INTERPRETAZIONE ECG NEL PAZIENTE CON SOSPETTO STEMI

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x congresso nazionale
simeu
NAPOLI 18-20 NOVEMBRE 2016

Siete d’accordo se vi propongo per una relazione.. Magari nella sezione giovani?

Certo!
Sì!

Sì!
Certo!

Andrea Fabbri

A: Federico Germini, Giacomo Veronese

Rispondi a: Andrea Fabbri

I: Congresso SIMEU Napoli...

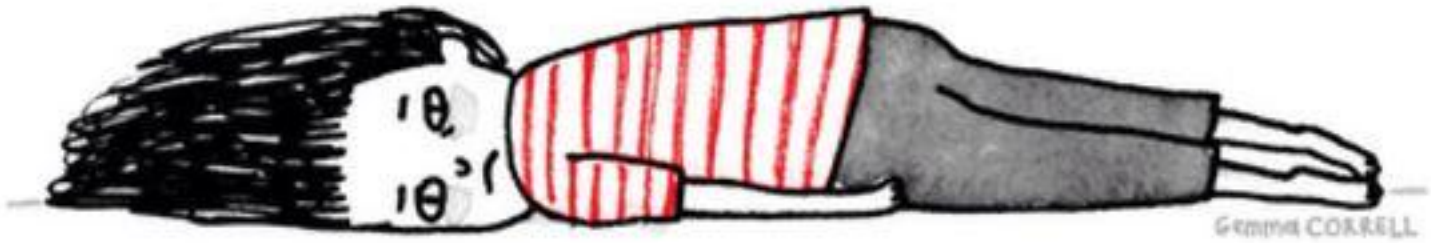
Vi allego il programma del congresso SIMEU Napoli..
Come accennato vi ho proposto tra i relatori.
A presto,

A

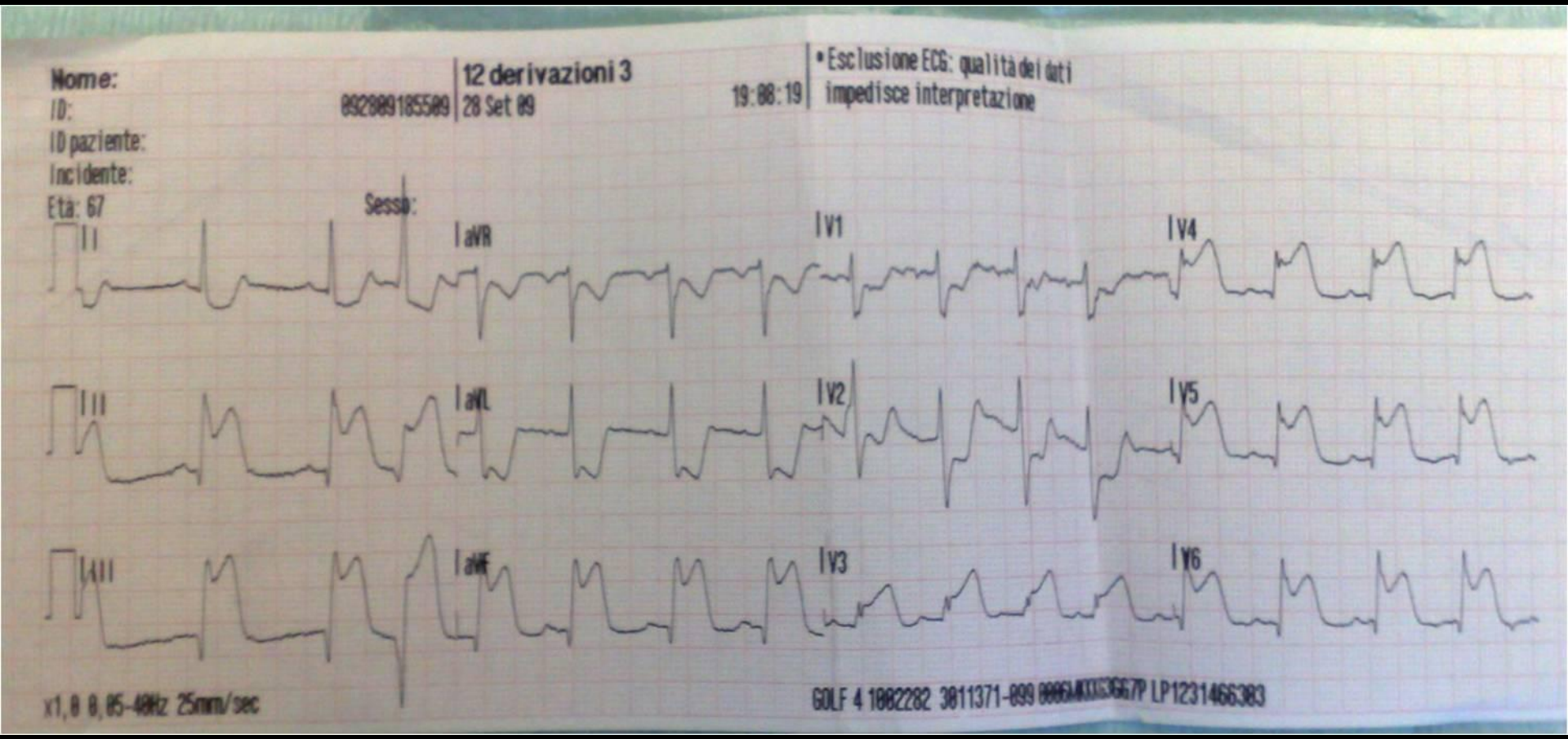
Find the intruder!

Il soggetto ipoperfuso: monitoring metabolico
Fernando Schiraldi
Discussione
TECNOLOGIA – ECG
Interpretazione ECG nel paziente con sospetto STEMI
Giacomo Veronese
Interpretazione ECG nelle tachicardie a complessi larghi
Enrico Ruggiero

NOPE.



CHEST PAIN



1) È SEMPRE COSÌ FACILE?
2) IN REALTÀ QUANTO SBAGLIAMO?

Causes of ST segment elevation

- Acute myocardial infarction
- "High take-off"
- Benign early repolarisation
- Left bundle branch block
- Left ventricular hypertrophy
- Ventricular aneurysm
- Coronary vasospasm/Printzmetal's angina
- Pericarditis
- Brugada syndrome
- Subarachnoid haemorrhage

È SEMPRE COSÌ FACILE?

MAGARI!

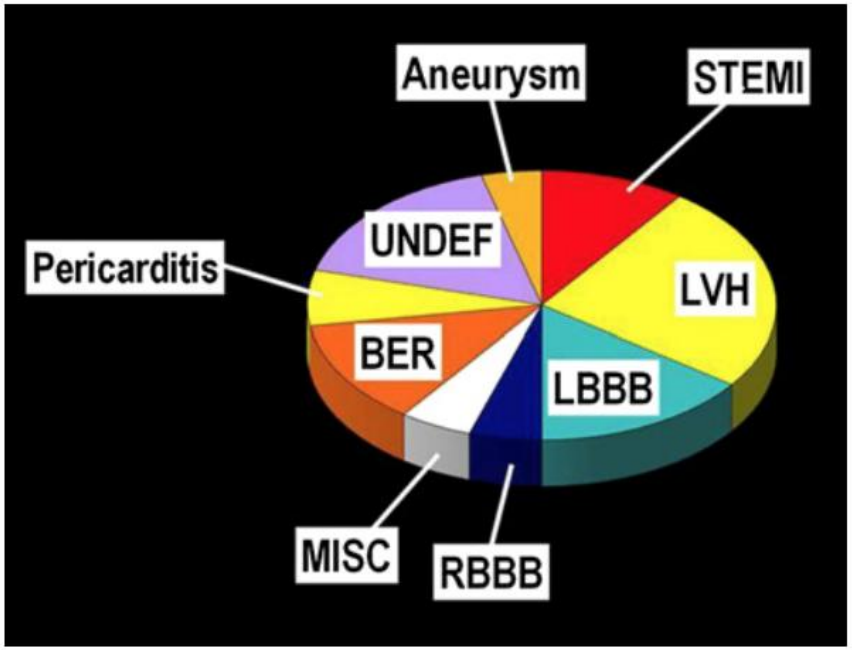


Fig. 1. Causes of ST segment elevation in adult patients with chest pain. BER, benign early repolarization; LBBB, left bundle branch block; LVH, left ventricular hypertrophy; MISC, miscellaneous; RBBB, right bundle branch block; UNDEF, undefined.

