

Cardiology For Finals

Dr. A. Joshi

London, 1st January 2020

@CardiacJoshi



Plan

- Palpitations and Tachyarrhythmia
- Chest pain and Myocardial Infarction
- Breathlessness and Heart Failure
- Syncope and Bradyarrhythmia
- Death
- Angina and...
- Valvular disease
- Cardiovascular “risk factors”

- Questions



Cardinal Cardiac Symptoms

- Chest pain
 - “Typical”
- Breathlessness
 - Paroxysmal Nocturnal Dyspnoea
 - Orthopnoea
- Palpitations
- Syncope/LoC
 - Collateral
- Sudden Death (attempted)

Modifiers:

Exertional symptoms

Risk factors



Case 1

58 ♂

Palpitations



Case 1

History

- Sudden onset and offset
 - Lasts up to a few hours
 - Fast and feels irregular
 - Came to A&E
-
- No loss of consciousness/chest pain



Case 1

PMHx

- nil

DHx

- nil

SHx

- Non-smoker
- Bottle of wine a week

FHx

- No sudden cardiac death



Case 1

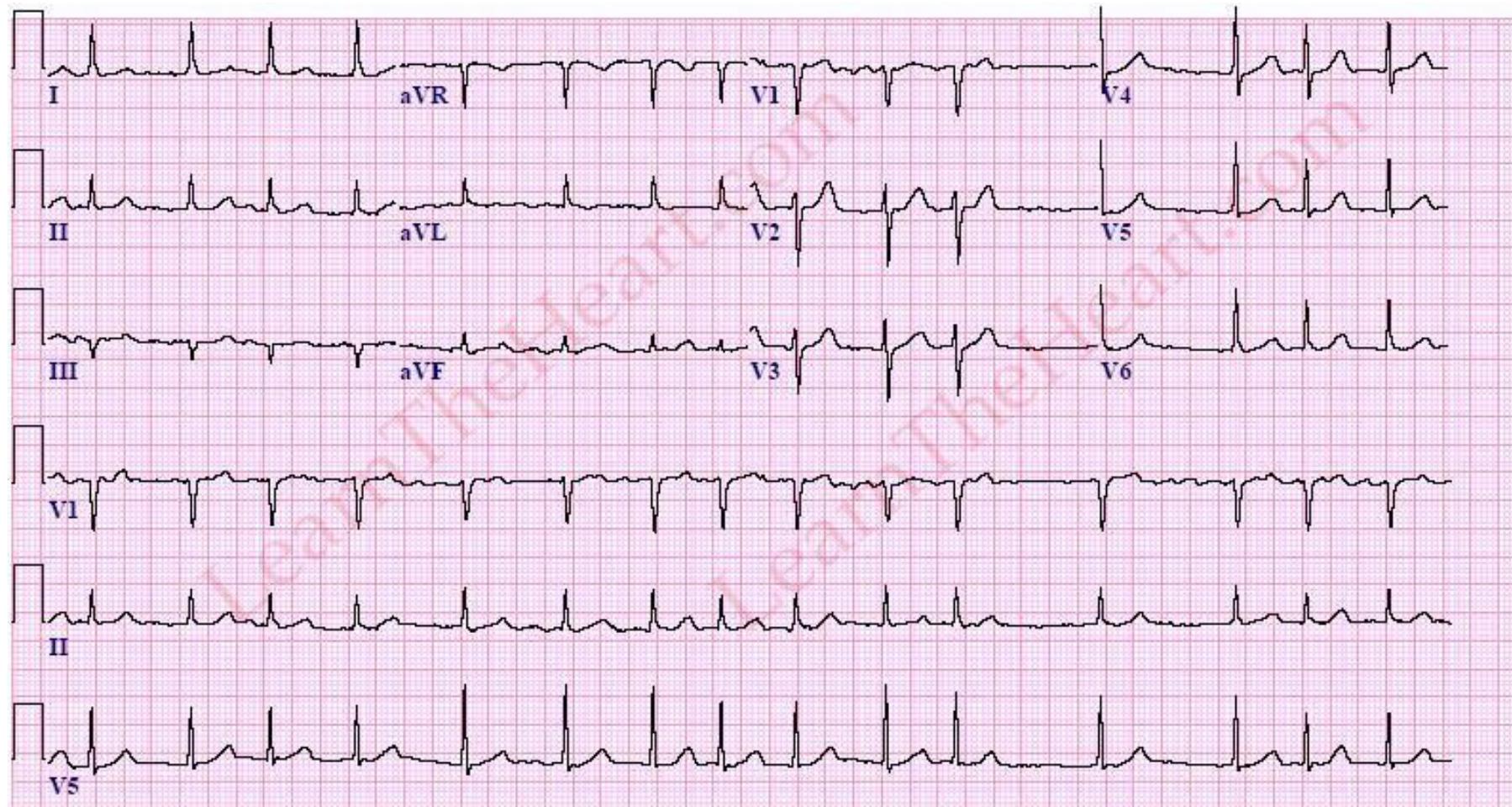
Examination

- BP 120/60, HR 130, RR 16, sats 95%
- RA
- Irregularly irregular pulse
- No murmurs

Investigations

- Bloods + thyroid
- ECG

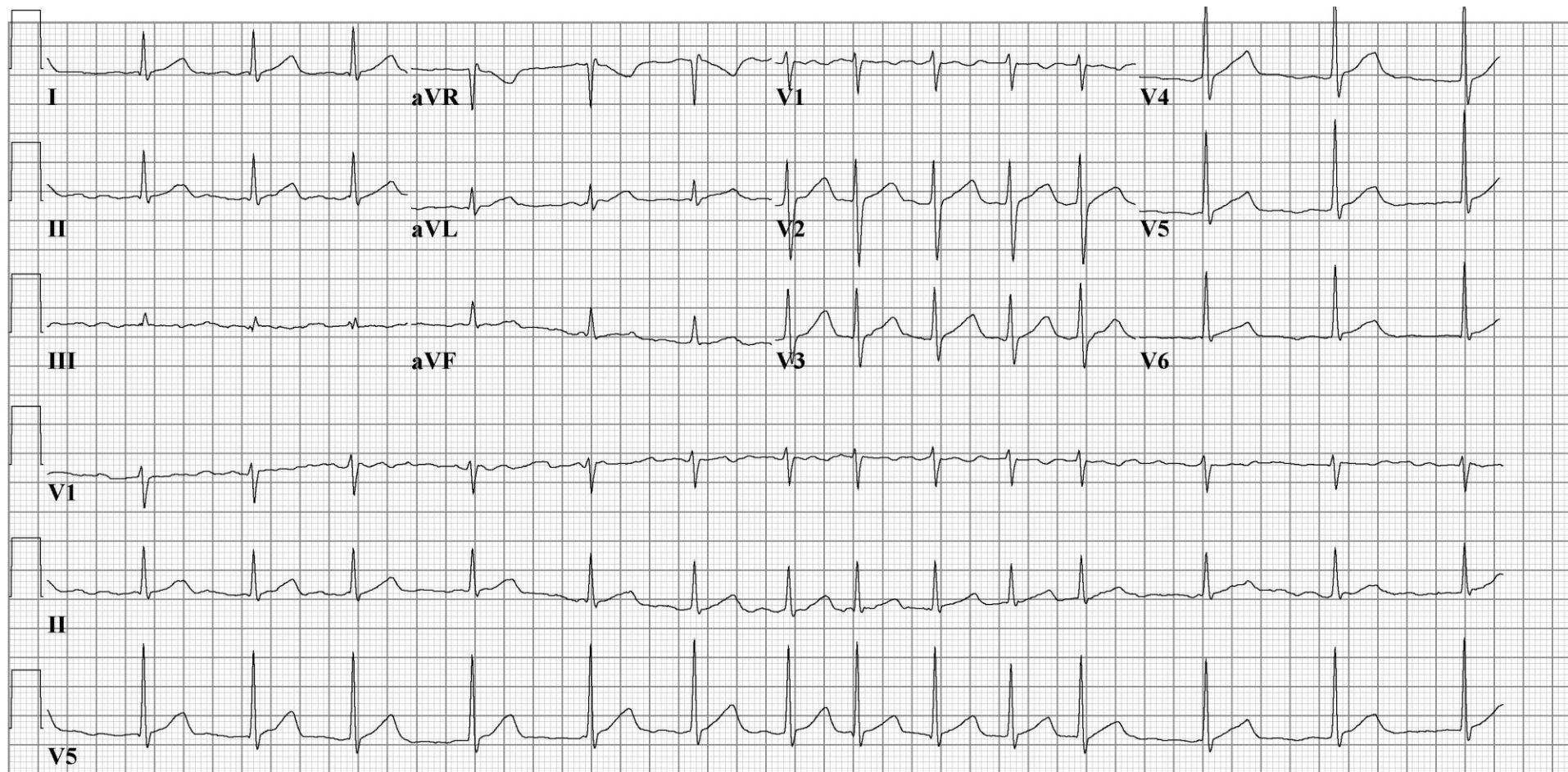
Case 1



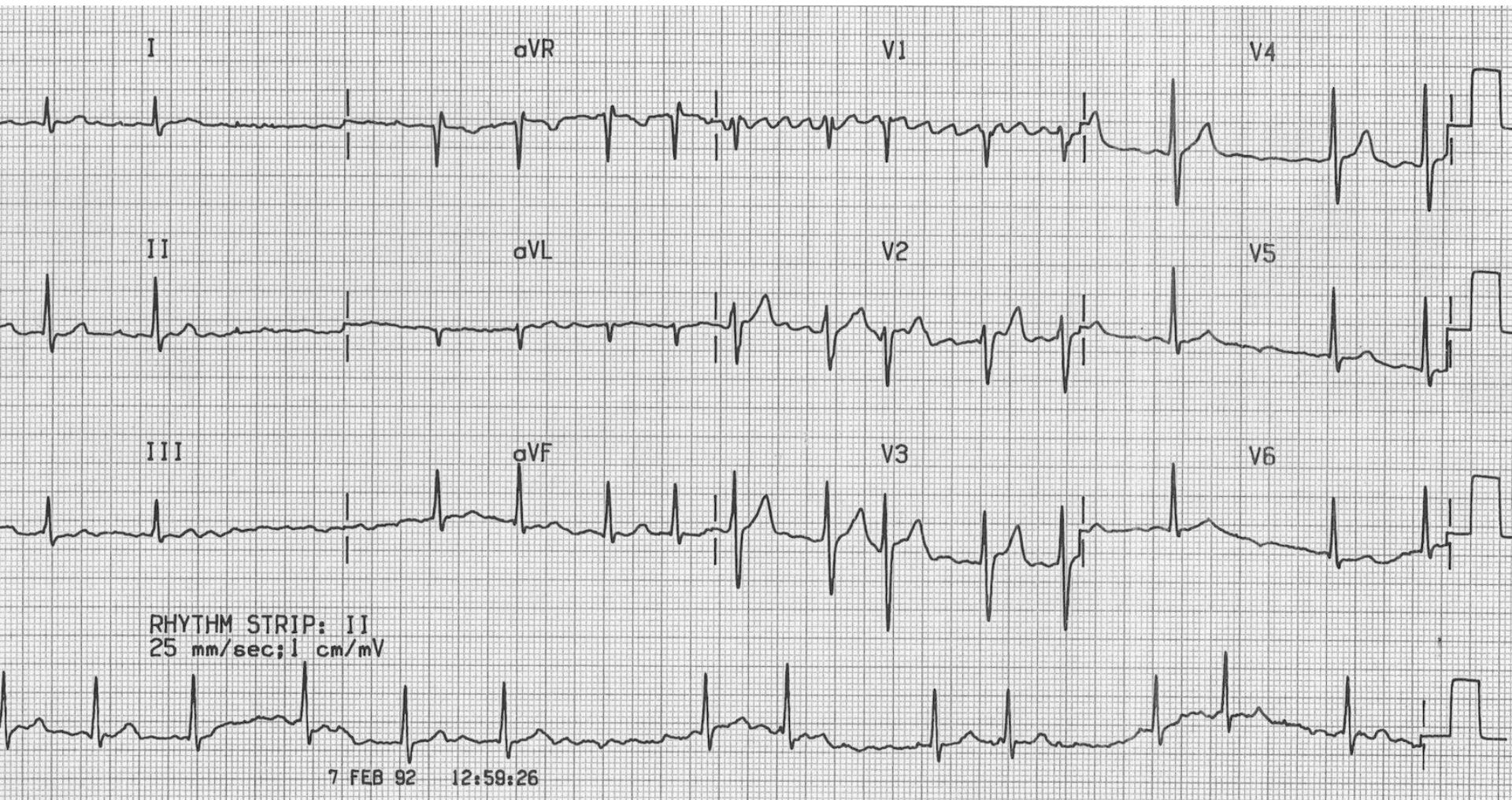
25mm/s 10mm/mV 40Hz 005C 12SL 254 CID: 27

EID:608 EDT: 15:33 25-OCT-2003 ORDER:

Case 1



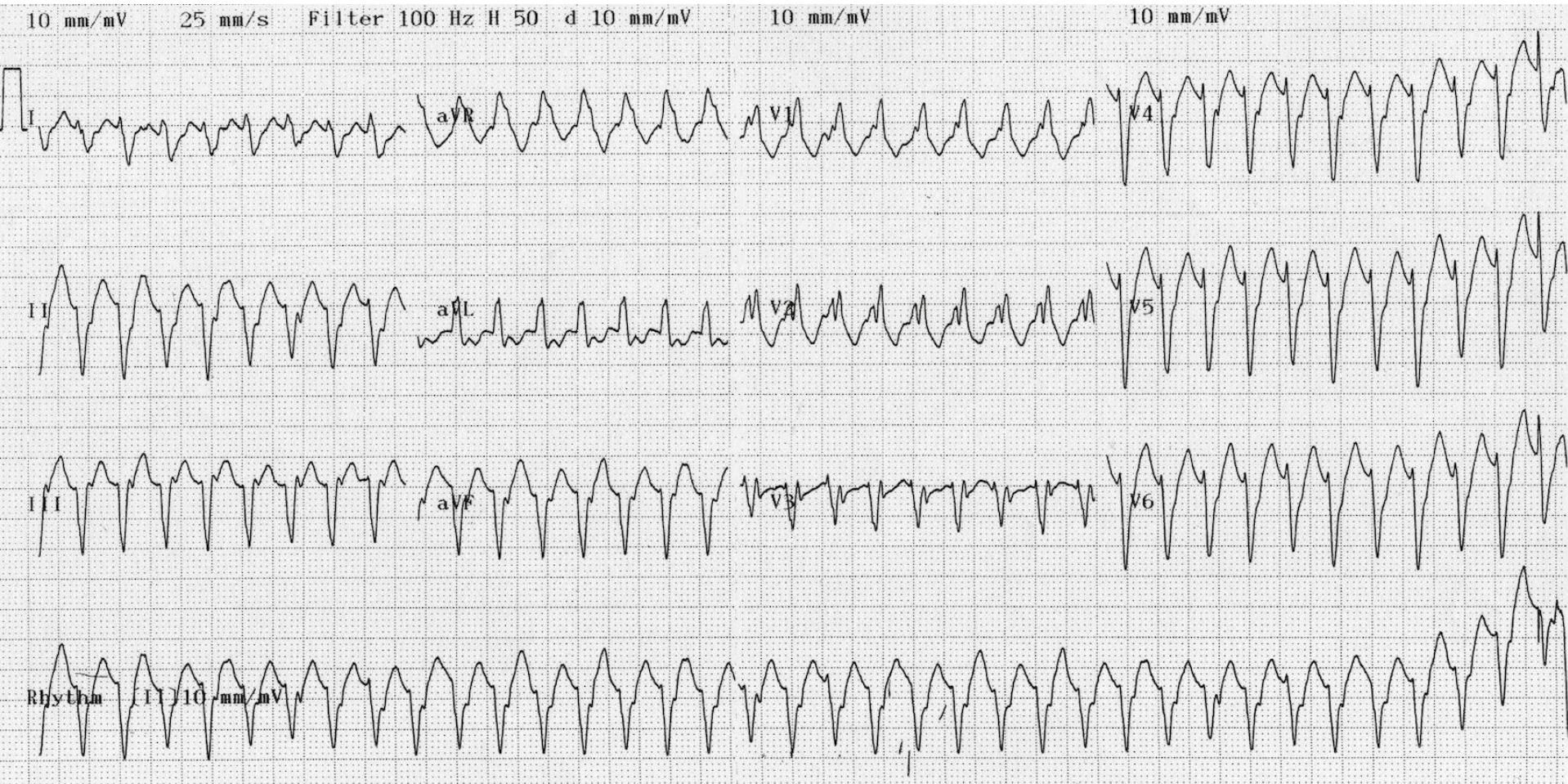
Case 1



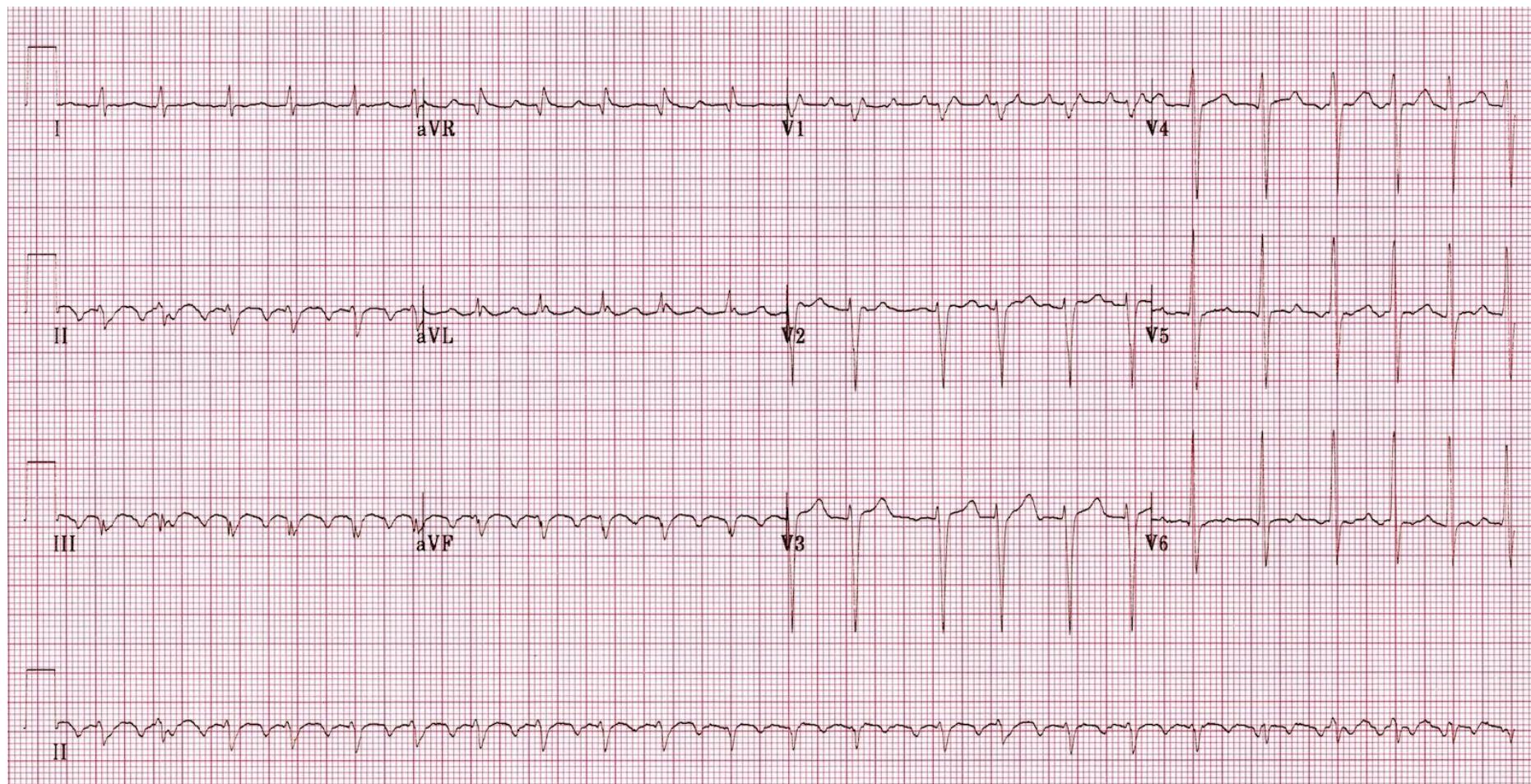
Case 1



Case 1



Case 1



Atrial Fibrillation

Classification

Type	Definition
Paroxysmal	<24 hrs
Persistent	>24hrs Needs treatment to cardiovert
Permanent	Can't cardiovert

Atrial fibrillation

STROKE RISK!!

