

ATRIAL INFARCTION

Infarction of the cardiac atria occurs more frequently than is commonly considered. Ischemic damage to the atrial myocardium is usually associated with infarction of cardiac ventricles, but isolated infarction of an atrium can occur and may be of clinical significance¹.

Atrial infarction is rarely diagnosed before death because of its characteristically subtle and nonspecific electrocardiographic findings.

Atrial infarction is a neglected electrocardiographic sign with important clinical implications.

These findings may be overshadowed by changes associated with concomitant ventricular infarction².

- 1) Cunningham KS, Cardiovasc Pathol. 2008; 17:183-185.
- 2) Shakir DK.et al.Can J Cardiol. 2007;23:995-997.

ATRIAL INFARCTION

ECG DIAGNOSIS CRITERIA

PR (PRs), PQ segment (PQs), STa segment or PTa-segment: it stretches from the end of P wave to the onset of QRS complex. Displacement of this segment (depression or elevation), which represents part of the atrial ST (STa) segment only ostensive when associate with AV block as a consequence of atrial infarction (Figure 1).

Ja point: Point of junction between the end of the P wave and the onset of PRs. (Figure 2)

Normal location of atrial repolarization (Ta or TP wave). It coincides with ventricular depolarization (QRS complex), what explains its absence for being concealed by the ventricular phenomenon (Figure 3).

The 3 segments **PRs**, **ST** and **TPs** normally are at the same level (Figure 4).

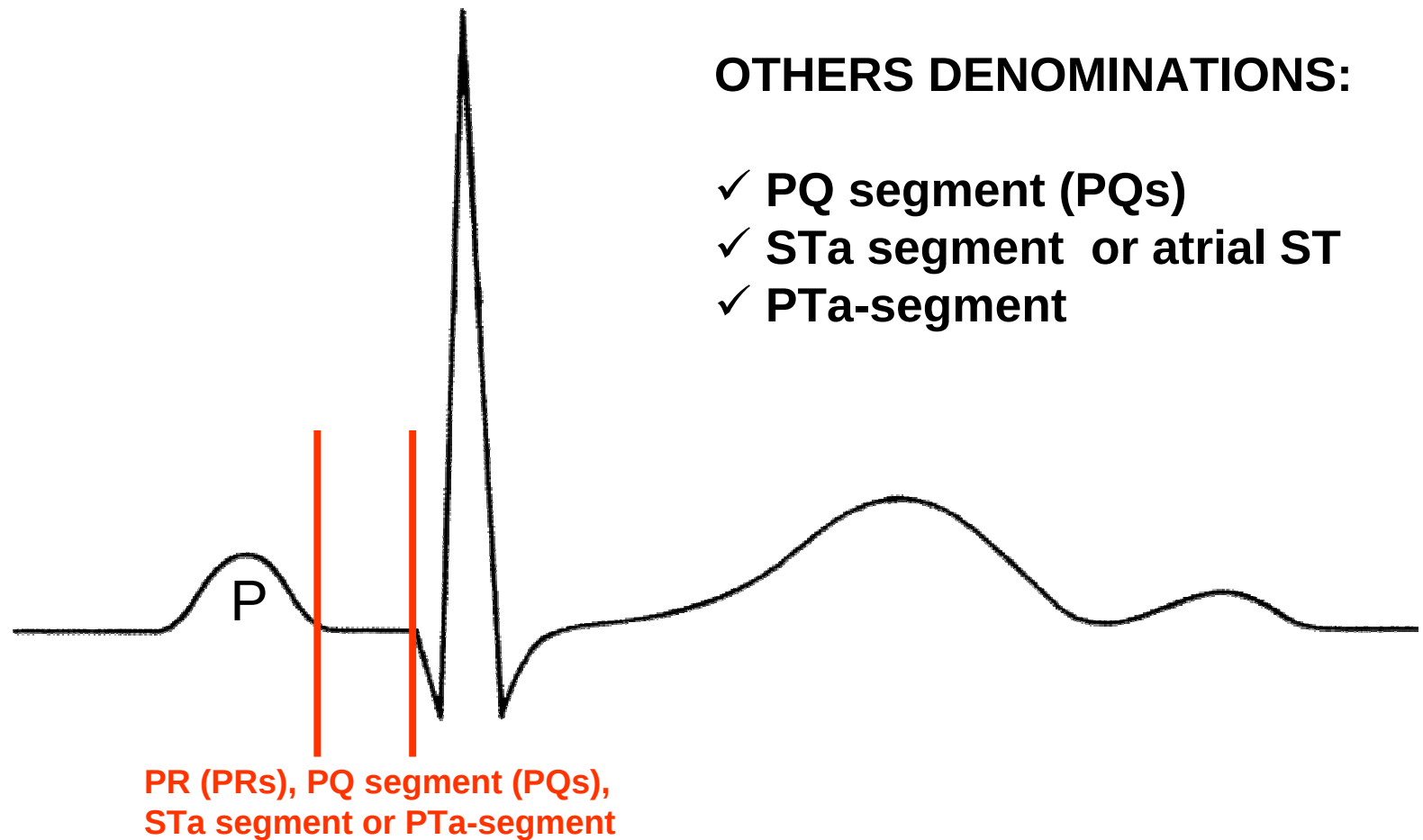
Ta wave may cause falsely positive strain tests in the presence of important PR segment depression in maximal strain, longer time of exercise and maximal strain faster than those truly positive, absence of effort-induced pain and P wave of voltage higher in maximal strain.