ORIGINAL ARTICLE

Emergency physician accuracy in interpreting electrocardiograms with potential ST-segment elevation myocardial infarction: Is it enough?

Giacomo Veronese[a], Federico Germini[b], Stella Ingrassia[c], Ombretta Cutuli[d], Valeria Donati[e], Luca Bonacchini[a], Maura Marcucci[b,f], Andrea Fabbri[g], and The Italian Society of Emergency Medicine (SIMEU)

36 ECG
STEMI or NOT?

The accuracy of interpretation of STEMI ECGs was modest among ED physicians

Table 2. Accuracy of physicians' STEMI diagnosis stratified by training level, working place and working experience.

	n (%)	ECGs read[a]	Accuracy
Overall	135	4603	69.1 (67.8–70.4)
Training level			
Resident	63 (48.5)	2171	68.1 (66.2–70.1)
Attending	67 (51.5)	2354	69.9 (68.1–71.8)
Working place			
Level 1 ED	7 (6.0)	225	65.9 (62.3–69.6)
Level 2 ED	43 (36.7)	1481	69.6 (67.2–71.9)
Level 3 ED	49 (41.9)	1721	70.9 (68.8–73.1)
Working experience			
0–5 years	62 (64.6)	2177	67.7 (65.7–69.7)
6–10 years	15 (15.6)	539	69.7 (65.8–73.6)
> 10 years	19 (19.8)	642	70.4 (66.8–73.9)

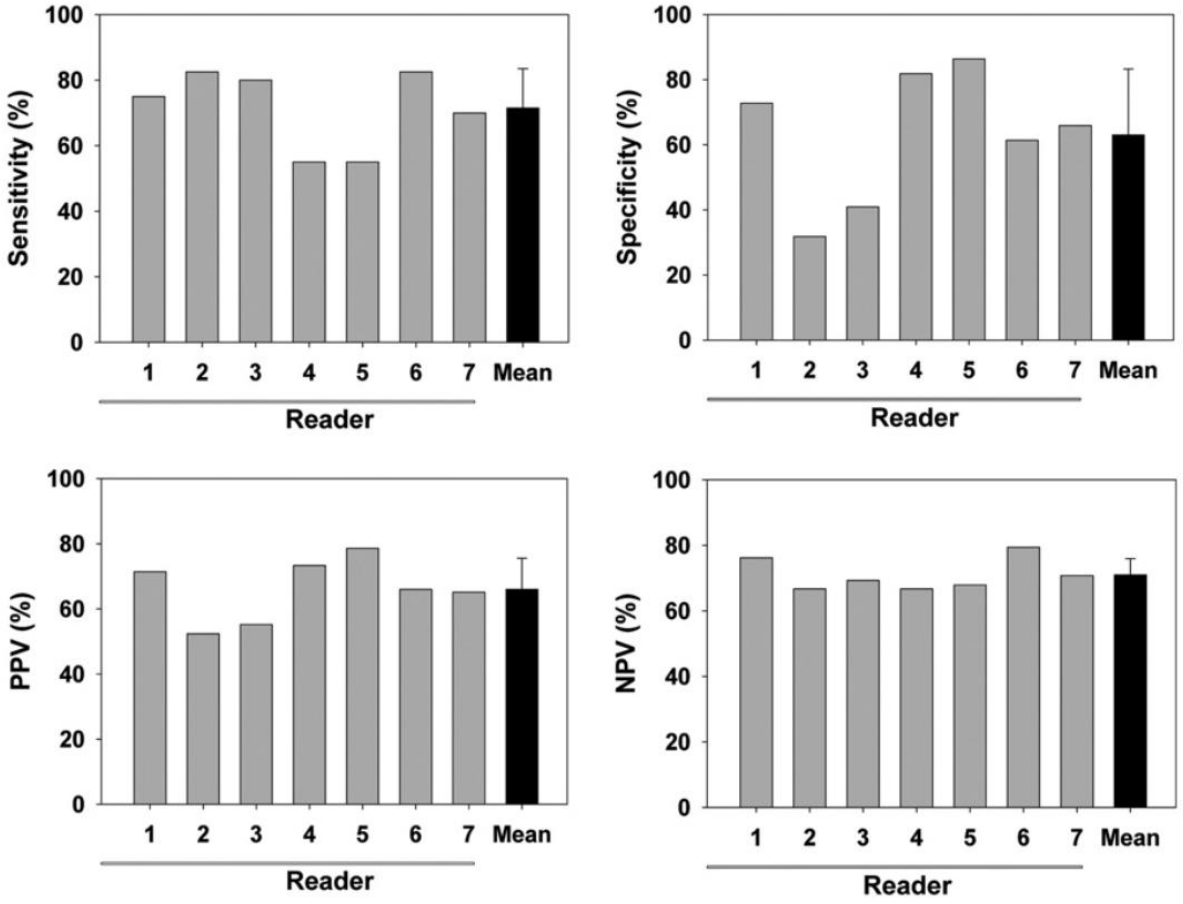
Differentiating ST-Elevation Myocardial Infarction from Nonischemic ST-Elevation in Patients With Chest Pain

Viet Tran, MD[a], Henry D. Huang, MD[a], Jose G. Diez, MD[a,b], Gerardo Kalife, MD[b], Rajiv Goswami, MD[a], David Paniagua, MD[a], Hani Jneid, MD[a], James M. Wilson, MD[a,b], Scott R. Sherron, MD[b], and Yochai Birnbaum, MD[a,b,*]

84 cath lab activations
Showed ECGs to 7 experienced interventionalists

Emergent PCI or not?

Recommendations for immediate PCI
33 to 75%



"False-Positive" Cardiac Catheterization Laboratory Activation Among Patients With Suspected ST-Segment Elevation Myocardial Infarction

David M. Larson, MD
Katie M. Menssen, BA
Scott W. Sharkey, MD
Sue Duval, PhD
Robert S. Schwartz, MD
James Harris, MD
Jeffrey T. Meland, MD
Barbara T. Unger, RN
Timothy D. Henry, MD

JAMA

1345 patients with suspected STEMI underwent coronary angiography

Prevalence of **false-positive cardiac cath** activations between **9.2% and 14%**

Table 2. Etiologies of False-Positive Cardiac Catheterization Laboratory Activation in Patients Without a Culprit Artery (n = 187)

Negative biomarker results (n = 123)	
Early repolarization	25
Nondiagnostic electrocardiogram	21
Pericarditis	20
Previous myocardial infarction	20
Left bundle-branch block	11
Left-sided ventricular hypertrophy	8
Vasospasm	4
Tachycardia related	3
Right bundle-branch block	3
Pacemaker	3
Brugada syndrome	1
Aortic dissection	1
Unknown	3

!! NB !!