- Most important thing
- More important than rhythm vs. rate management
- Really, really important.



Stroke risk

CHA₂DS₂VASc score

C – Congestive cardiac failure +1

H – Hypertension +1

A – Age >75yrs +2

D – Diabetes +1

S – Stroke/TIA +2

V – Vascular disease (MI, PVD) +1

A – Age >65yrs +1

Sc – Sex class, female +1



Stroke risk: CHADS-VASC

Score	Risk %/year
0	0
1	1.3
2	2.2
3	3.2
4	4.0
5	6.7
6	9.8
7	9.6
8	6.7
9	15.2

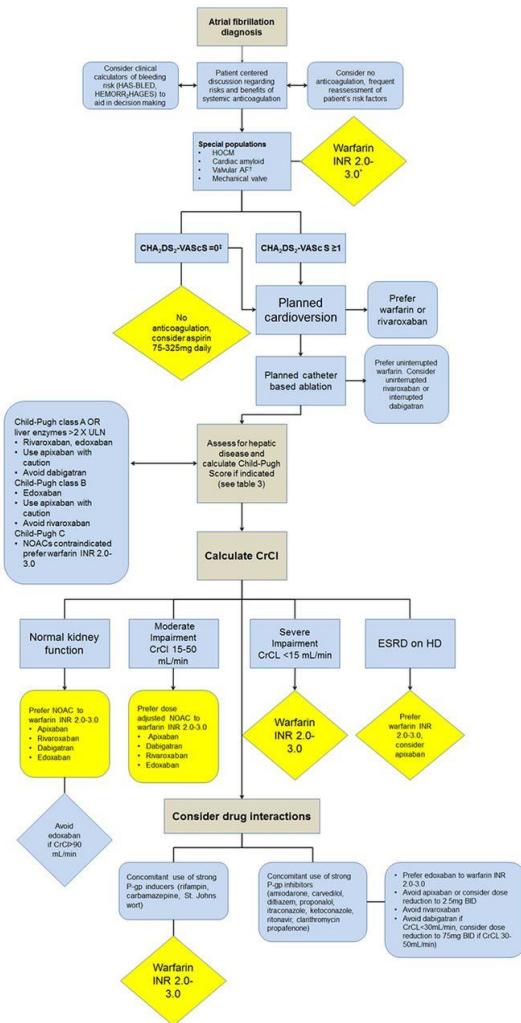
Stroke Risk - Management

- 0: Nothing
- 1: ~~Aspirin~~/Warfarin/OAC/(Nothing)
- >2: Warfarin/OAC

Drug	Dose
Dabigatran	110mg/150mg bd
Apixaban	5mg bd
Rivaroxaban	20mg od
Edoxaban	60mg/30mg 30mg/15mg



Suggested algorithm for selecting anticoagulation therapy for patients with atrial fibrillation.



Drug

Dabigatran

5mg bd

Rivaroxaban

20mg od

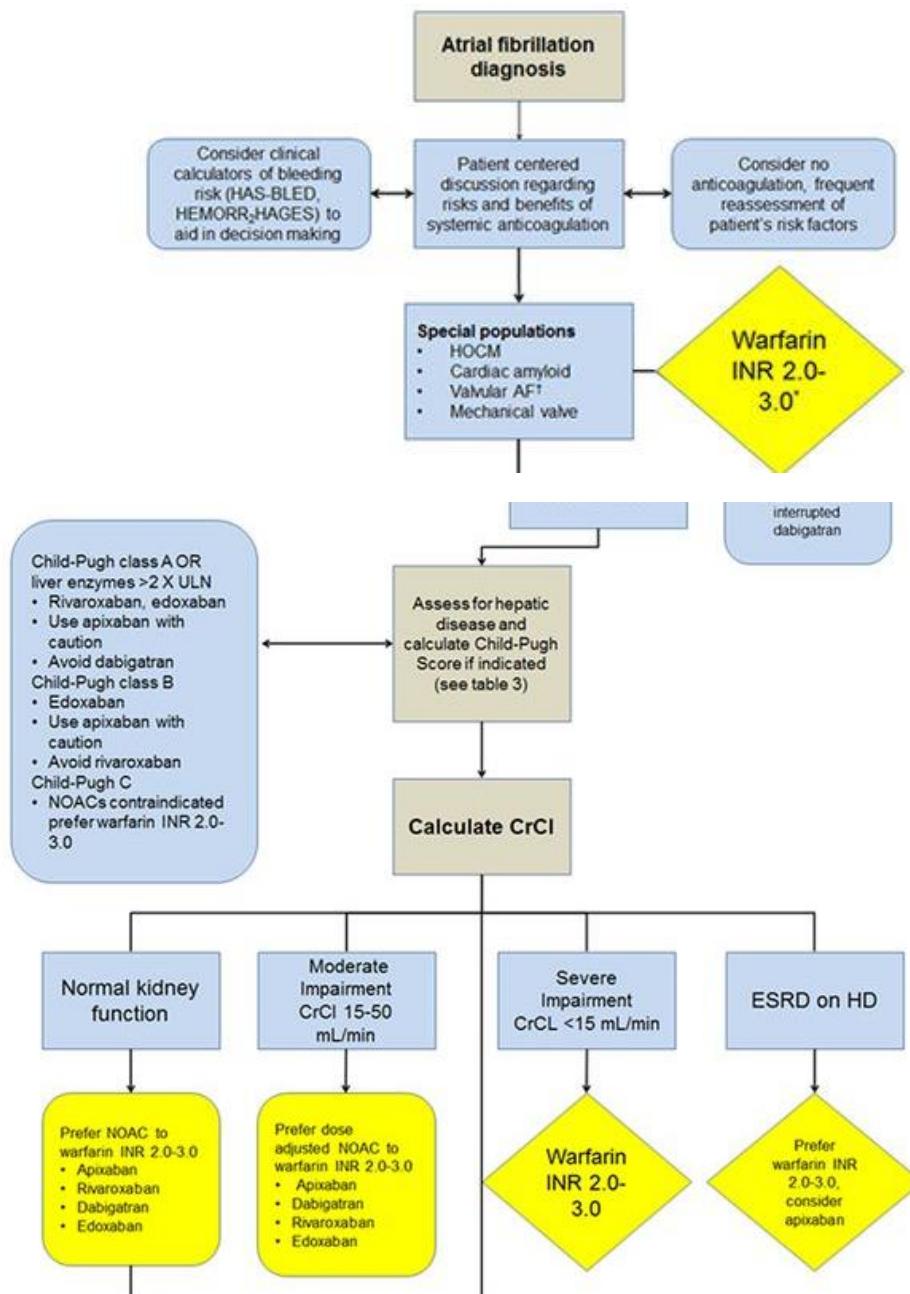
Edoxaban

60mg/30mg 30mg/15mg

Michael Ghannam, and Aman Chugh Heart 2017;103:1129-1137

Heart





Will they bleed?

Will it work?

Can they clear?

Rate vs. Rhythm in AF

- Which is better:
 - Sinus rhythm or AF but normal heart rate?
- We don't know...
- Often patient-directed.
- Evidence and preference for sinus rhythm is increasing



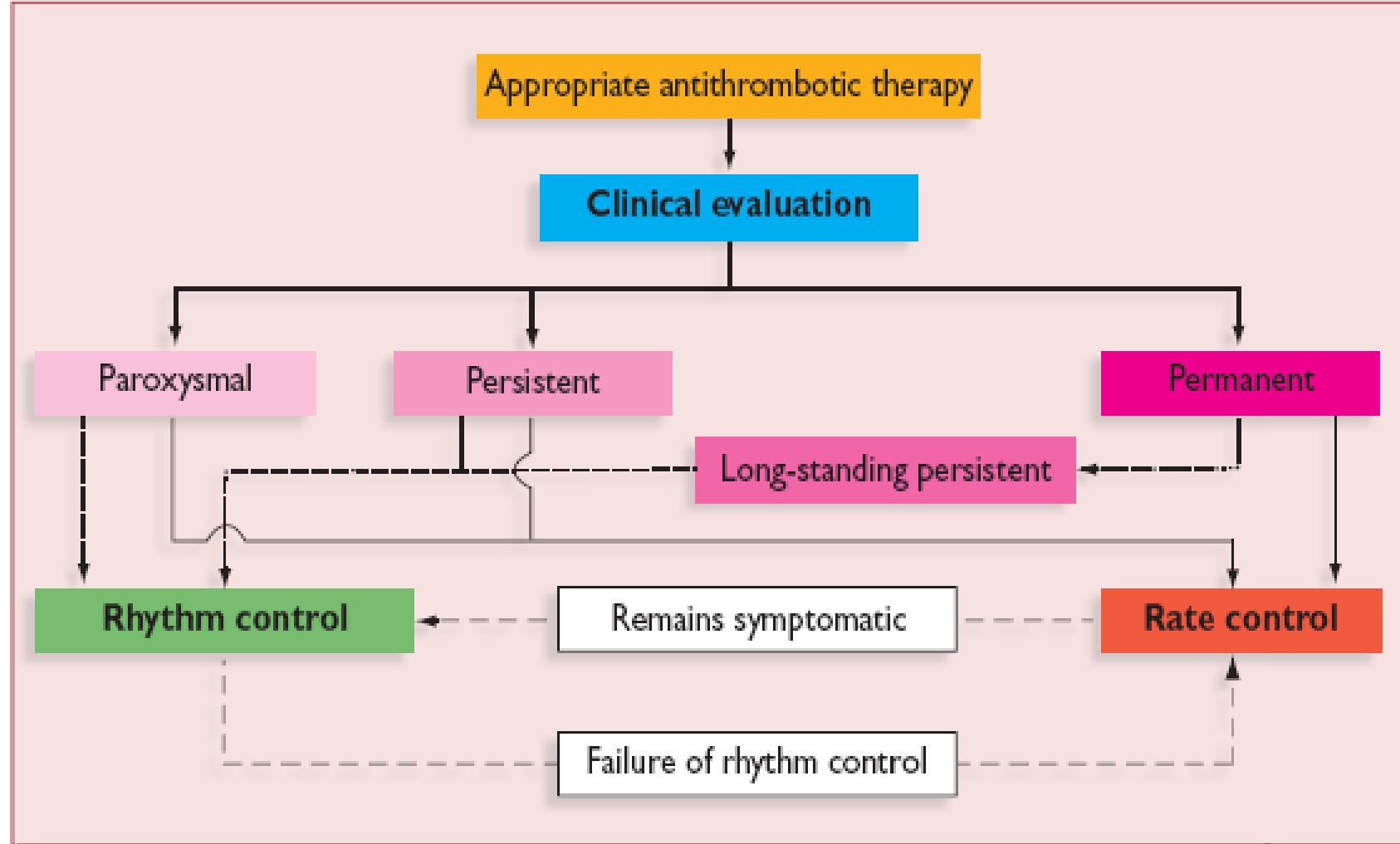
“COMPROMISED” AF

When AF causes haemodynamic compromise

- Hypotensive
- Chest pain
- Signs of heart failure
- Affecting level of consciousness (GCS)
- Other markers of insufficiency (metabolic acidosis)

DC CARDIOVERSION

Rhythm vs. Rate in AF



Rate vs. Rhythm

- Why Rhythm Control?
 - Paroxysmal AF/New onset Persistent
 - Very symptomatic
 - Uncontrolled rate
 - Younger patients
 - **Mitral stenosis**
 - Congenital Heart Disease



Rate vs. Rhythm

- Why Rate Control?
 - Asymptomatic
 - Acceptable rate
 - Not likely to succeed
 - Long history of AF



Rhythm strategies

MUST be in AF <48hrs

OR on warfarin/NOAC for 3 weeks BEFORE/4 AFTER
OR TOE guided DCCV

- Electricity: DC Cardioversion
- Drugs
 - Flecainide (normal heart)
 - Sotalol
 - Amiodarone (last resort/short term)
- AF Ablation (not acutely)



When to do nothing?

- No symptoms
- Not “compromised” (normal obs)
- No signs of end-organ dysfunction
 - Kidneys fine, lactate fine, GCS fine
- Reversible acute illness probably the cause
 - Thyroid
 - Infection
 - Post-surgery



Rate Control Strategies

- β-blockers (bisoprolol, metoprolol)
 - Avoid in asthma
- CCA (diltiazem, verapamil)
 - Avoid in heart failure
- Digoxin
 - Careful in renal failure (K^+)
- All have side-effects/toxicity states.

Case 1

- 53 yo man with palpitations
- Persistent AF (>24hrs)
- BP 120/60, HR 130, RR 16, sats 95% RA
- Irregularly irregular pulse
- Rhythm control:
 - i.v. flecainide
 - DCCV
 - Long term: β -blocker, flecainide



Case 1.1

- 93 yo with no symptoms
- BP 120/60, HR 70, RR 16, sats 95% RA
- Irregularly irregular pulse noted by GP
- Rate control:
 - Warfarin (unless bleeding risk)
 - β -blocker



Case 1.1

HASBLED clinical characteristic [click on present risk factors]

CLINICAL CHARACTERISTIC	POINTS AWARDED
Hypertension	1
Abnormal liver function	1
Abnormal renal function	1
Stroke	1
Bleeding	1
Labile INRs	1
Elderly (Age >65)	1
Drugs	1
Alcohol	1
Your score	1

HASBLED clinical risk estimation. Adapted from Pisters et al.

HAS BLED SCORE	NUMBER OF PATIENTS	NUMBER OF BLEEDING	BLEEDS PER 100 PATIENT YEARS
0	798	9	1,13
1	1286	13	1,02
2	744	14	1,88
3	187	7	3,74
4	46	4	8,70
5	8	1	12,50
6	2	0	0
7	---	---	---
8	---	---	---
9	---	---	---
Total	2084	22	2.15

view results

Case 1.2

- 67 yo with chest pain, background of HTN.
- BP 80/30, HR 170, RR 30, sats 95% RA
- Irregularly irregular pulse
- Rhythm control:
 - Emergency DCCV
 - Warfarin



OSCE tips

- Assess the pulse → detect irregularity
 - Assess again at the carotids
 - Listen/look carefully for MITRAL signs
- “This lady has an irregularly irregular pulse, the diagnosis is most likely atrial fibrillation, but may be sinus with frequent ectopic beats.”



Case 2

63 ♂

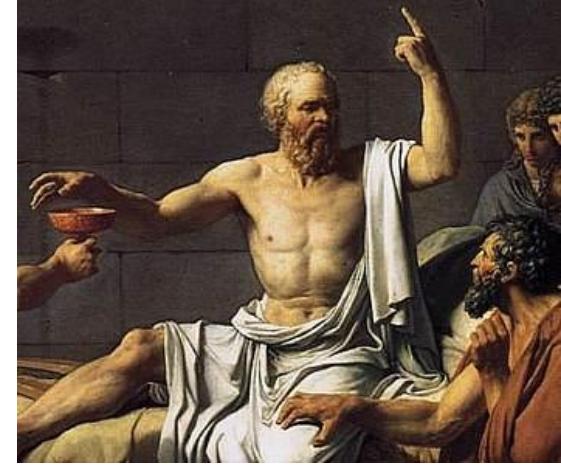
Chest pain



Chest pain

History

- S – central/sided
- O – sudden/very sudden/gradual
- C – pressure/stabbing/tearing
- R – left arm/jaw/shoulder blades
- A – nausea/vomiting/sweating/fear
- T – lasts longer than 30mins
- E – exertion/position GTN/morphine
- S – out of 10



Case 2

- History
 - Sudden onset, 2 hours ago
 - Central
 - Crushing
 - Nausea and sweatiness
 - Worse with walking
 - Got better with GTN spray
 - Feels like he's about to die
- Sometimes gets a similar pain on climbing stairs



Case 2

Medical History

- Cholesterol
 - Hypertension
 - Smoking (20 pack years)
 - Diabetes (Type II)
 - Family history
-
- Doesn't like tablets.



