Management of Acute STEMI

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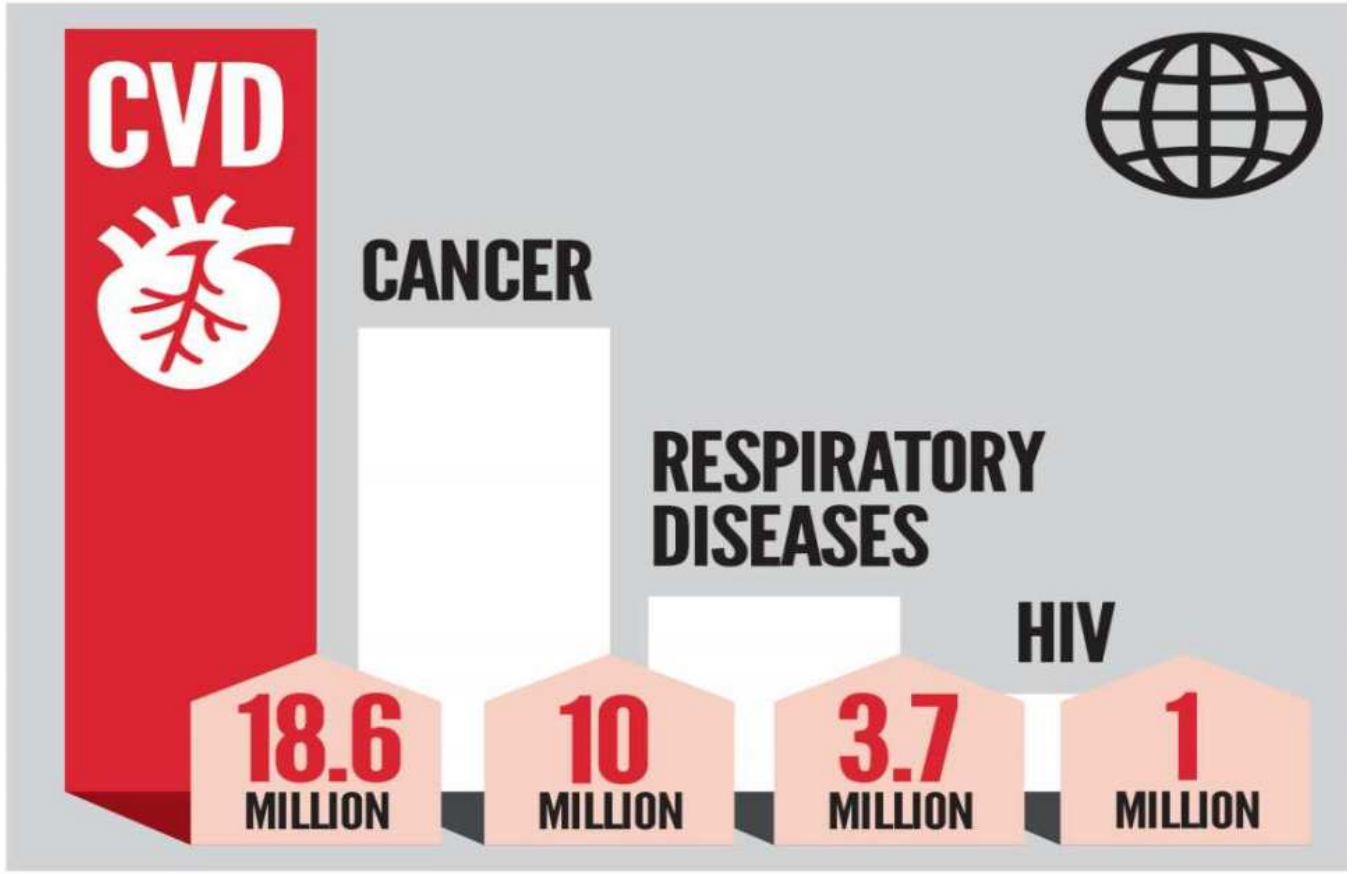
Some Key Factors

GLOBAL CAUSES OF DEATH



RISK FACTORS FOR CVD

- High Blood Pressure
- Unhealthy Diet
- High Cholesterol
- Diabetes
- Overweight & Obesity
- Tobacco
- Air Pollution
- Kidney Disease
- Physical Inactivity
- Harmful use of alcohol

Mortality in acute MI

- 25% patient die within minutes without treatment

  (Asystole/VF)

- 1/3rd patient die after hospitalization within 24 h

  (Delayed diagnosis and delayed treatment)

- 12% of patient die within 1 month and 20% within next 6 month

- Proper management can reduce mortality by 60%

Improved outcome depends on

- Rapid diagnosis
- Rapid start of pharmacological agents
- Coronary Intervention as soon as possible
- All of this can limit mortality upto 60%

Universal definition of myocardial infarction

Increase and/or decrease of a cardiac biomarker, preferably high-sensitivity cardiac troponin, with at least one value above the 99th percentile of the upper reference limit and at least one of the following:

1.Symptoms of ischaemia.

2.New significant ST-T wave changes or new left bundle branch block >>>>ECG.

3.Development of pathological Q waves on ECG.

4.Echocardiogram: New wall motion abnormality

5.Intracoronary thrombus detected on angiography or autopsy

Types of MI

Type	
Type 1	Spontaneous MI due to plaque rupture, erosion or dissection
Type 2	MI due to demand imbalance
Type 3	Sudden death, Symptoms with ECG changes
Type 4a	Post PCI MI
Type 4b	MI due to stent thrombosis
Type 5	Post CABG MI

Symptoms

-Central chest pain
(May be absent in elderly and diabetic patient)

-Sudden, Severe, Crushing

-Persisted more than 20 min

-Not relieved with rest or S/L nitrate

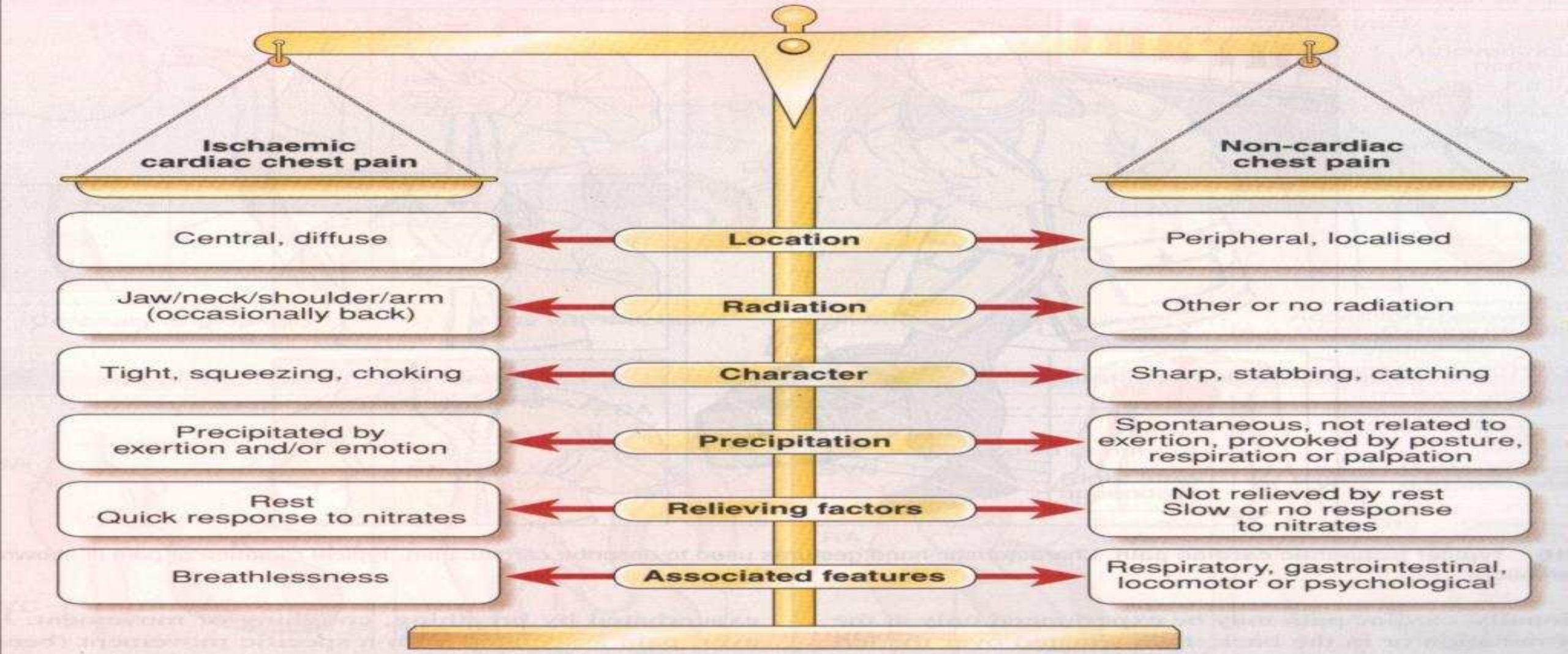
-Radiated to jaw, neck, shoulder, arm, back, epigastrium

