ECG Emergency Decision Making in ACS

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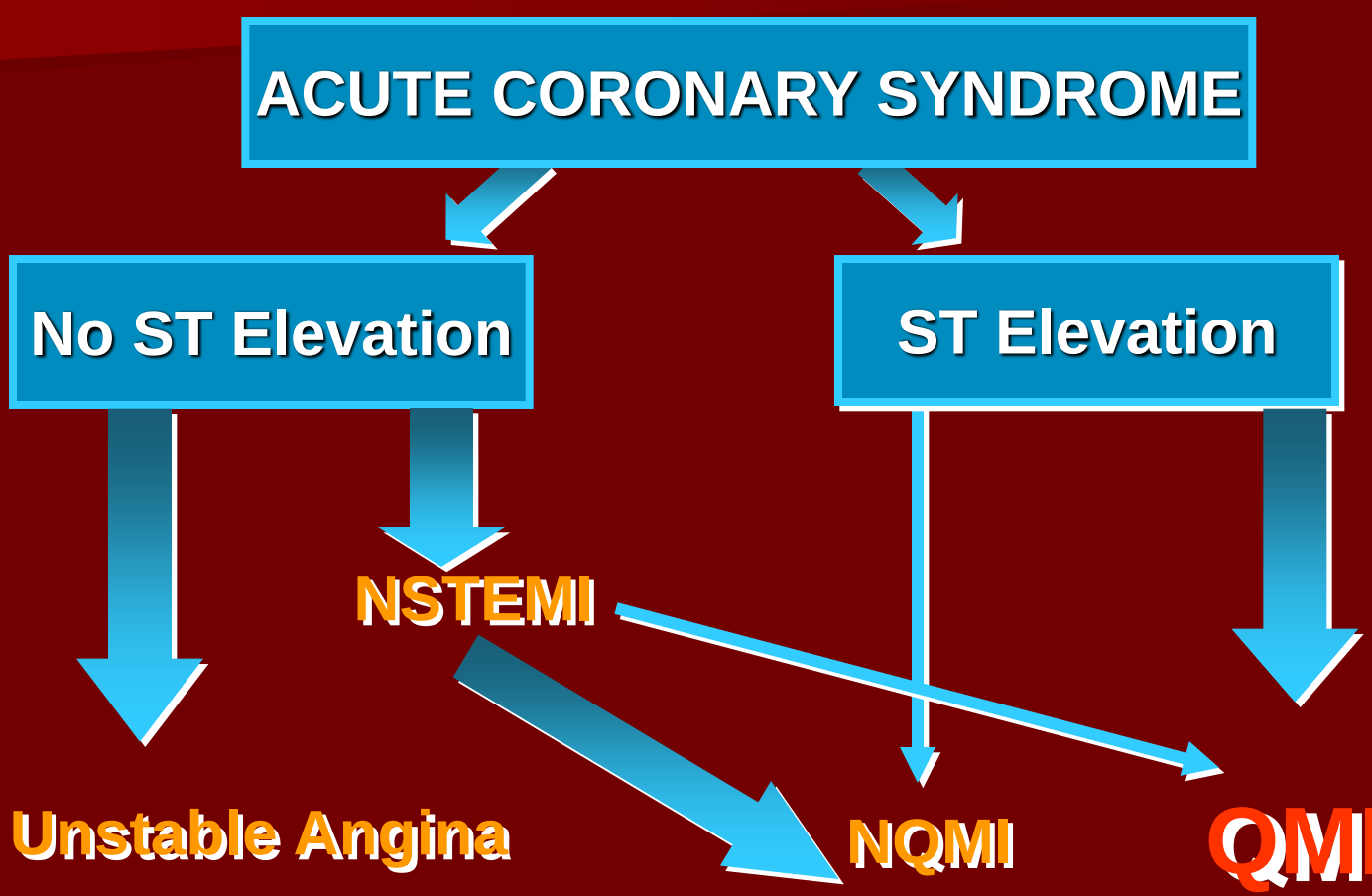
National Heart Institute

Classification of ACS

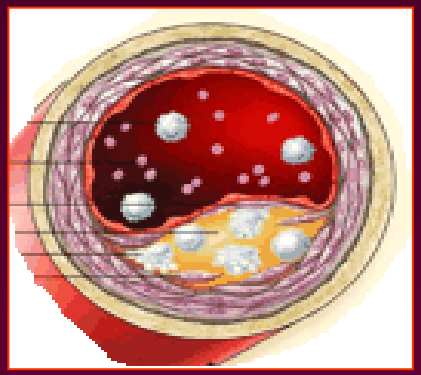


History
Physical Exam

ECG

Manangement

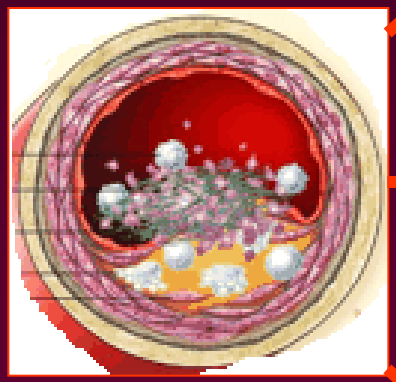
Pathophysiology



Vulnerable Plaque

Plaque rupture
(55-80%)