Case 2

Drugs

- GTN spray
- Simvastatin 20mg
- Amlodipine 5mg
- Brufen 200mg prn

Social

- Father of 2
- Taxi driver
- 20 pack years smoker
- 6 pints a week (12 units)

Family

- Dad had a heart attack aged 55, now has heart failure

Case 2

Examination

- Looks ill, sweaty, clammy.
- BP 160/80, HR 100, sats 95% on 2L
- All pulses present
- No murmurs
- Clear chest

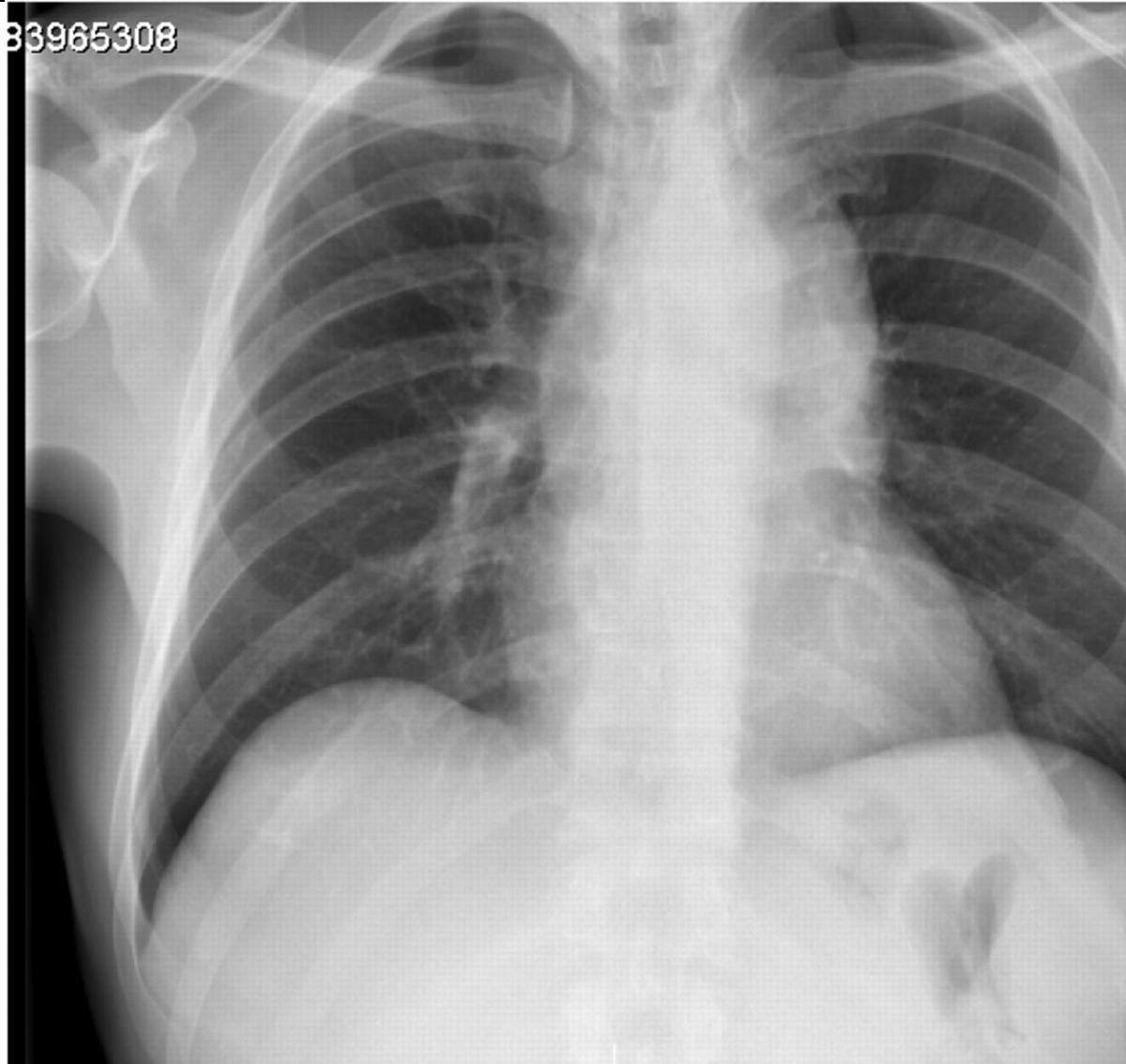


Investigations

- Chest X-ray
- ECG
- Bloods (routine)
- Troponin



33965308



Bonus slide: Aortic Dissection

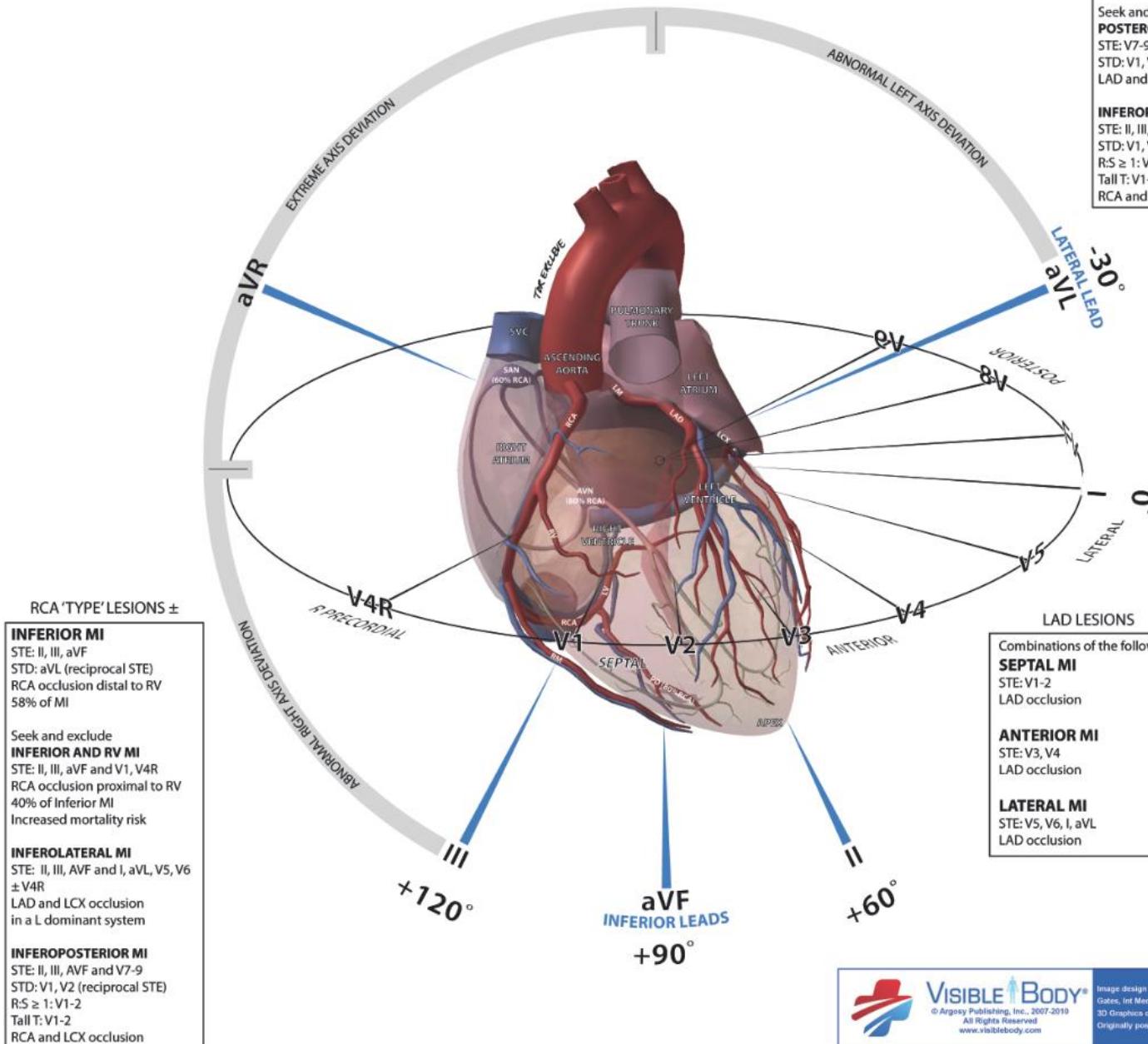
- Tearing chest pain
- Interscapular
- Missing pulses
- CT/echo
- BP <100 systolic
- Surgeons

ECGs: ACUTE MI

- Where's the clot?
- Is it a STEMI?



AMI ECG, ANATOMY AND PATHOLOGY



STEMI or NSTEMI?

Or UA?

Chest pain:

ST elevation CRITERIA

2 contiguous leads

- >1mm limb leads

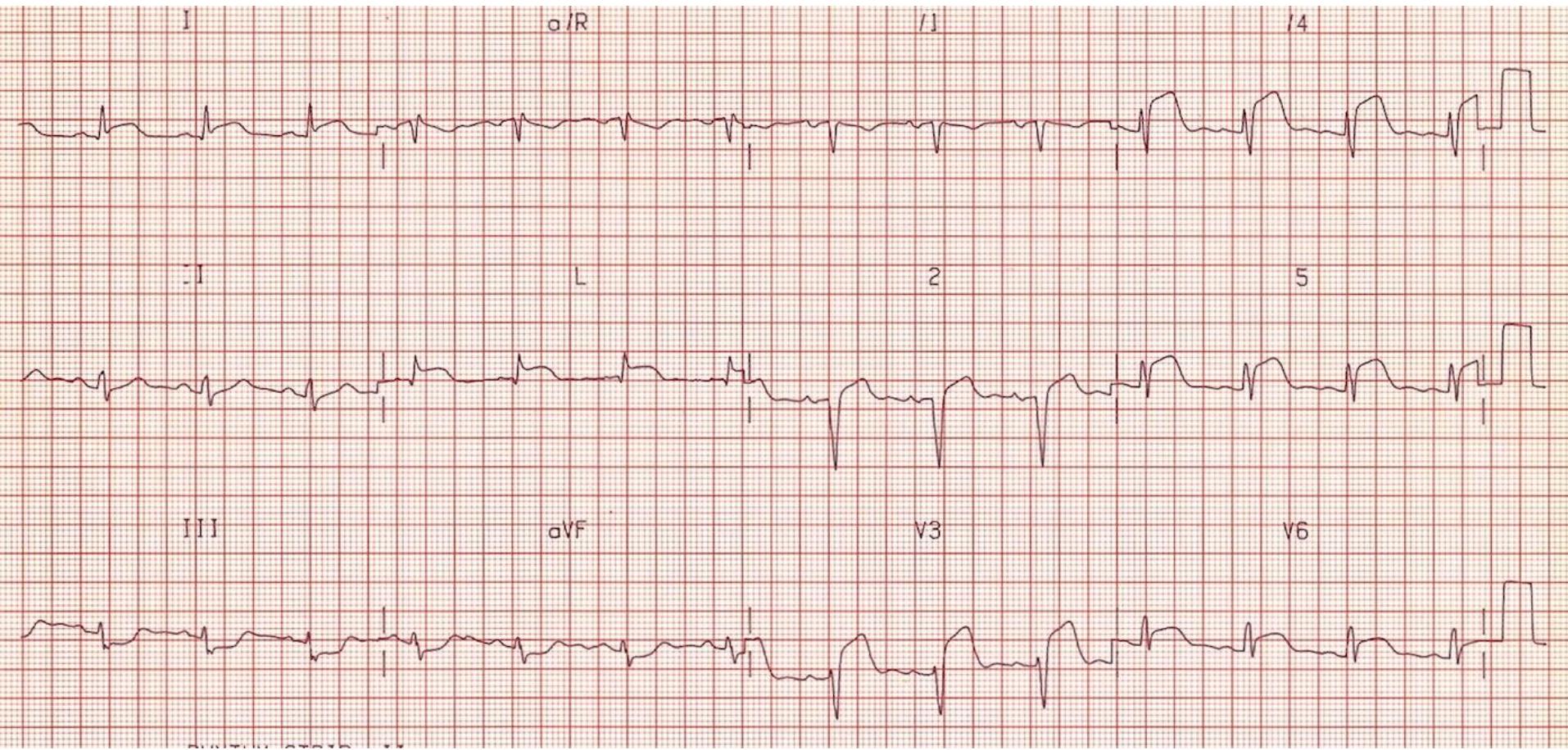
- >2mm V1-V6

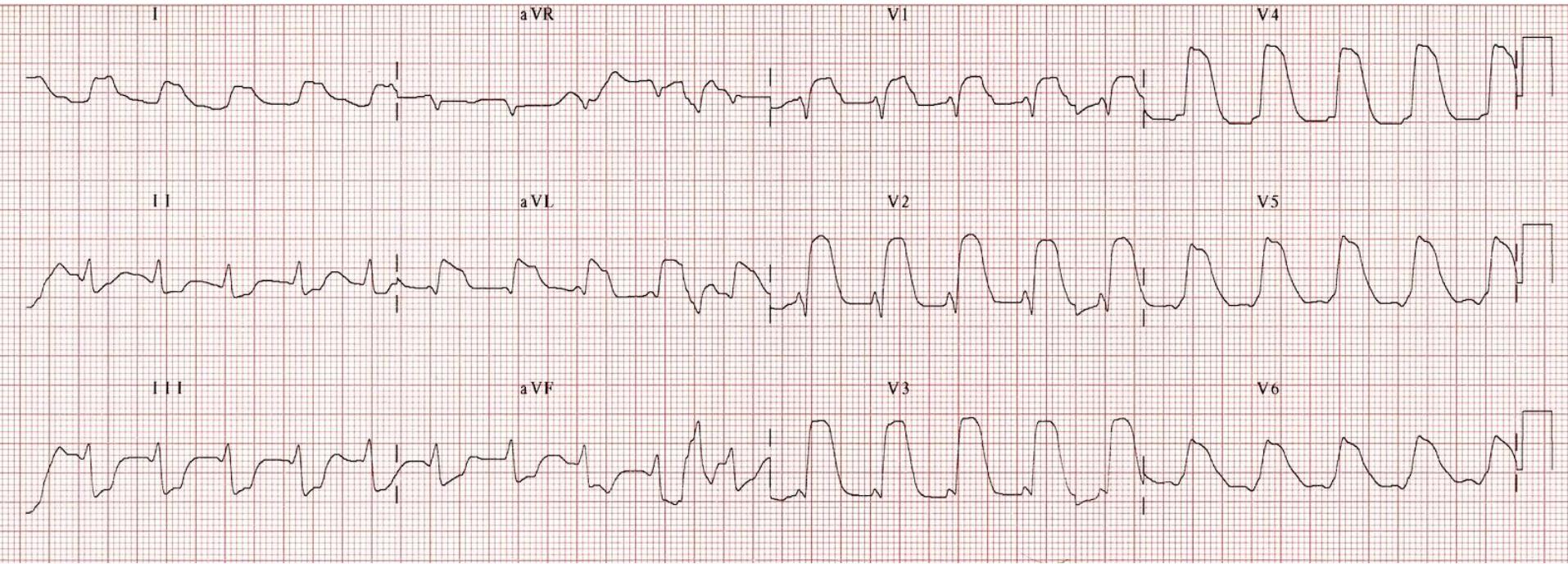
Chest pain:

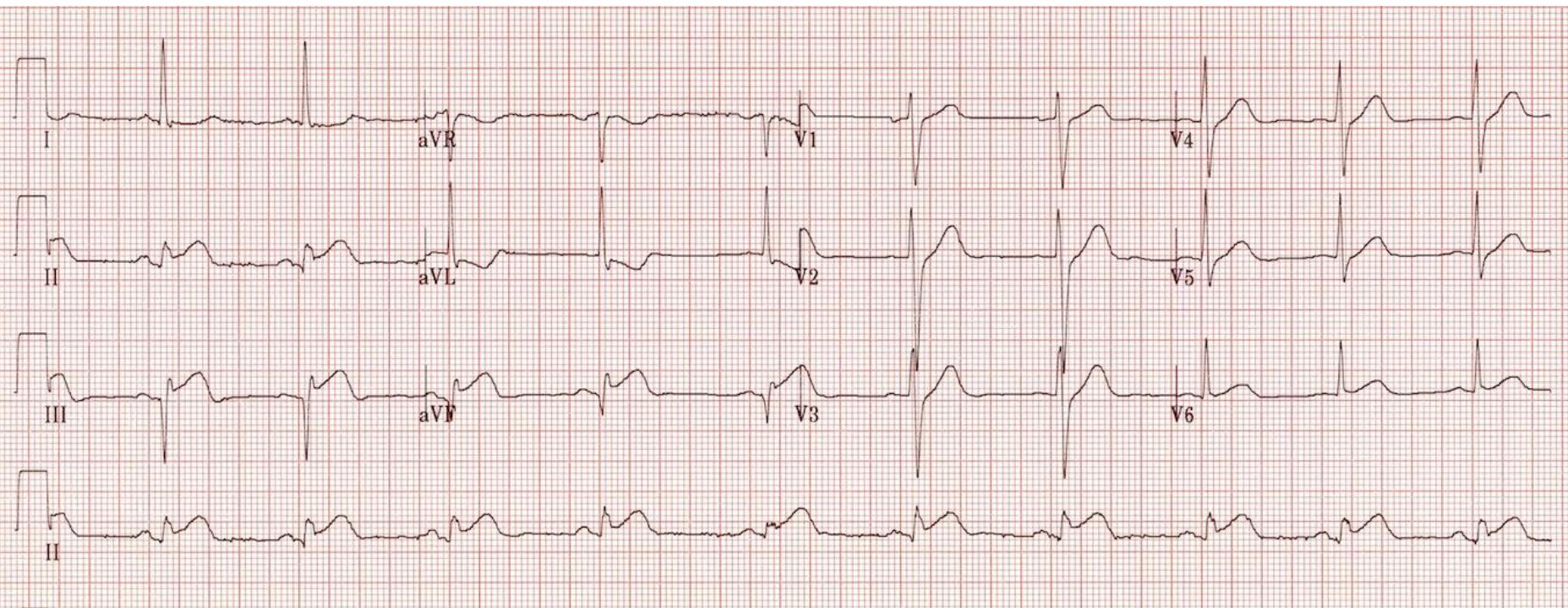
w/other changes:

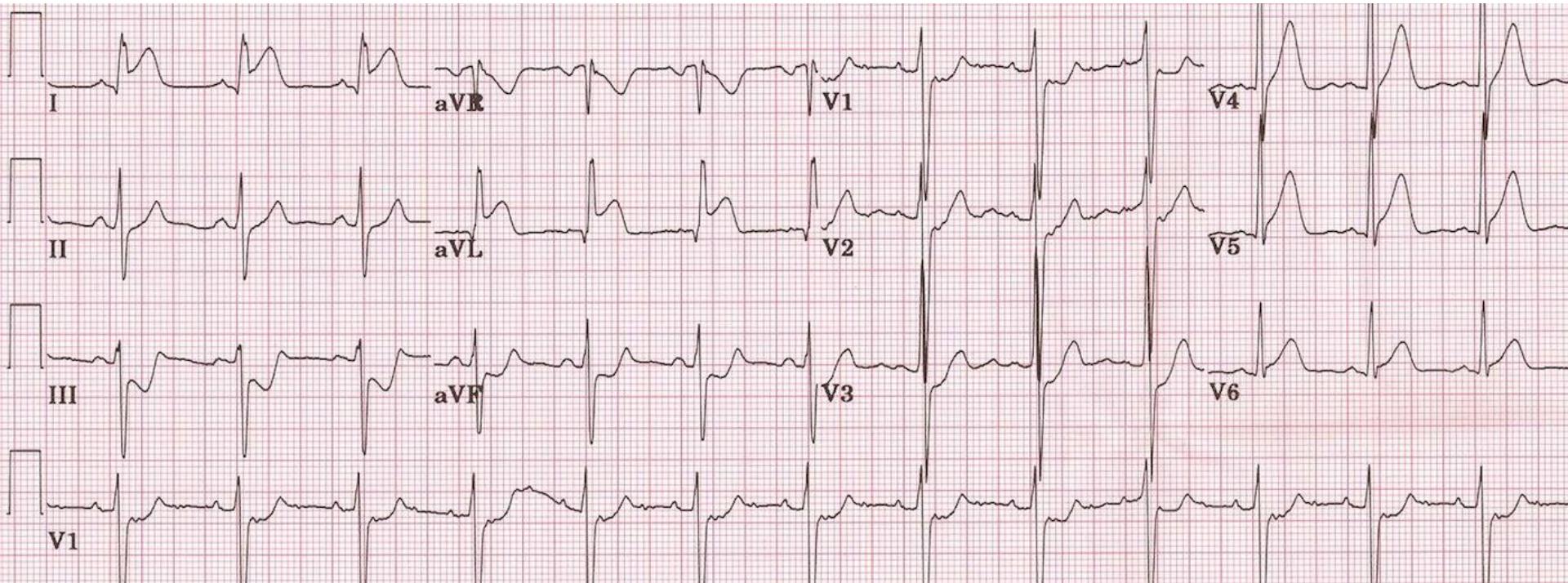
- ST depression
- T wave inversion
- Troponin!