Associated symptoms

- Breathlessness
- Palpitation
- Sweating, Nausea, Vomiting
- Confusion, lightheadedness
- Fear of impending death

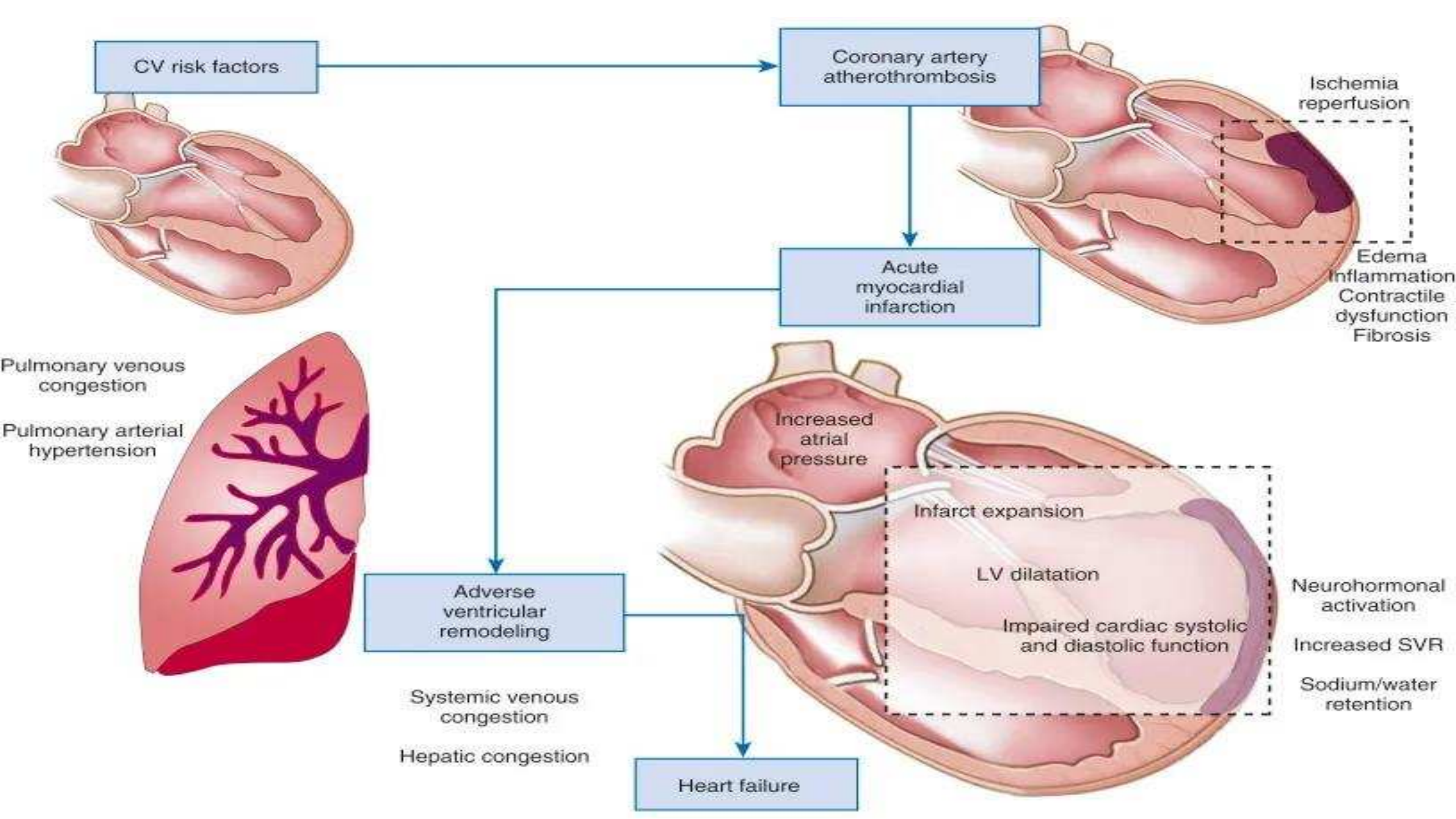
❖Gastrointestinal symptoms are common in Inferior MI

DIFFERENCE B/W ISCHEMIC AND NON ISCHEMIC PAIN



Complications of acute MI

- Arrhythmia
- Post MI angina
- Acute heart failure
- Pericarditis
- Dressler's syndrome (Fever,pericarditis,pleurisy)
- Papillary muscle rupture with MR
- Ventricular septal or ventricular rupture
- Ventricular remodeling
- Embolism


CV risk factors
Coronary artery atherothrombosis
Ischemia reperfusion
Edema
Inflammation
Contractile dysfunction
Fibrosis
Acute myocardial infarction
Pulmonary venous congestion
Pulmonary arterial hypertension
Increased atrial pressure
Infarct expansion
LV dilatation
Impaired cardiac systolic and diastolic function
Adverse ventricular remodeling
Neurohormonal activation
Increased SVR
Sodium/water retention
Systemic venous congestion
Hepatic congestion
Heart failure

GRACE

Global Registry of Acute Coronary Events

ACS Risk Model

At Admission (in-hospital/to 6 months) | At Discharge (to 6 months)

Age: Years

HR: bpm

SBP: mmHg

Creat.: µmol/l

CHF: Killip Class

US Units

- [ ] Cardiac arrest at admission
- [ ] ST-segment deviation
- [ ] Elevated cardiac enzymes/markers

Probability of	Death	Death or MI
In-hospital	--	--
To 6 months	--	--

Reset

Calculator | Instructions | GRACE Info | References | Disclaimer

GRACE score

- Score of ≤ 60 In-hospital mortality ≤ 0.2%
- Score of ≥ 250 In-hospital mortality ≥ 52%

Ref:Manual of Cardiovascular Medicine 5th Edition

MI with Poor prognostic factor

- Advance age (> 75 years)
- Tachycardia, Resting HR> 100 b/m
- Systolic BP < 90 mmHg
- Heart failure, Killip class ≥ II
- Anterior MI > Inferior MI
- Low body weight
- Time to treatment > 4 hour
- Presence of uncontrolled DM, Renal impairment

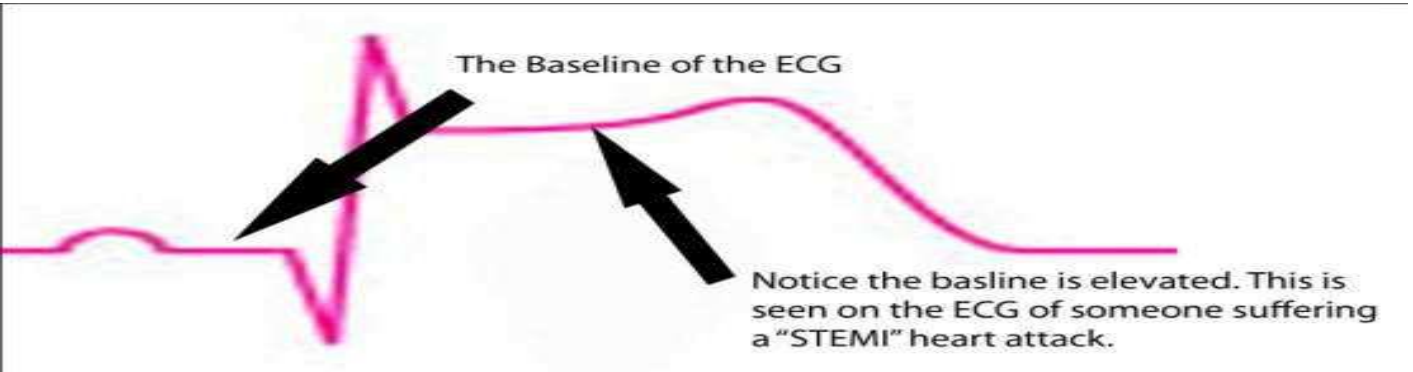
Ref:Manual of Cardiovascular Medicine 5th Edition

Investigations

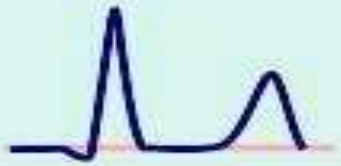
- ECG
  -(Repeat ECG after 30 min)
- Troponin I, CK-MB
- X-Ray chest A/P (Portable)
- Bed side echocardiogram
- CBC
- RBS
- Fasting/Random lipid profile within 24 h
- RFT (S.Creatinine,S.Electrolyte,Urine R/E)
- SGPT,SGOT
- Coronary angiogram

ECG criteria of STEMI

- ST elevation ≥ 1 mm in limb leads and chest leads except V2-V3 (2 contiguous lead)
- V2-V3 ≥ 2 mm (male), ≥ 1.5 mm (Female)
- ST elevation ≥ 0.5 mm in V7-V9 and RV3-RV4 indicate posterior MI and RV infarct respectvily.