Exertion
BP, HR
Vasoconstriction



✓Platelet cascade
✓Thrombus formation
✓Vasospasm

Complete occlusion

Acute MI

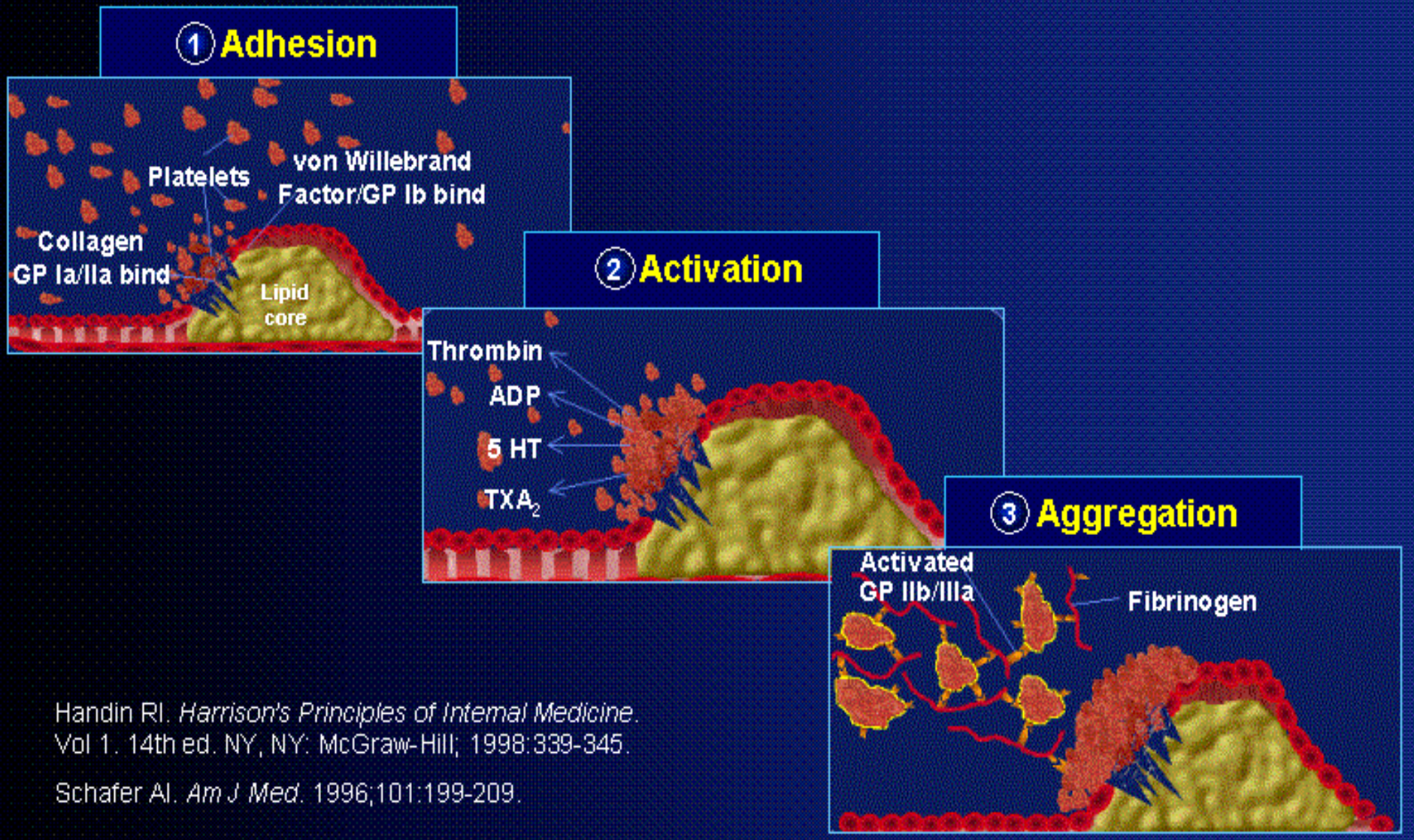
Spontaneous lysis

Healing plaque

Incomplete occlusion
Distal embolization

Unstable angina Non-Q MI

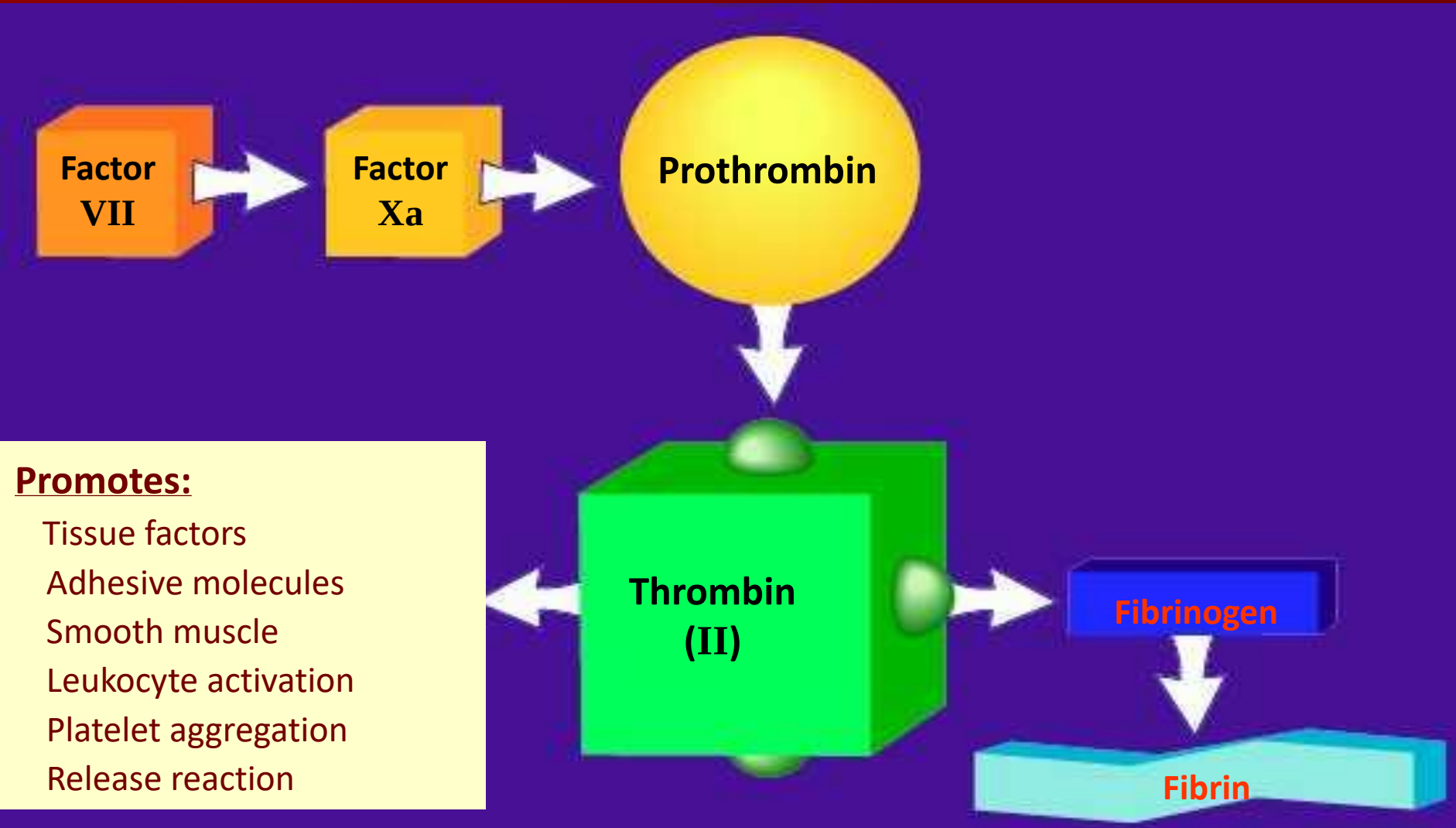
Platelet cascade



Handin RI. *Harrison's Principles of Internal Medicine*. Vol 1. 14th ed. NY, NY: McGraw-Hill; 1998:339-345.

Schafer AI. *Am J Med*. 1996;101:199-209.

Thrombus formation



Promotes:

- Tissue factors
- Adhesive molecules
- Smooth muscle
- Leukocyte activation
- Platelet aggregation
- Release reaction

TIMI risk score in NSTEMI

1. Age > 65 yr
2. CAD risk > 3
3. Stenosis > 50%
4. Chest pain > 2 times in 24 hr
5. ASA within 1 wk
6. EKG; ST deviation > 0.5 mm
7. Positive Troponin-T

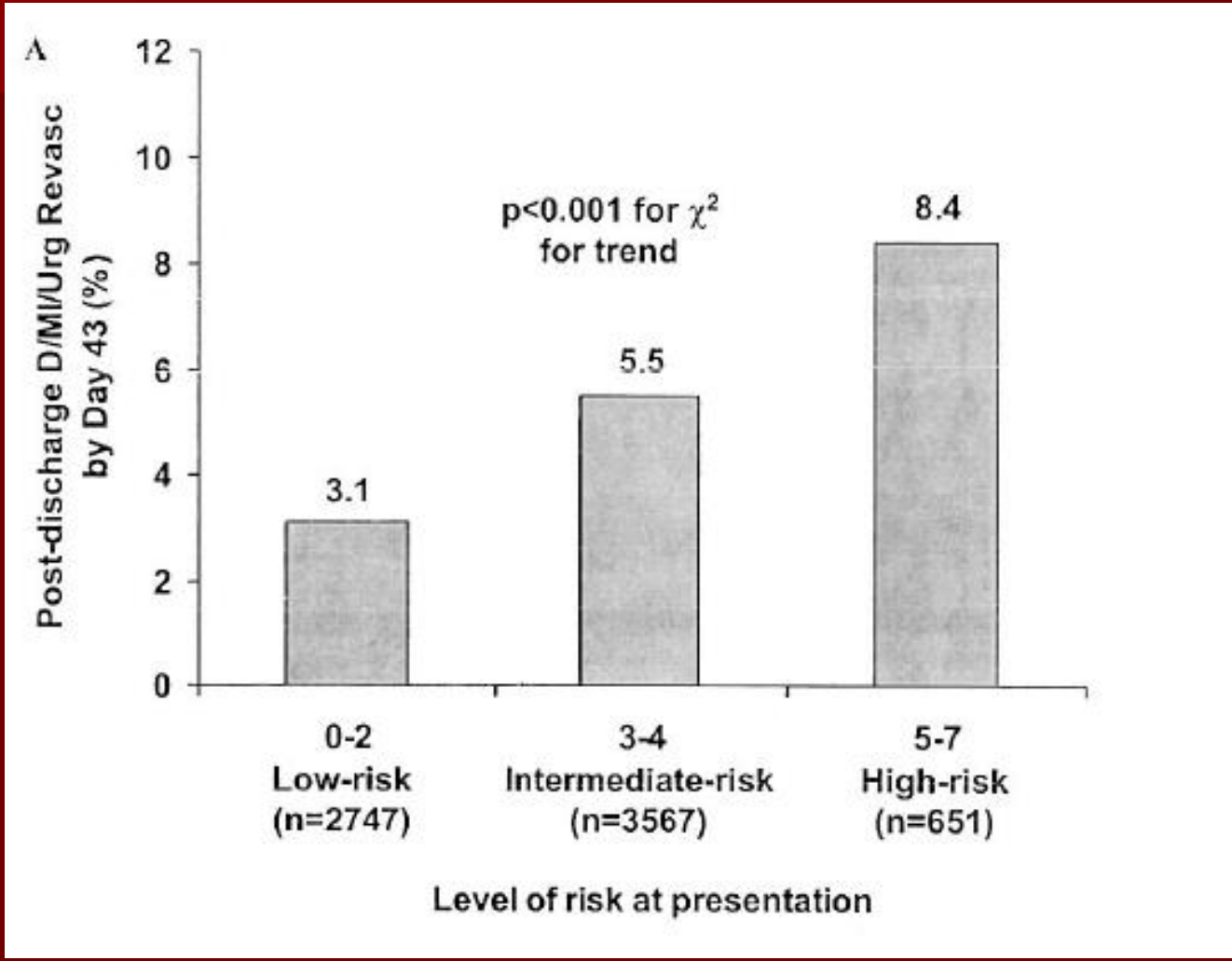
SCORE > 4 → **HIGH RISK

- Glp 2b3a Rx.
- early revasculaization

Am Heart J 2012; 143: 966-70

J Invasive Cardiol. 2006 Dec;18(12):617-39.

TIMI risk score in NSTEMI



Am Heart J 2002; 143: 966-70

TIMI risk score in STEMI

	Score
1. Historical	
▪ Age, y ≥ 75	3
▪ Age, 65-74	2
▪ Hx of DM, HT or angina	1
2. Examination	
▪ SBP < 100 mmHg	3
▪ HR > 100/min	2
▪ Killip class II-IV	2
▪ Weight < 67 kg	1
3. Presentation	
▪ Ant ST elevation or LBBB	1
▪ Time to reperfusion > 4 hr	1

Uses of the Electrocardiogram

- Establish the diagnosis
- Determination of cardiovascular risk
- Help in choice and monitoring response to treatment

Limitations of the ECG

- Adult chest pain with **absolutely normal** ECG:
  - 20% of ER presentation
  - ~ 10% of these patients have an ACS
- A source of error is pseudonormalization of baseline ST-T changes

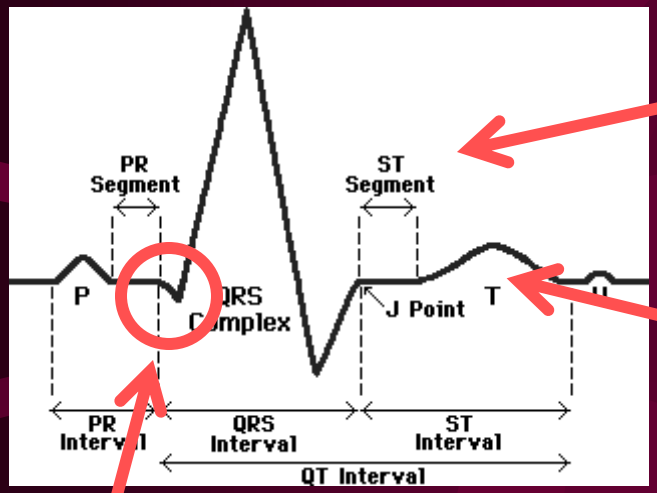
Limitations of the ECG

- **Non-diagnostic** ST-T Wave changes:
  - Less than 1 mm STD or STE
  - Blunted or flattened T waves