70% sensitive for acute coronary occlusion, with 85% specificity

CRITERIA

ST-elevation at the J point in 2 contiguous leads that reaches the following thresholds:

- **Men < 40 y: 2.5 mm in V2-V3 and 1 mm in all other leads**
- **Men > 40 y: 2 mm in V2-V3 and 1 mm in all other leads**
- **Women: 1.5 mm in V2-V3 and 1 mm in all other leads**

American Heart Association®
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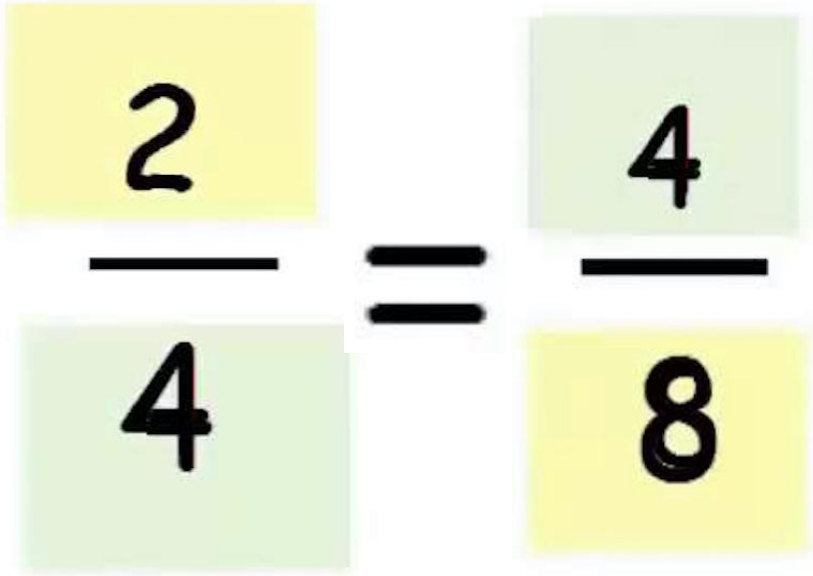
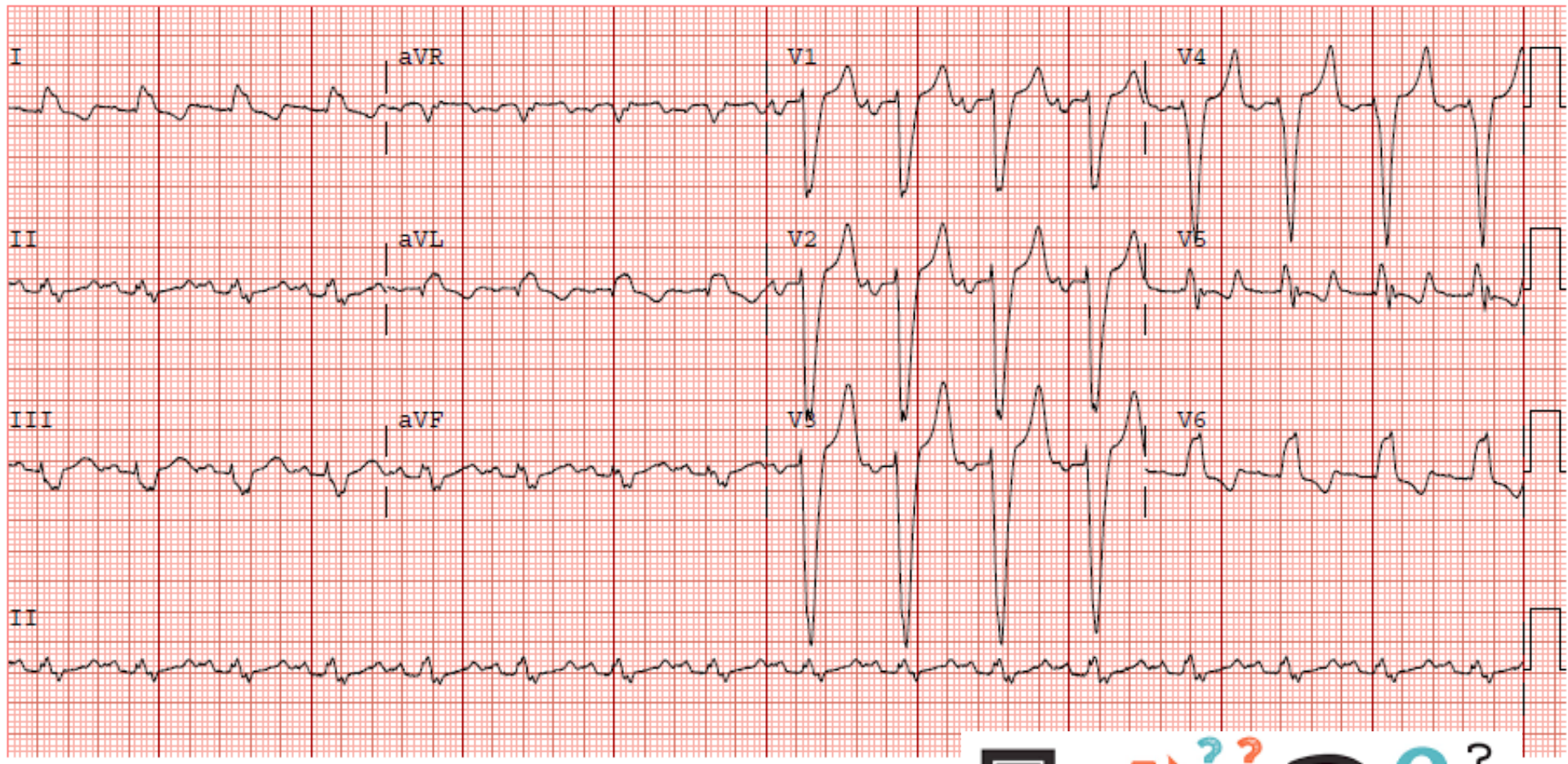
AMERICAN COLLEGE OF CARDIOLOGY

EUROPEAN SOCIETY OF CARDIOLOGY®

STEMI EQUIVALENTS

- ✓ “New left bundle branch block (LBBB)”
- ✓ LBBB meeting mod. Sgarbossa criteria
- ✓ Isolated posterior STEMI
- ✓ Left main coronary “insufficiency”
- ✓ de Winter ST/T-wave complexes
- ✓ Hyperacute T-waves
- ✓ Wellens’syndrome
- ✓ Subtle STEMI