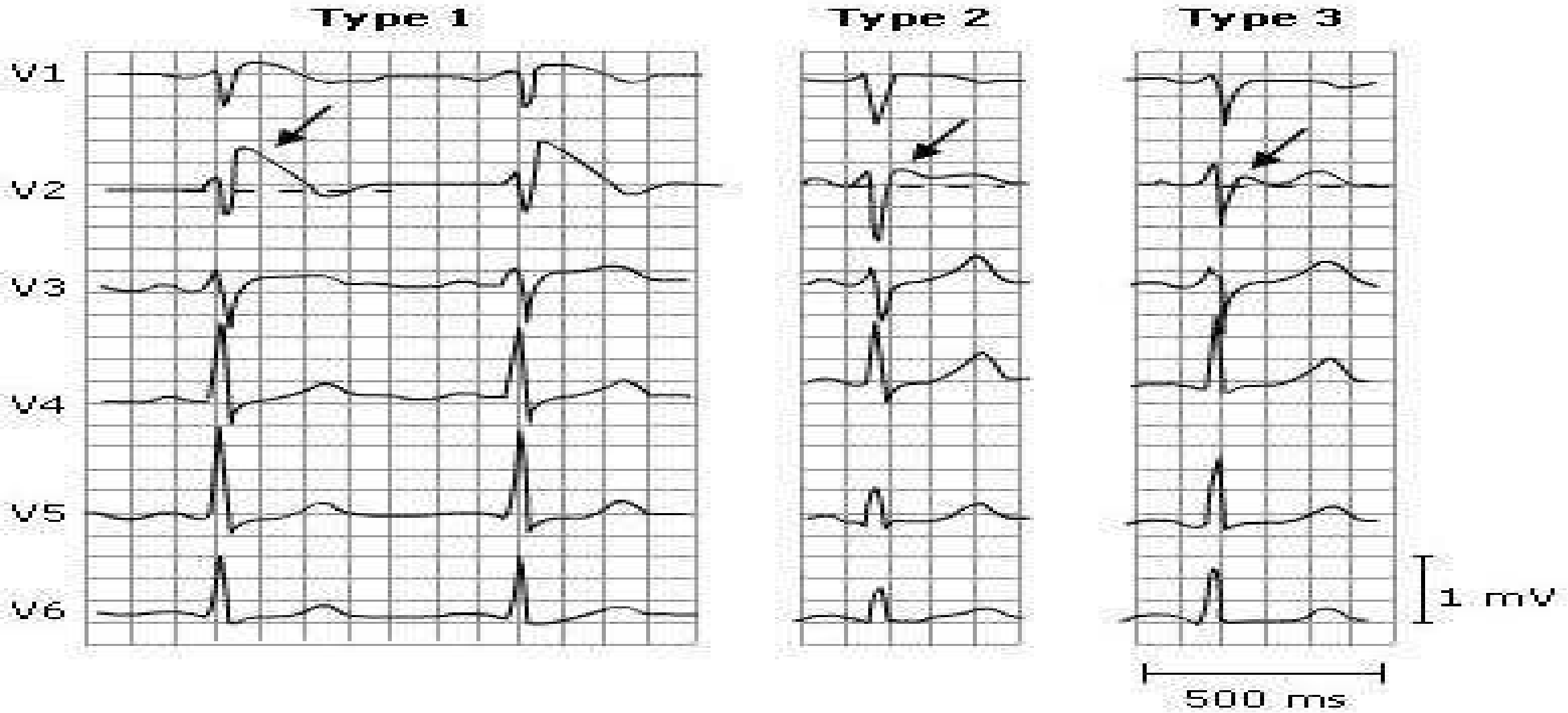


ECG evolution in non-reperfused myocardial infarction

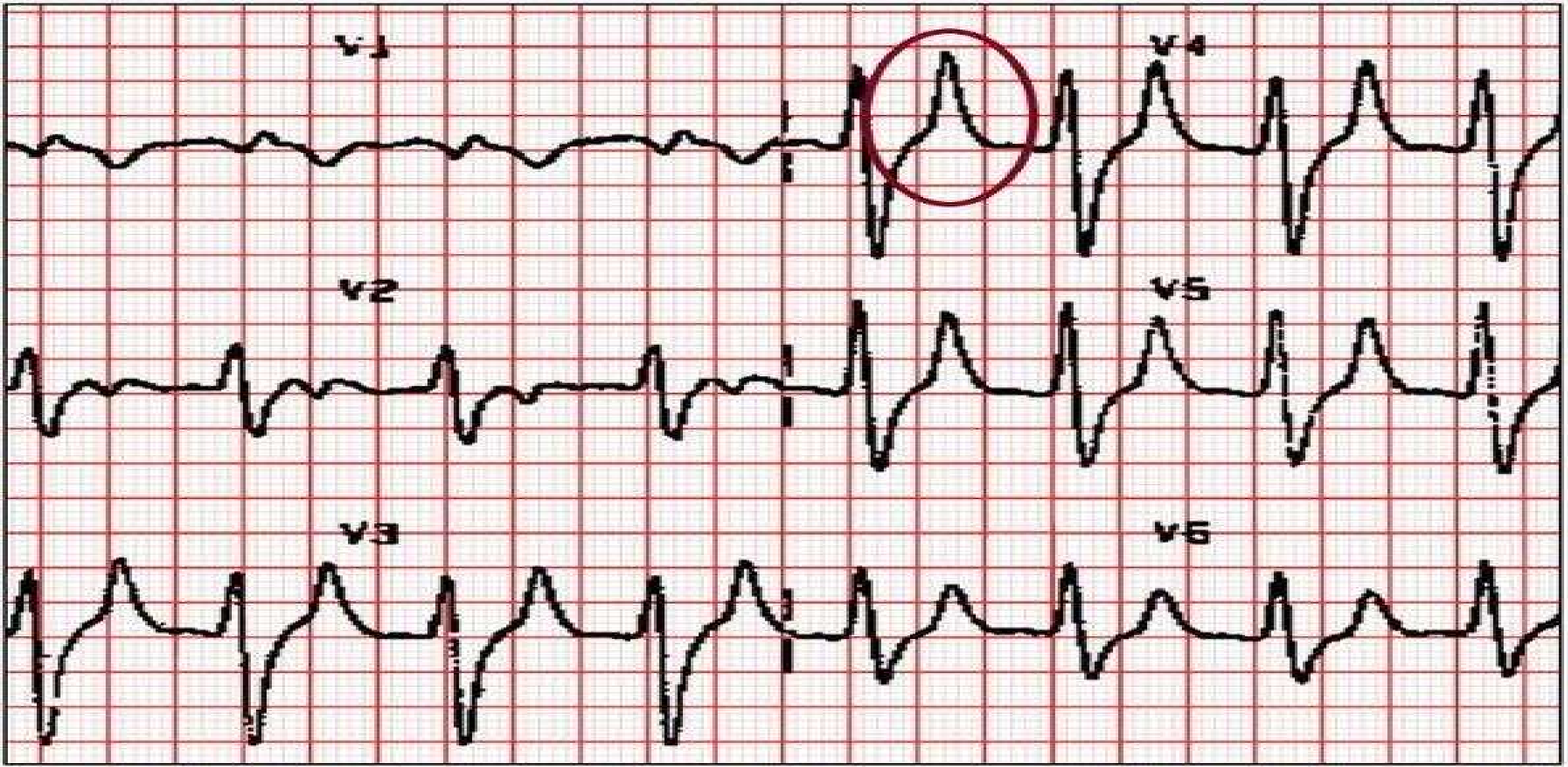
Normal		
Peaked T wave		minutes
Progression of ST segment elevation		minutes - hours
Loss of R wave, Q wave formation		hours - days
T wave inversion		days
T wave normalisation persisting Q wave		days - weeks - months