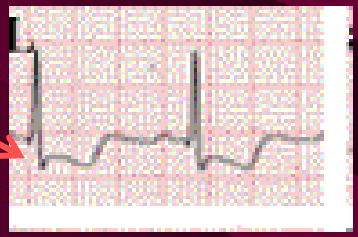
– ~ 37% of these patients have an ACS

ECG Changes with ACS

Ways ECG can change in ACS include:

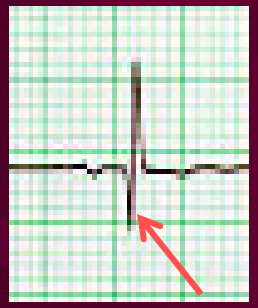


ST elevation & depression

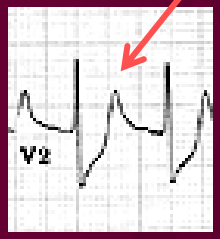


T-waves changes

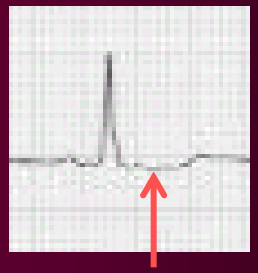
Appearance of pathologic **Q-waves**



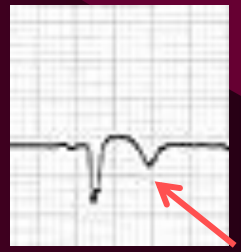
peaked



flattened



inverted



ECG of UA/NSTEMI

- ST-segment depression is the primary ECG markers of UA/NSTEMI
- Also the ECG may be normal or show non-diagnostic changes

ECG changes of STEMI

A. Normal ECG prior to MI (or with MI)

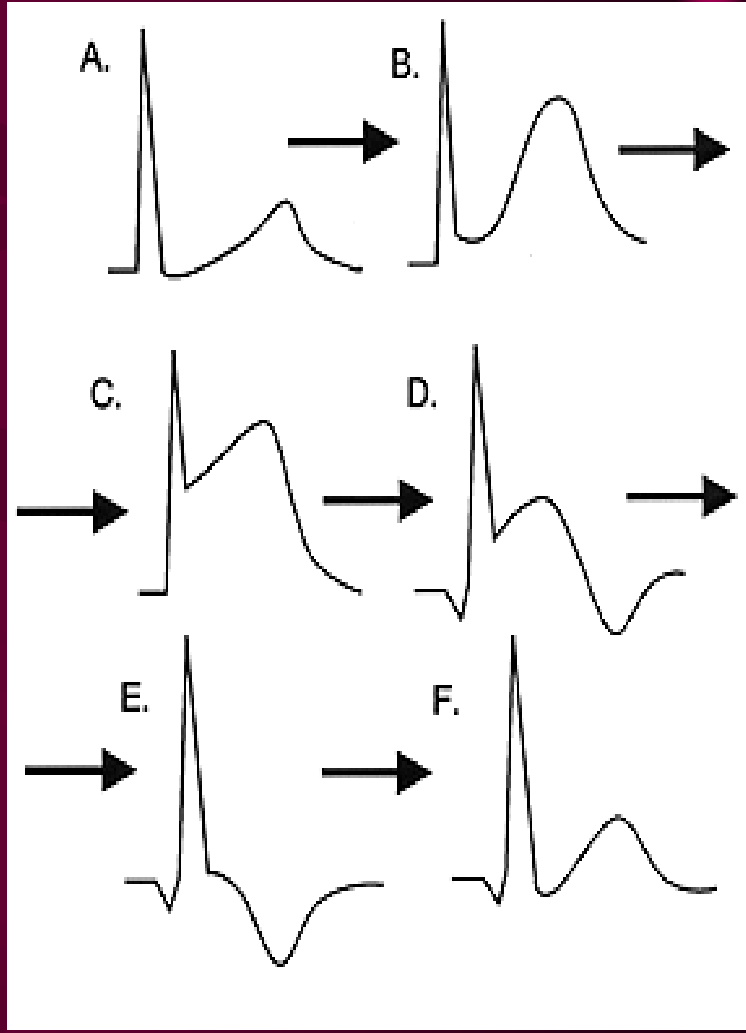
B. Ischemia ⟶ in peaked T-waves

C. Infarction ⟶ in ST elevation

D. Infarction and Necrosis ⟶ pathologic Q-waves with ST elevation

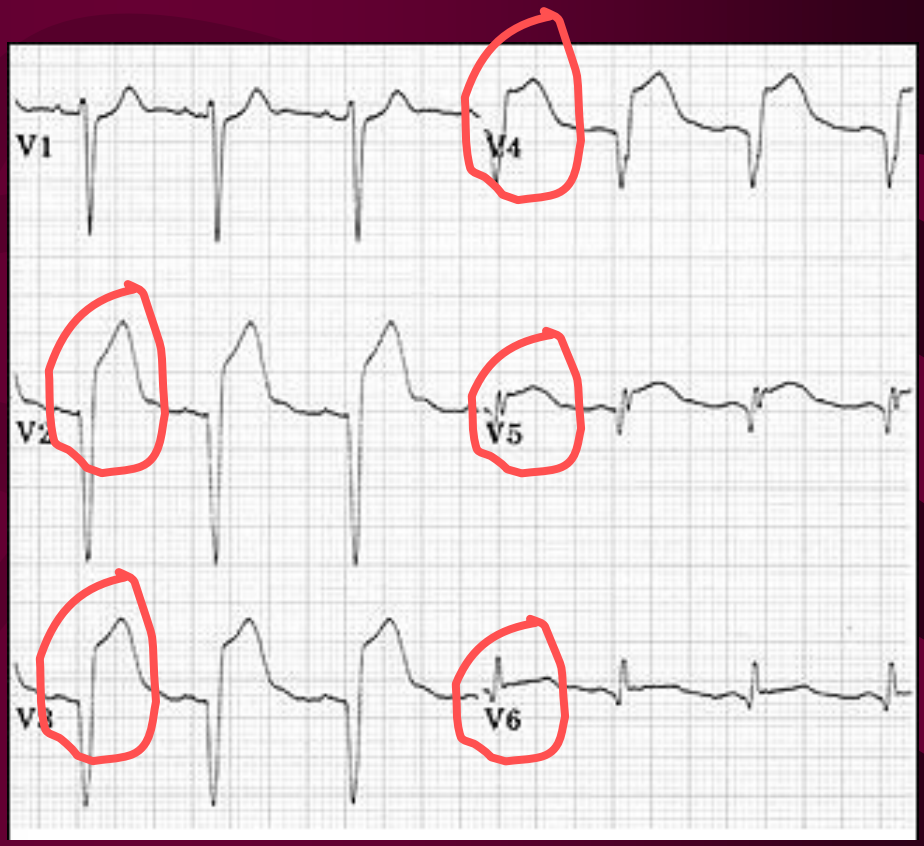
E. Necrosis and fibrosis ⟶ Pathologic Q waves, with T-wave inversion