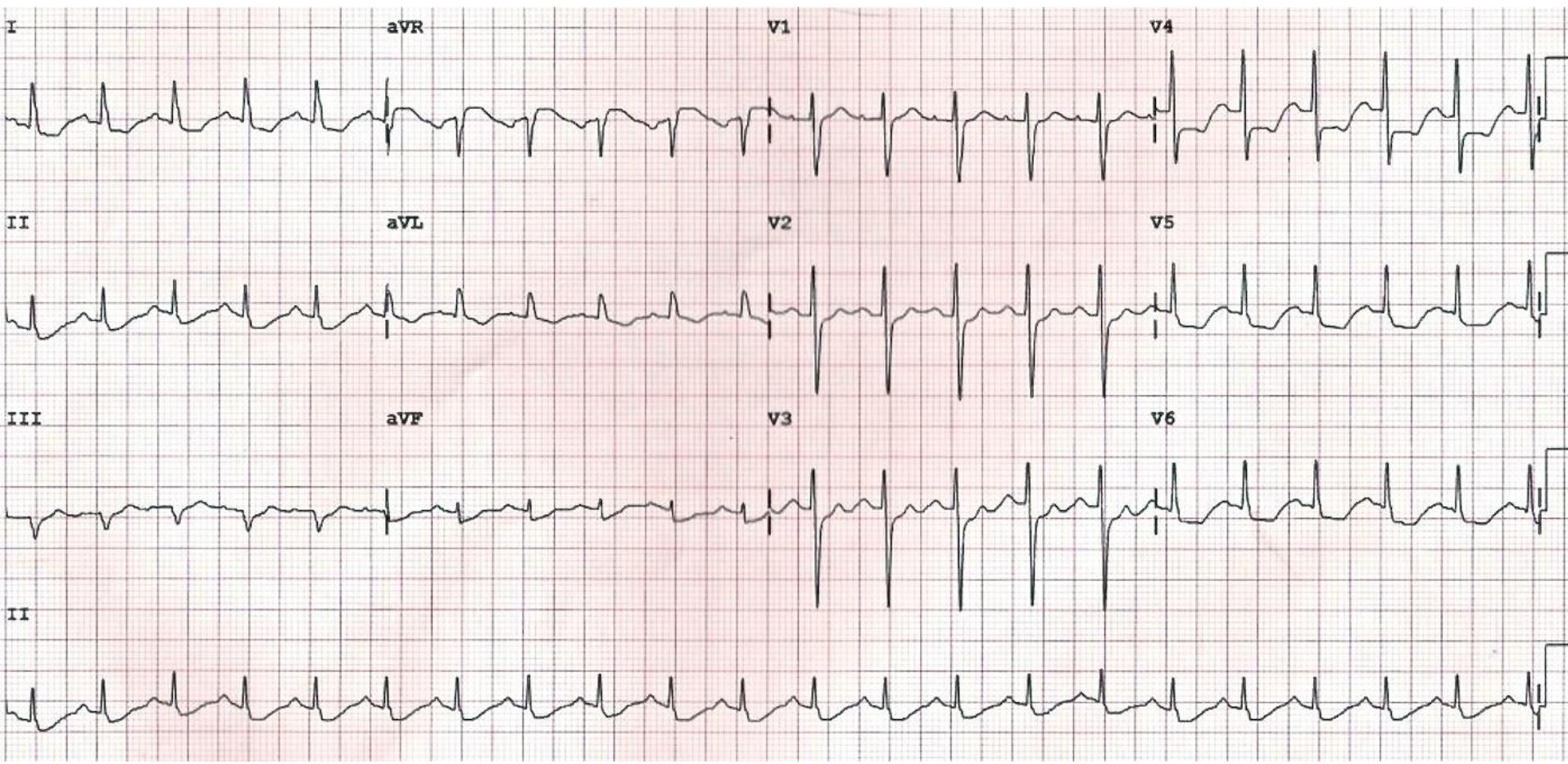


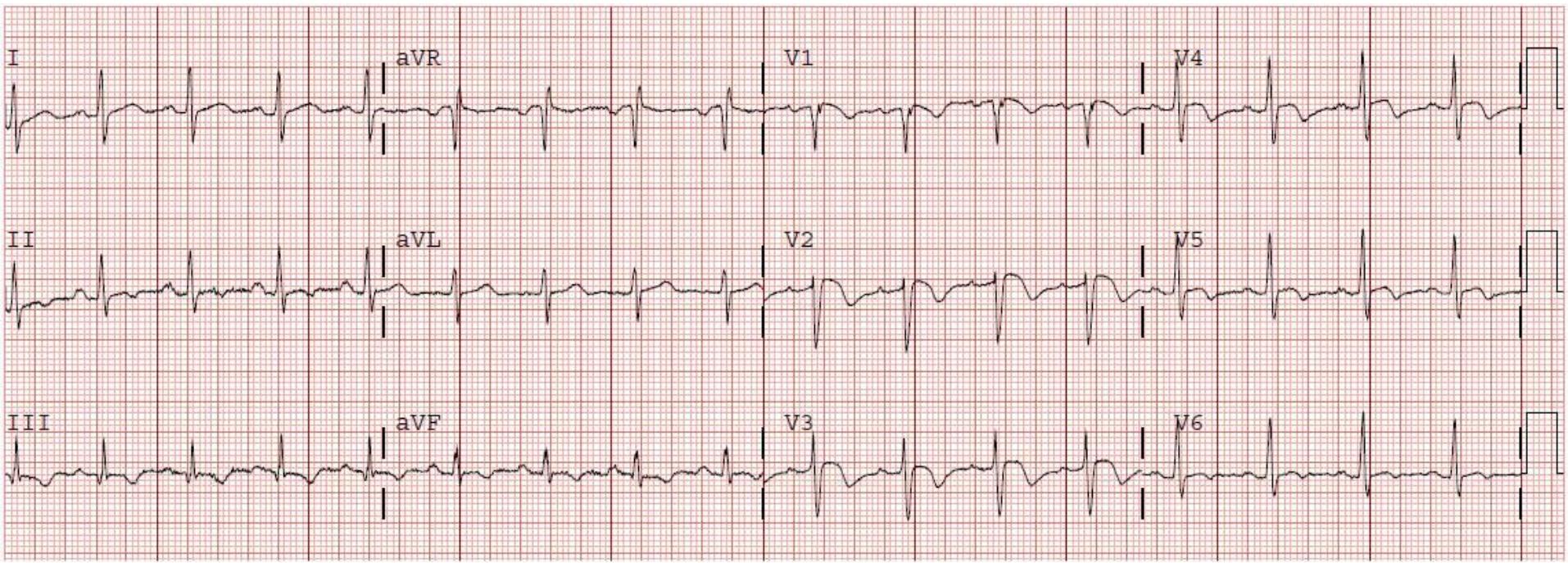


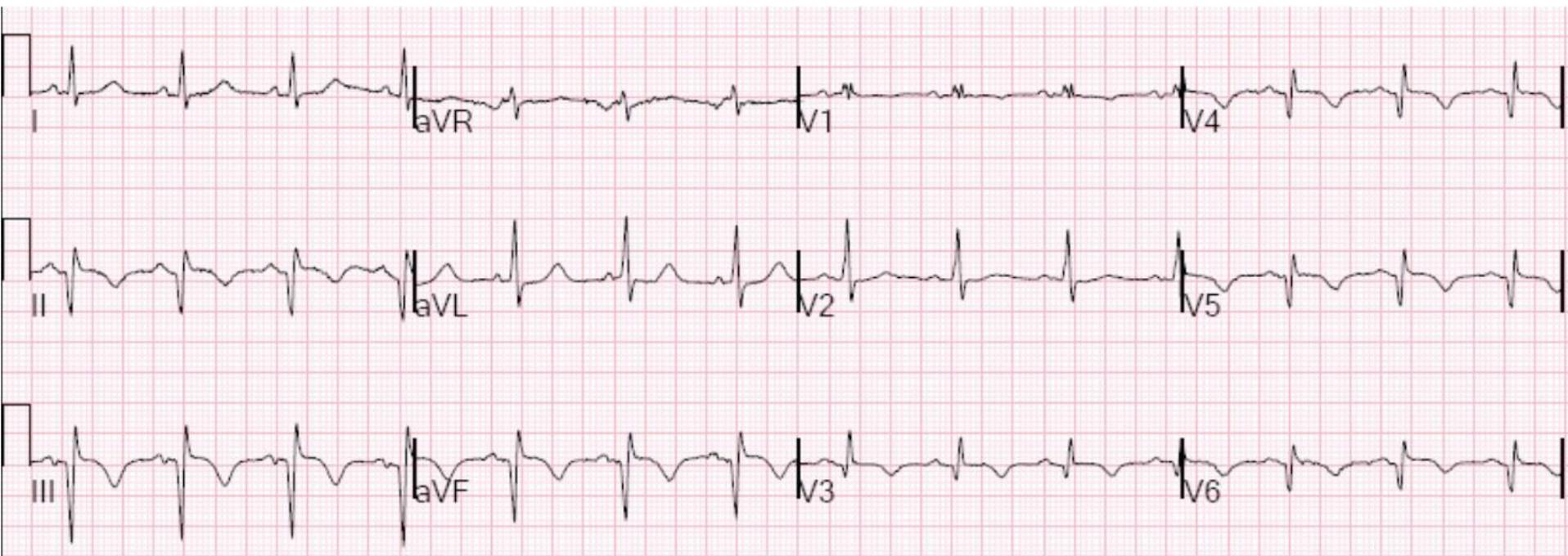


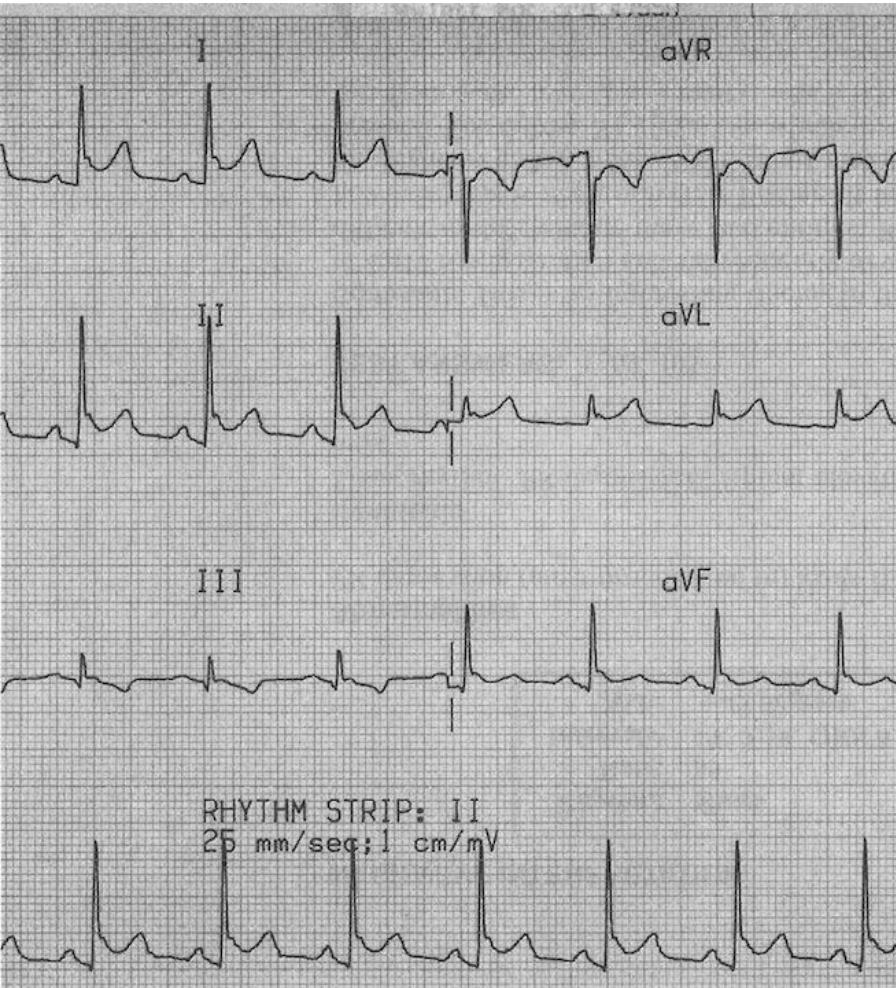












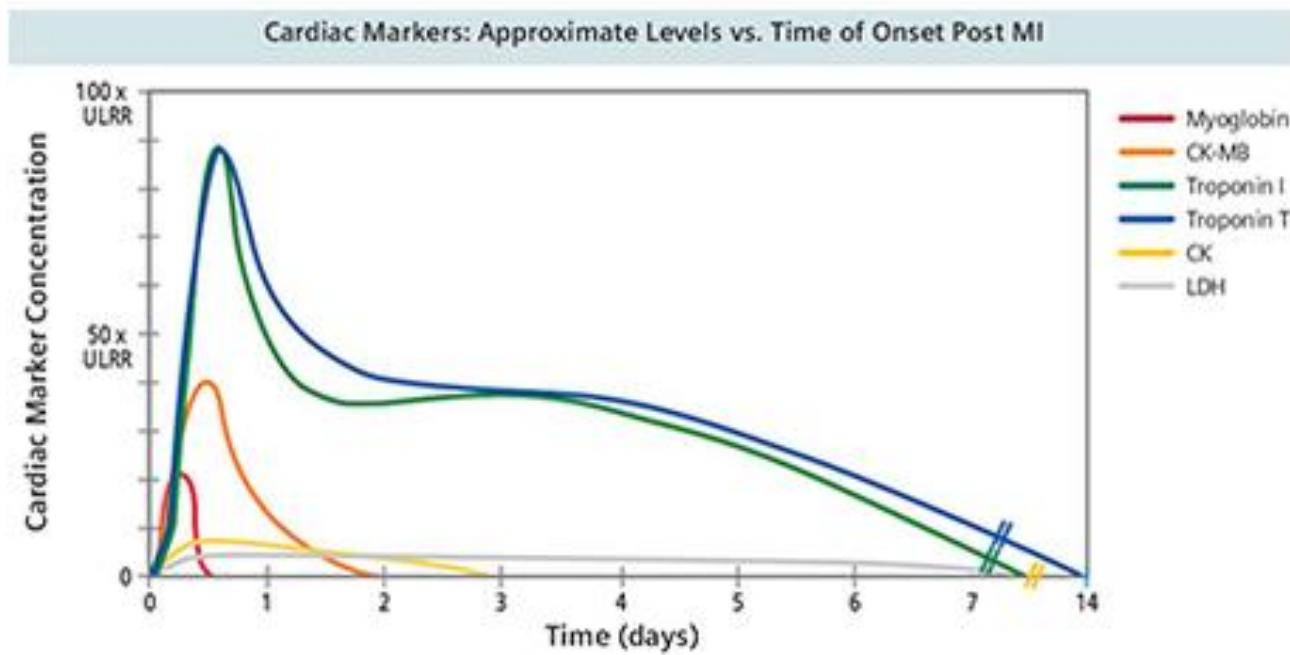
- Bonus slide!

Pericarditis

- Chest pain
- Positional
- Worse on inspiration
- Saddle shaped ST segments
- Treat with NSAIDs
- Can lead to myocarditis (trop rise)
- Heart failure

Troponin

DON'T WAIT FOR A TROPONIN IN STEMI!!



- Most sensitive at 12 hours
- But now 3 hour algorithms with hs-Tn

Troponin

TROPONIN ISN'T ALWAYS A BLOCKED CORONARY

Criteria for Type 1 MI

Detection of a rise and/or fall of cTn values with at least 1 value above the 99th percentile URL and with at least 1 of the following:

- Symptoms of acute myocardial ischemia;
- New ischemic ECG changes;
- Development of pathological Q waves;
- Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischemic etiology;
- Identification of a coronary thrombus by angiography including intracoronary imaging or by autopsy.*

cTn indicates cardiac troponin; ECG, electrocardiogram; URL, upper reference limit.

*Postmortem demonstration of an atherothrombus in the artery supplying the infarcted myocardium, or a macroscopically large circumscribed area of necrosis with or without intramyocardial hemorrhage, meets the type 1 MI criteria regardless of cTn values.

Management of MI

Immediately:

- Treat pain
 - GTN
 - Morphine (co-prescribe anti-emetic)
- Give Aspirin 300mg
- P2Y₁₂ Inhibitor
 - Clopidogrel (300-600mg)
 - Prasugrel
 - Ticagrelor



Management of MI

STEMI

- Direct transfer for PCI
- Angiogram +/- stent
- IIb/IIIa-i (abciximab, tirofiban, eptifibatide)

NSTEMI

- “Cool off”
- Angiogram <72hrs
- Fondaparinux 2.5mg
- Risk stratify: GRACE score
- Emergency PCI if pain continues



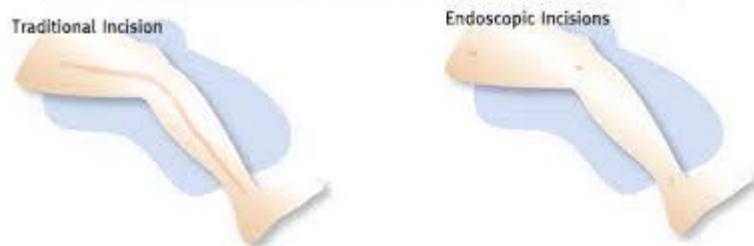
Complications of MI

- Death
- Arrhythmia/heart block
- Ruptured aneurysm
- Thrombus (mural)
- Heart failure/cardiogenic shock

- VSD
- Another MI
- Dressler's syndrome
- Emboli
- Regurgitant valve



OSCE Station: Median Sternotomy



- Probably a bypass
 - Look for vein graft on the legs
- Could be a valve replacement
 - Listen for metallic clicks.

Case 3

79 ♀

Breathlessness



Case 3

- At night
- Wheezy and short of breath
- “Sounded chesty”
- Orthopnoea
- Paroxysmal Nocturnal Dyspnoea (PND)
- Reducing ET (dyspnoea)

Differential?

- Heart failure
- Pneumonia
- Asthma/COPD?
- Pulmonary embolus?!



Case 3

PMHx

- MI 1999 → 2 stents
- MI 2004 → CABG
- Hypertension
- Type 2 Diabetes
- CKD 3



Case 3

DHx

- Aspirin 75mg
- Atorvastatin 40mg
- Bisoprolol 2.5mg
- Amlodipine 5mg
- New: Furosemide 40mg od from GP
 - “Swollen ankles”



Case 3

Social

- Lives alone
- Coping less well for 2/52
- No alcohol
- Ex-smoker (30py)

Family

- Parents lived to 80s
- 2 children
 - Australia
 - America



Case 3

Examination

Looks ill, cold, clammy.

BP 190/60, HR 110.

Sats 90% on RA. RR 30.



Case 3

Examination

- Raised JVP (7cm)
- Pan-systolic murmur
- Third heart sound
- Peripheral oedema to knee

Diagnosis?

- Crepitations to the midzone!