In acute right ventricular MI high degree AV block is present in almost half of the cases.

STa segment elevation may produce a diagnostic monophasic pattern during the early stage of ventricular ischemia.

Figure 1

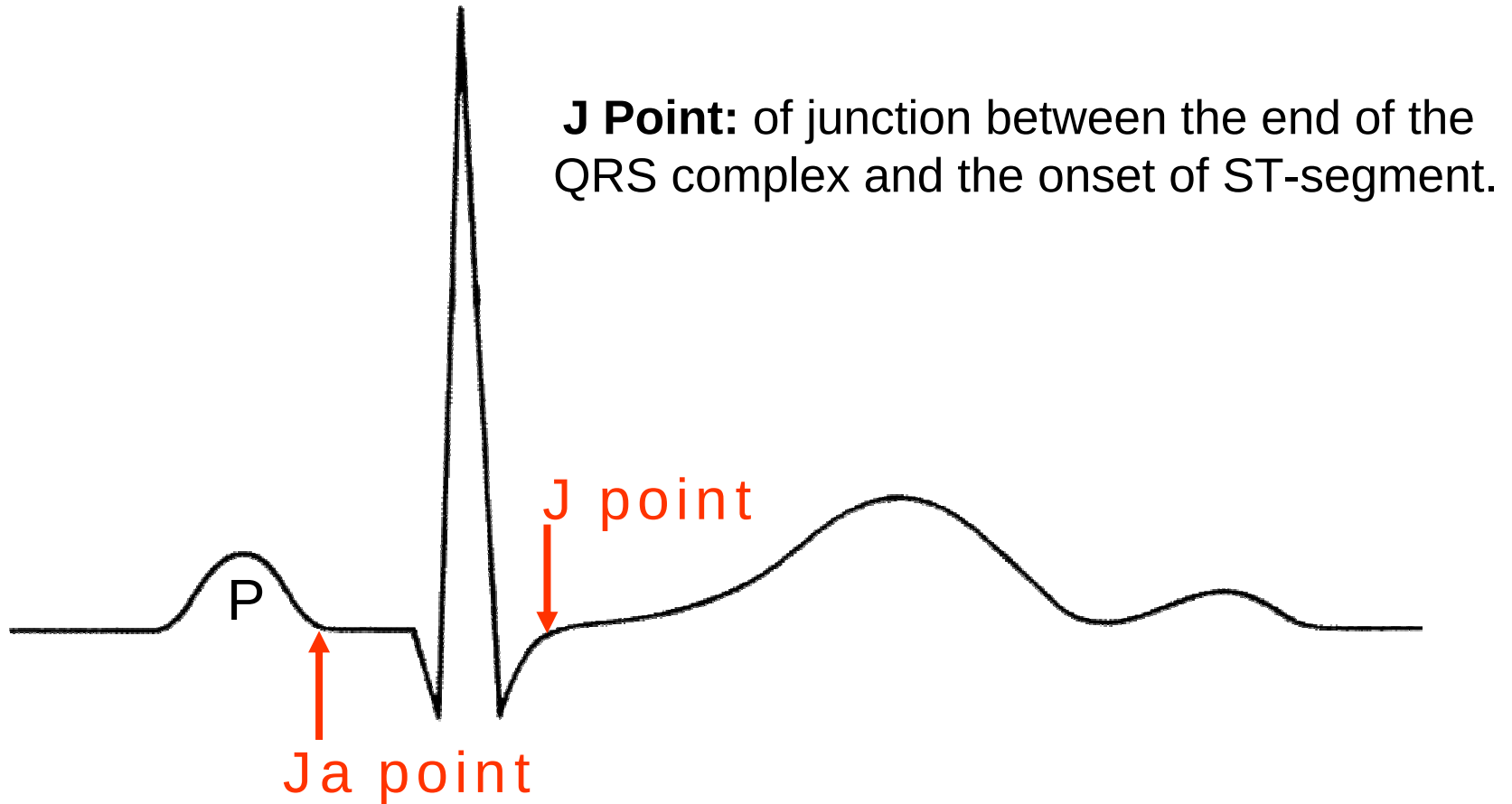
PR segment (PRs)