F. Fibrosis ⟶ Q- waves, but normal ST segment and T- waves

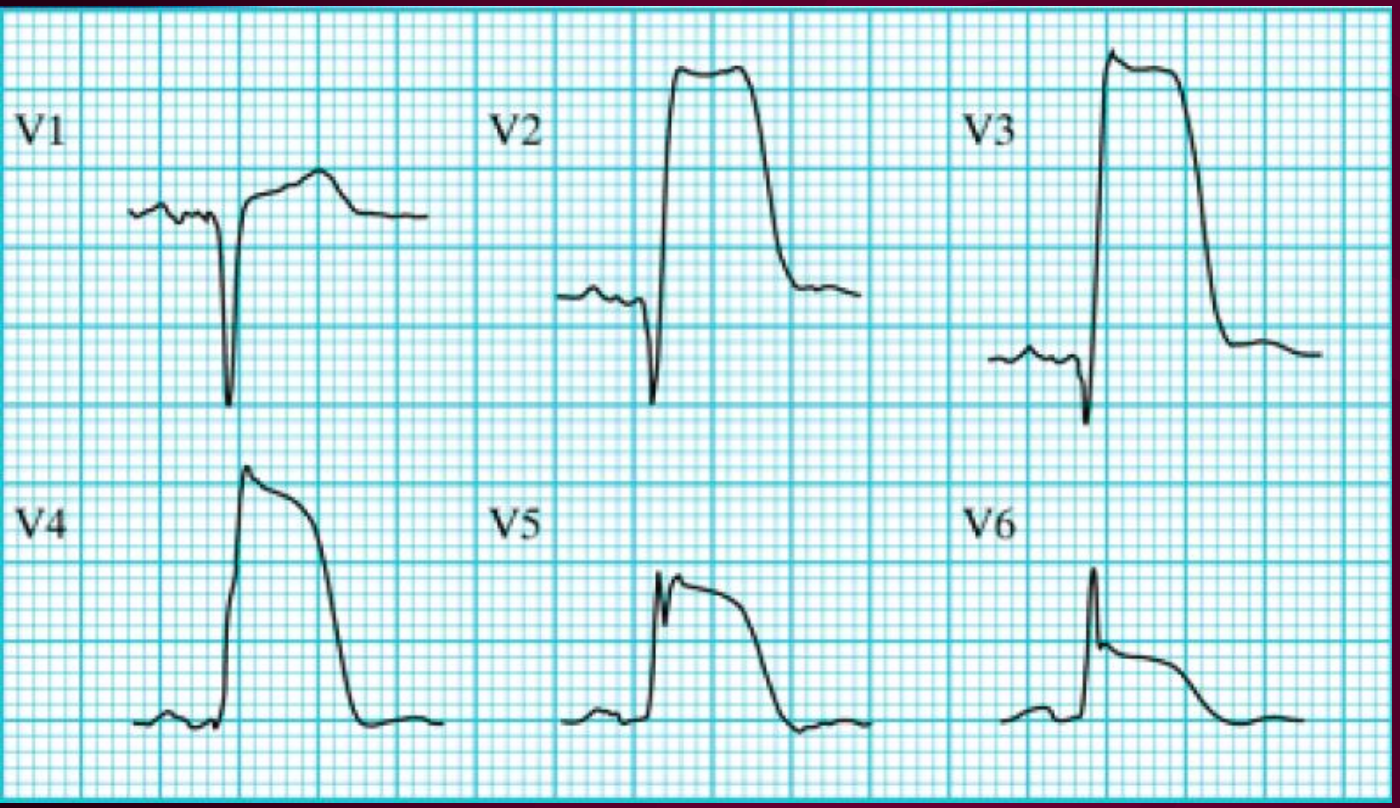


Diagnosis of MI

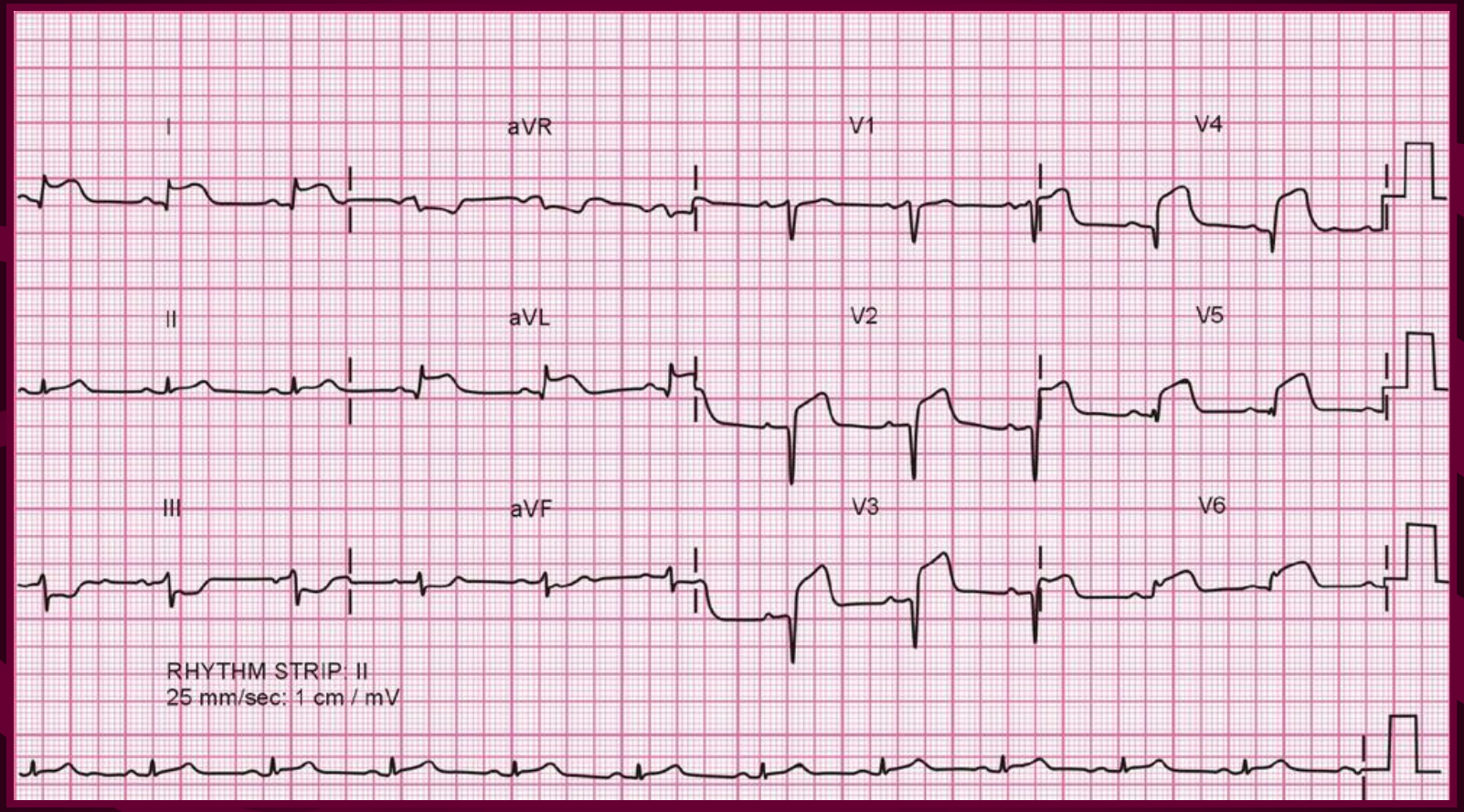
Elevation of the ST segment >1 small box in 2 leads is consistent with acute MI



ST Elevation

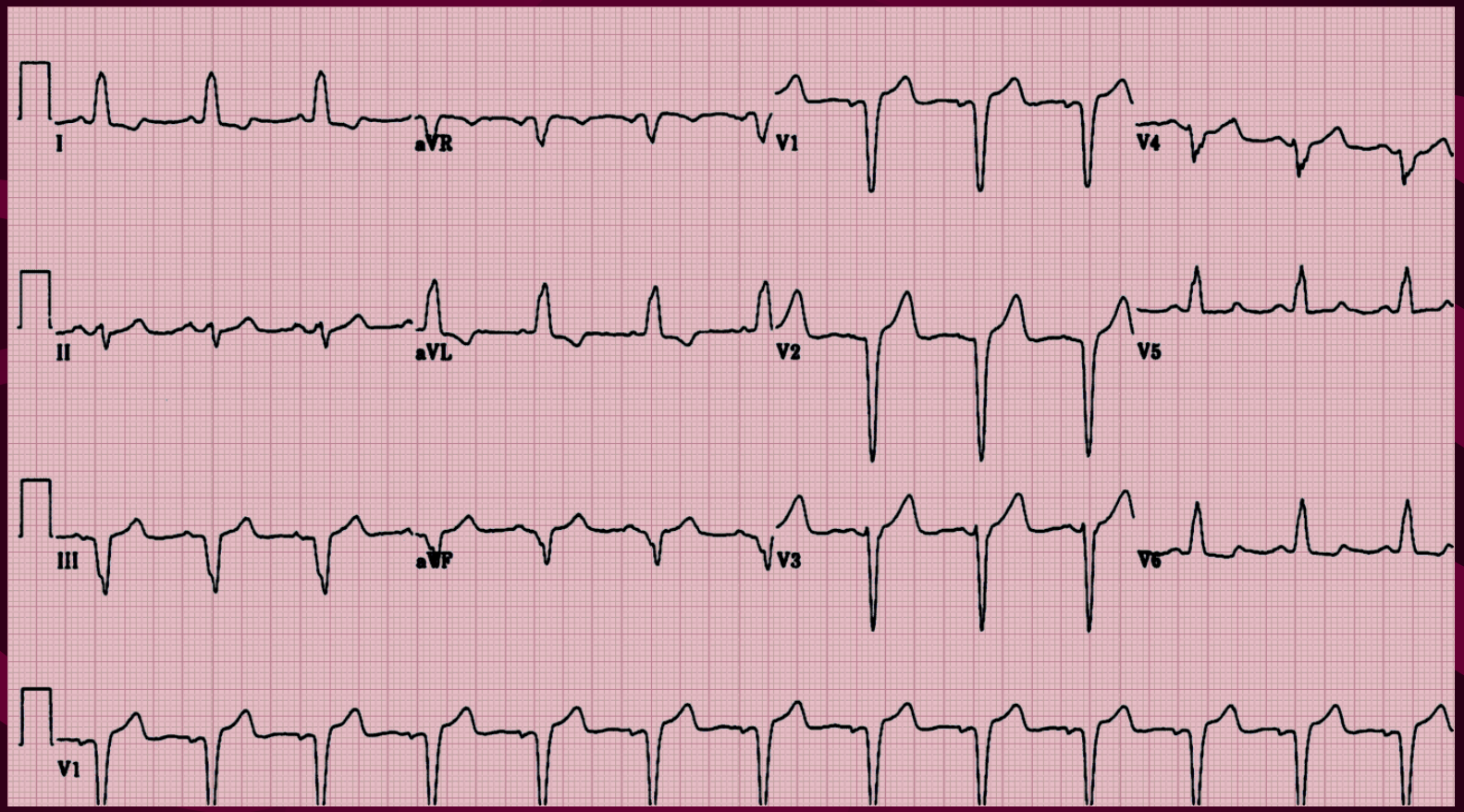


•The ST segment elevation may fuse with the QRS and T wave - yielding a "Tombstone" complex.