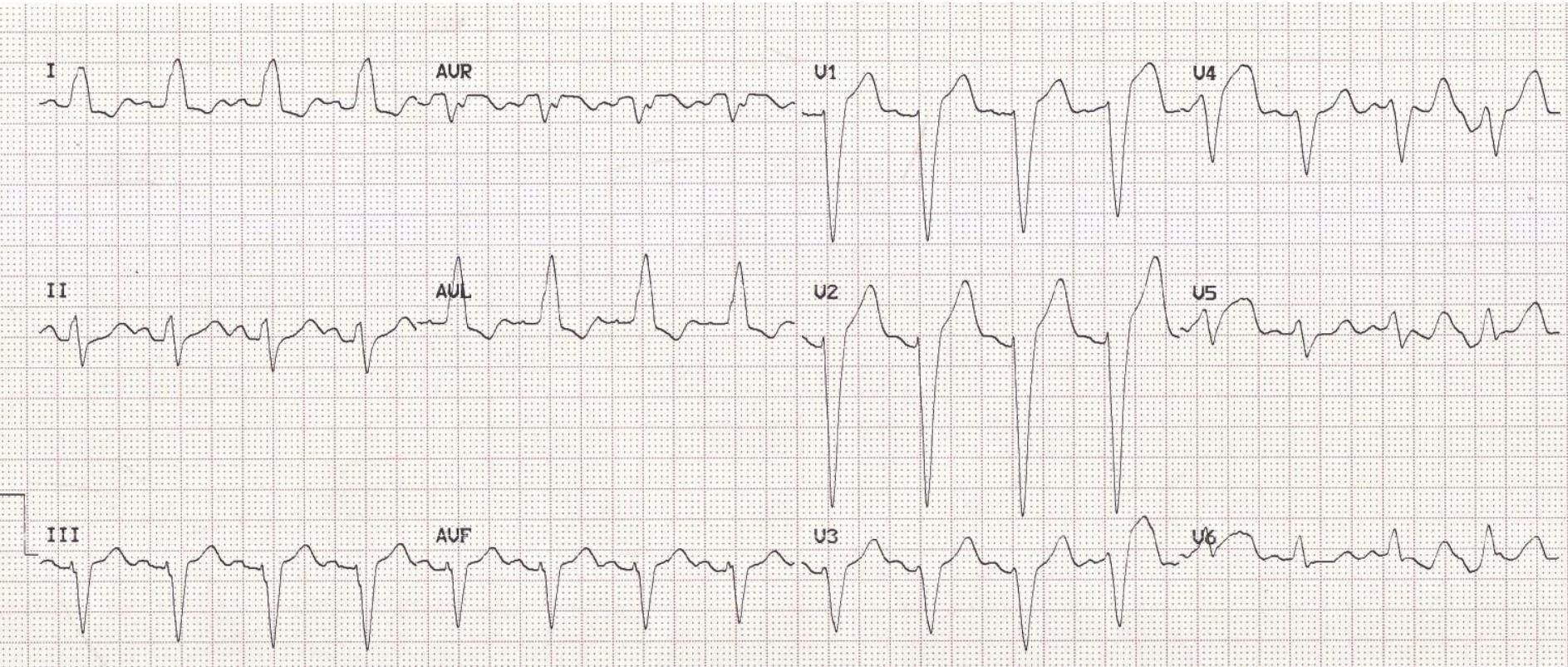
Case 3

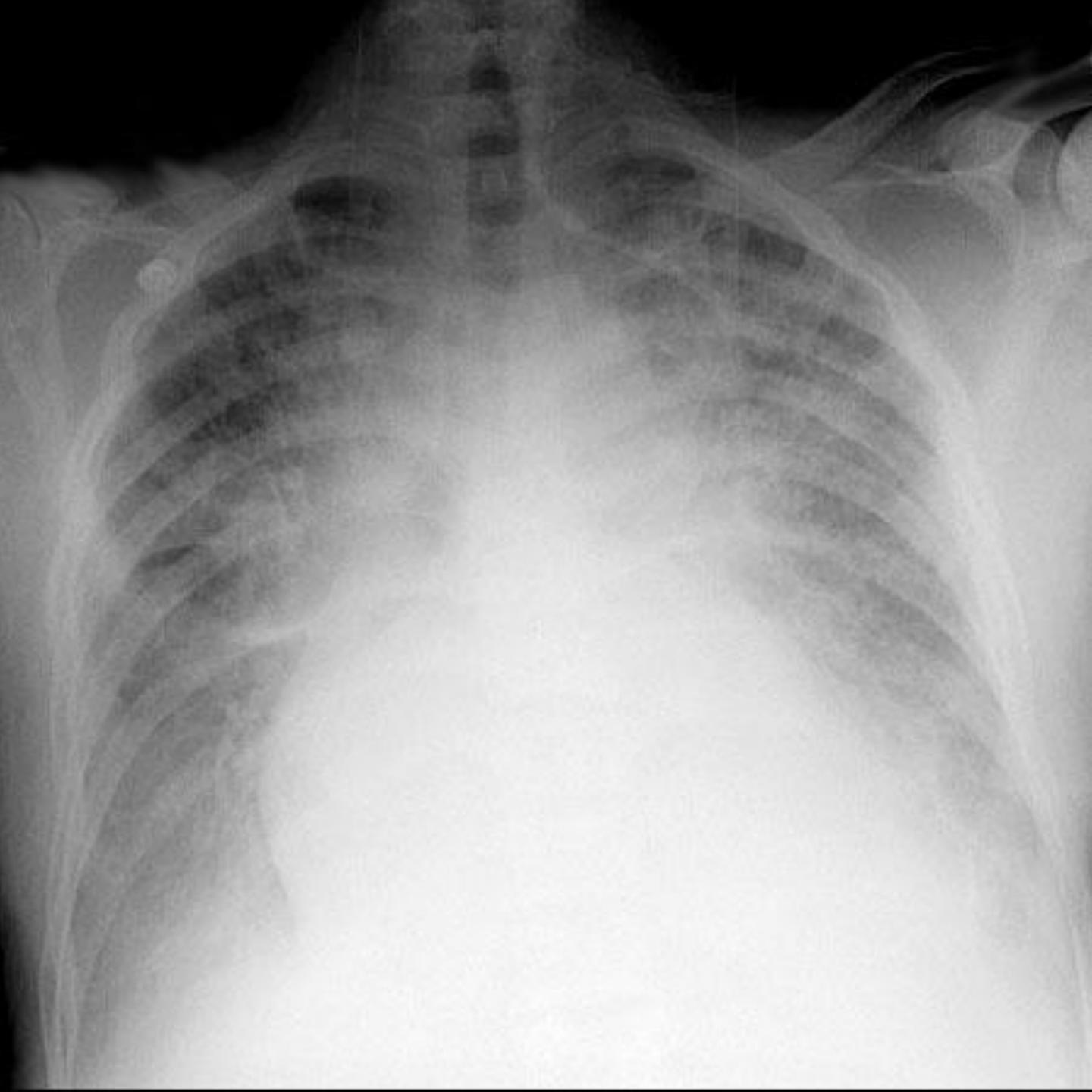
Investigations

- Bloods
- ECG
- Chest X-ray
- Echocardiogram

Na+	128
K+	4.0
Ur	13.5
Cr	270
WCC	7
Hb	10.5
Plts	327
NT-pro-BNP	3000
CRP	<5

Case 3





IPLY
CARDIOLOGY

Heart Failure CXR ABCDE

A - Alveolar shadowing

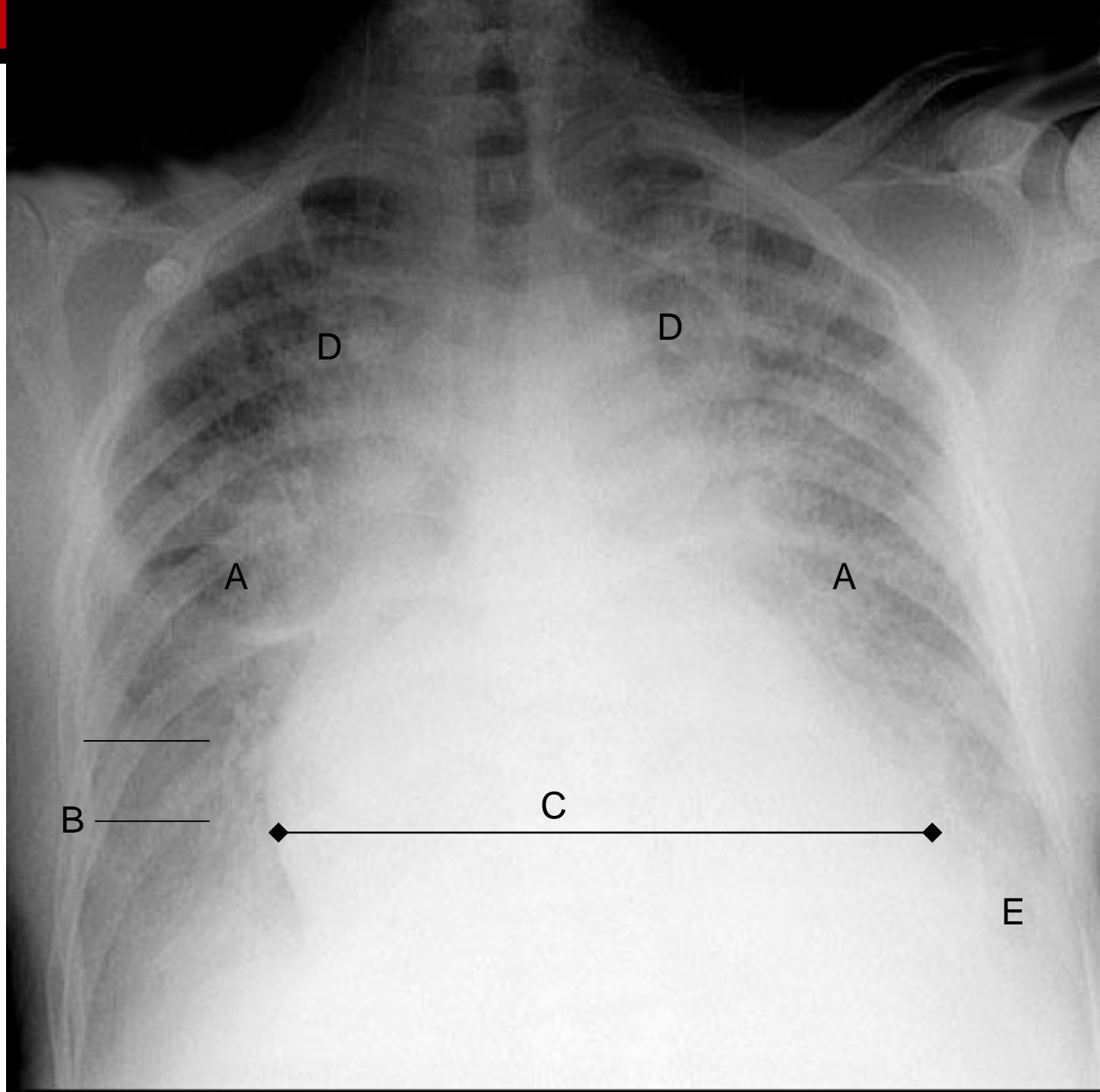
B – Kerley-B lines

C - Cardiomegaly

D - Upper lobe Diversion

E - Pleural Effusions





Heart Failure Management

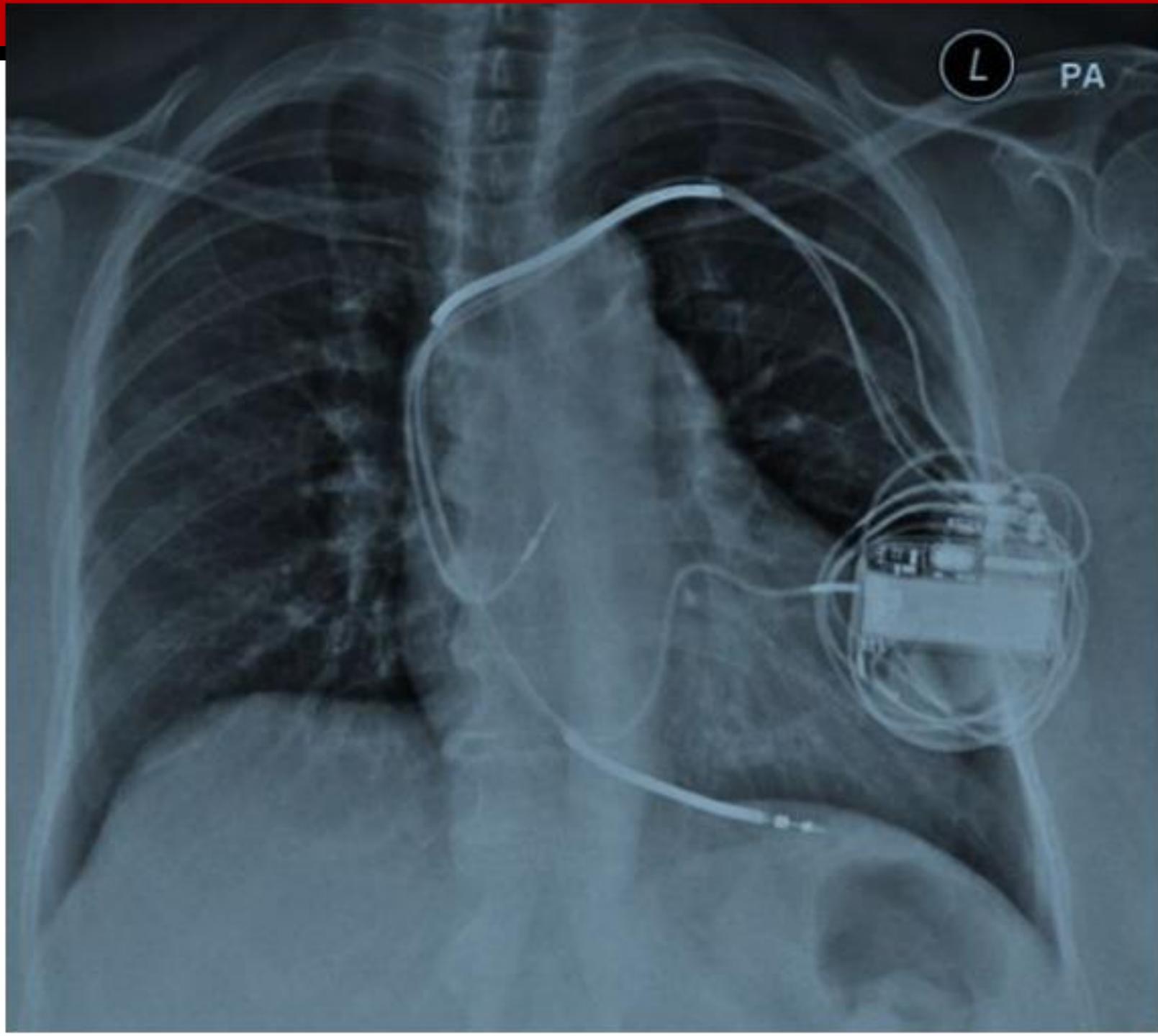
Acute

- Oxygen
- Furosemide (i.v.)
 - Aiming for diuresis
- If fails → CPAP
- Off the menu!
 - GTN
 - Morphine

Long-term

- Salt restricted diet
- Cardiac rehab course
- Oral loop diuretics
- Spironolactone/Eplerenone
- ACE-i/A2RB/Sac&Val
- β -blocker
- Anti-platelets/Statin
- Defibrillator/Resynchronisation





LY
OLOGY

What causes heart failure?

- Ischaemic heart disease
- Valvular disease
- Hypertension
- Cardiomyopathy
 - Lots of rare causes



Why decompensation?

- Infarction
- Infection
- Drugs
- Arrhythmia
- Thyroid disease
- Hypertension



Heart Failure

Symptoms classification

New York Heart Association:

- NYHA I
 - No symptoms
- NYHA II
 - Mild symptoms during daily life
- NYHA III
 - Symptoms with any exertion
- NYHA IIII
 - Symptoms at rest



Heart Failure – Ejection Fraction

Mild >45%

Moderate 35-45%

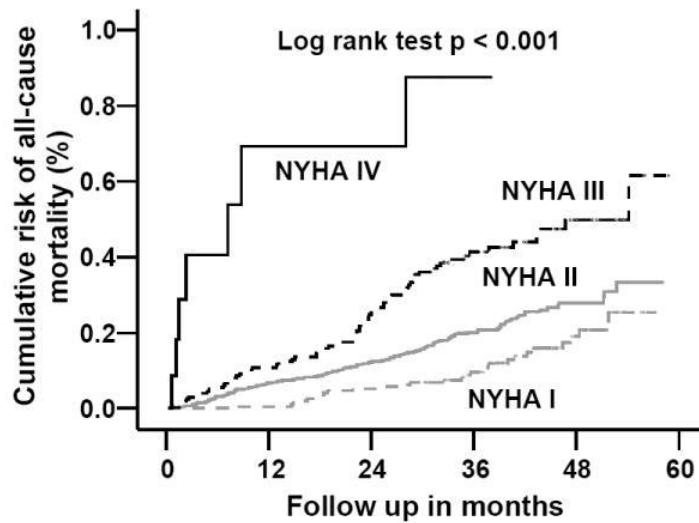
Severe <35%



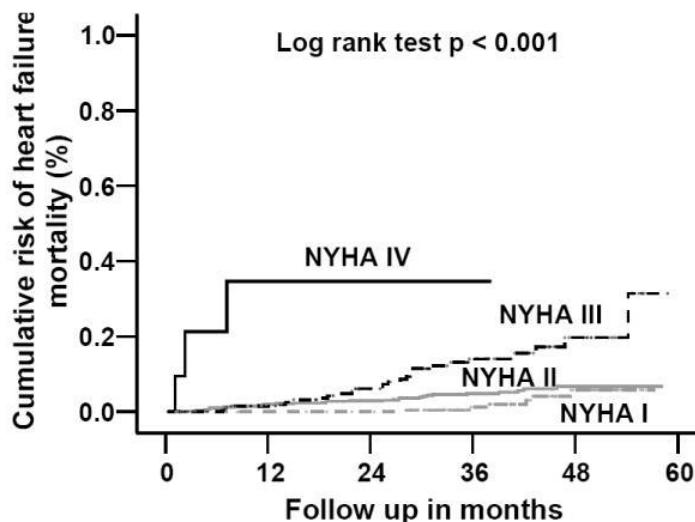
Heart Failure

Prognosis

(a)



(b)



OSCE tips

- Hard to get a decompensated patients in your exam
- Feel for a pacemaker or an ICD
- Look for RV signs without LV signs
 - JVP raised
 - Peripheral oedema
 - NO pulmonary oedema.
- Extra heart sounds (“Gallop” rhythm)



Case 4

88 ♂

Loss of
Consciousness



Case 4

History

- Sitting at church
- Suddenly felt “wrong”
- Woke up on floor
- Immediately knew was in church
- No tongue biting/urinary incontinence/injury



Case 4

Collateral

- Went pale
- Slumped off seat
- No shaking
- Out for “minutes”
- Normal on recovery