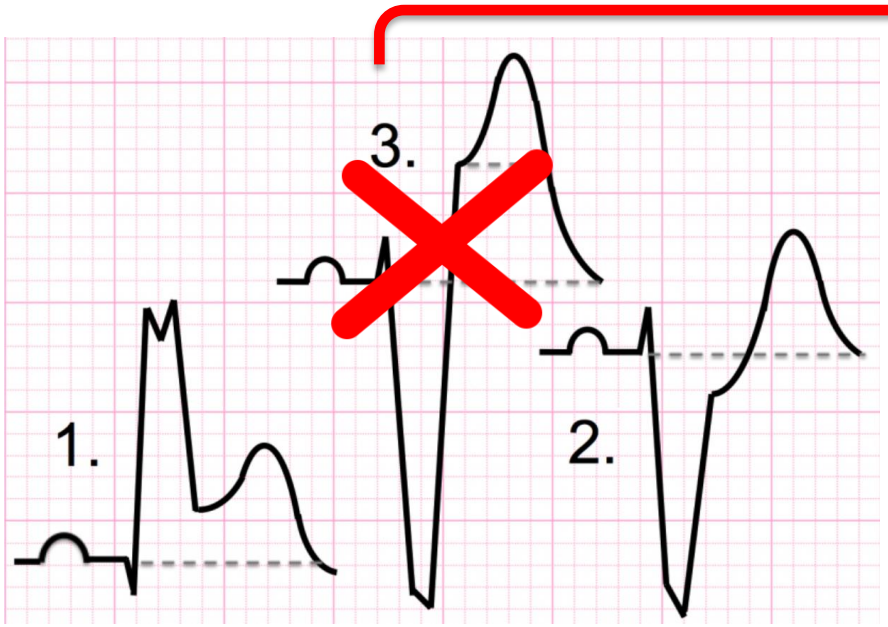


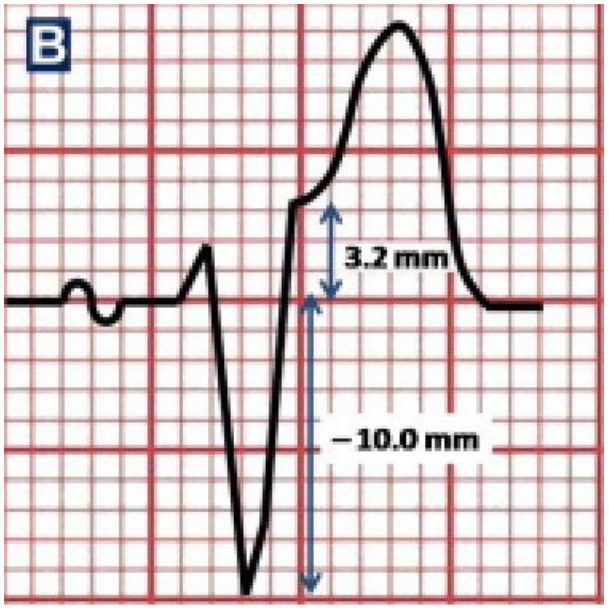


"It is common knowledge that the ECG diagnosis of completed myocardial infarction in the presence of LBBB is extremely difficult and often impossible." – Ann Emerg Med 1995

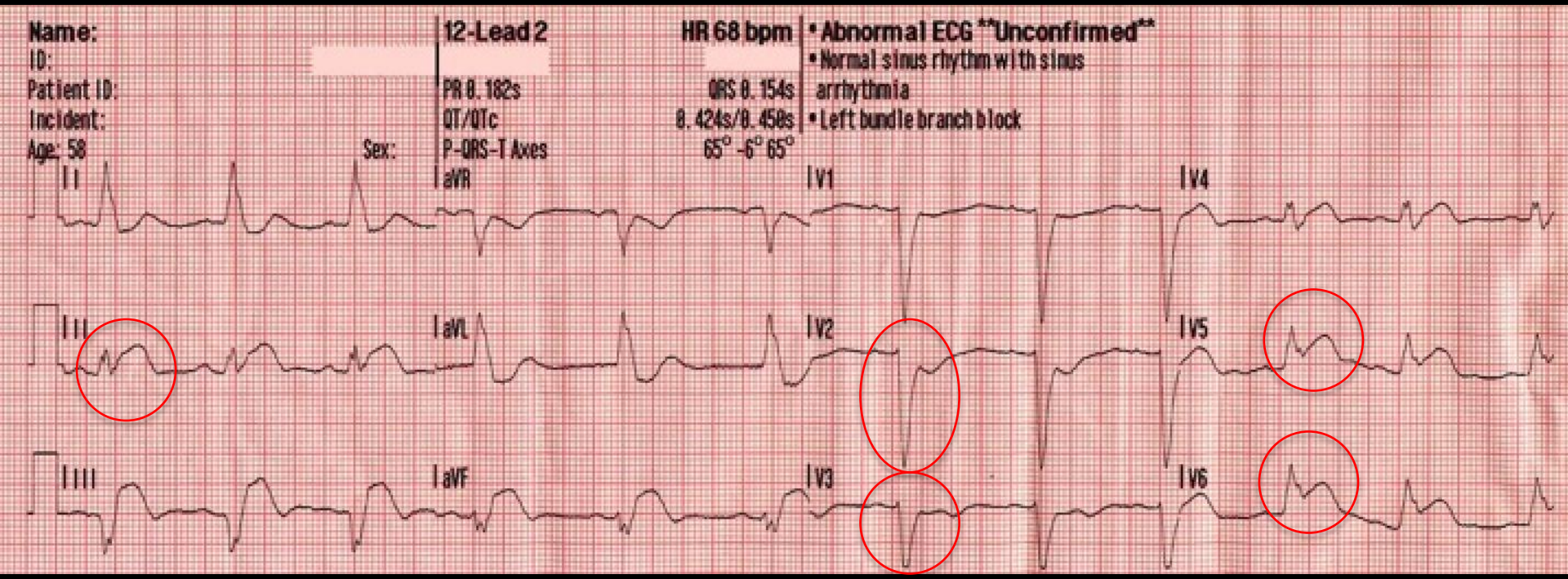
Modified Sgarbossa Criteria

1. ≥ 1 lead with ≥1 mm of concordant ST elevation
2. ≥ 1 lead of V1-V3 with ≥ 1 mm of concordant ST depression
3. ≥ 1 lead anywhere with ≥ 1 mm STE and proportionally excessive discordant STE, as defined by ≥ 25% of the depth of the preceding S-wave.