STEMI Mimic/DD of STEMI

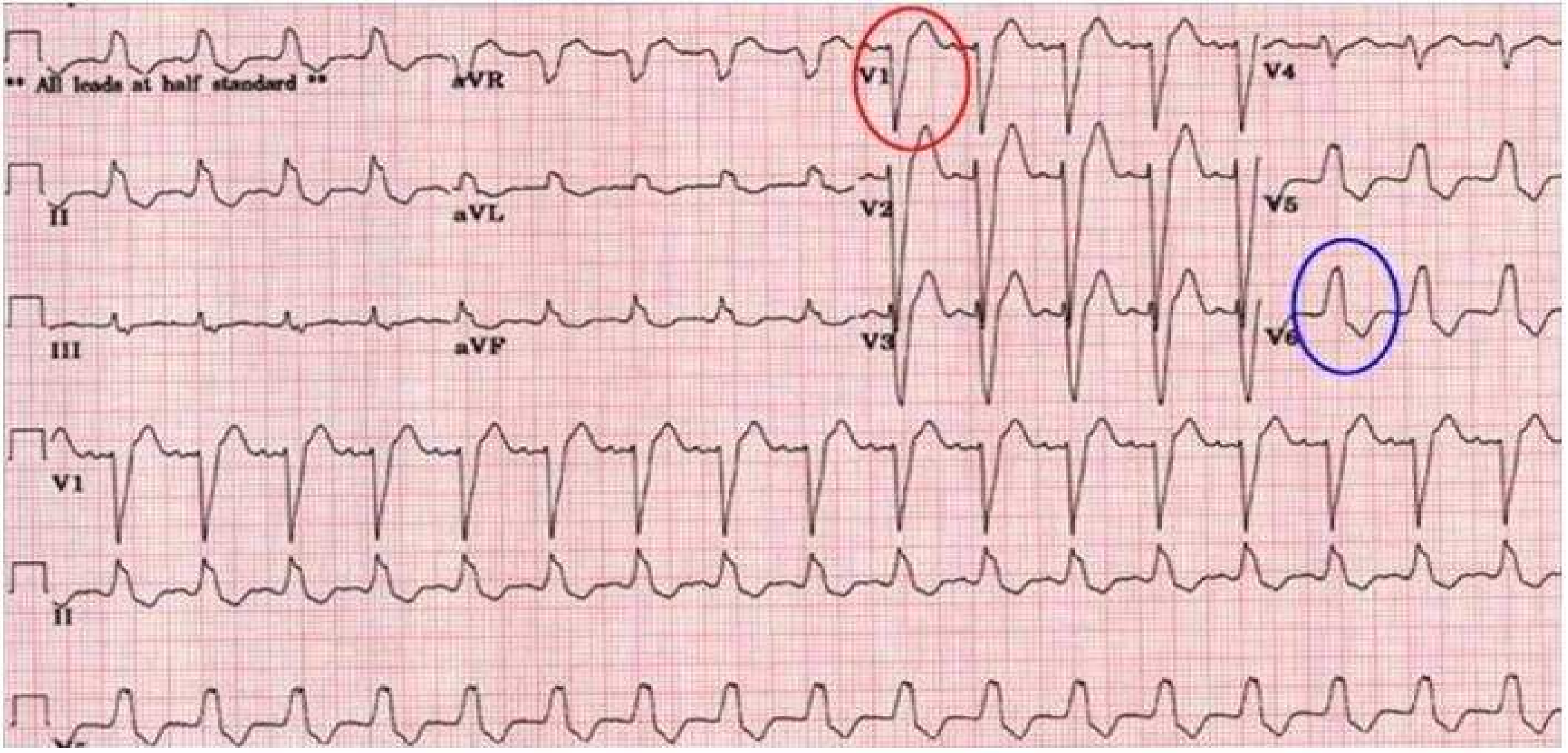
Brugada syndrome



Hyperkalemia

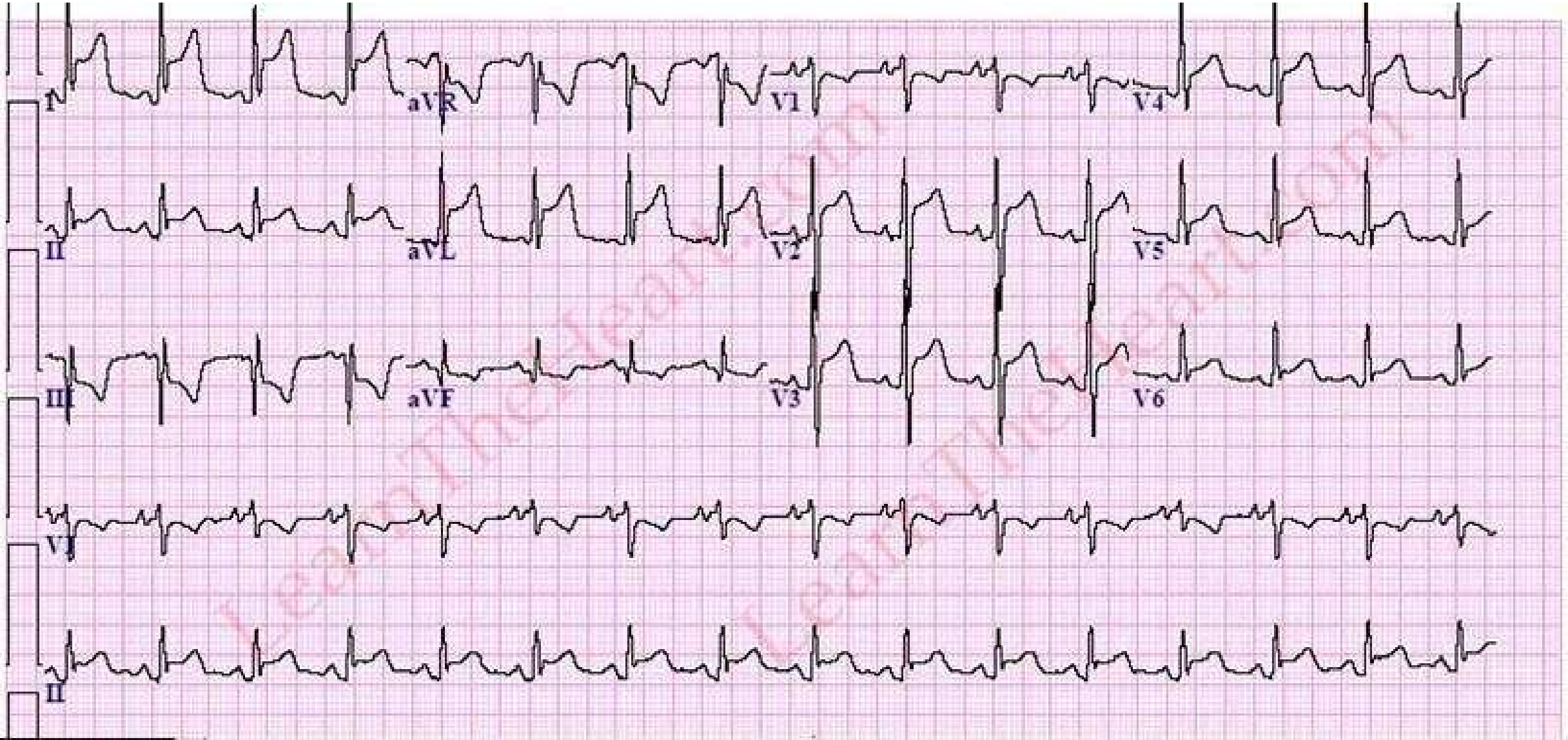


LBBB


** All leads at half standard **
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II

Early Repolarization

Acute pericarditis



LV aneurysm

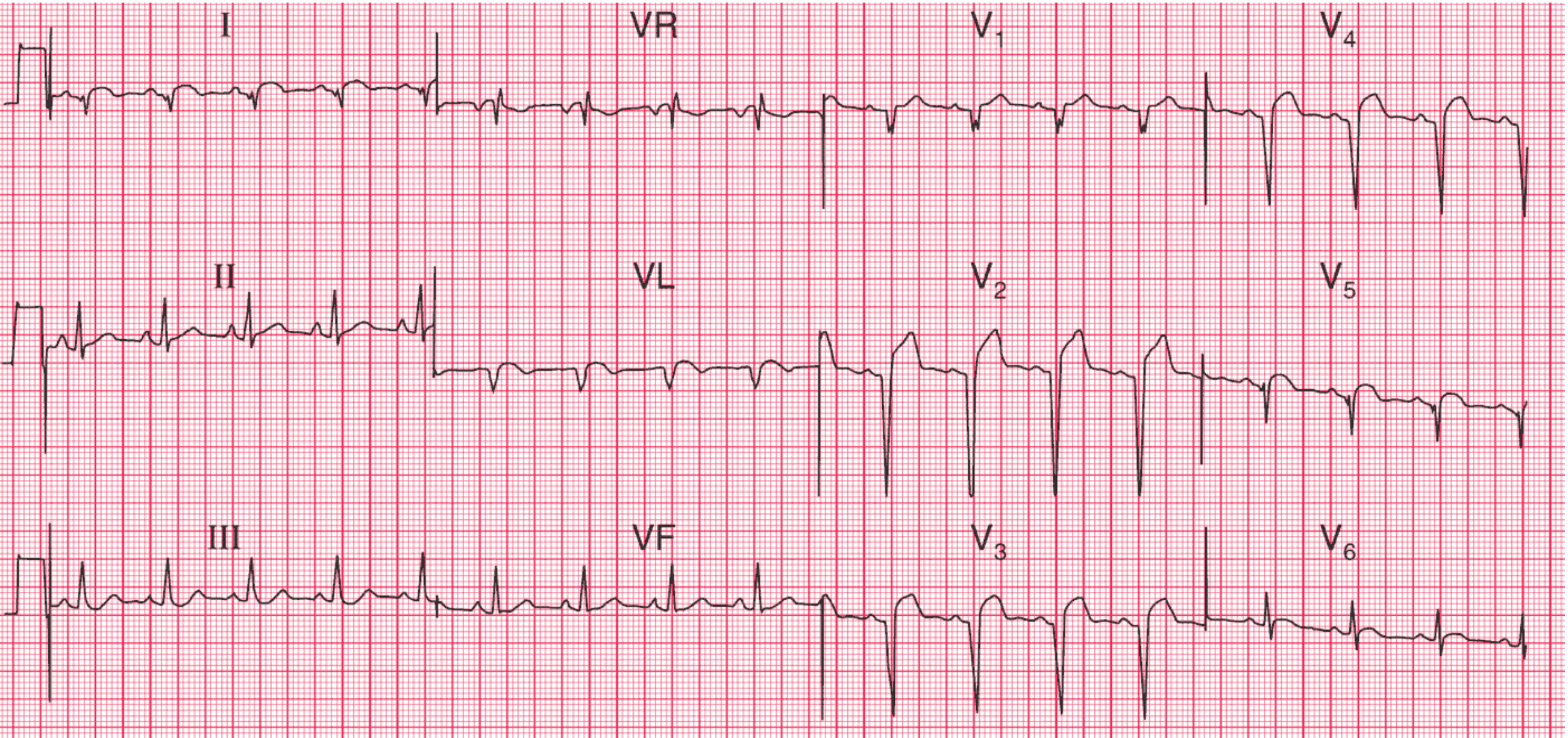
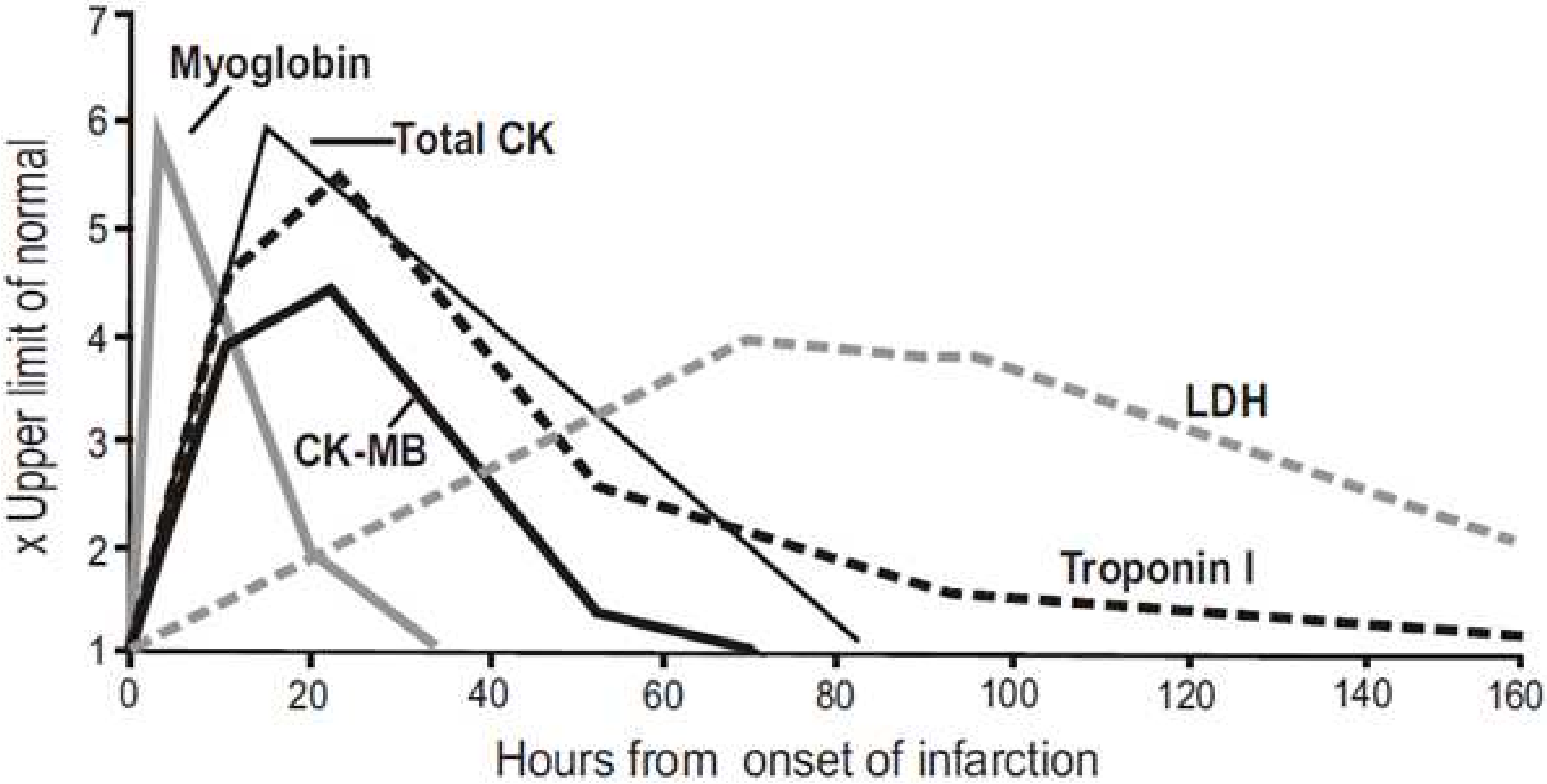


Figure 1: Cardiac Marker Pattern Associated with Myocardial Infarction (5)



Common Causes of raised Troponin other than MI

- Tachyarrhythmia
- CPR/DC Shock
- Acute LVF
- Myocarditis/Cardiomyopathy
- Acute pulmonary embolism
- ARDS/Sepsis/DIC
- AKI/CKD
- Subarachnoid haemorrhage,Acute pancreatitis

REF:2017 ESC Guidelines for the management of acute myocardial infarction

Management

- Admission in CCU
- Brief History and Clinical Assessment
- Cardiac Monitoring
- Oxygen if O2 saturation < 94%
- Loading Dose of antiplatelet and statin
  (Aspirin and Clopidogrel/Ticagrelor/Prasugrel)
- Sublingual or IV nitrate
- Analgesia (Morphine/pethidine) if Continuing Pain