Case 4

PMHx

- Hypertension
- Cholesterol

DHx

- Amlodipine
- Simvastatin

SHx

- Non-smoker
- No alcohol
- Independent

FHx

- Nil



Case 4

Examination

- Looks well
- BP 190/70, HR 40, RR 16, sats 95% RA
- Ejection systolic murmur



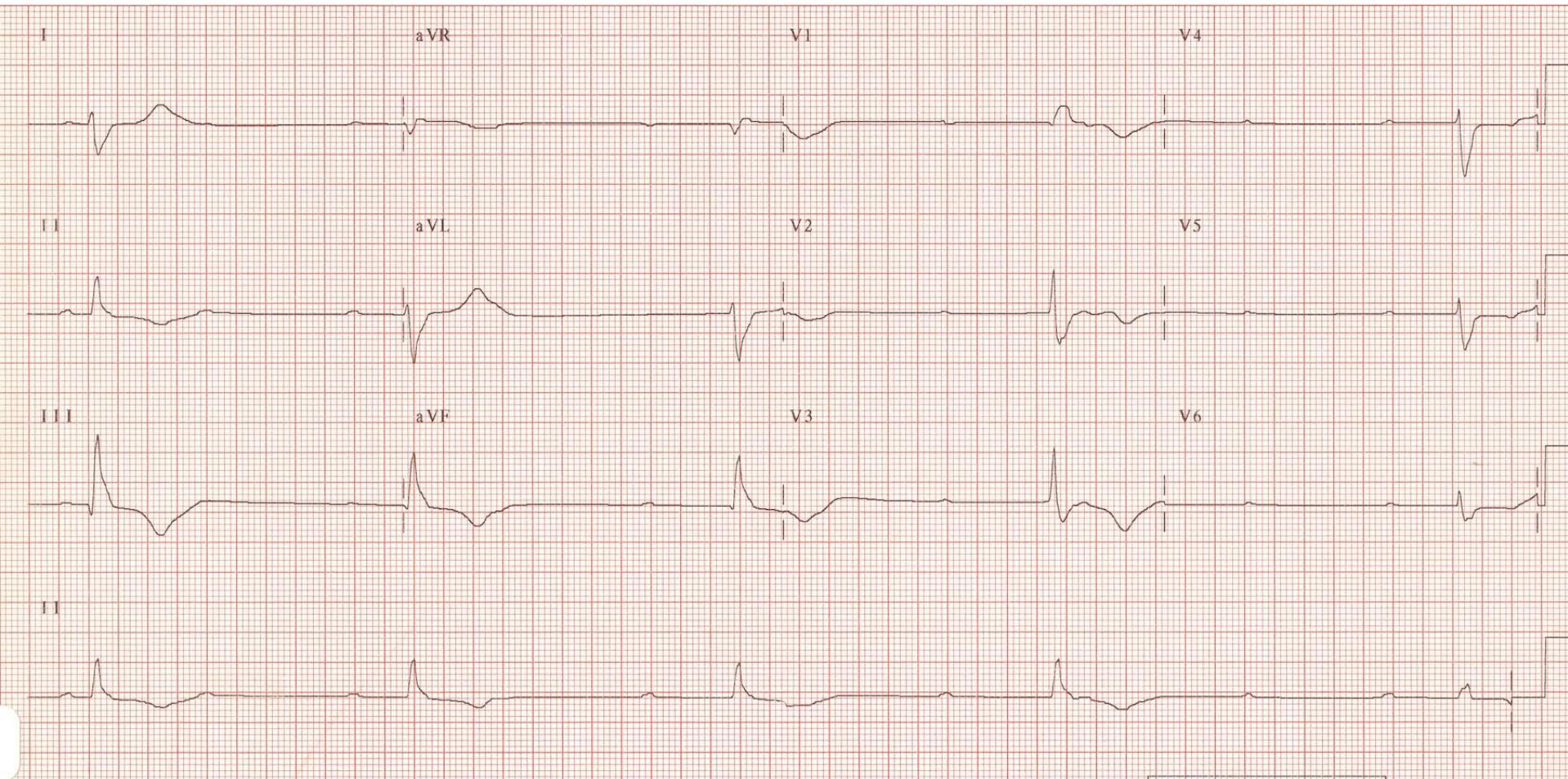
Case 4

Investigations

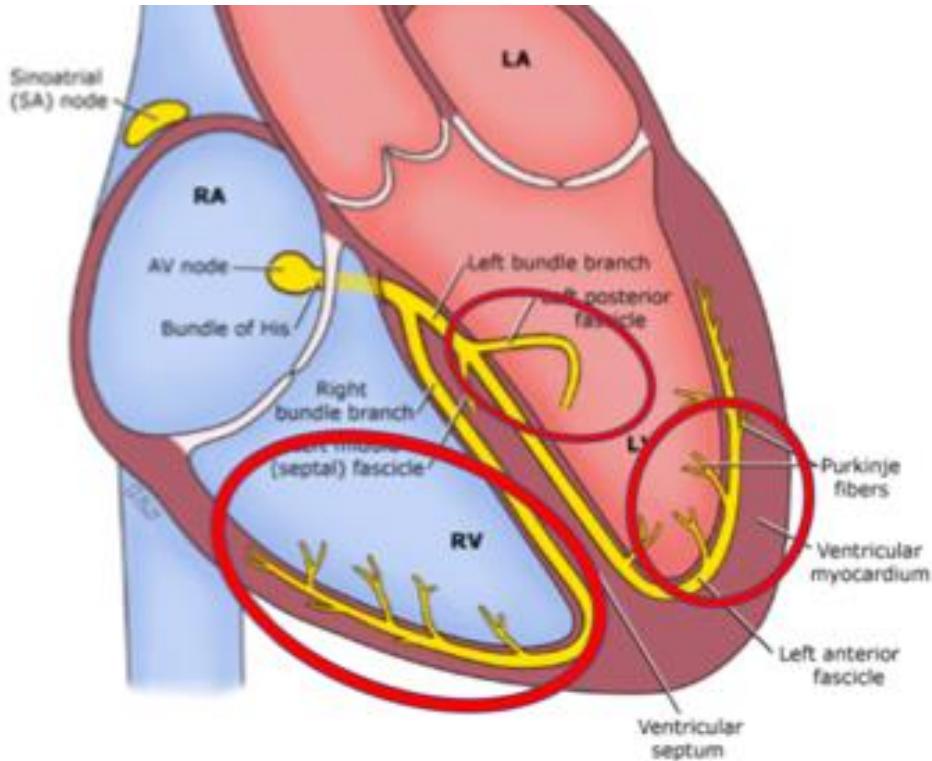
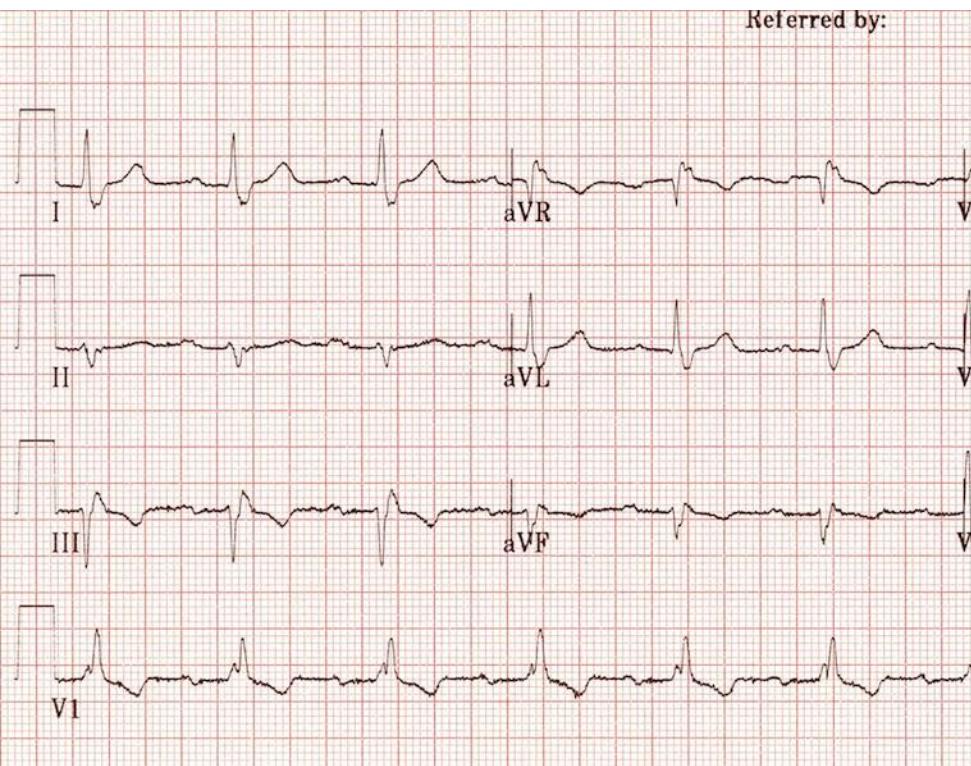
- Bloods
- CXR
- ECG
- Echo?



ECG



ECG



ECG



Pacemaker Indications

- 1st Degree HB
- 2nd Degree HB
 - Mobitz 1
 - Mobitz 2 (2:1, 3:1)
- Tri-fascicular block
- 3rd Degree HB (Complete)

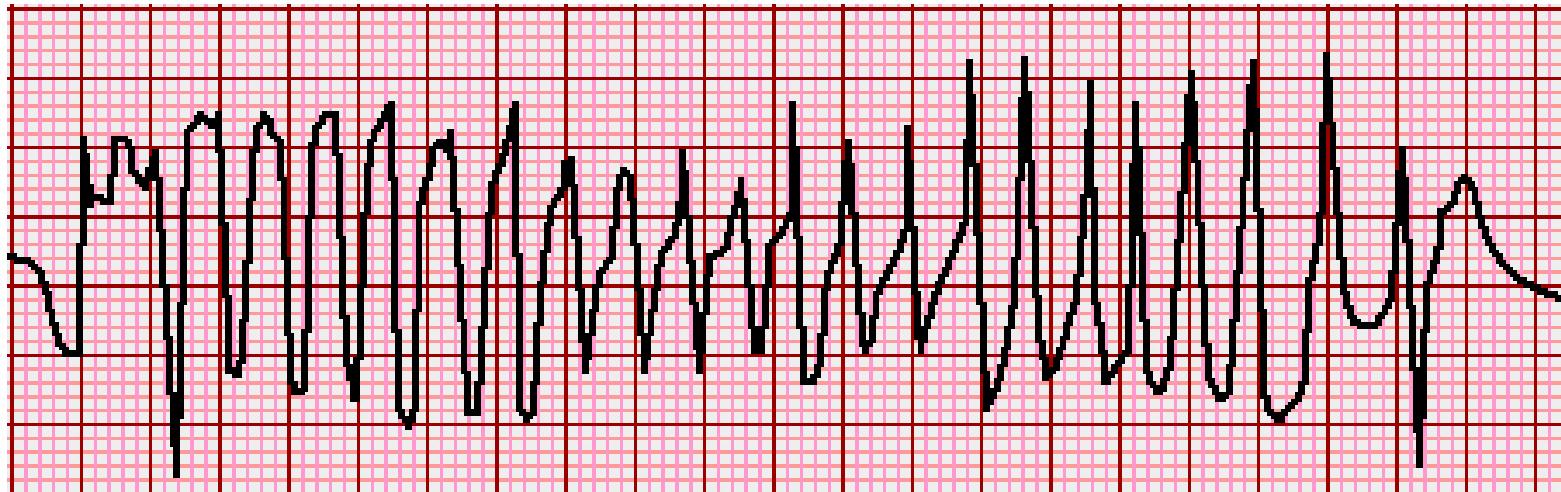


Case 3.1

27 ♂

DEAD

DEAD



Torsade de Pointes

Treatment

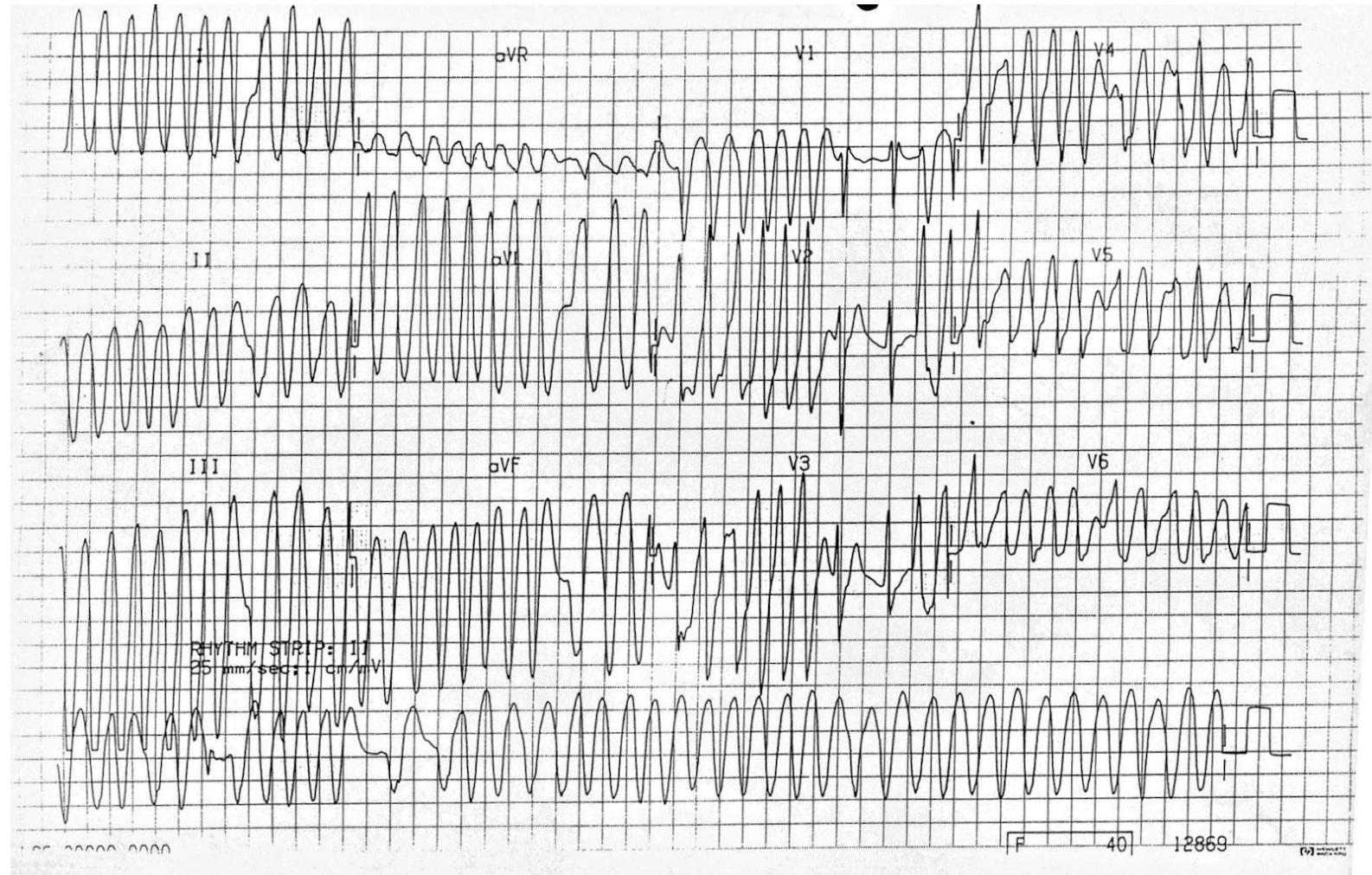
- 1) Electricity
- 2) Magnesium (2g/10mins) (when alive)

Diagnosis?

- Drugs (cocaine, speed, MDMA)
 - LQTS 1,2,3 (up to 13!)
 - Brugada syndrome
 - ARVC
 - HCM
-
- All rare