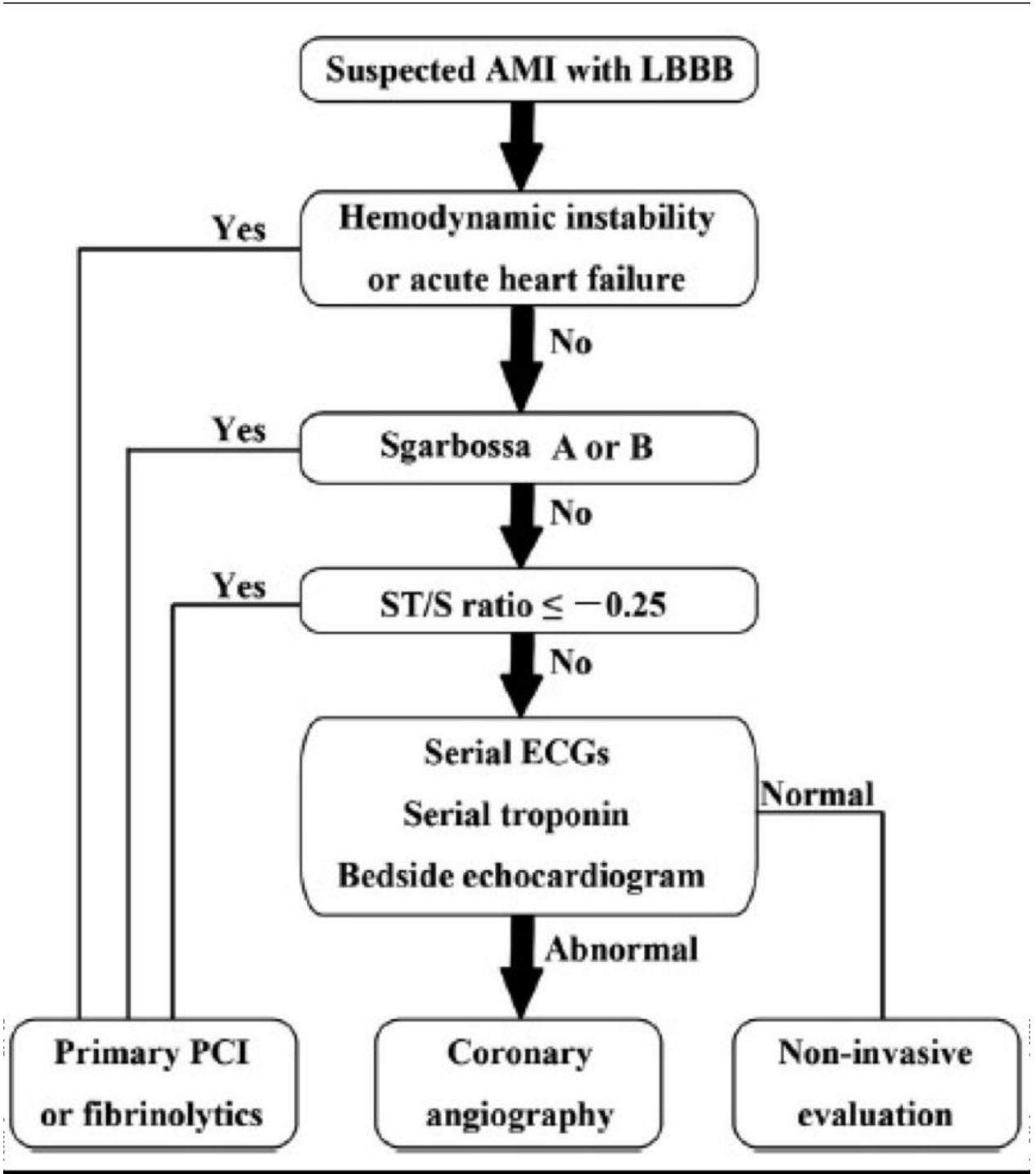


CHEST PAIN


Name:
ID:
Patient ID:
Incident:
Age: 58
Sex:
12-Lead 2
PR 0.182s
QT/QTc
P-QRS-T Axes
HR 68 bpm
QRS 0.154s
0.424s/0.458s
65° -6° 65°
• Abnormal ECG **Unconfirmed**
• Normal sinus rhythm with sinus arrhythmia
• Left bundle branch block
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

The LBBB puzzle in the 2013 STEMI guideline: from falsely declaring emergency to denying reperfusion in