

Acute Coronary Syndromes

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ACS Definition

- A collection of clinical expressions of acute coronary artery disease classified by the appearance of the presenting 12-lead electrocardiogram (ECG) and/or concentrations of cardiac markers detected in the blood.
- (Fox, 2000)



Definition

❖ ACS is not a diagnosis!

There are two main groups:

1. ST elevation myocardial infarction (STEMI).
2. **Unstable angina (UA) and non-ST elevation myocardial infarction (NSTEMI).**

(Jowett and Thompson, 2003)

ACS is not just an old persons illness



Unstable Angina

- Unstable angina:
Pattern of increased frequency and duration of angina episodes produced by less exertion or at rest, progressing to myocardial infarction if untreated. Cardiac markers may be slightly raised.

(Lilly 2007)

NSTEMI

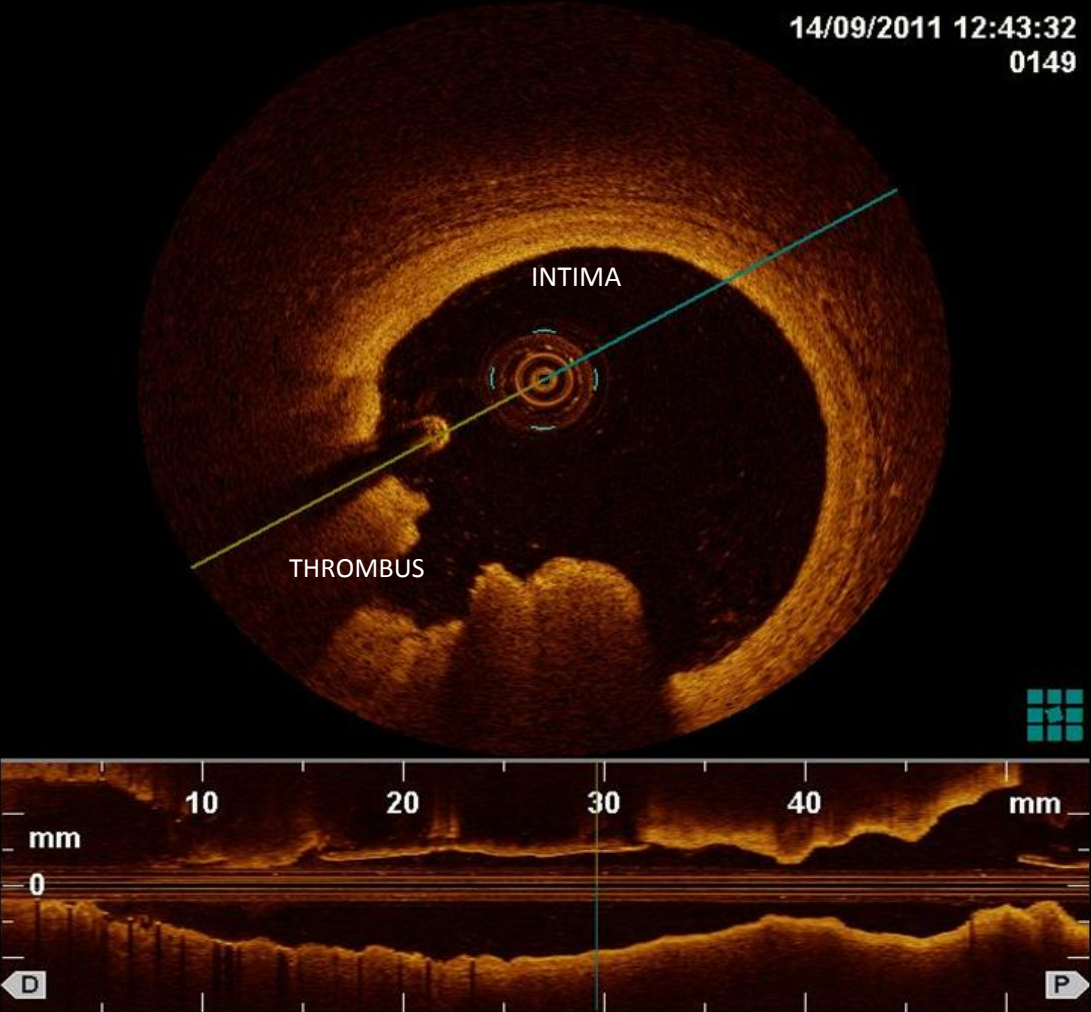
(non ST elevation Myocardial Infarction)

- Non-ST elevation myocardial infarction:
Symptoms of myocardial ischaemia, without ST elevation. The ECG is usually abnormal but can be normal. Cardiac markers will be positive. Often said to be result of non full thickness MI/subendocardial.