Pre-excited AF/WPW



Delta-waves

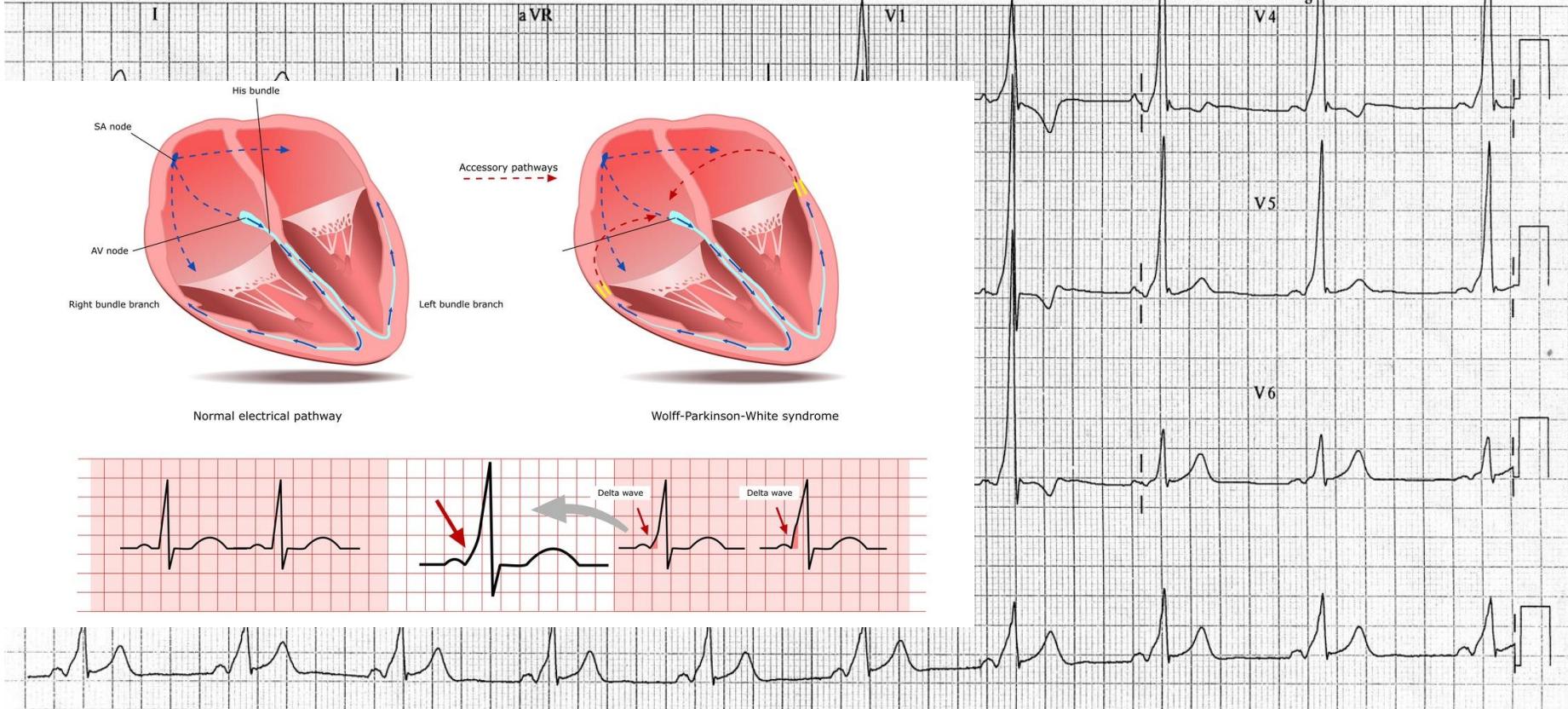
QTc 392

--Axis--

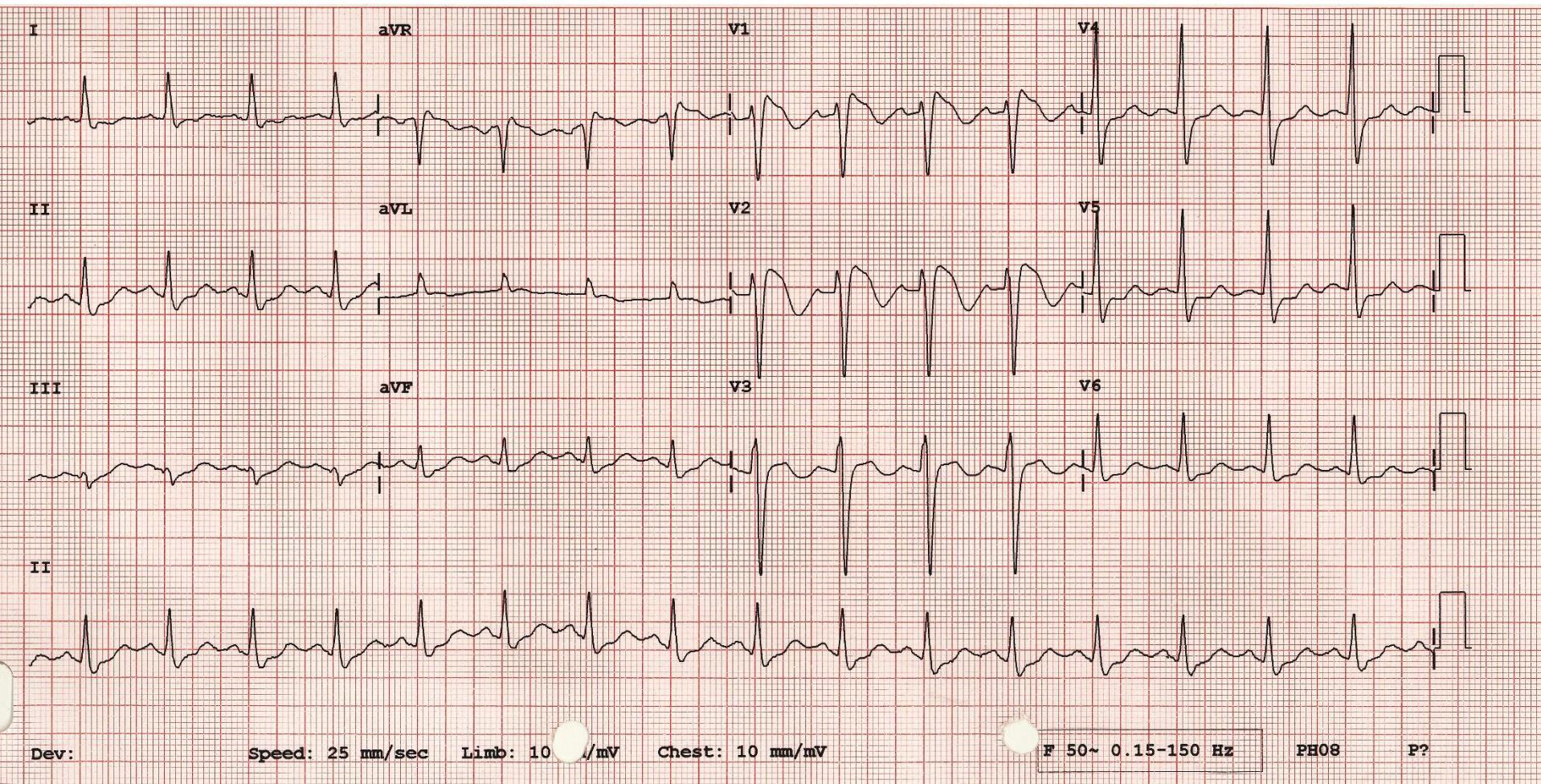
P - 40

QRS 77

T 15



Brugada



Case 5

57 ♂

Chest pain on
Exertion



Case 5

History

- Worsening chest pain on exertion
- Associated with breathlessness
- Never lost consciousness



Case 5

PMHx

Nil

DHx

None

SHx

- Non-smoker
- 6 units/week
- Independent

FHx

- Nil

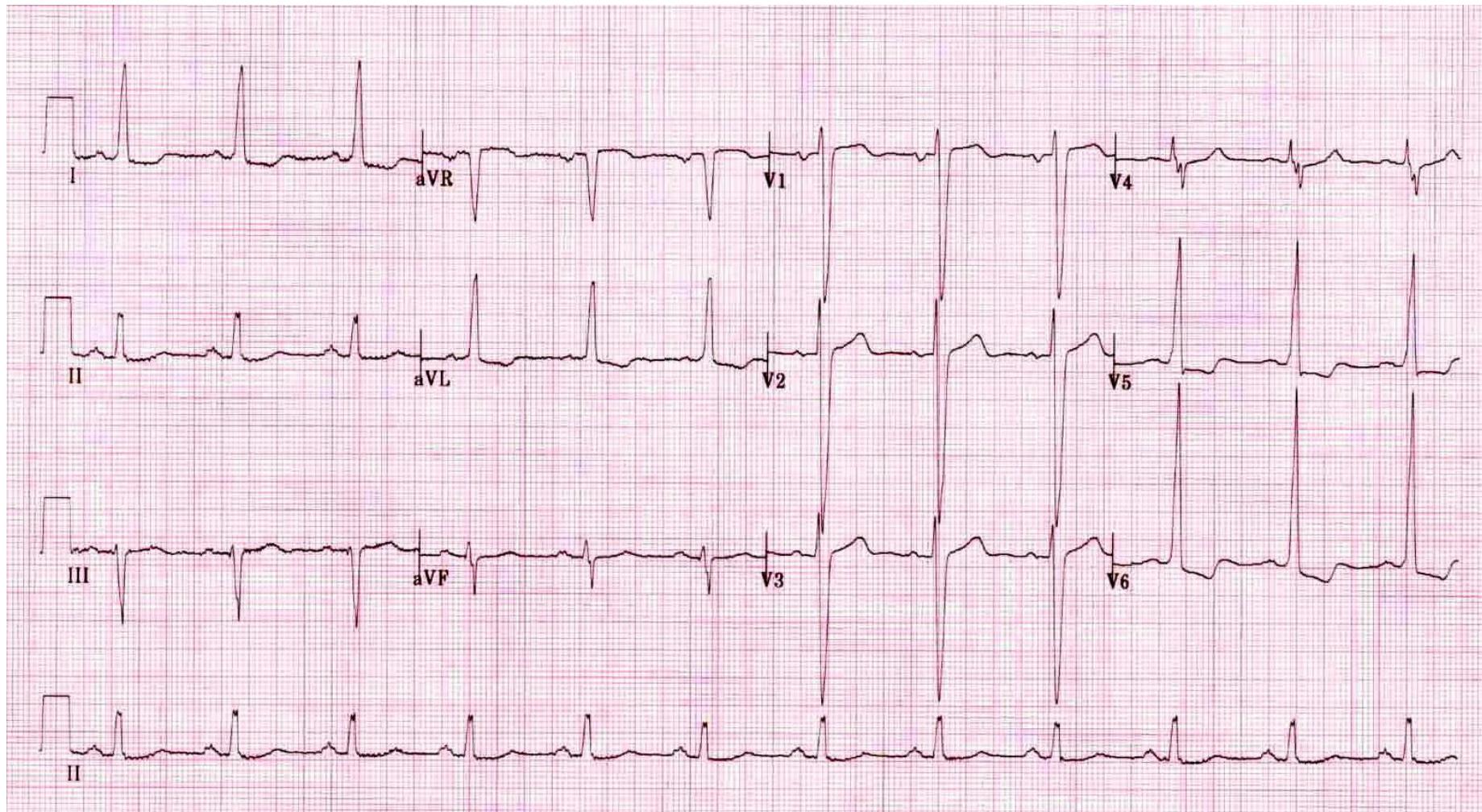


Case 5

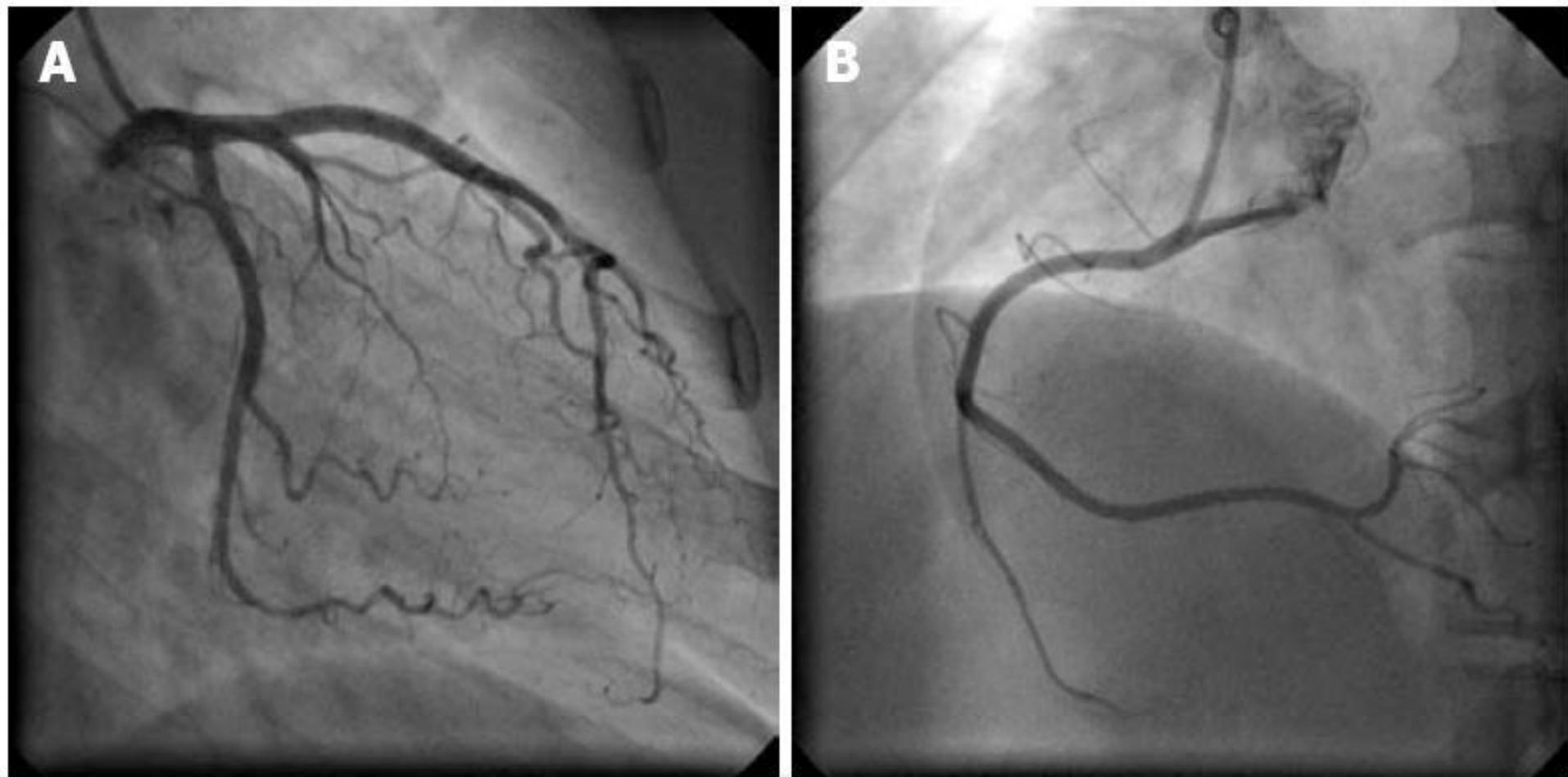
- BP100/80, HR 70, sats 96%, RR 16
- Murmur heard:
 - Ejection systolic
 - Loudest over aortic region
- Radiates to carotids.
- Quiet second heart sound.
- Slow rising pulse



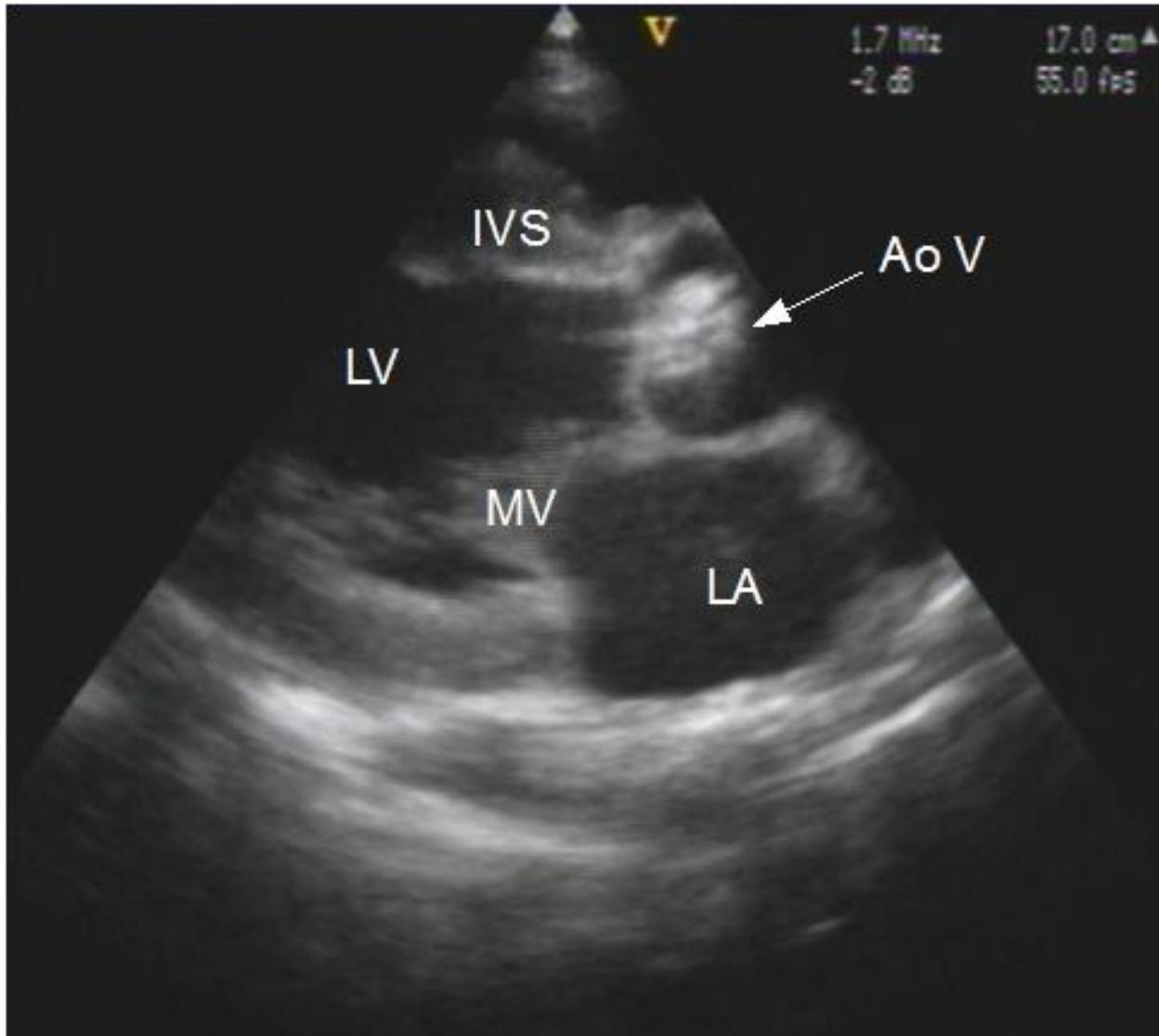
Case 5



Case 5

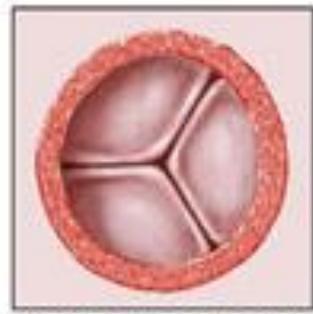


Case 5

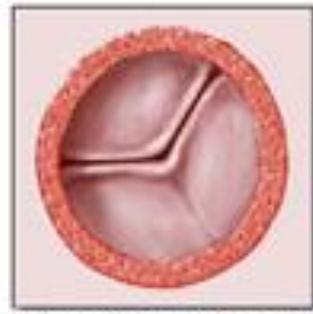


Aortic Stenosis

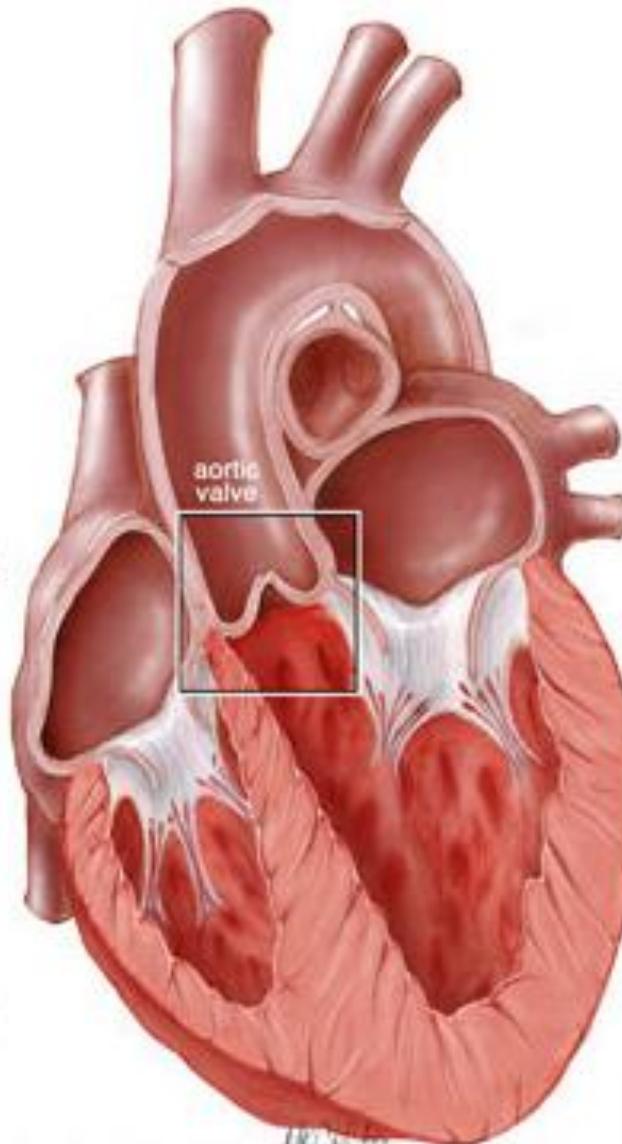
Aortic Valve



Tricuspid aortic valve
(normal)