a high-risk population. Are the Sgarbossa Criteria ready for prime time?

Cai Q et al. Am Heart J 2013



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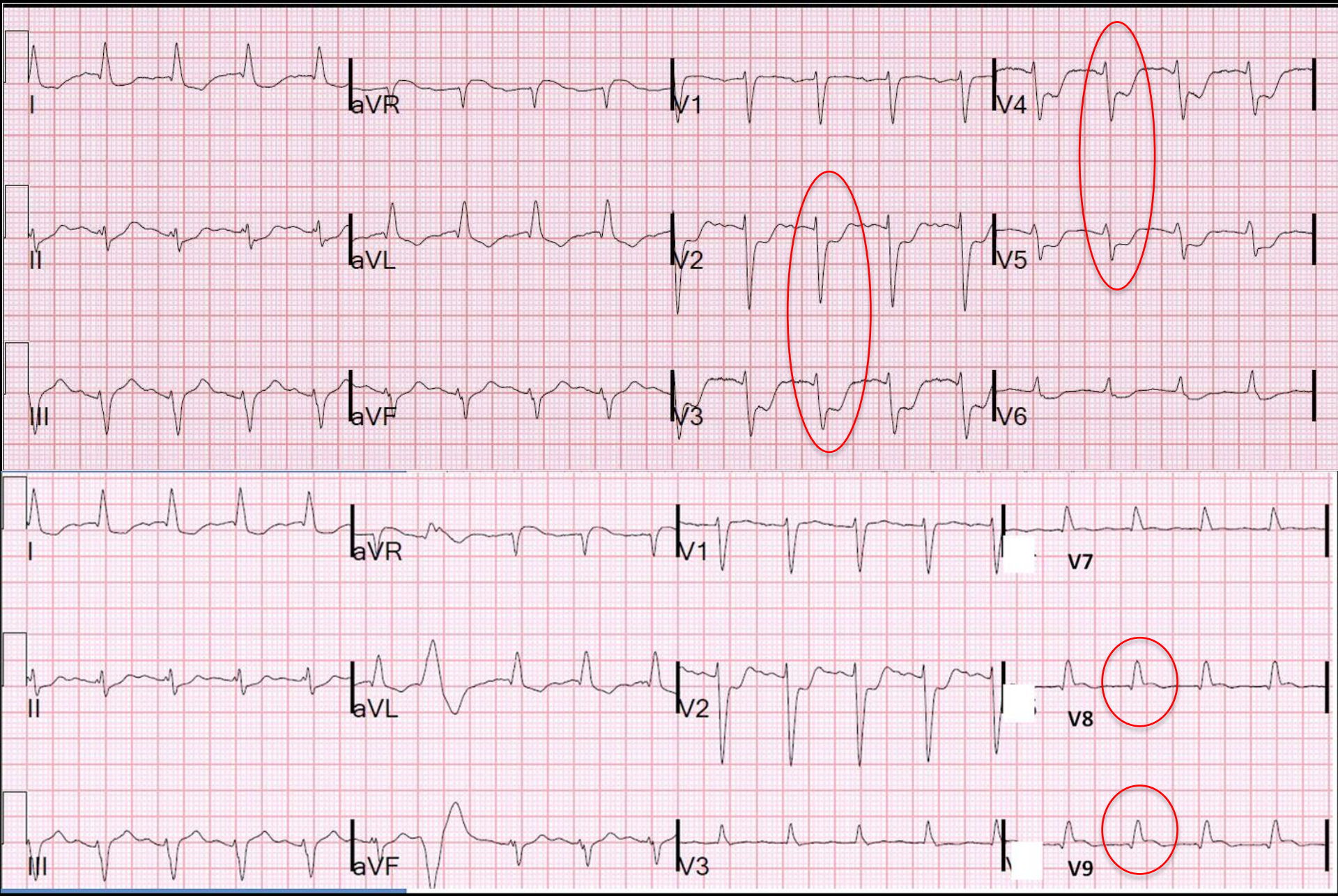
I
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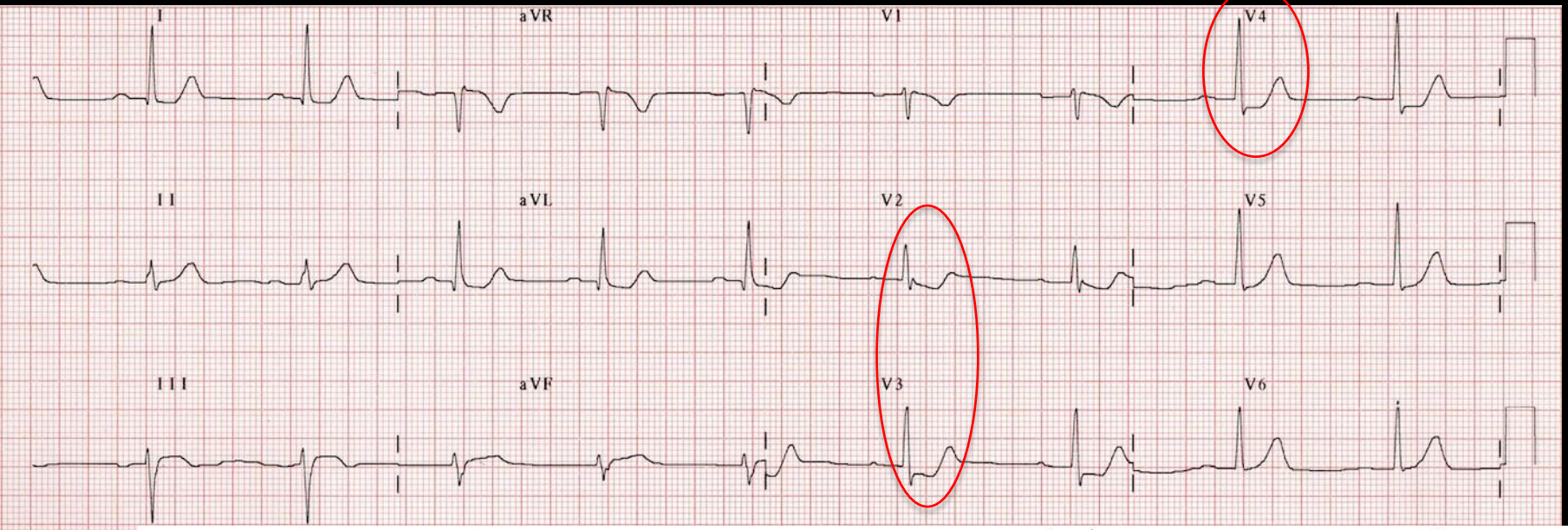
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III
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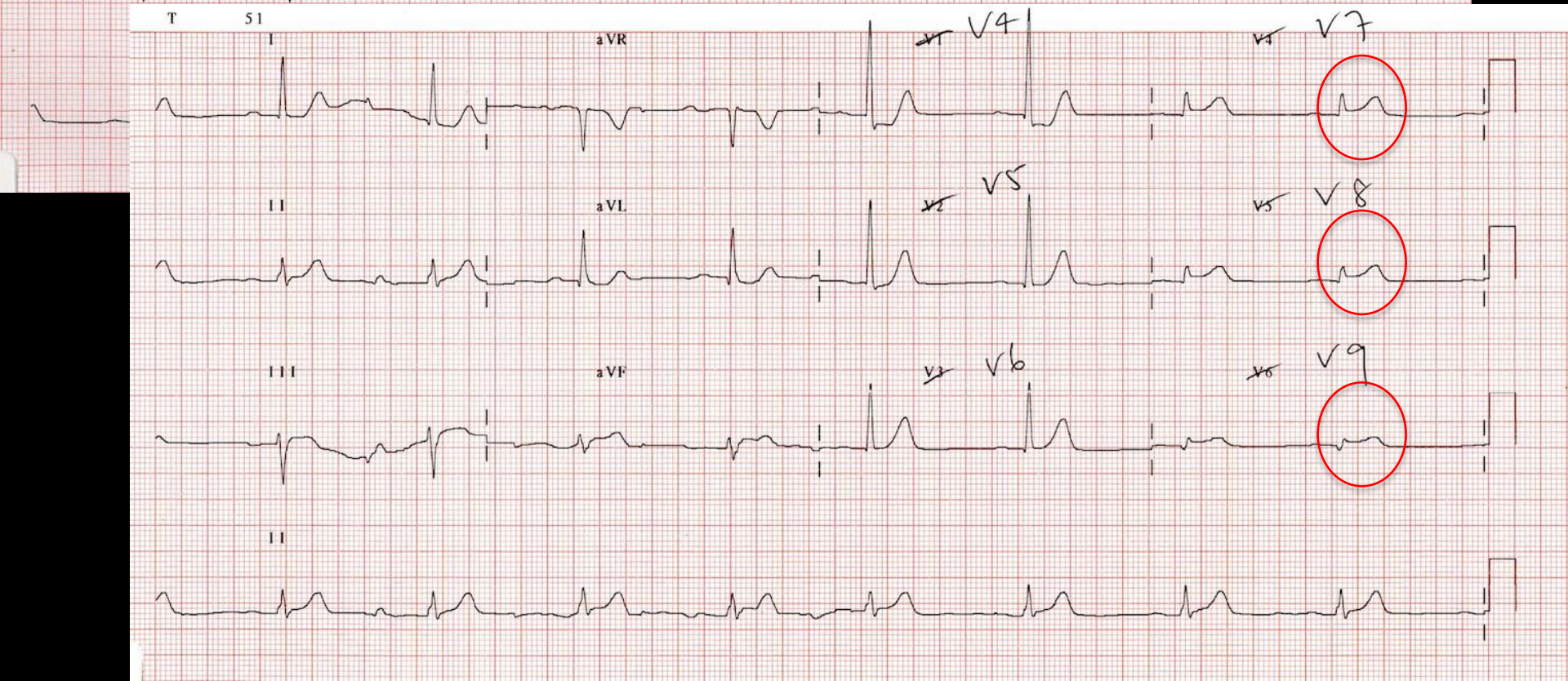