(Jowett and Thompson 2003)

Red thrombus

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Pathophysiology of NSTEMI

- Unstable angina to Acute myocardial infarction is a continuation of the same disease process.
- MI is the total occlusion of the arterial lumen by a thrombus leading to myocardial necrosis. Unstable angina is caused by transient emboli, usually non-occlusive. Both originate from plaque rupture.

(Lilly, 2007)



ECG Changes

- Usually abnormal, though can be normal.
- Can manifest as QRS complex, T wave and ST segment changes.
- ST depression
- T-Wave inversion
- Left and Right bundle branch blocks

ECG Changes

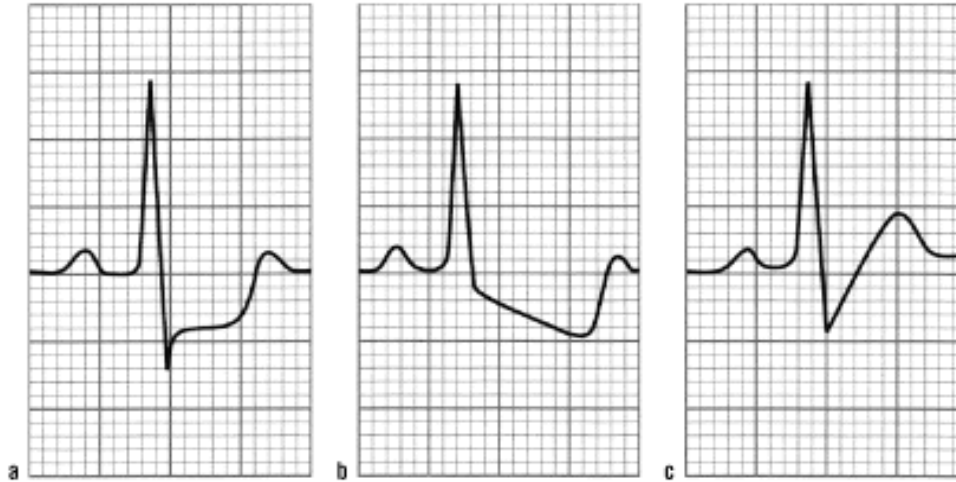
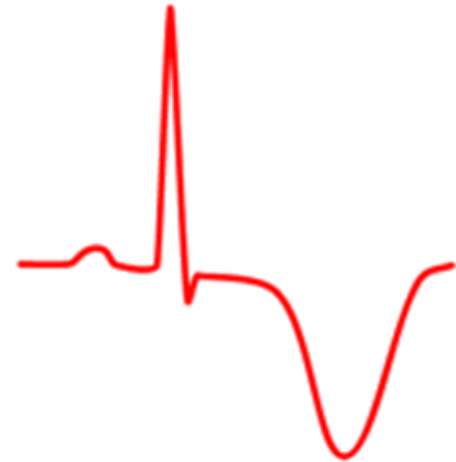


Figure 1. Various forms of ST-segment depression during exercise stress testing. a. Horizontal. b. Downsloping. c. Upsloping. Horizontal and downsloping forms indicate ischemia; upsloping is a poor indicator of ischemia.

T WAVE INVERSION



Cardiac Markers

- Troponin T- Normal range 0-0.05 and present in blood after 3hrs. Peaks at 12 hrs.
- Troponin I - Normal range 0-0.4 and present in blood after 3hrs. Peaks at 12 hrs.
- CK (Creatine Kinase)-Found in skeletal and cardiac muscle. Normal range 0-170 and present in 3hrs and peaks at 12hrs
- CK-MB (CK isoenzyme)-Almost exclusively in cardiac muscle.
Present after 3 hrs but peaks at 12hrs.

