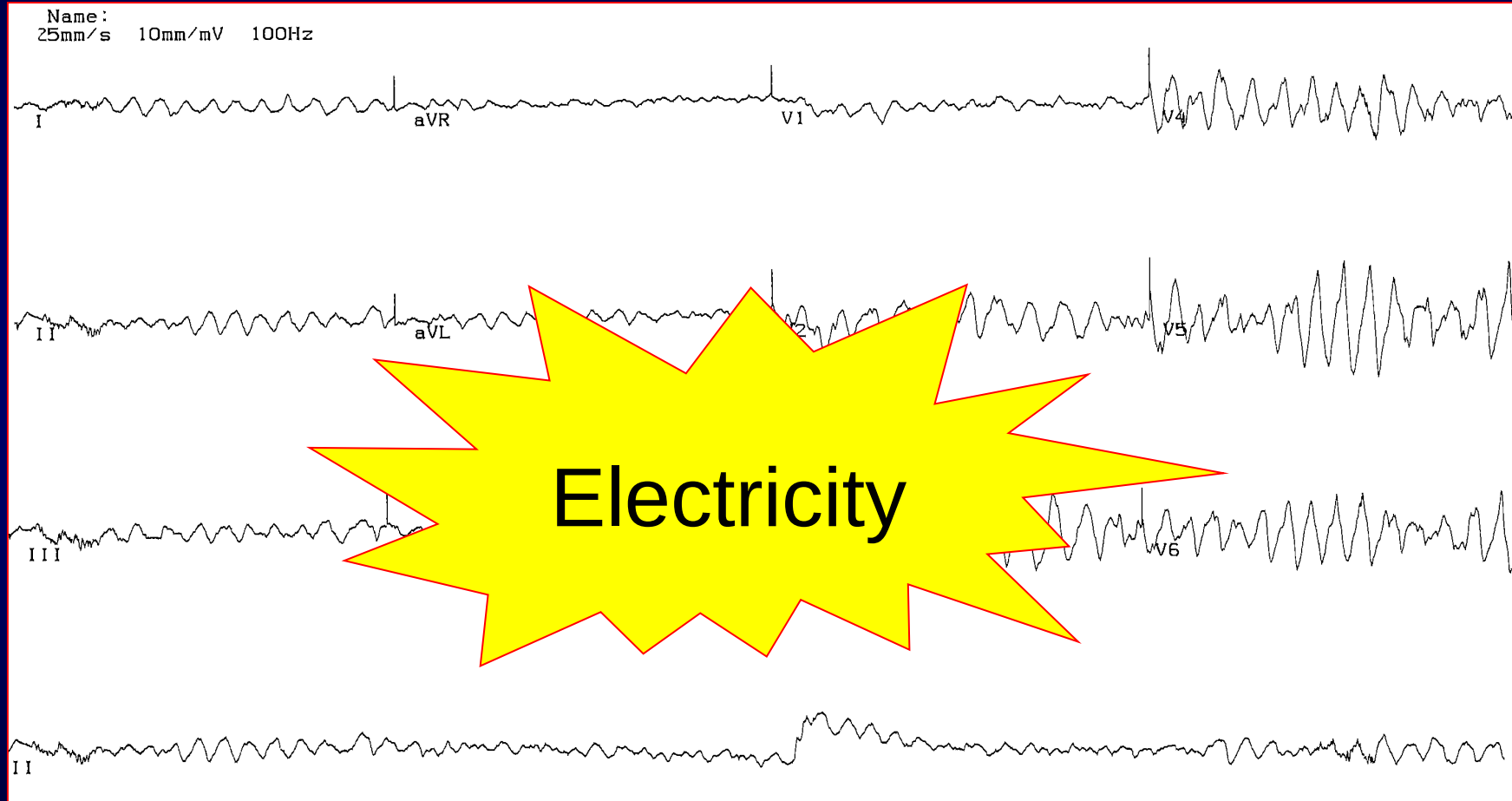
Torsades de Pointes – polymorphic VT associated with long QT interval