T 51
I
aVR
V4
V7
II
aVL
V5
V8
III
aVF
V6
V9
II

(ISOLATED) POSTERIOR MI

- Isolated posterior STEMIs rate is between 3 and 11%
- Posterior infarction accompanies 15-20% of STEMIs, usually occurring in the context of an inferior or lateral infarction

CAREFUL CRITERIA

- ✓ Precordial ST-depression ≥ 1 mm maximal in leads V1-V4 Posterior STEMI until proven otherwise
- ✓ Appearance of tall R-waves in V1-V2 may be delayed
- ✓ Elevations of 0.5 mm or more in V7/V8/V9 add specificity but may not be sensible
- ✓ Upright T wave? Not always

!! NB !! DDx between subendocardial ischemia

SUBTLE STEMI

LAT

Any degree of ST elevation in aVL with ST depression in lead III (with or without II and aVF)

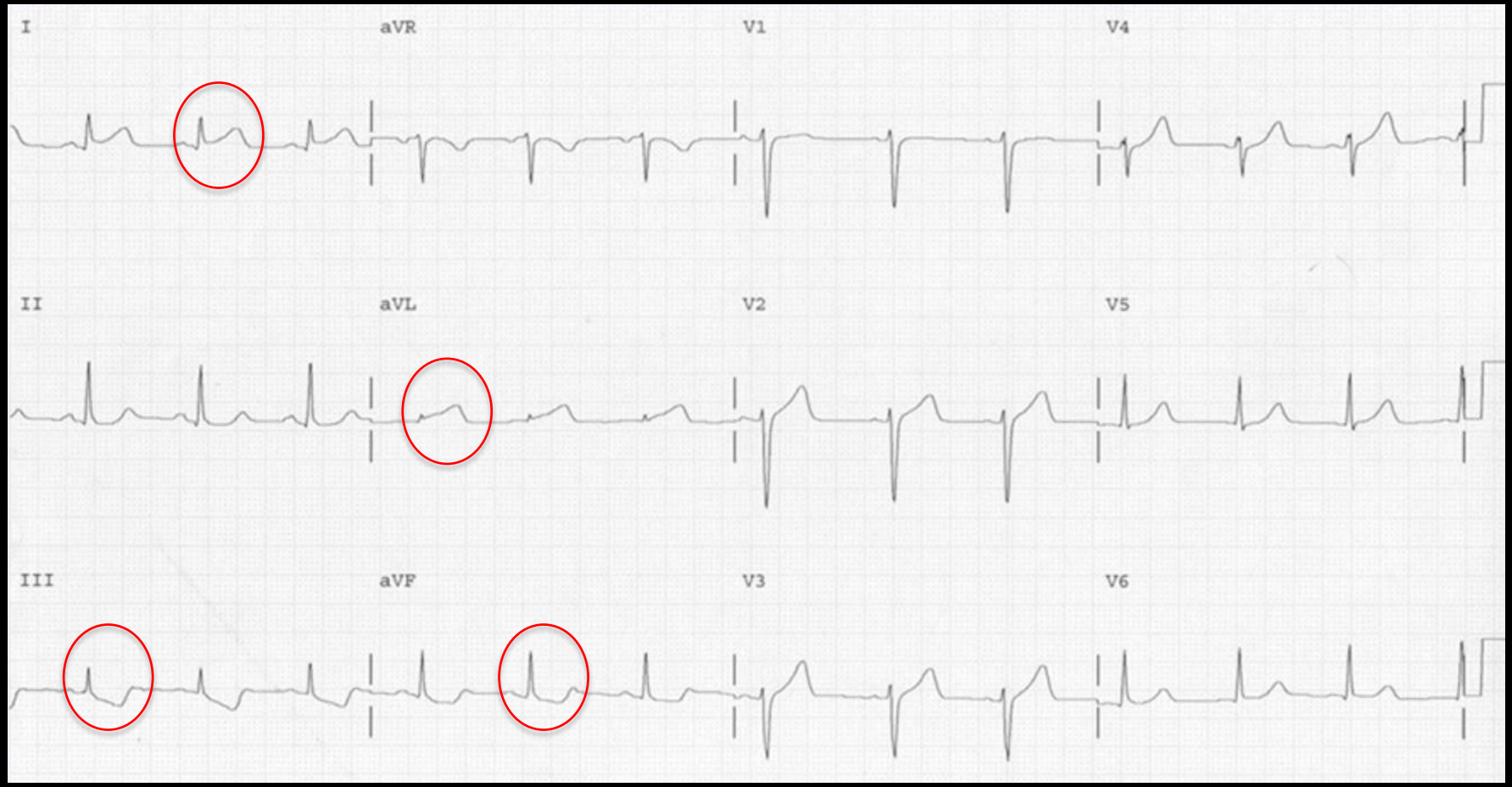
INF

Elevation of any degree in two contiguous leads (II, III, or aVF) + any amount of ST segment depression in aVL is highly suspicious for inferior MI.

ANT

- Longer QTc (mean 420 msec)
- Diminished R waves (Q waves in any of V2-V4)
- T waves fat, wide-based, symmetric, out of proportion
- Terminal QRS distortion (loss of S/J-waves in V2 or V3)
- Straight or convex ST in V2-V6
- Reciprocal ST depression in II,III, aVF
- Higher ST elevation

CHEST PAIN



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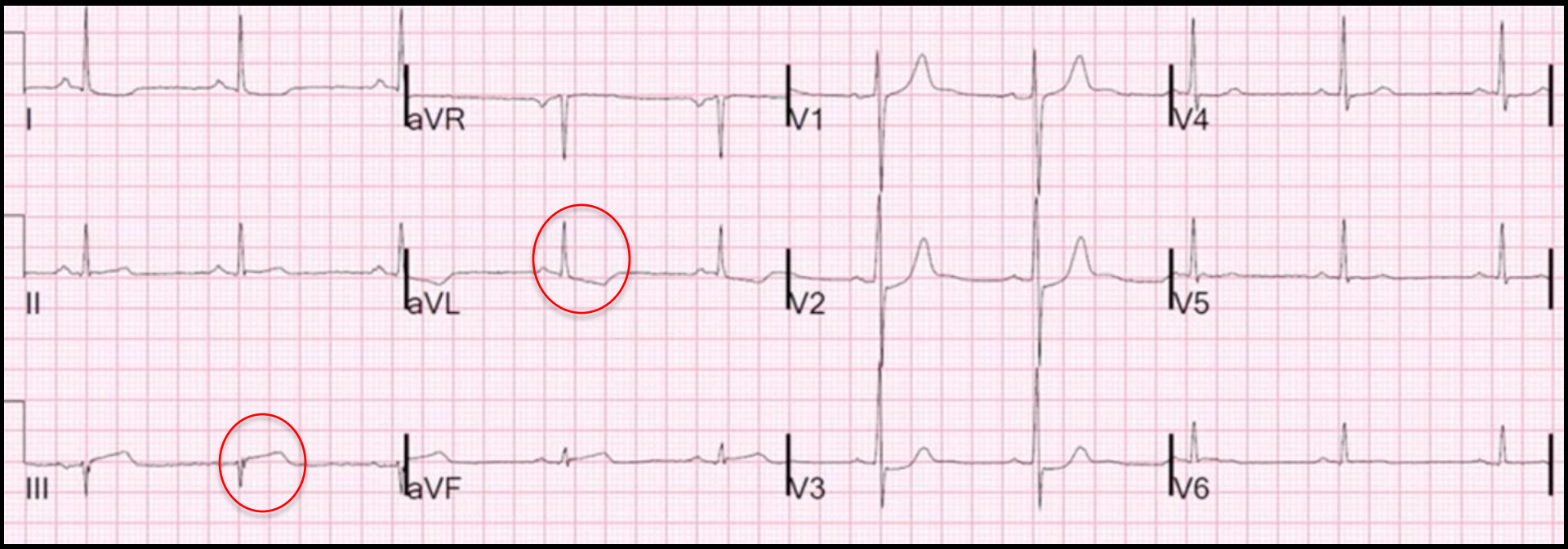