CK/CK-MB usually resolve within 72hrs whereas Troponin remains elevated for two weeks



NSTEMI – Unstable Angina?

- ST depression/T wave inversion/abnormalities and positive Troponin

NSTEMI

- Unremarkable ECG and positive Troponin

NSTEMI

- ST depression/T wave abnormalities and negative Troponin

Unstable angina

(Troponin I – less than 0.4)

(Troponin T – less than 0.05)

*Remember the value of CK (0-170) and CK-MB (0-3)



Treatment

- 300mg Aspirin & 300mg Clopidogrel
- Fondaparinux or LMWH
- Refer for a ?Proc within 72 hours
- Full clinical history including risk factors.
- Physical examination
- 12 lead ECG's & Bloods

Additional treatment of the high risk

- Offer a further 300mg Clopidogrel
- PCI urgent or within 24 hours
- Consider GPI (Tirofiban) or Bivalirudin
- Assessment of LV function.

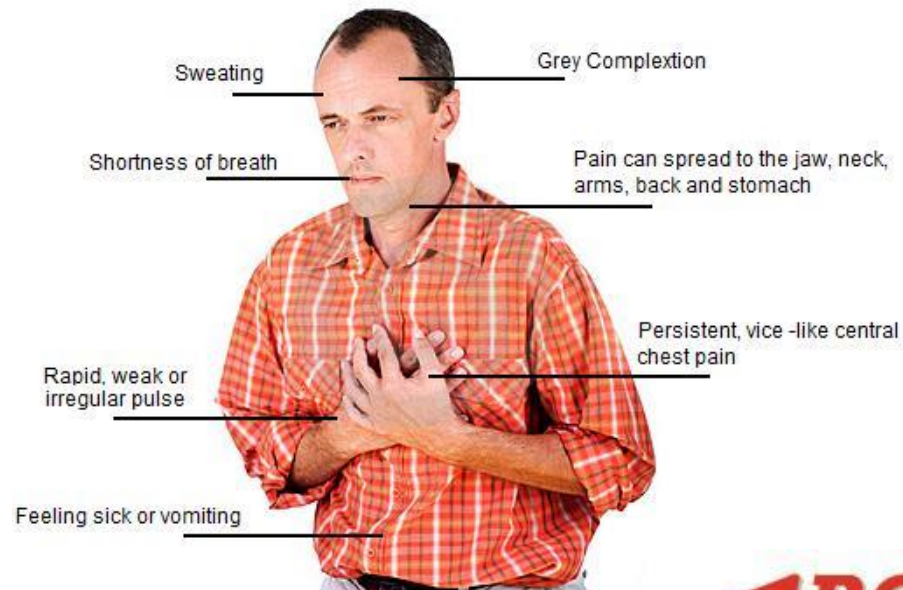
What to do in the Lab

- Haemodynamic and rhythm monitoring.
- IV Fluids
- Drugs
- Pain control/sedation
- O2 administration
- Documentation
- Information.

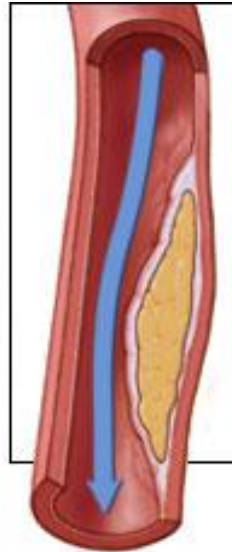
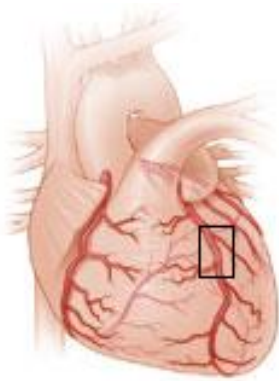


STEMI

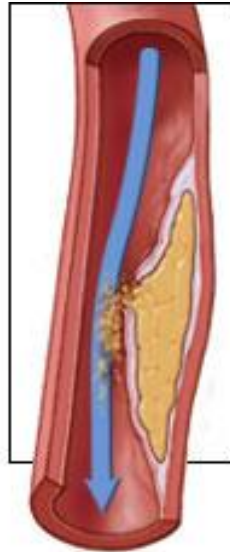
- **S** **T** **E**levation **MI** require **P**rimary **P**ercutaneous **C**oronary **I**ntervention.