Congenital / Acquired – drugs, electrolytes

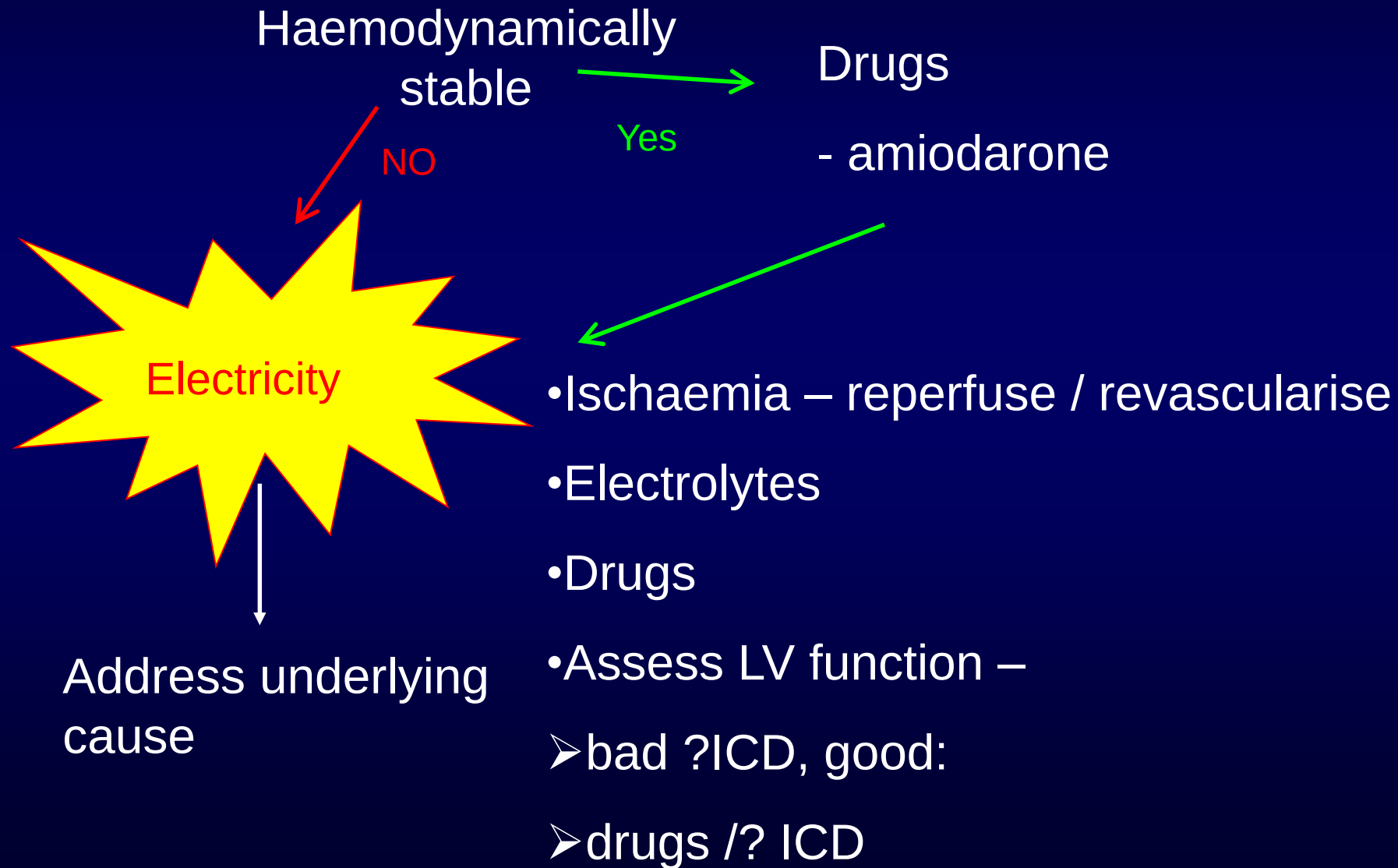
Long QT Syndrome



Ventricular Fibrillation



Treatment of ventricular arrhythmias





Cheick Ismaël Tioté

Cause of Sudden Death in Young People

- [Hypertrophic obstructive cardiomyopathy \(HOCM\).](#)
- [Dilated cardiomyopathy.](#)
- [Arrhythmogenic right ventricular cardiomyopathy \(ARVC\).](#)
- Cardiac ion channelopathies - eg, congenital long QT syndrome (LQTS), Brugada's syndrome, short QT syndrome.
- Catecholaminergic polymorphic ventricular tachycardia (CPVT).
- Valvular heart disease (with or without [infective endocarditis](#)) - eg, [aortic stenosis](#), [mitral valve prolapse](#).