PRs: from the end of P wave to the onset of QRS complex.

Figure 2

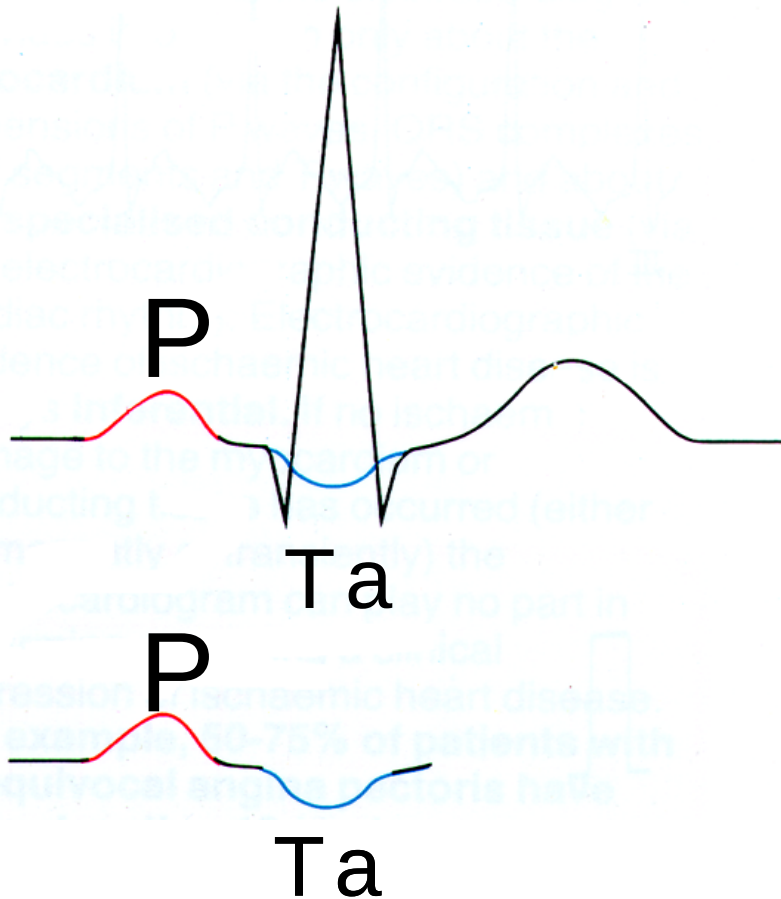
Ja point & J point



Ja Point: junction between the end of the P wave and the onset of PRs.

Figure 3

Ta or TP wave



Normal location of atrial repolarization (Ta or TP wave). It coincides with ventricular depolarization (QRS complex), what explains its absence for being concealed by the ventricular phenomenon.

Its polarity is opposite to the P wave and its magnitude is 100 to 200 m μ V. Sometimes it may appear in the ST segment and the T wave.