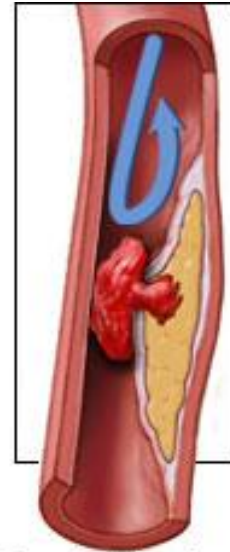
STEMI



Plaque with fibrous cap



Cap ruptures

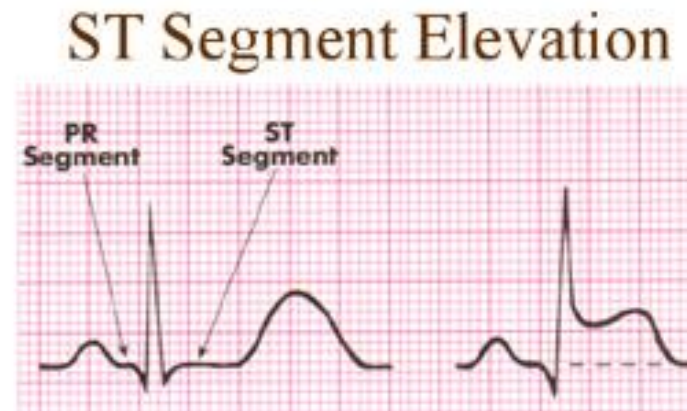


Blood clot forms around the rupture, blocking the artery

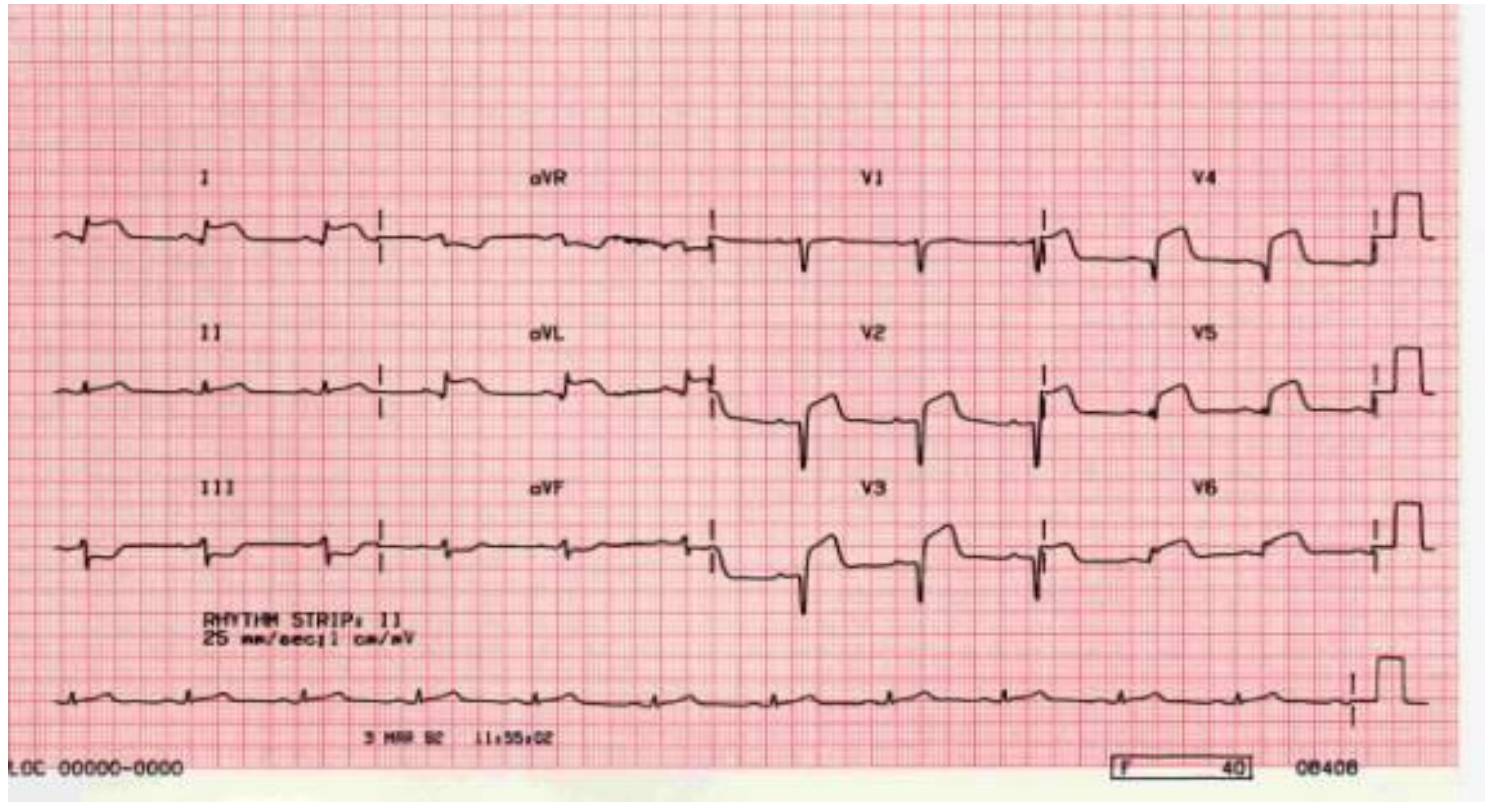
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ST Segment Elevation