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
RHYTHM STRIP: II
25 mm/sec: 1 cm / mV

Another way to diagnose an acute MI

New LBBB ,concordant leads,discordant leads,midprecordial leads

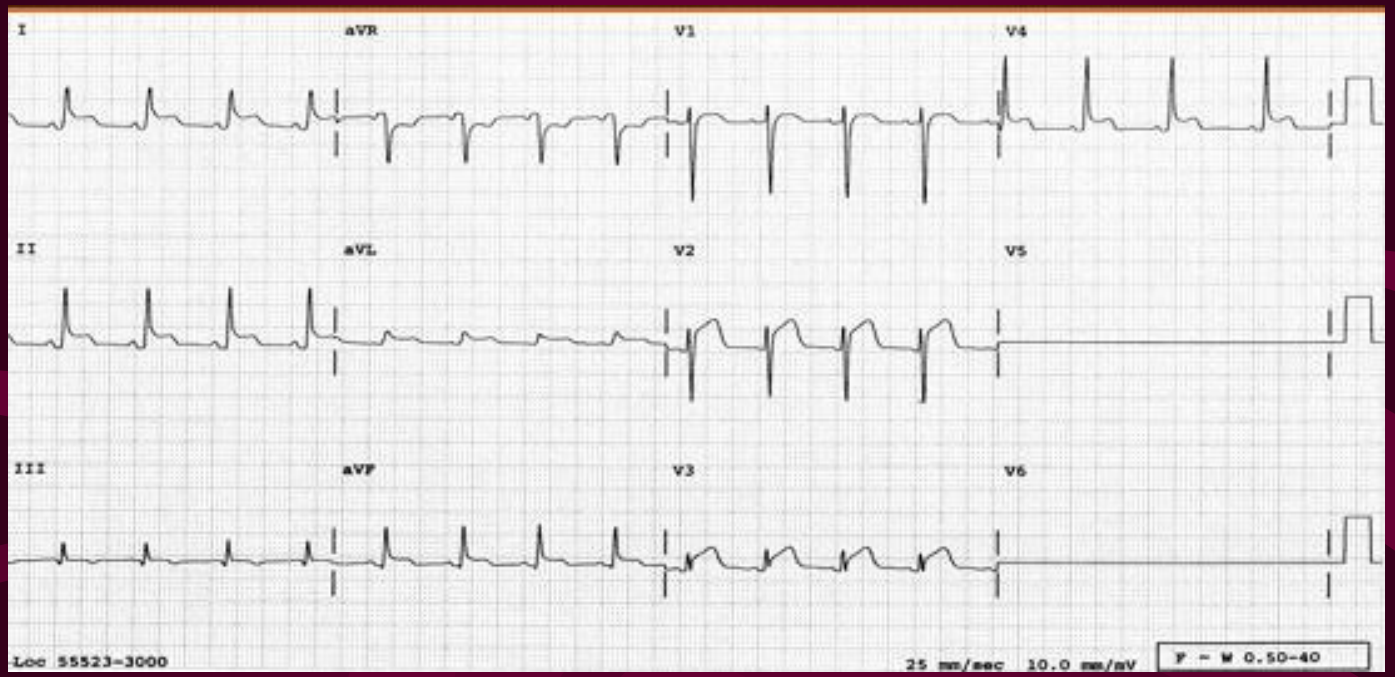


Case presentation

- A 60-year-old man with a history HTN presents to ED with a 1-day history of chest pain. He describes it as a sharp pain. The pain worsens when he is lying down, but it is relieved by bending forward.

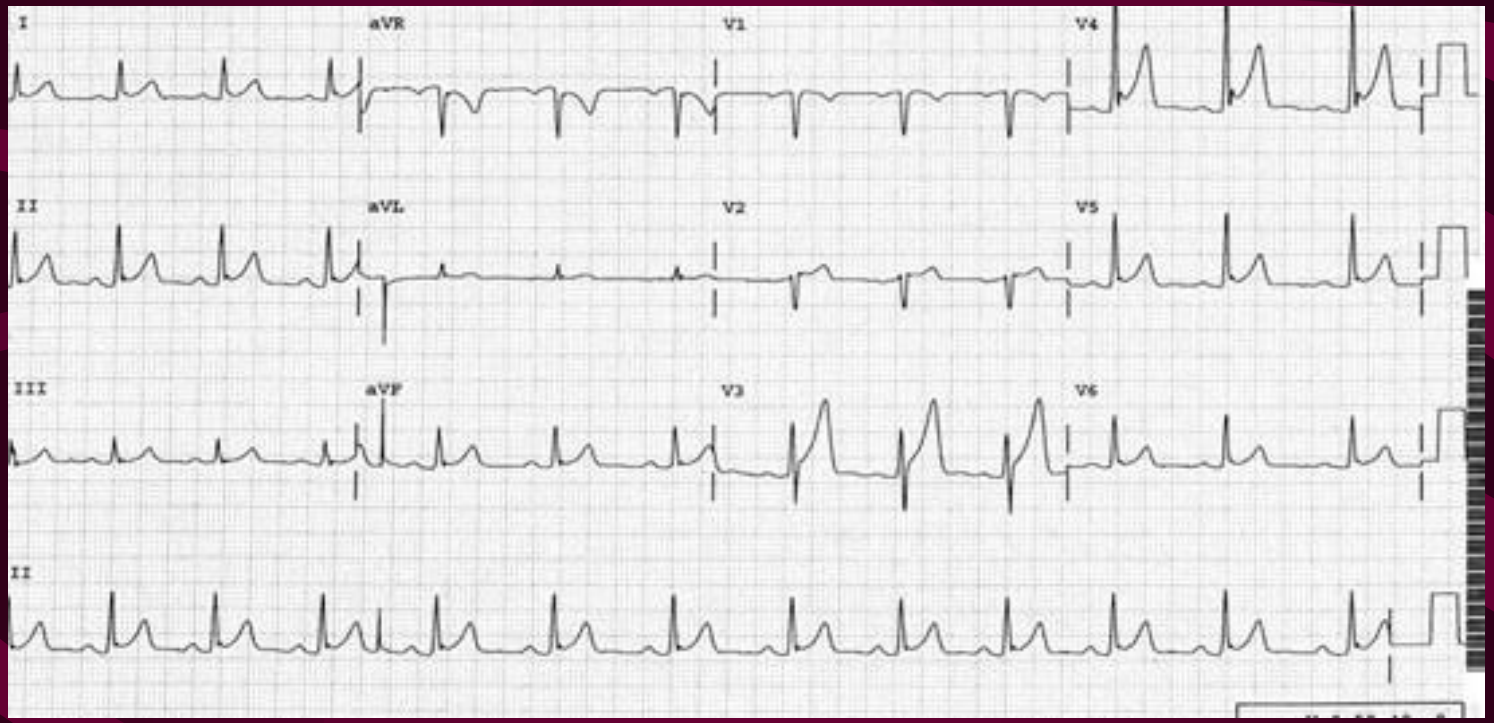
- The physical examination is unremarkable.

Acute pericarditis

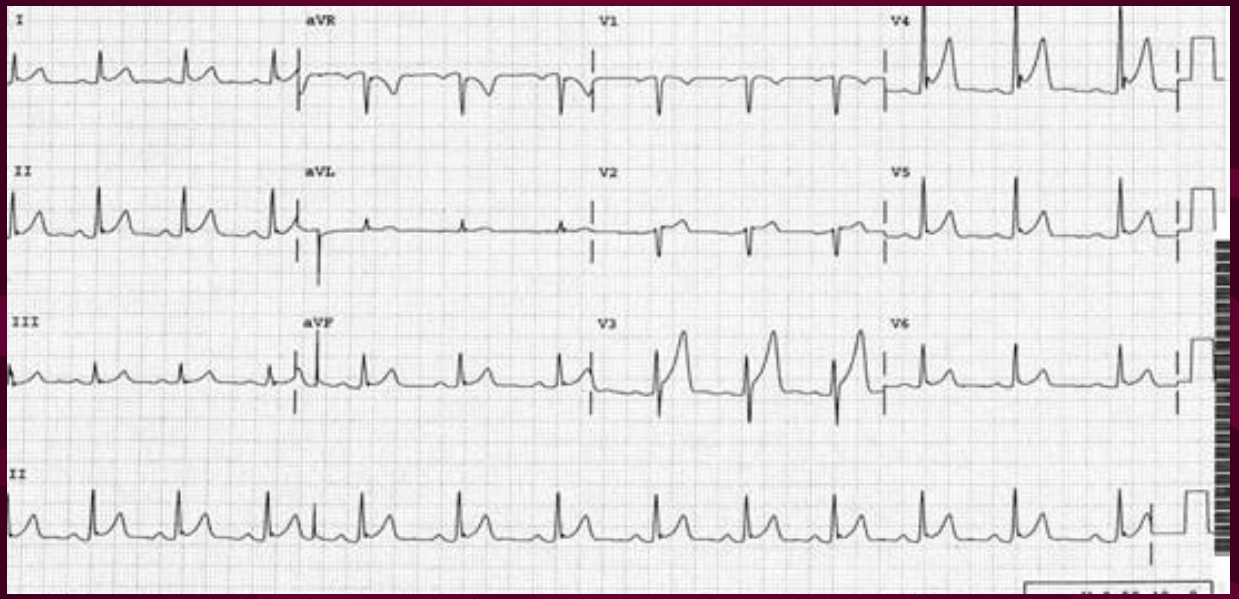


- ST segment is elevated most leads (is elevated in both the inferior and aVL leads and does not behave reciprocally).
- The PR segment is depressed in most of the leads
- The T wave not tall

This tracing highly suggestive of ?



Early repolarization pattern



- The ST segment is elevated in the midprecordial leads
- There is a notch in the J point.
- The T waves are tall.