REF:2017 ESC Guidelines for the management of acute myocardial infarction

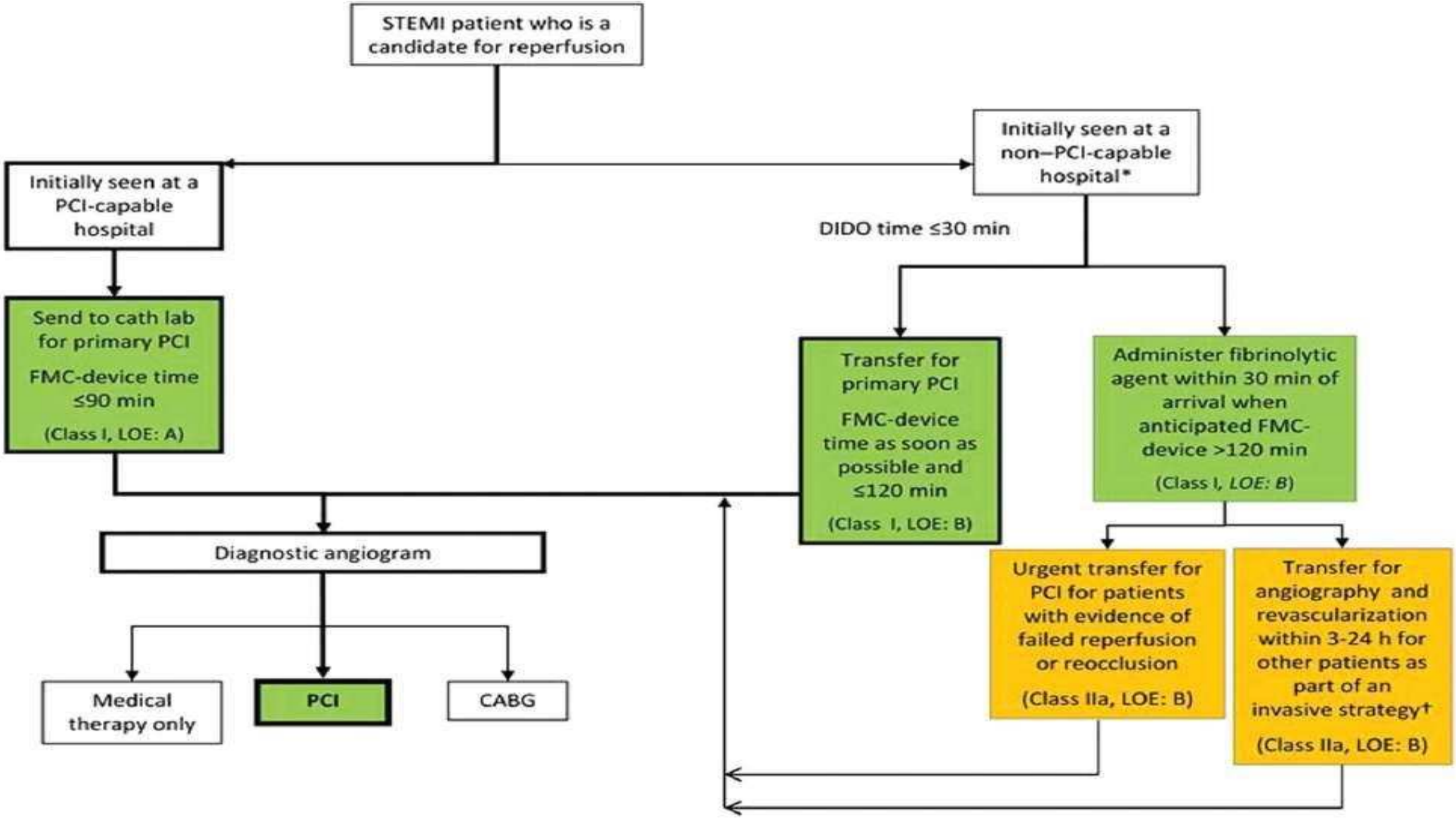
Urgent Reperfusion Therapy:

- Primary PCI or
- Pharmacoinvasive PCI:

- Thrombolytic agents
  - -Streptokinase
  - -Tenectaplase

❖ Patient should keep on heparin

Indications	COR	LOE	References
Primary PCI*			
STEMI symptoms within 12 h	I	A	(175-178)
Severe heart failure or cardiogenic shock	I	B	(179,180)
Contraindications to fibrinolytic therapy with ischemic symptoms <12 h	I	B	(193,194)
Clinical and/or electrocardiographic evidence of ongoing ischemia between 12 and 24 h after symptom onset	IIa	B	(195-197)
Asymptomatic patients presenting between 12 and 24 h after symptom onset and higher risk	IIb	C	N/A
Noninfarct artery PCI at the time of primary PCI in patients without hemodynamic compromise	III: Harm	B	(198-202)
Delayed or elective PCI in patients with STEMI			
Clinical evidence for fibrinolytic failure or infarct artery reocclusion	IIa	B	(181,182)
Patent infarct artery 3 to 24 h after fibrinolytic therapy	IIa	B	(186,187)
Ischemia on noninvasive testing	IIa	B	(203,204)
Hemodynamically significant stenosis in a patent infarct artery >24 h after STEMI	IIb	B	(205-209)
Totally occluded infarct artery >24 h after STEMI in a hemodynamically stable asymptomatic patient without evidence of severe ischemia	III: No Benefit	B	(210-212)


STEMI patient who is a candidate for reperfusion
Initially seen at a PCI-capable hospital
Initially seen at a non–PCI-capable hospital*
DIDO time ≤30 min
Send to cath lab for primary PCI
FMC-device time ≤90 min
(Class I, LOE: A)
Transfer for primary PCI
FMC-device time as soon as possible and ≤120 min
(Class I, LOE: B)
Administer fibrinolytic agent within 30 min of arrival when anticipated FMC-device >120 min
(Class I, LOE: B)
Diagnostic angiogram
Urgent transfer for PCI for patients with evidence of failed reperfusion or reocclusion
(Class IIa, LOE: B)
Transfer for angiography and revascularization within 3-24 h for other patients as part of an invasive strategy†
(Class IIa, LOE: B)
Medical therapy only
PCI
CABG

Indications of thrombolysis

	COR	LOE	References
Ischemic symptoms <12 h	I	A	81, 306–311
Evidence of ongoing ischemia 12 to 24 h after symptom onset, and a large area of myocardium at risk or hemodynamic instability	IIa	C	N/A
ST depression except if true posterior (inferobasal) MI suspected or when associated with ST-elevation in lead aVR	III: Harm	B	10, 11, 81, 312, 313

COR indicates Class of Recommendation; FMC, first medical contact; LOE, Level of Evidence; MI, myocardial infarction; N/A, not available; and PCI, percutaneous coronary intervention.

Contraindications of thrombolysis

- Bleeding risk should be considered
- Out of 1000 patient 4 patient developes intracranial haemorrhage
- Incidence of other major bleeding is 0.5-1.0%

Ref:Davidson’s Principles and Practice of Medicine 23rd Edition

Absolute contraindications

- Haemorrhagic stroke or stroke of unknown origin at any time
- Ischaemic stroke in the preceding 6 months
- Central nervous system damage or neoplasms
- Recent major trauma/surgery/head injury in the preceding 3 weeks
- Gastrointestinal bleeding within the last month
- Aortic dissection
- Known bleeding risk

REF:2017 ESC Guidelines for the management of acute myocardial infarction

Relative contraindications

- Transient ischaemic attack in the preceding 6 months
- Oral anticoagulant therapy
- Pregnancy or within one week postpartum
- Non-compressible puncture site
- Traumatic resuscitation
- Refractory hypertension (SBP>180 mm Hg or DBP>110 mmHg)
- Advanced liver disease
- Infective endocarditis
- Active peptic ulcer