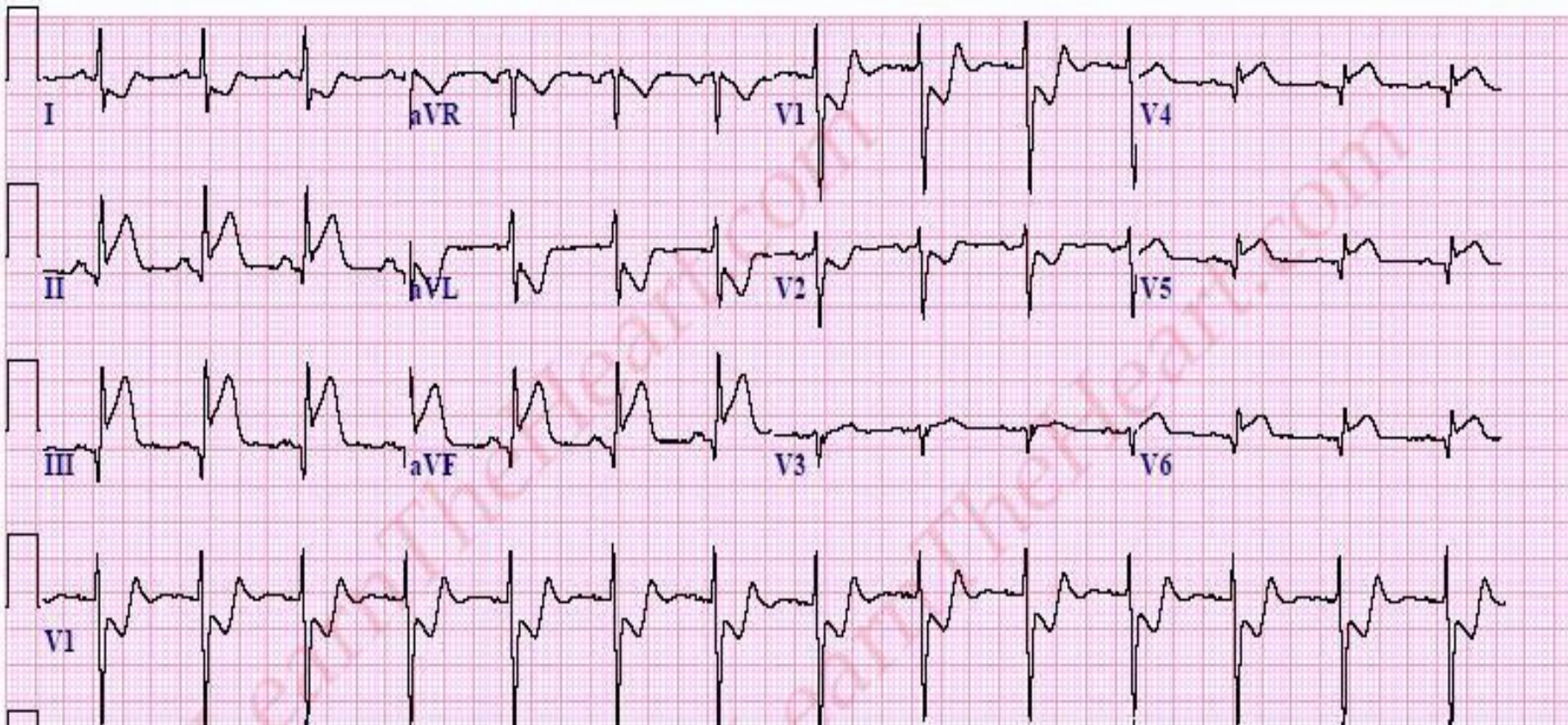
ST segment elevation should be $>1\text{mm}$ in two adjacent limb leads, I, II, III, aVL, aVF. OR $>2\text{mm}$ in two adjacent chest leads V1-V6