During exercise, it may in theory, cause ST segment depression and resemble myocardial ischemia¹

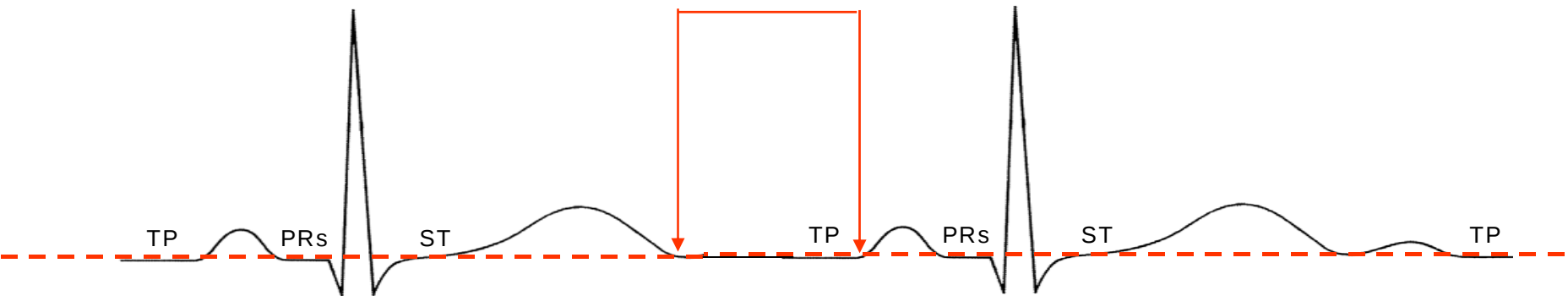
1) Kapin PM, et al. J Am Coll Cardiol. 1991; 18: 127-135.

Figure 4

CORRELATION OF LEVEL BETWEEN PRs, ST & TP

From the end of the T wave up to the onset P wave of the following cycle

TP SEGMENT



The PR segment is leveled when it is at the same level of the PR segment of the beat being studied.

Usually, PRs (end of P wave up to QRS complex onset), ST (from J point or the end of QRS up to the beginning of the T wave) and TPs (from the end of the T wave up to the onset P wave of the following cycle) segments **are at the same level**. The figure shows a normal ECG and a line of dots pointing out the level of the three segments: PRs, ST and TPs.

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ECG CRITERIA

- 1) Depression of the STa segment alone is not a reliable sign unless the degree of depression is marked.
- 2) P shape with M or W morphology during the acute MI episode.
- 3) Frequently atrial arrhythmias (35% of cases): Higher incidence of supraventricular arrhythmias in acute atrial fibrillation compared with ventricular infarction, atrial flutter, supraventricular tachycardia, changing pacemaker, junctional rhythm, sinus bradycardia, and AV conduction disturbances. Ischemia of the sinus node due to coronary occlusion proximal to the origin of the sinus node artery is a likely cause of arrhythmias¹.

1) Kyriakidis M. Chest. 1992;101:944-947.