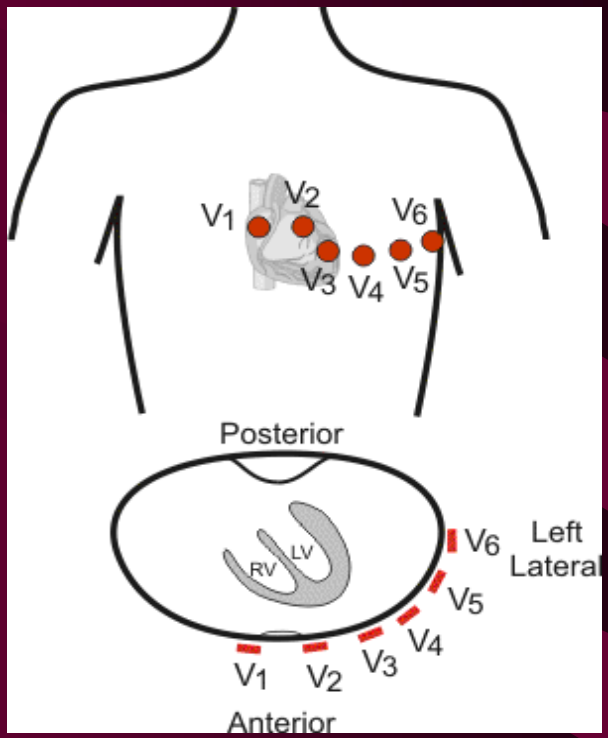
Pearl for Practice

Infarction → ST elevation, But ST elevation may represents other non-ischemic conditions.

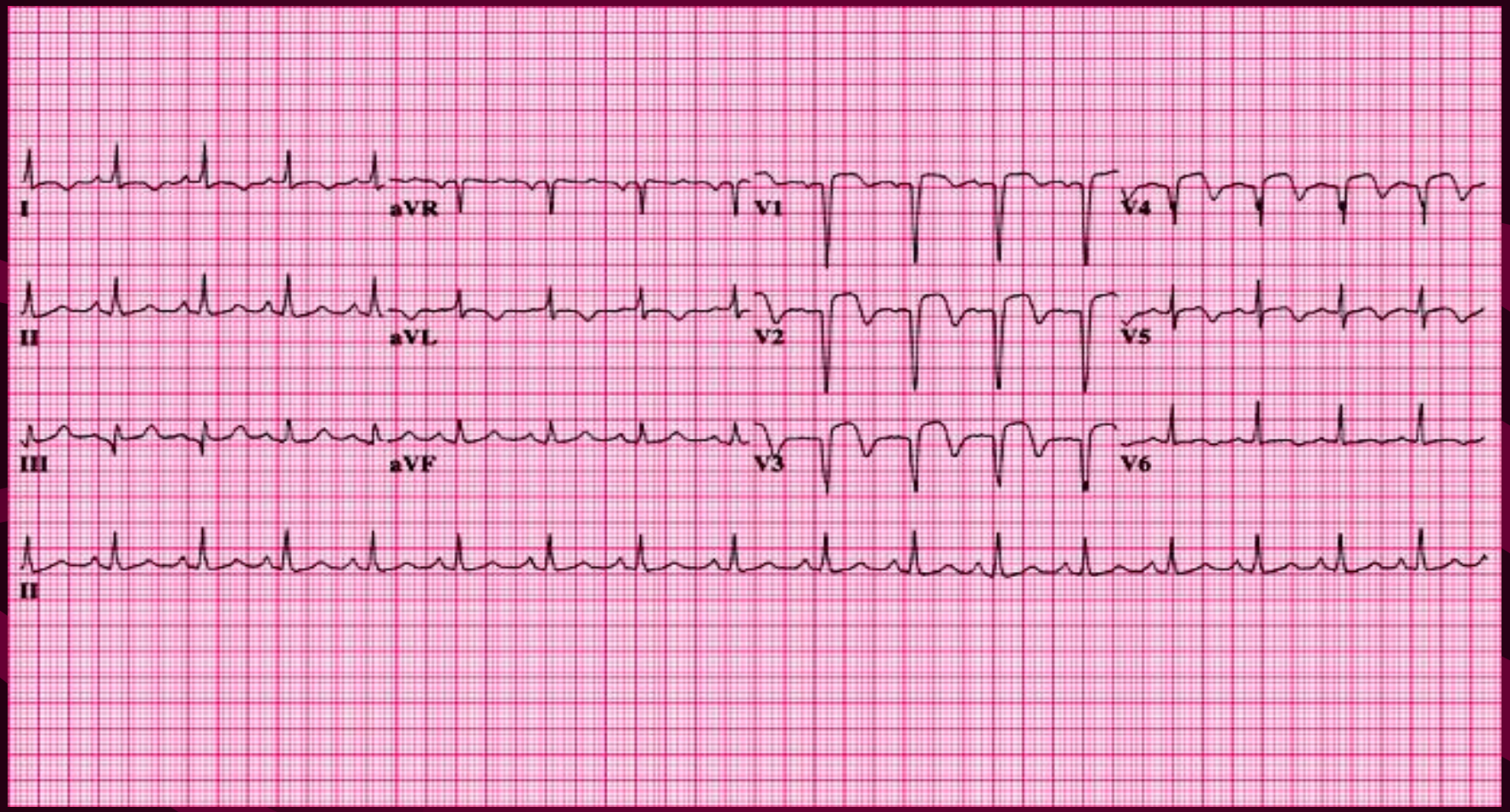
ECG Leads and Ventricular Region

As regard ECG, some leads get a good view of the heart:

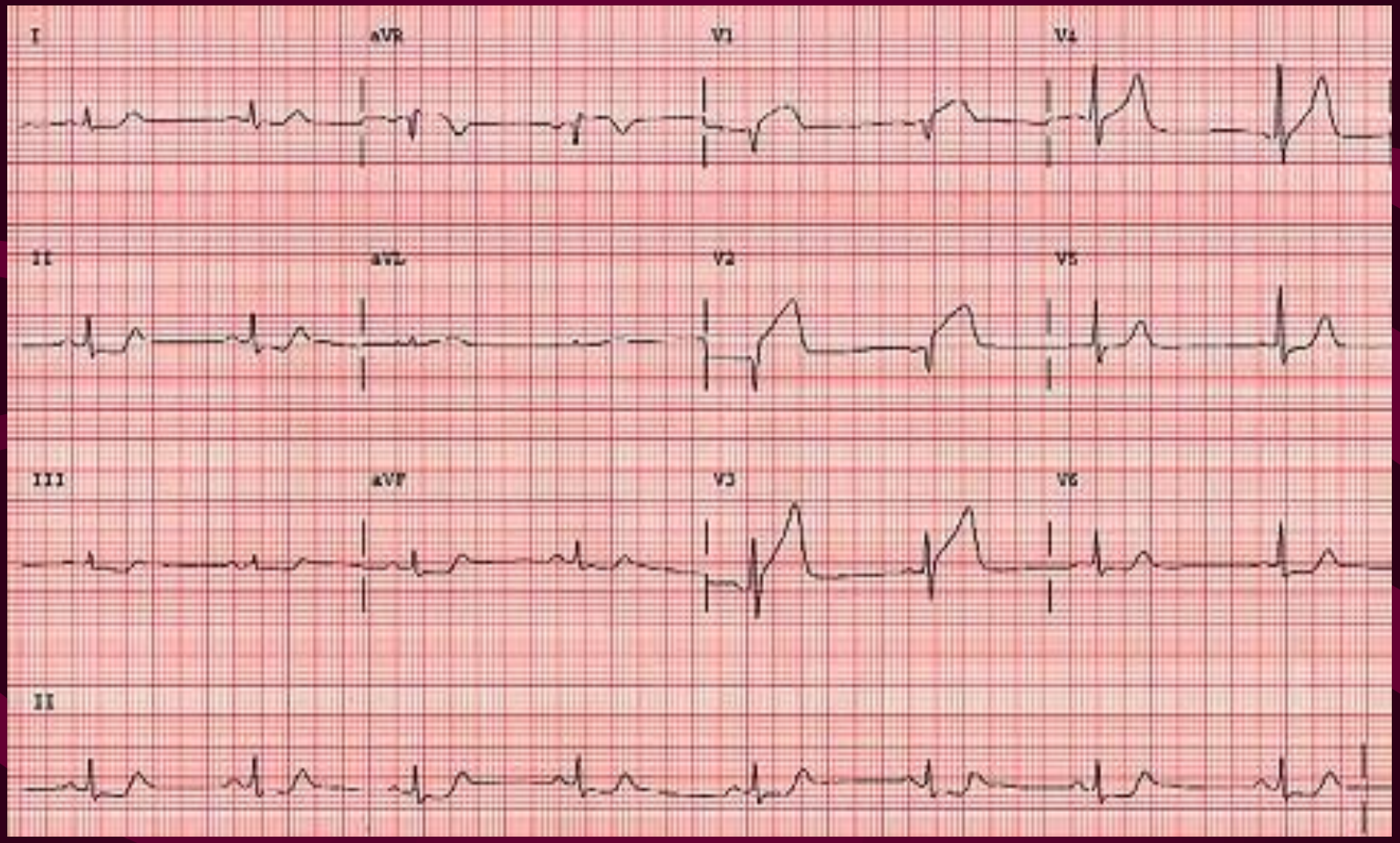
- V1-V4 = anterior
- V1-V2 = anteroseptal
- V3-V4 = anteroapical
- V1-V6 = anterolateral (Extensive anterior)
- I, aVL&V5-V6 = lateral
- II, III & aVF = Inferior