- Cyanotic heart disease - eg, [Fallot's tetralogy](#), [transposition](#).
- Acyanotic heart disease - eg, [ventricular septal defect](#), [patent ductus arteriosus](#).
- Cardiac arrhythmias - eg, [Wolff-Parkinson-White syndrome](#).
- Coronary heart disease: [acute myocardial infarction](#), congenital anomaly of coronary arteries, coronary artery embolism, coronary arteritis.
- [Myocarditis](#).
- Myotonic dystrophy.
- [Kawasaki disease](#).
- Commotio cordis (traumatic blow to the chest wall).

Figure 1

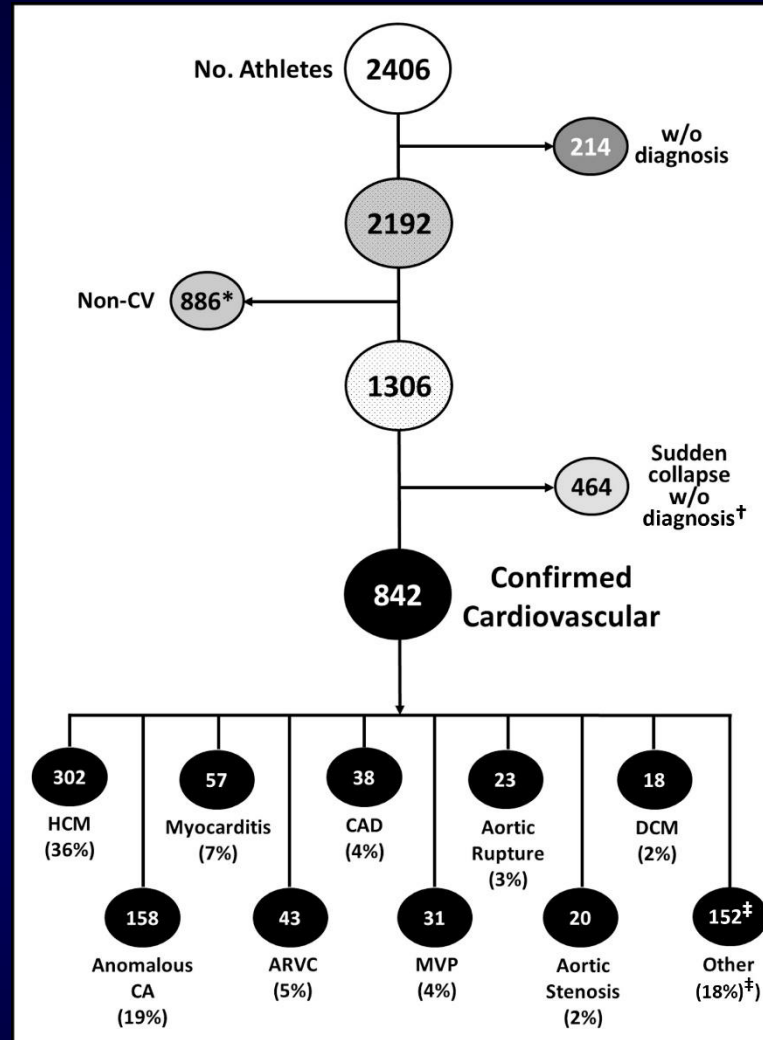


Figure 2