STEMI

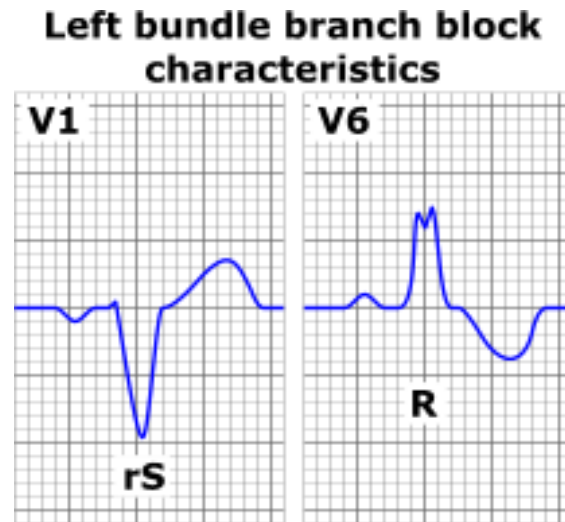


STEMI

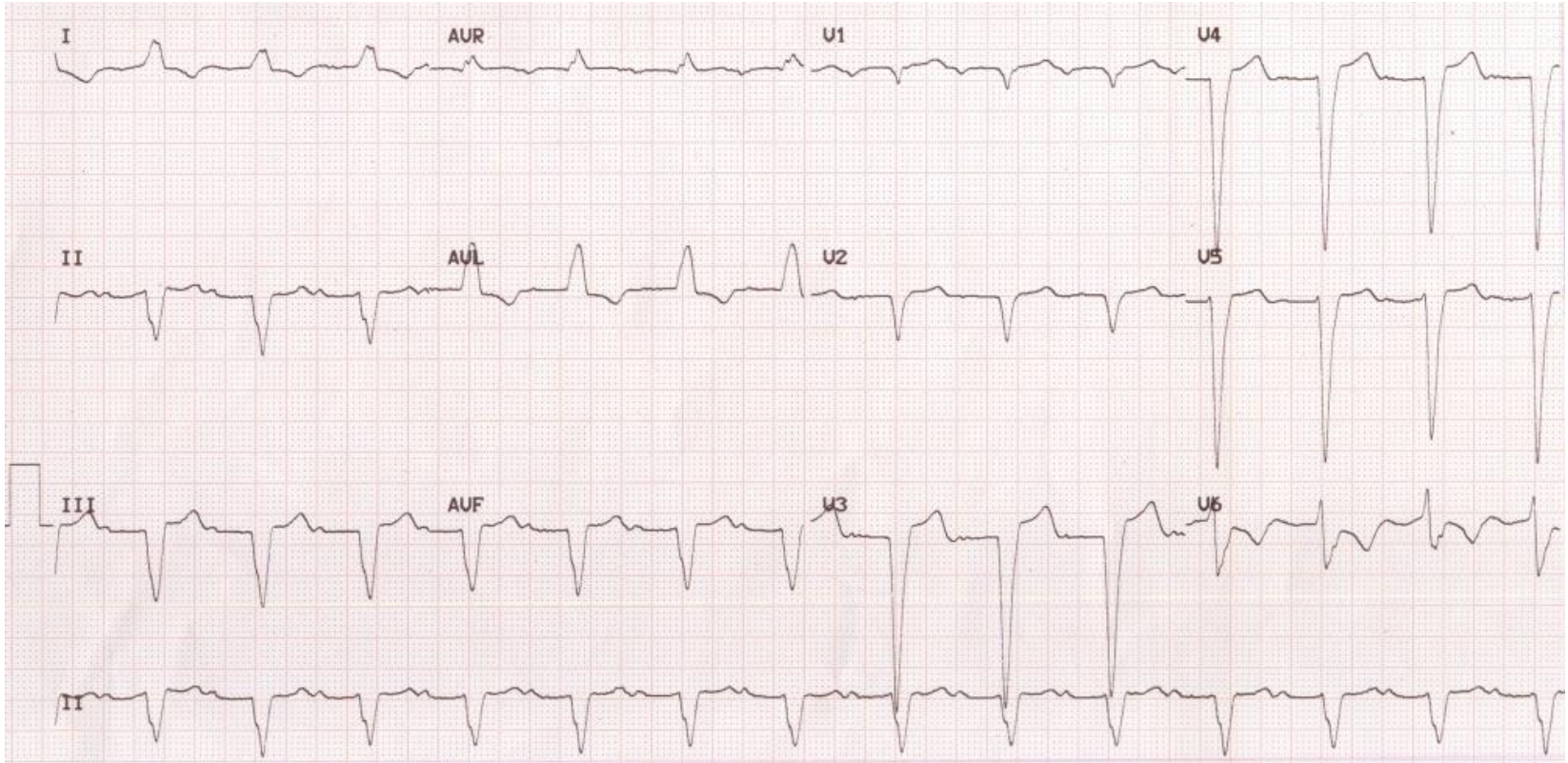


Left Bundle Branch Block

- Patients with clinical symptoms of MI, whose ECG displays a NEW left bundle branch block should be managed as a STEMI.
- 10-20% of MI's are complicated by bundle branch blocks.



LBBB



PCI

- Acute MI is usually caused by thrombotic occlusions.
- Prompt recanalisation of the affected artery can reduce infarct size, preserve LV function and reduce mortality.
- PCI significantly reduces mortality, re-infarction and stroke rates.
- This is true for patients in hospital awaiting transfer as well as direct admissions.

Thrombolysis Criteria and Contraindications

1. “Chest pain” or cardiac associated pain
 2. ST segment elevation (1mm in limb leads/2mm in chest leads)
 3. New left bundle branch block
 4. No Contraindications
- Any CVA in last six months (clot/bleed)
 - Aortic dissection
 - Severe hypertension (should be managed prior to thrombolysis)
 - Coagulation defects (includes raised INR)
 - Any surgery within last 2 weeks
 - Pregnancy or 18 weeks post-natal
 - Acute GI bleeding or pancreatitis
 - Prolonged traumatic CPR



Cath Lab preparation for PPCI



- DRUG PREPARATION
- TROLLEY PREPARATION
- EQUIPMENT CHECKS
- DOCUMENTATION
- INVESTIGATIONS
- IABP
- SAFE TRANSFER
- HANDOVER
- DOOR TO BALLOON TIME

EMERGENCIES AND COMPLICATIONS

- RETRO PERITONEAL BLEEDS
- VASO-VAGAL EPISODES
- HAEMATOMA
- CARDIOGENIC SHOCK
- CARDIAC ARREST MANAGEMENT
- ANAESTHETIC CARE AND ICU
- IABP
- INOTROPES