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COMPLICATIONS

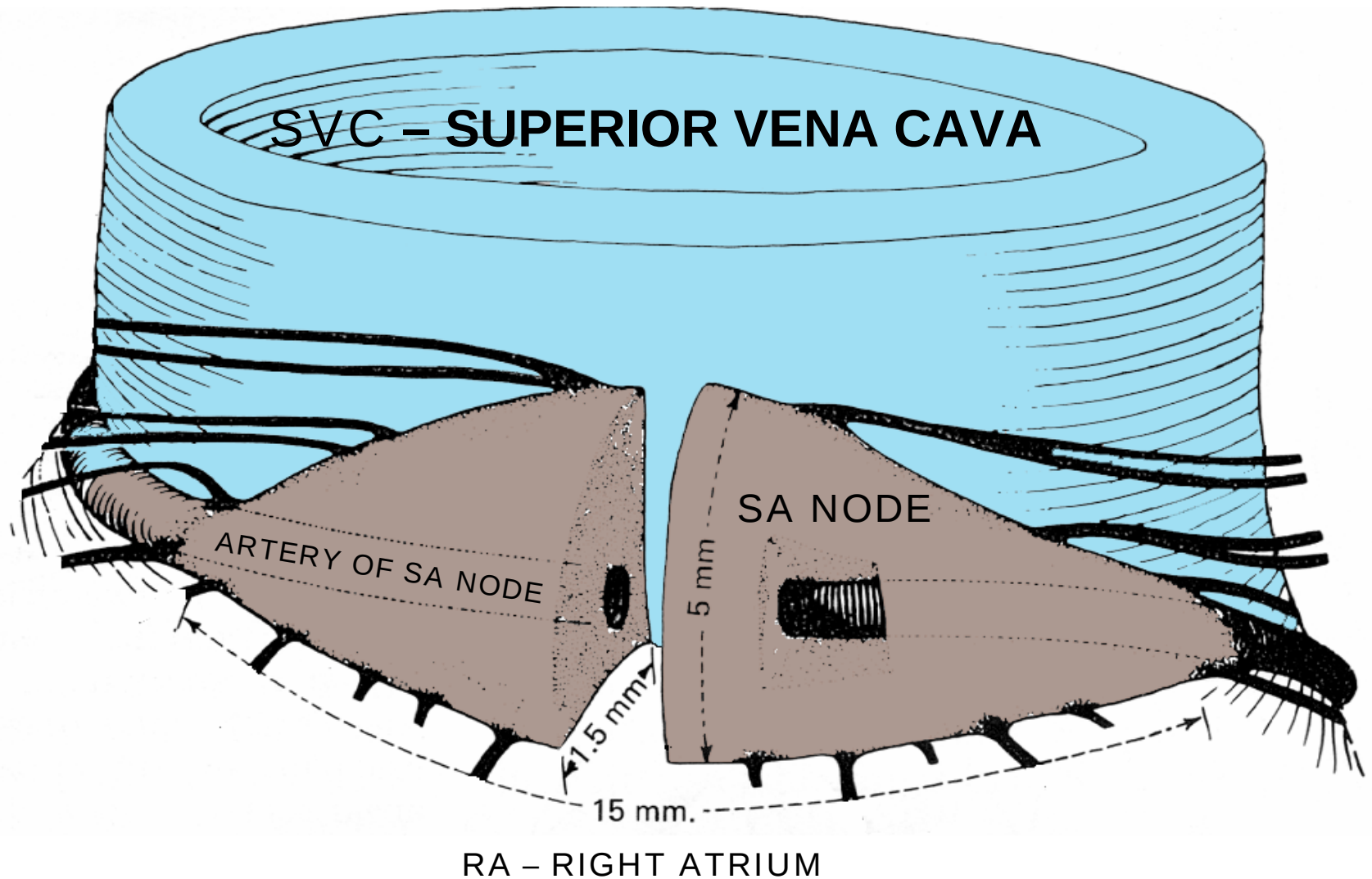
- 1) Atrial arrhythmias (present in 35% of cases): ischemia of the sinus node due to coronary occlusion proximal to the origin of the sinus node artery is a likely cause of arrhythmias¹. (Figure 5)
- 2) Pump failure of the right and left ventricle
- 3) Atrial wall rupture
- 4) Thromboembolization²

1) Kyriakidis M. Chest. 1992;101:944-947

2) Neven K, et al. J Cardiovasc Electrophysiol. 2003;14:306-308.

FIGURE 5

RIGHT CORONARY ARTERY ORIGIN



The Right coronary artery supplies the SA node artery in 60% of patients. The other 40% of the time, the SA nodal artery is supplied by the left circumflex artery.

ATRIAL INFARCTION

CRITERIA¹

I) MAJOR CRITERIA

- 1) PRs elevation $>0.5\text{mm}$ in leads V5 and V6 with reciprocal depression of PRs in V1 and V2 leads.
- 2) PRs elevation $>0.5\text{mm}$ in leads I with reciprocal depressions in II and III.
- 3) PRs depression $>1.5\text{mm}$ in precordial leads and 1.2mm in I, II, associated with any atrial arrhythmia.