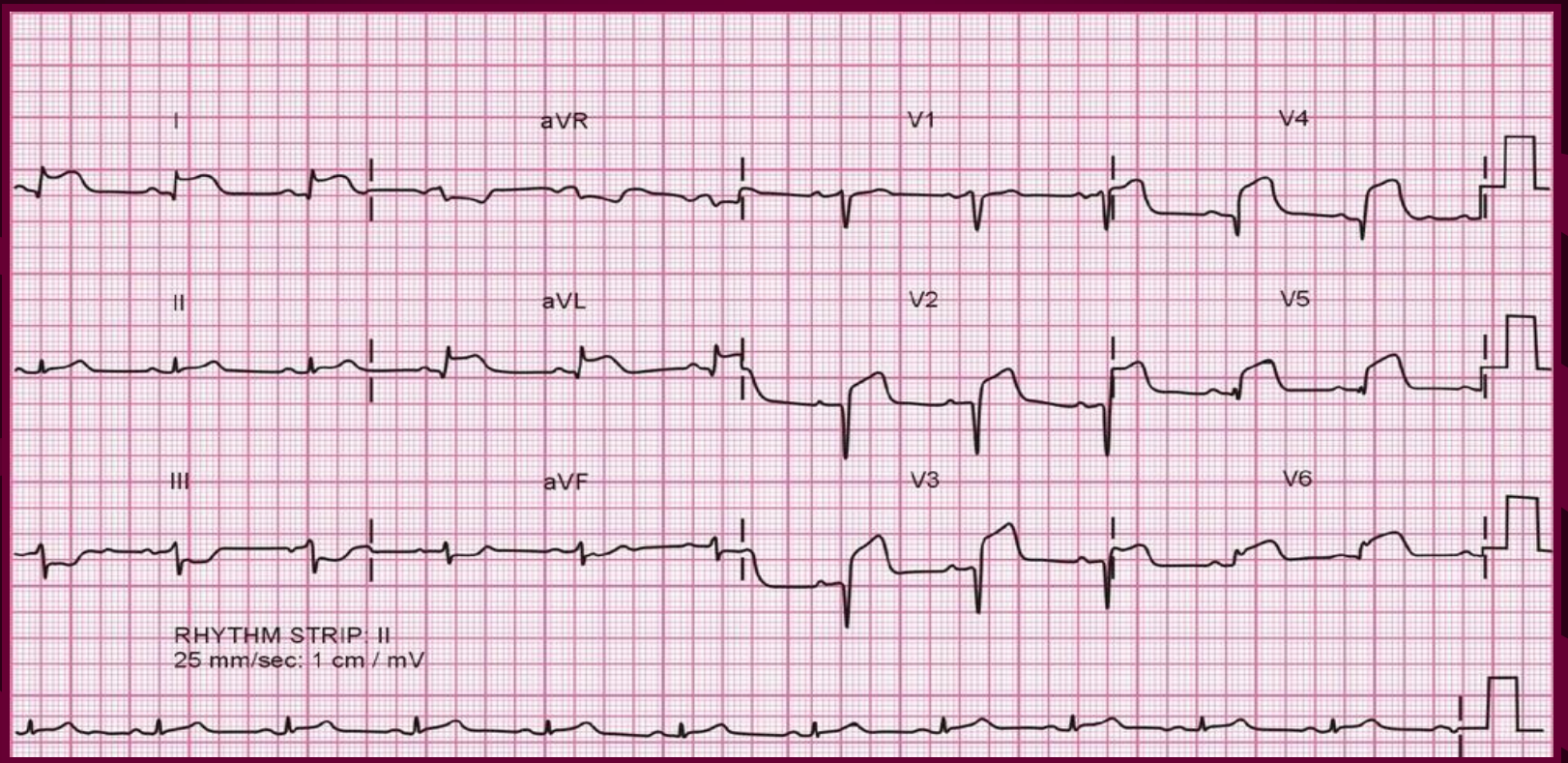
Anterior Wall MI



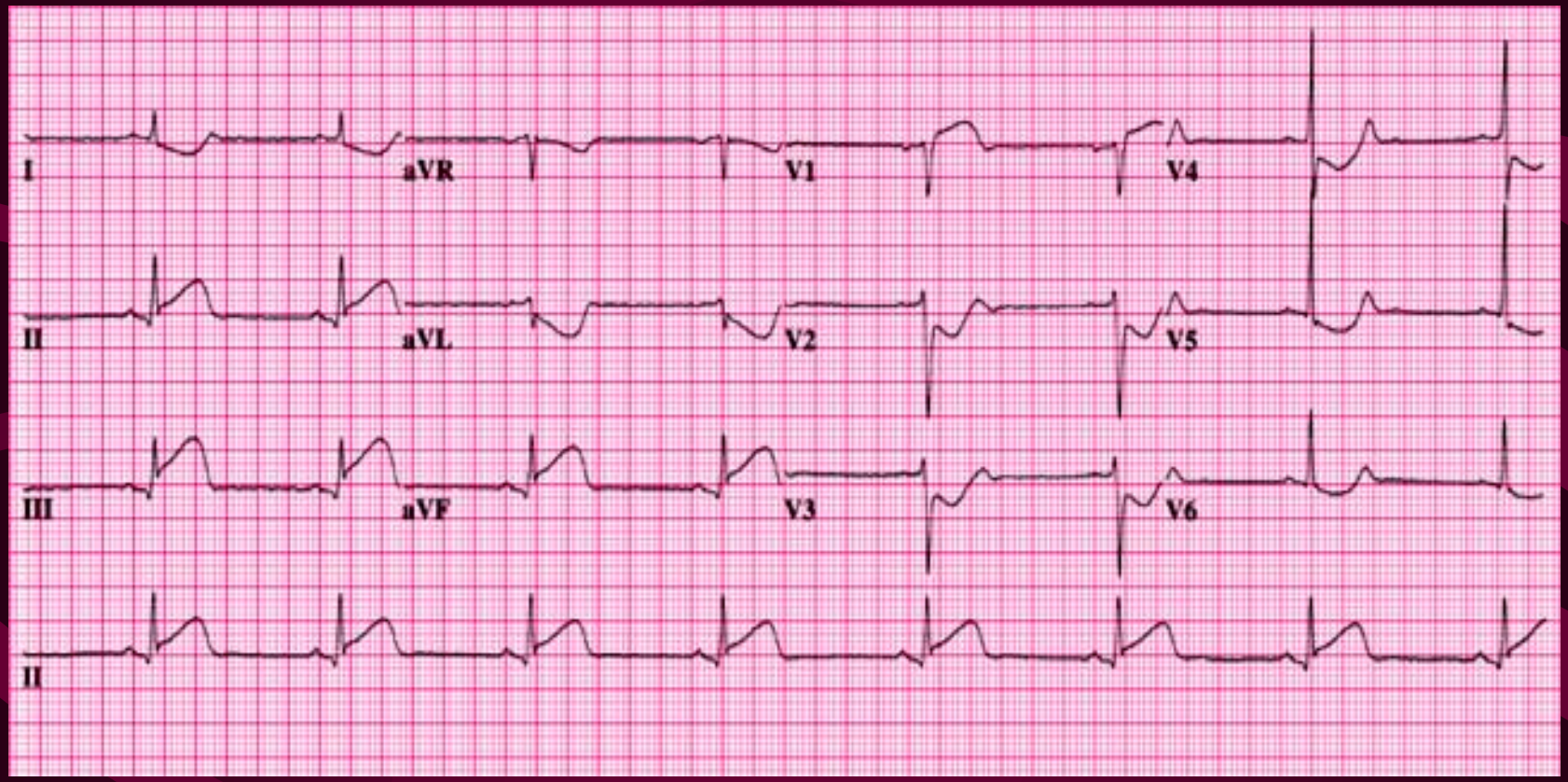
Anteroseptal MI



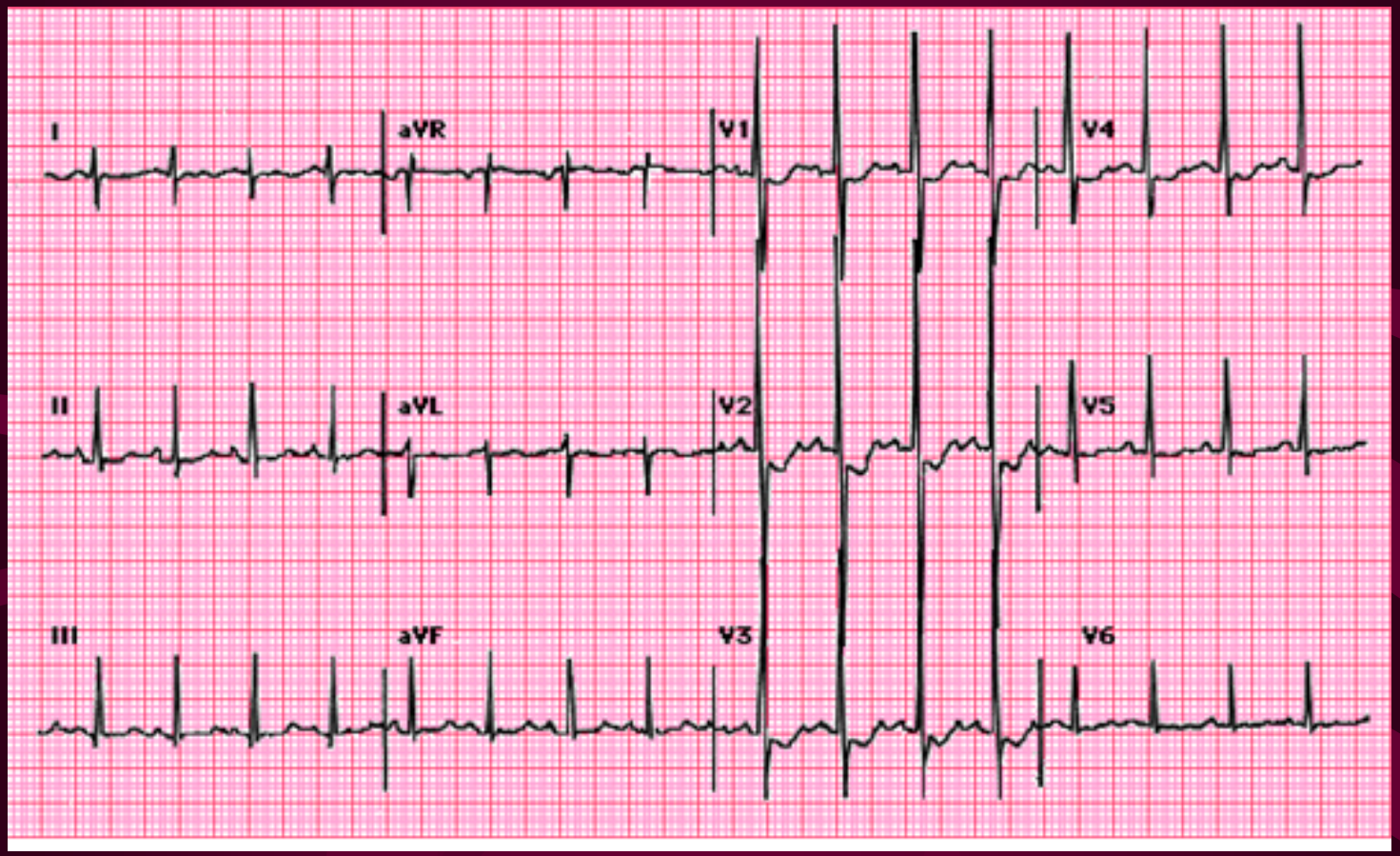
Anterolateral MI



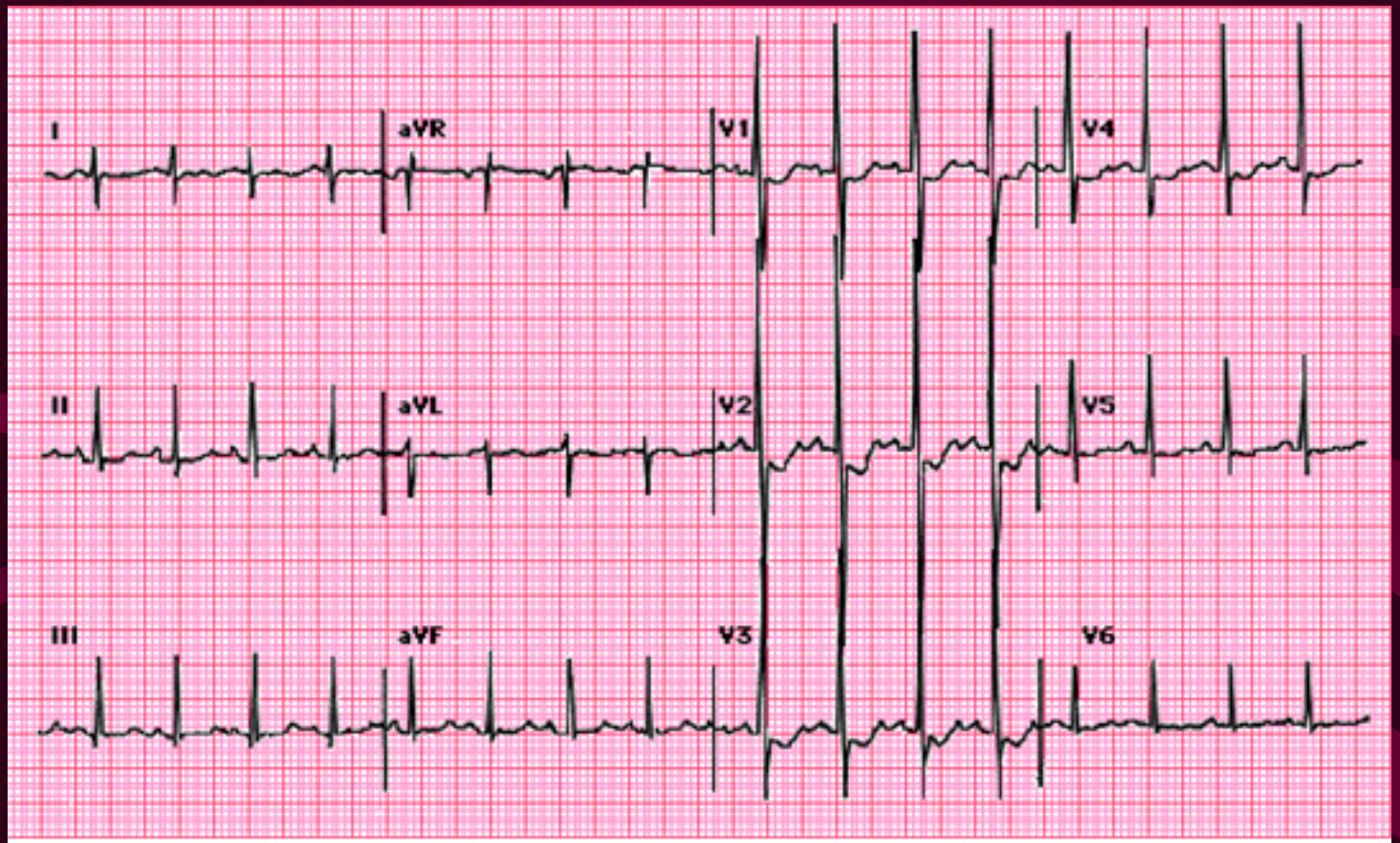
Inferior Wall MI



What is the diagnosis?



Normal ECG

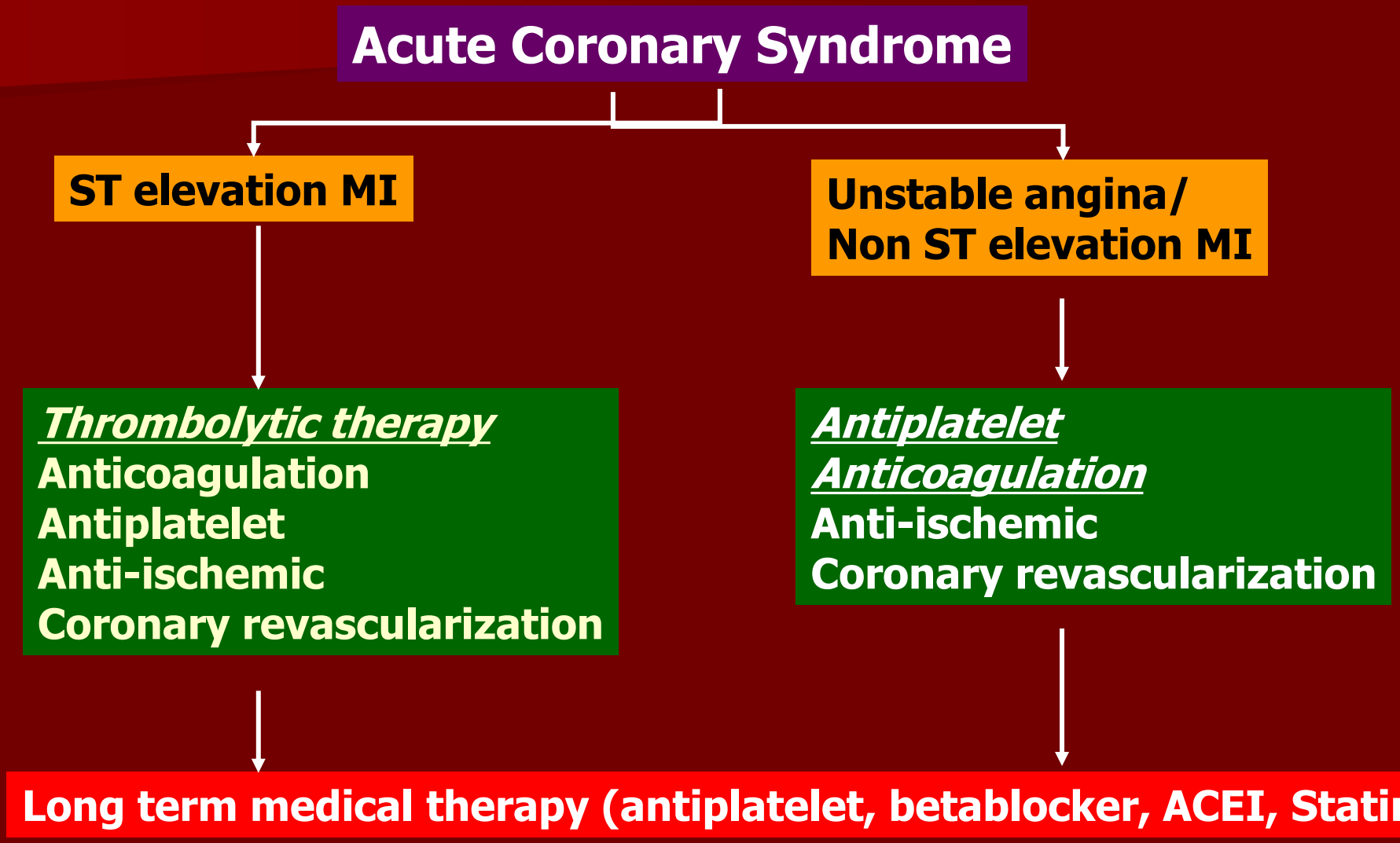


Normal neonatal ECG Electrocardiogram from a healthy neonate resembles right ventricular hypertrophy in adults (tall right precordial R waves with right axis deviation). Right ventricular preponderance in neonates is a physiologic finding related to fetal circulatory dynamics; resting sinus tachycardia is expected. The very narrow QRS (only about 0.05 sec) is a major clue in differentiating this pattern from a pathologic one in adults. Courtesy of Ary Goldberger, MD.

Pearl for Practice

ECG **must be** interpreted in the context of the clinical history and physical exam

Treatment of ACS



THANK YOU