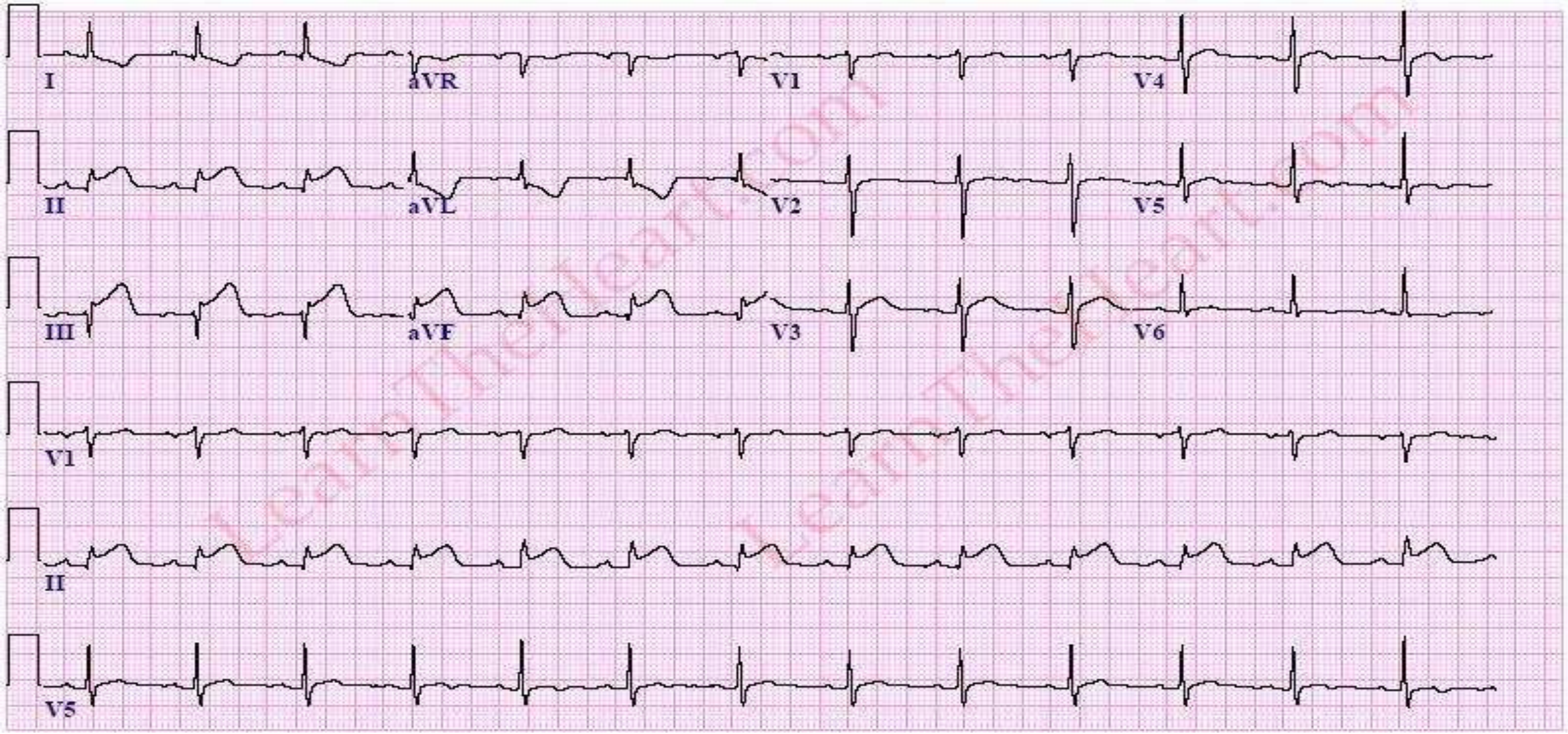
Criteria for successful thrombolysis

- Absence or decreased chest pain
- Resolution of ST segment ≥ 50 % from baseline
- Rapid rise or fall of Troponin I
- Reperfusion arrhythmia
- Improvement of wall motion abnormality on echocardiogram
- Absence of intracoronary thrombus on angiogram

Case management

- Mr. X 56 year gentleman presented with...
- Sudden severe Central chest pain radiated to left arm for 2 hour
- Associated with nausia, vomiting and profuse sweating
- Pulse:56/min, BP 90/60 mmHg, lung base: clear
- Risk factors: DM, HTN, Smoker

ECG>>> Acute inferior STEMI



Management at emergency room

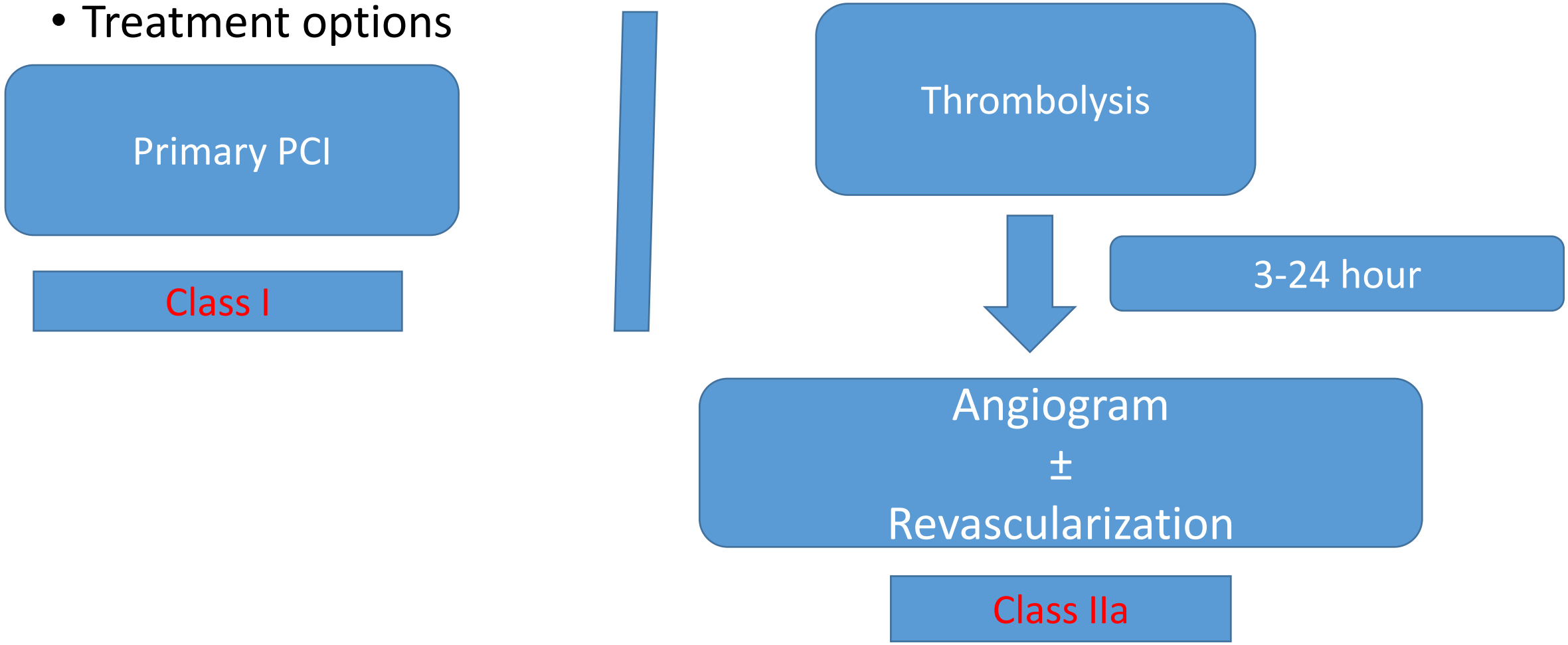
- Loading dose was given

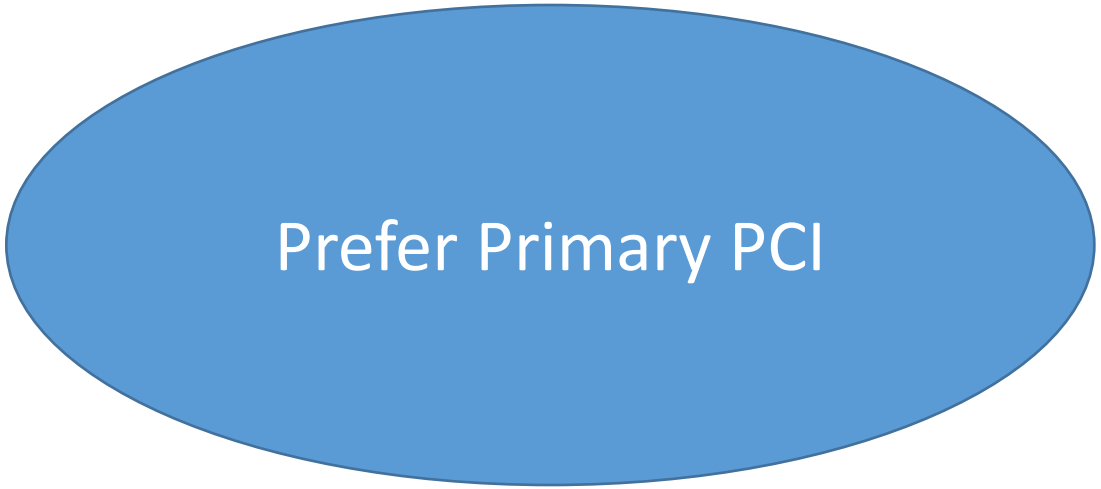
❖Aspirin 300 mg
❖Ticagrelor 180 mg
❖Rosuvastatin 20 mg
❖Pantonix 40 mg