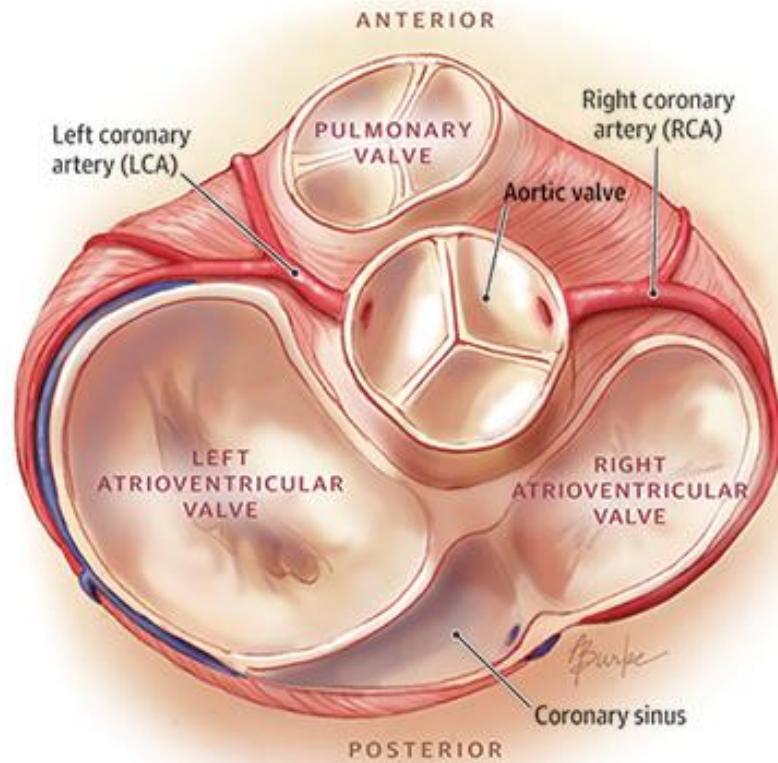


Bicuspid aortic valve
(abnormal)

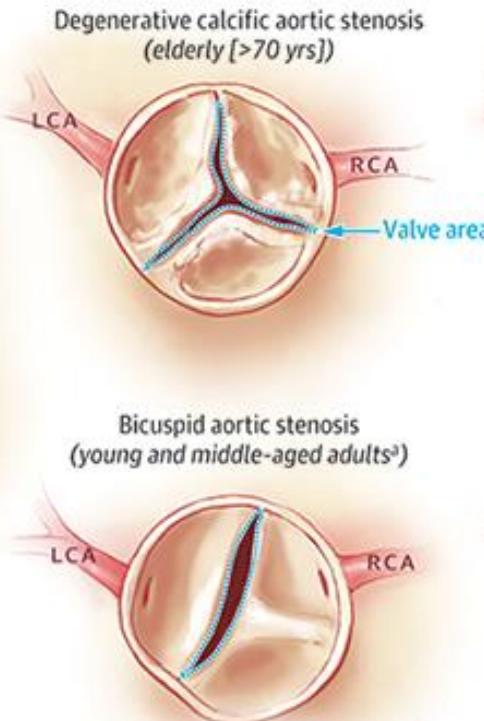


Aortic Stenosis

A Normal heart valve anatomy



B Examples of types of aortic stenosis and age of presentation of aortic stenosis



Aortic Stenosis

Symptoms:

- Angina
- Dyspnoea
- Syncope

Severity:

- Narrow pulse pressure
- Long murmur
- Quiet heart sound



Aortic Stenosis

Prognosis:

- If symptomatic: poor
- 15-50% dead in a year

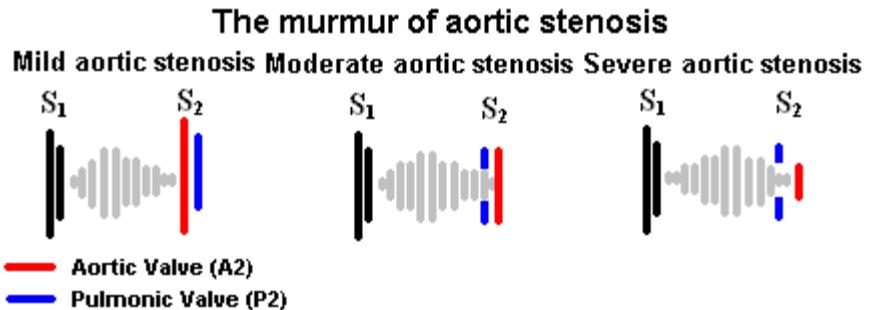
Treatment:

- NO GTN for angina!
- AVR (mechanical or tissue)
- TAVI



OSCE tips: Aortic Stenosis

- Severe AS
 - Late peaking murmur
 - Low volume pulse
 - Heaving Apex
 - More likely to get a sternotomy with a metallic second heart sound.
 - Listen at the carotids!
 - Rule out MR
 - Young person → bicuspid valve.



Case 6

57 ♀

Palpitations and
breathlessness



Case 6

History

- 12 months of palpitations
- 3 months of exertional dyspnoea

PMHx

- Hypertension

DHx

- Amlodipine

SHx

- Independent
- Non-smoker



Case 6

Examination

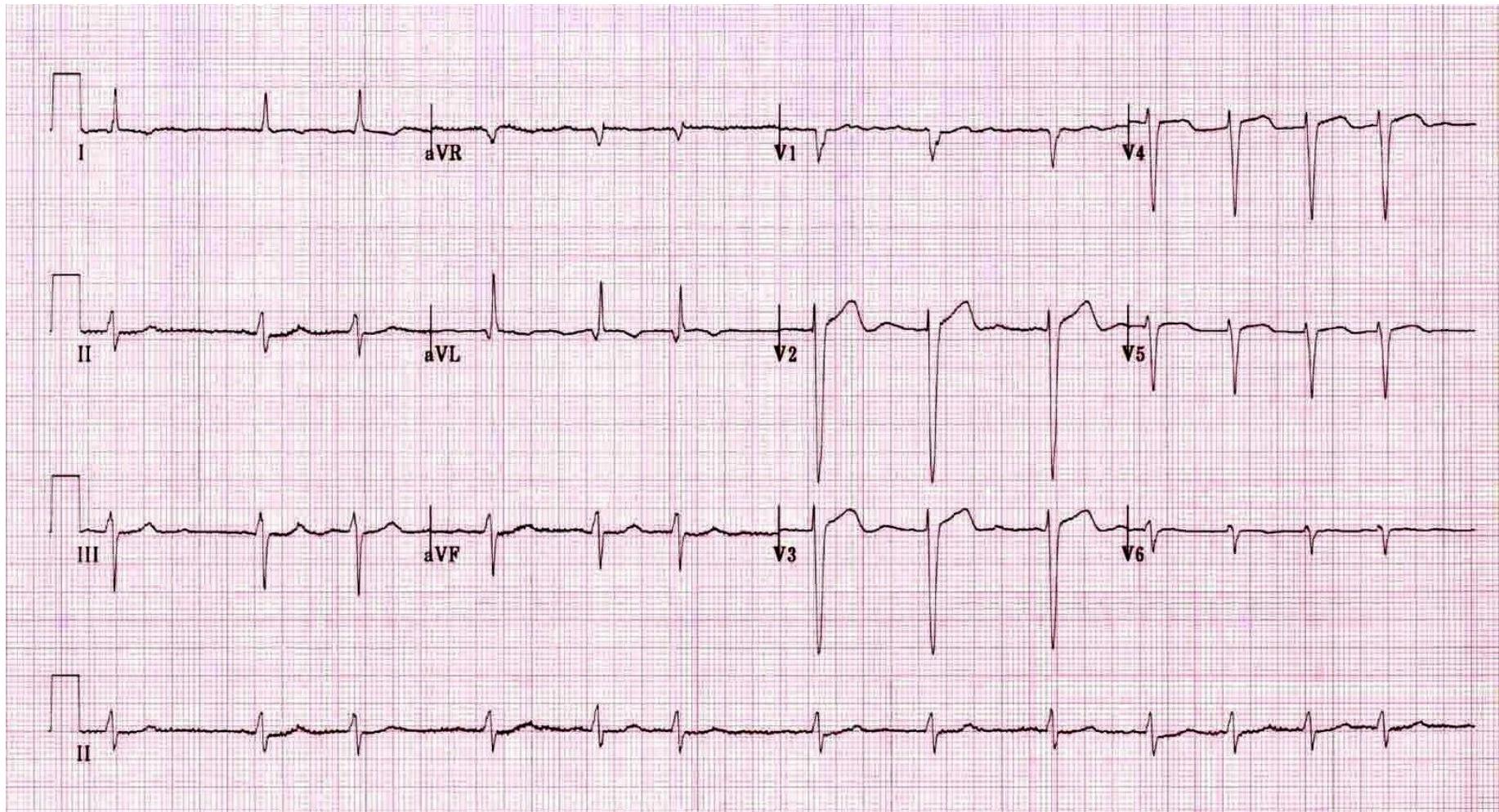
140/60

HR 100 – irregularly irregular

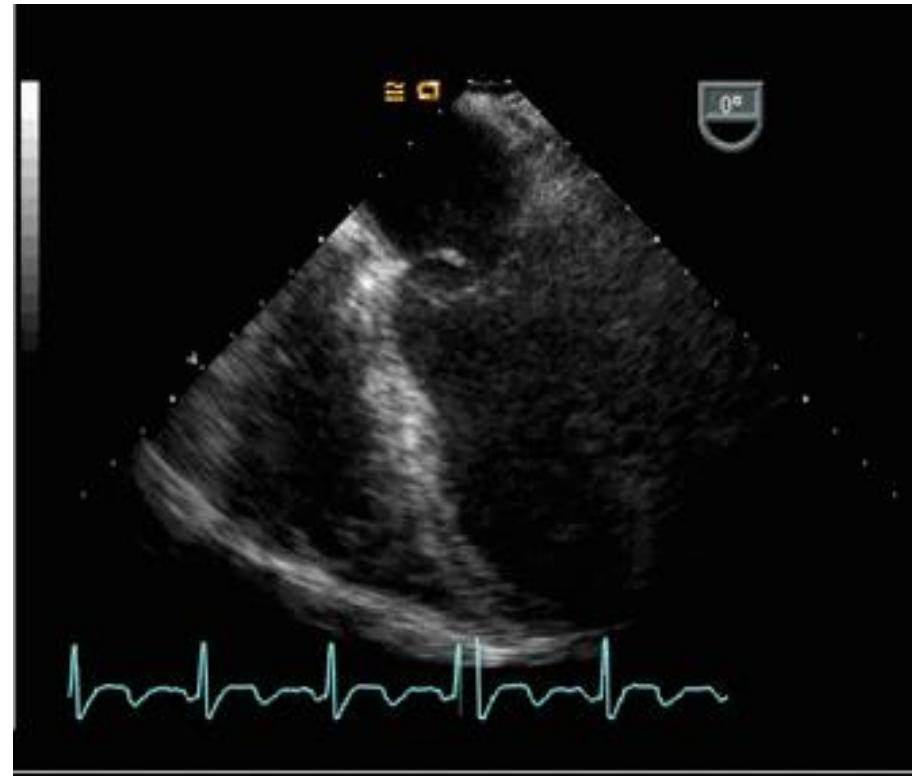
Pan-systolic murmur, loudest at apex.



Case 6



Mitral Regurgitation



Bonus slide
Endocarditis!!

Duke's criteria:

MAJOR

New regurgitant valve lesion

Typical bugs on cultures

- Strep.
- Staph (post op)
- HACEK

Minor

- Vasculitic lesions
- Embolic events
- Non-typical bugs

Mitral Regurgitation

Symptoms

- Breathless on exertion
- Heart failure symptoms
- (Chest pain)
- (Palpitations)

Signs

- Pan-systolic murmur
- Displaced apex beat
- Atrial fibrillation
- Heart Failure



Mitral Regurgitation

Prognosis

- Acute: bad
- Chronic, symptomatic: 22% in 5 years

Treatment

Heart failure (medical) management

Anti-coagulate if in AF!

Surgery if severe MR and:

- Symptomatic w/impaired LV
- Asymptomatic w/pHTN or AF



OSCE tips

- Common in OSCEs (because it doesn't need surgery immediately)
- If you feel AF, then listen/feel for mitral disease.
 - Displaced apex
 - Pan-systolic murmur



Case 7

63 ♀

No symptoms

Case 7

- Worried about family history
 - Dad died “of MI” at 40yrs
 - Mum died of heart failure at 70yrs
 - Brother had triple bypass last year.



Risk factor modification

- Blood pressure: 160/70mmHg
- Cholesterol: 6.3
- Diabetes: Don't know
- Smoking: Yes
- Exercise: No



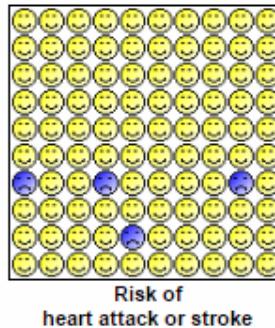
Risk Stratification: www.qrisk.org

Your results

Your risk of having a heart attack or stroke within the next 10 years is:

4.4%

In other words, in a crowd of 100 people with the same risk factors as you, 4 are likely to have a heart attack or stroke within the next 10 years.



Your score has been calculated using the data you entered.

Your body mass index was calculated as 20.06 kg/m².

How does your 10-year score compare?

Your score	
Your 10-year QRISK®2 score	4.4%
The score of a healthy person with the same age, sex, and ethnicity*	0.8%
Relative risk**	5.8
Your QRISK® Healthy Heart Age***	48

Risk factors

- Male sex
- Age (men ≥ 55 years; women ≥ 65 years)
- Smoking
- Dyslipidaemia
- Fasting plasma glucose 5.6–6.9 mmol/L (102–125 mg/dL)
- Abnormal Glucose TT
- Obesity
- Family history of CVD
- Asymptomatic organ damage
 - Pulse pressure (in the elderly) ≥ 60 mmHg
 - LVH

- Carotid wall thickening (IMT >0.9 mm) or plaque
- Carotid-femoral PWV >10 m/s
- Ankle-brachial index <0.9
- Microalbuminuria
 - Diabetes mellitus
 - Established CV or renal disease
 - Stroke
 - Ischaemic Heart Disease
- Heart failure, including heart failure with preserved EF
- Symptomatic lower extremities peripheral artery disease
- Chronic kidney disease
- Advanced retinopathy:

GIVE TABLETS

Cholesterol

Primary prevention (no heart attack, yet)

- Atorvastatin 20mg or Rosuvastatin 10mg
- Target is <40% of non-HDL cholesterol

Secondary prevention (had a heart attack)

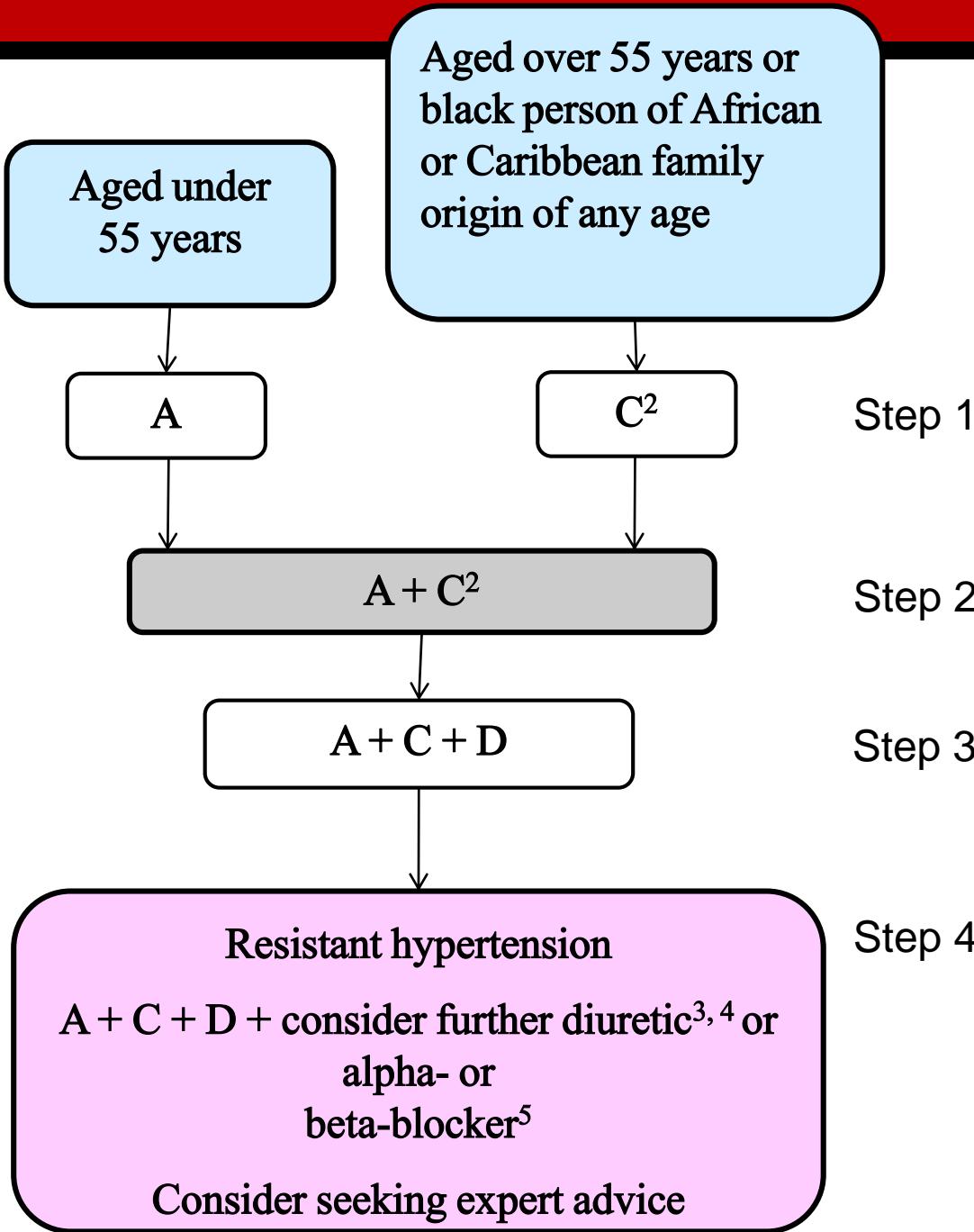
- Atorvastatin 80mg



Hypertension

- **Stage 1 hypertension:**
 - Clinic blood pressure (BP) is 140/90 mmHg or higher **and**
 - ABPM or HBPM average is 135/85 mmHg or higher.
- **Stage 2 hypertension:**
 - Clinic BP 160/100 mmHg is or higher **and**
 - ABPM or HBPM daytime average is 150/95 mmHg or higher.
- **Severe hypertension:**
 - Clinic BP is 180 mmHg or higher **or**
 - Clinic diastolic BP is 110 mmHg or higher.





Summary of antihypertensive drug treatment

Key

- A – ACE inhibitor or low-cost angiotensin II receptor blocker (ARB)¹
- C – Calcium-channel blocker (CCB)
- D – Thiazide-like diuretic

Summary

- MI
 - STEMI/NSTEMI?
 - Aspirin/Oxygen/Nitrates/Morphine
- Heart Failure
 - Diuretics then secondary prevention
- AF
 - Emergency?
 - Rate vs. Rhythm
- Valves
 - AS poor prognosis, early surgery
 - MR better prognosis, AF, later surgery
- Hypertension + Cholesterol
 - NICE guidelines



Cool websites

- www.lifeinthefastlane.com
- www.escardio.org (actually not that cool)
- The Simply Forum(?)