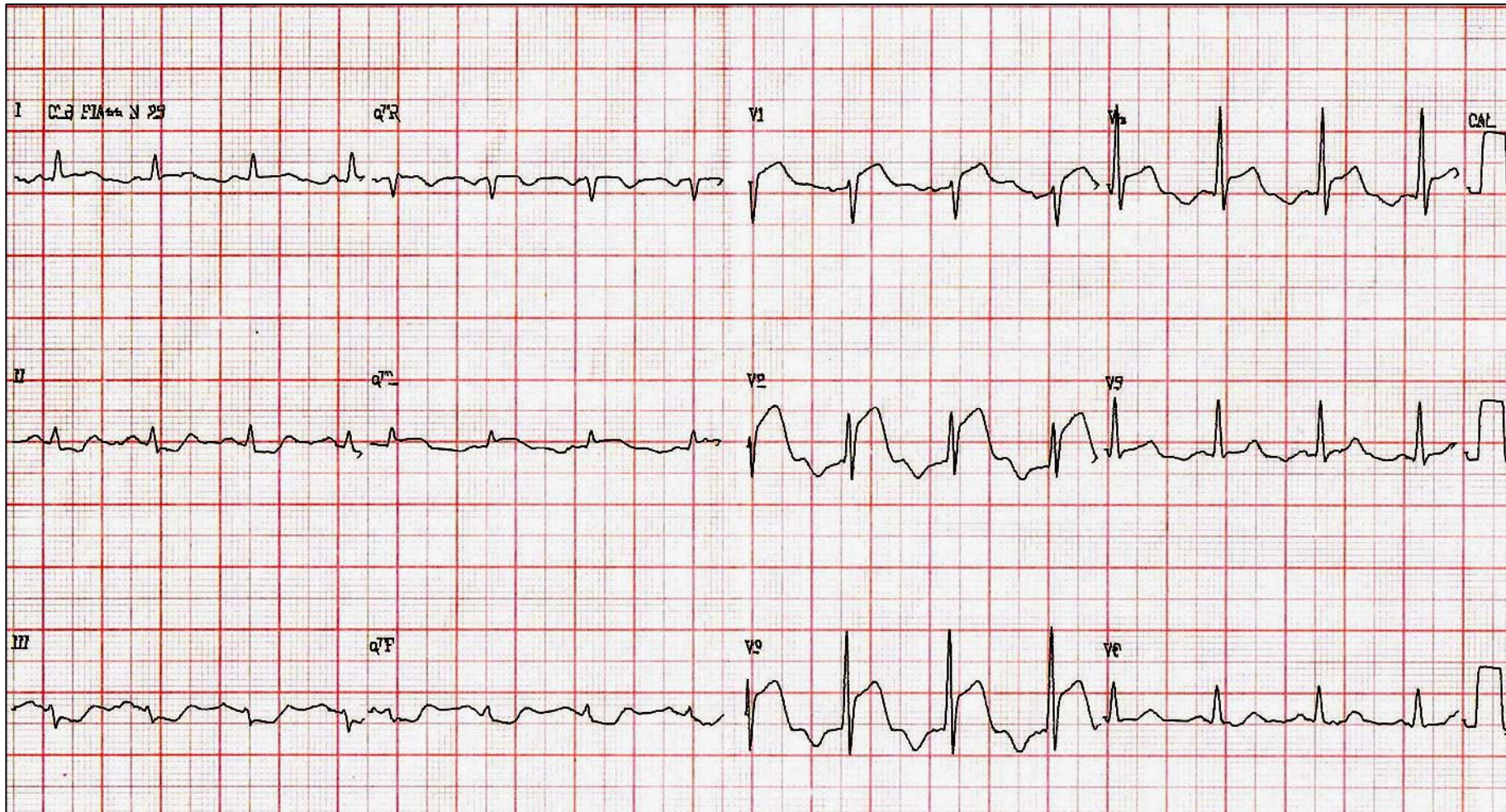
II) MINOR CRITERIA

- 1) Abnormal P waves, flattening of P-wave in M, flattening of P-wave in W, irregular or notched P wave.

1) Liu CK, et al. Circulation 1961;23:331-338.

Figure 6

INTRA-STENT ACUTE THROMBOSIS IN LAD ARTERY



Acute subepicardial injury in anteroapical wall. "Mirror image" in inferior leads.
Abnormal shape inverted P wave followed by PR segment depression in V2 and V3.

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