- Inj.LMWH (Clexane) 30 mg I/V was given

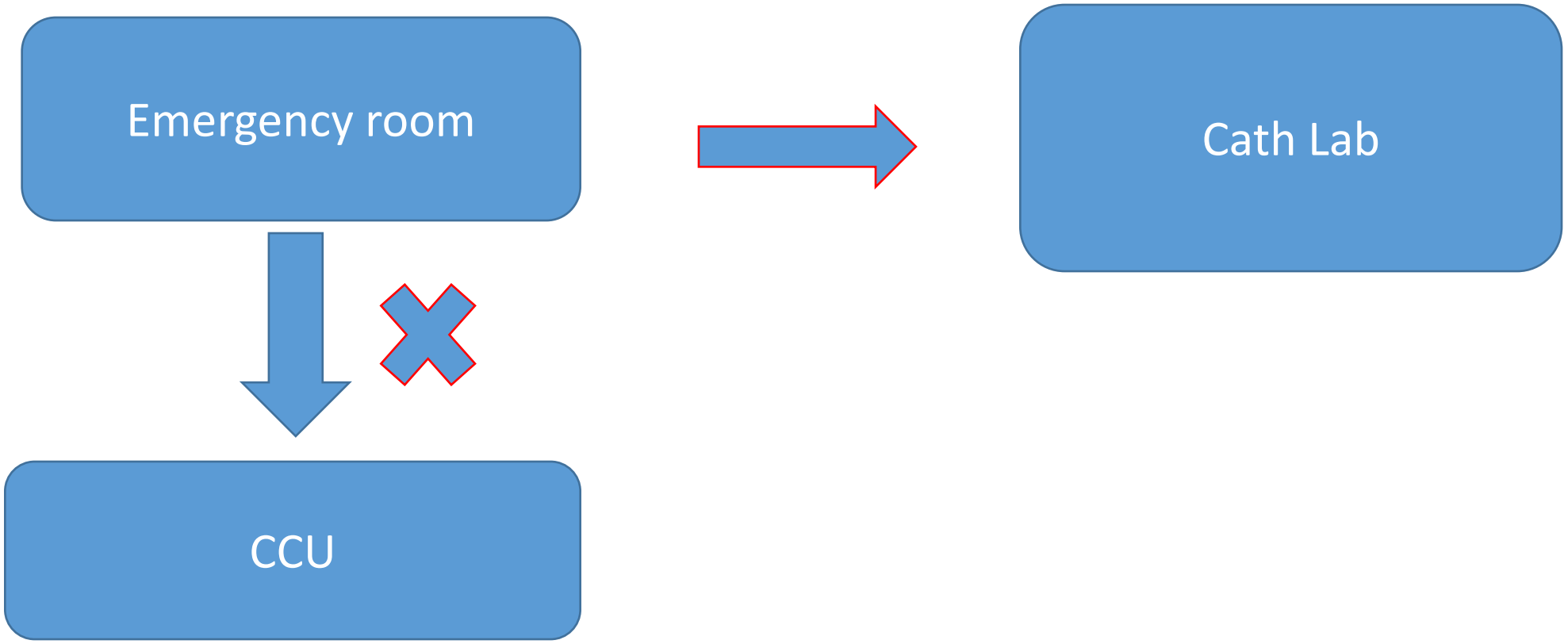
Patient party was counselled

- Treatment options

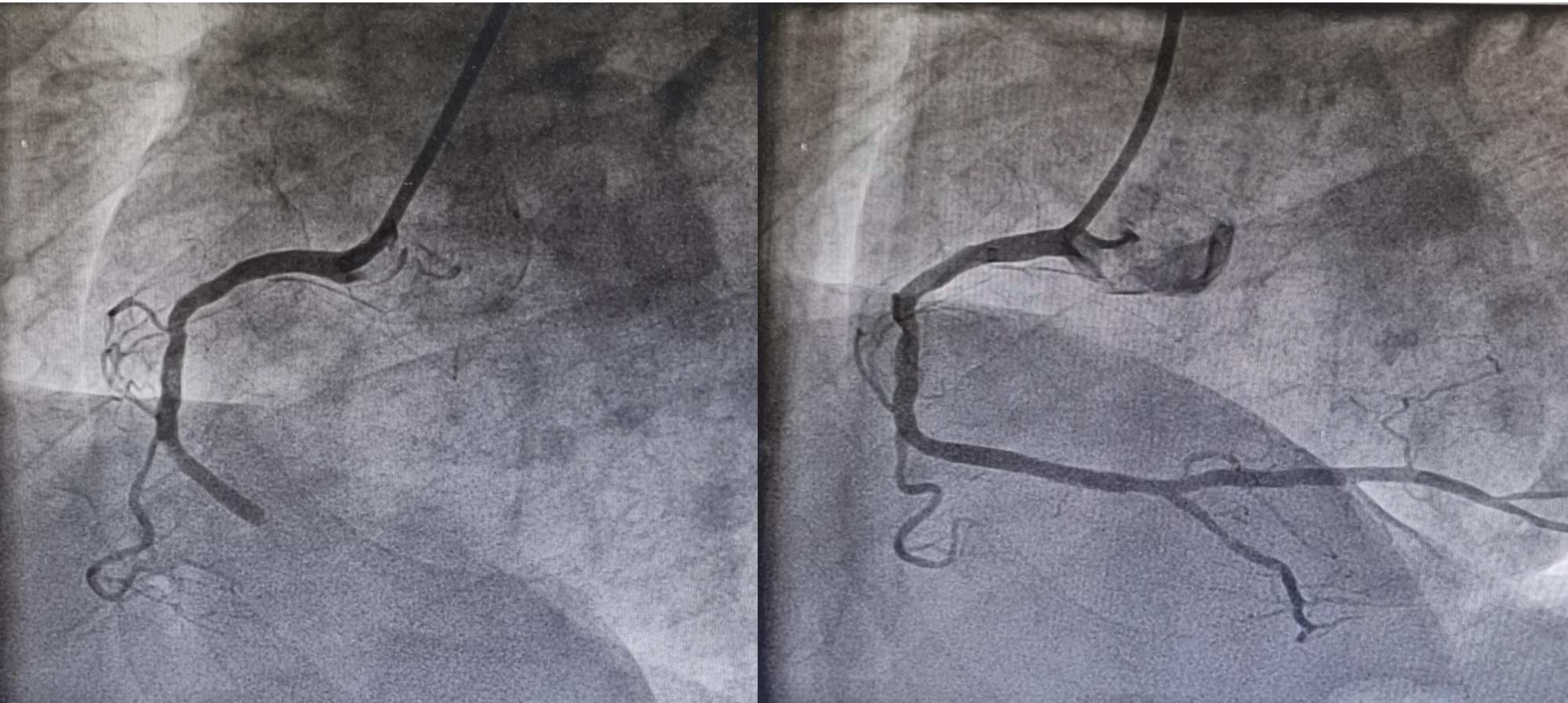



Prefer Primary PCI

Shift of patient for primary PCI



Before and after stenting



Life long treatments

- Antiplatelets
  - -Aspirin,Clopidogrel,Ticagrelor,Prasugrel
- Statins (Target LDL < 55 mg/dl)
  - -Atorvastatin,Rosuvastatin
- Anti Ischemic
  - -Nitrate,Beta blocker,Trimetazidine,Ranolazine,Ivabradine
- ACEi/ARB/ARNI
- Mineralocorticoid receptor antagonist
- Treatment of other comorbidities
  - -DM,HTN,BA,CKD

Lifestyle modification

- Smoking cessation
- Regular exercise (Limited for first 4 week)
- Weight control
- Diet (Mediterranean diet)

  -Restrict salt intake

  -Increase consumption of fresh fruits, vegetables

  -Decreased consumption of saturated fat

  -Avoid alcohol intake

- Rehabilitation

Take home message

- In case of MI minute means muscle, more time kills more muscle damage ensured

- If symptoms suggestive of ACS give loading dose of
  - antiplatelets, statin high dose
  - can limit mortality upto 25%

- Urgent transfer of patient to PCI capable hospital


USE ♥ KNOW ♥
What scares you more?
USE ♥ KNOW ♥
Lifestyle changes can help us manage
USE ♥ KNOW ♥
ARE YOU AT
RISK OF 💔?
USE ♥ KNOW ♥