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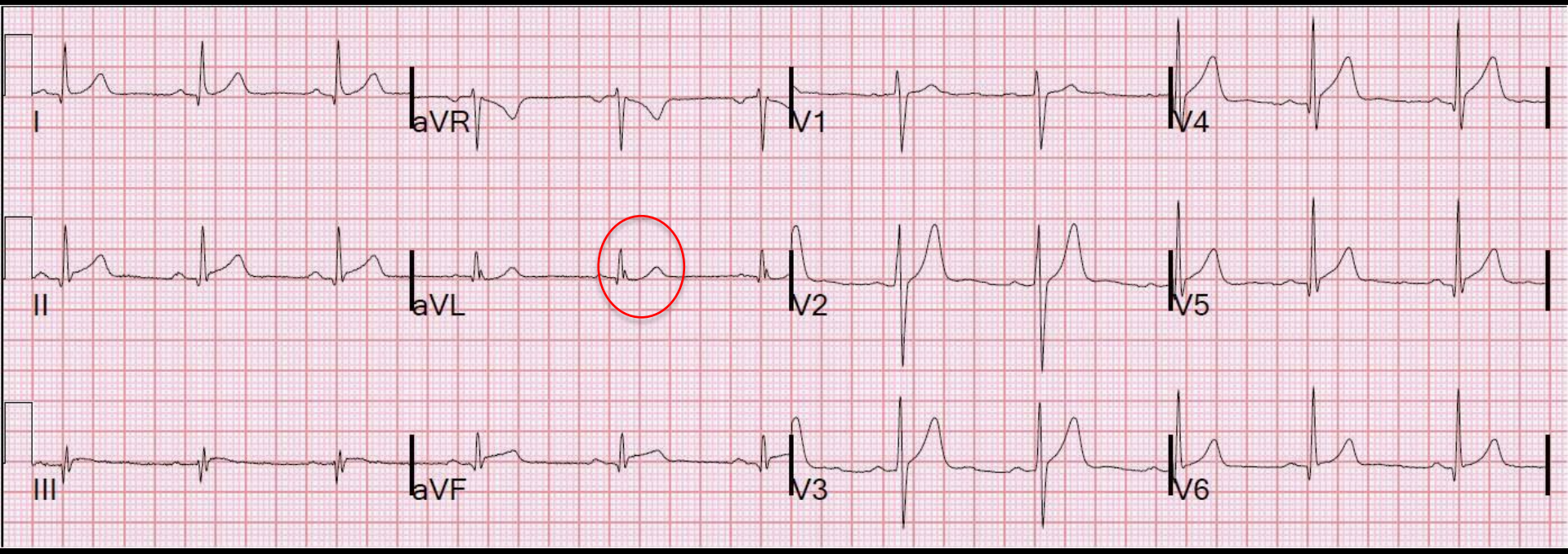
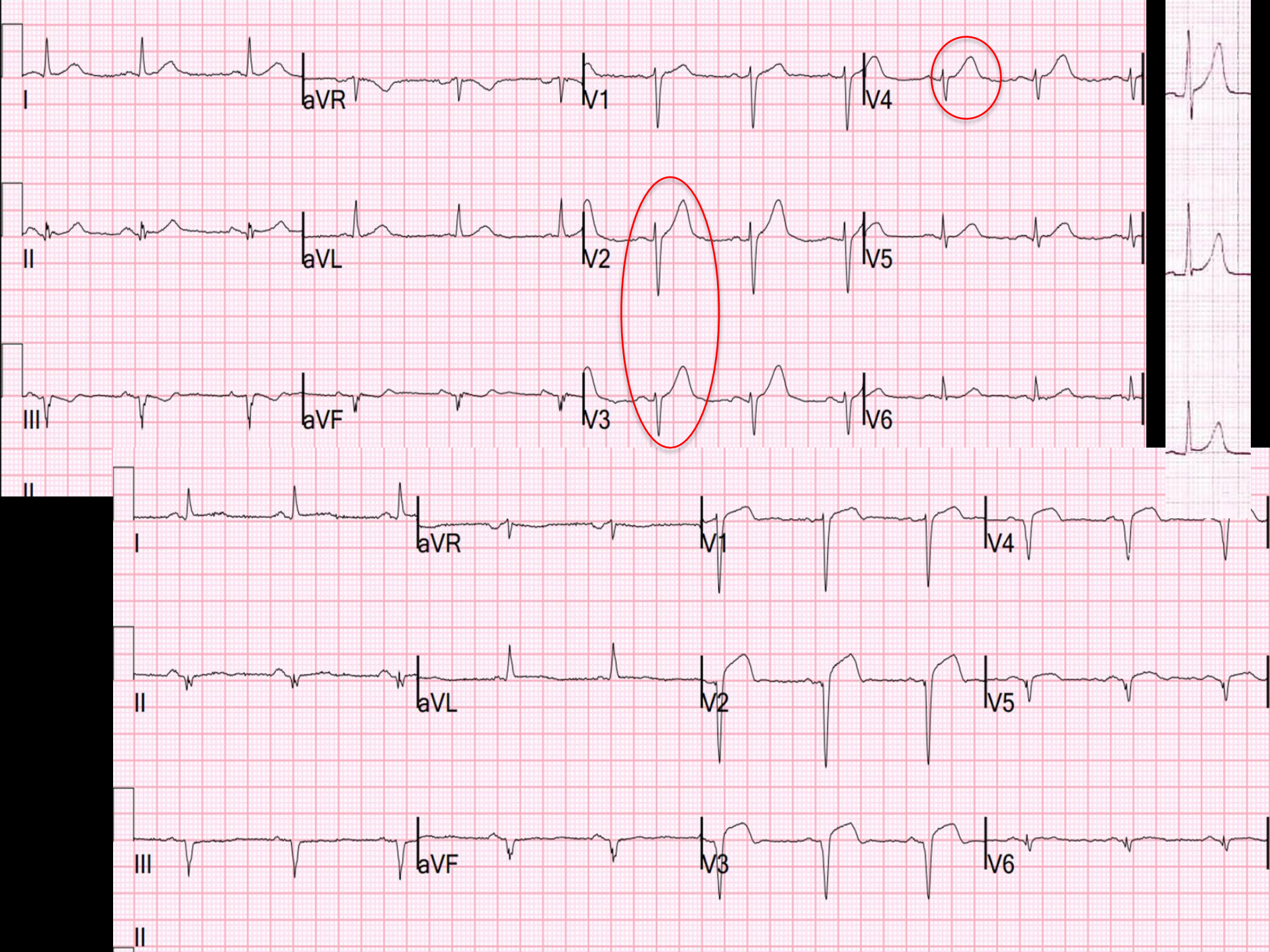


When there is inferior STE, the presence of any ST depression in lead aVL is highly sensitive for coronary occlusion in inferior MI and very specific for differentiating inferior MI from pericarditis.


I
aVR
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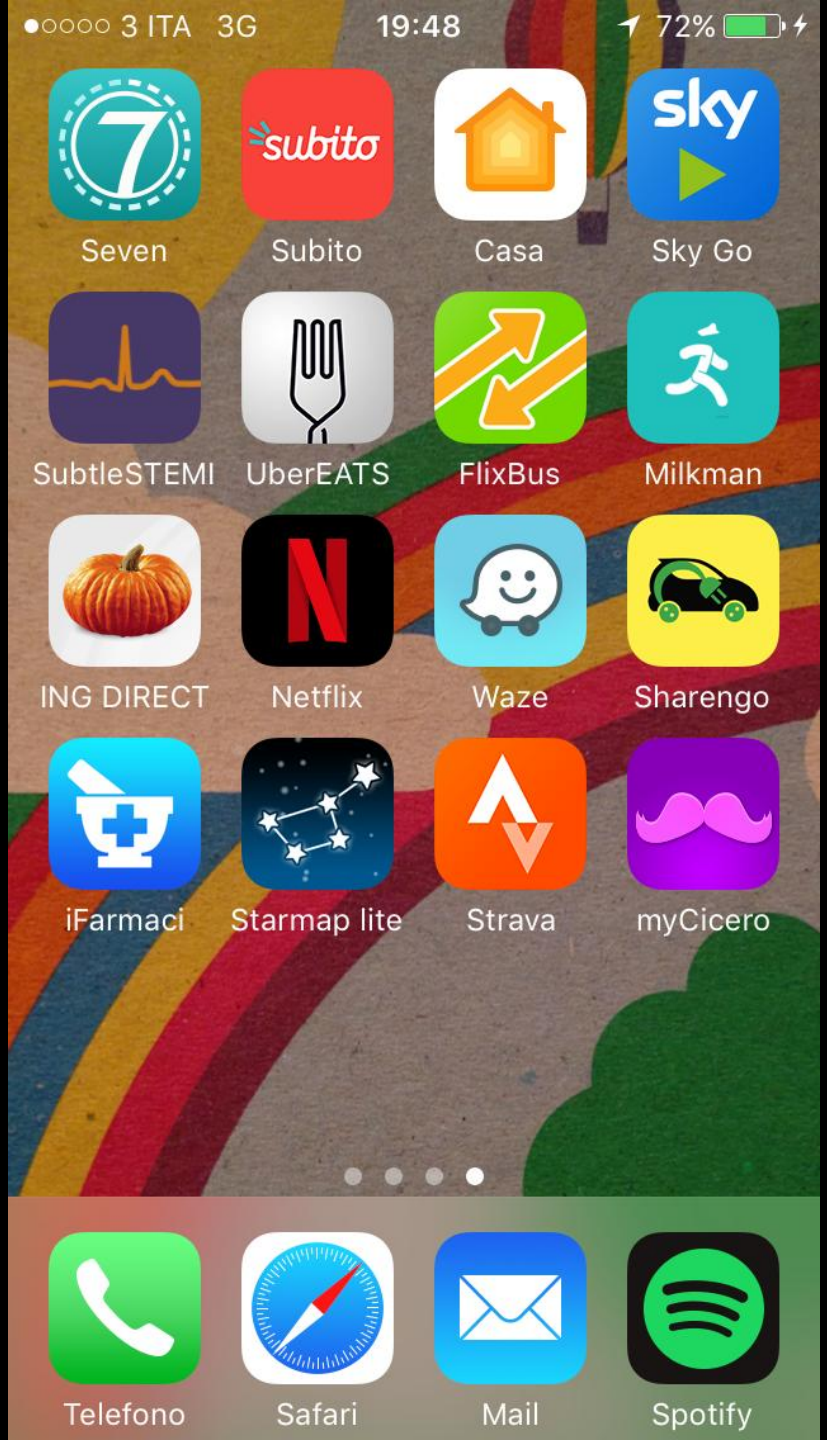
II


3 ITA 3G
19:48
72%
Seven
Subito
Casa
Sky Go
SubtleSTEMI
UberEATS
FlixBus
Milkman
ING DIRECT
Netflix
Waze
Sharengo
iFarmaci
Starmap lite
Strava
myCicero
Telefono
Safari
Mail
Spotify

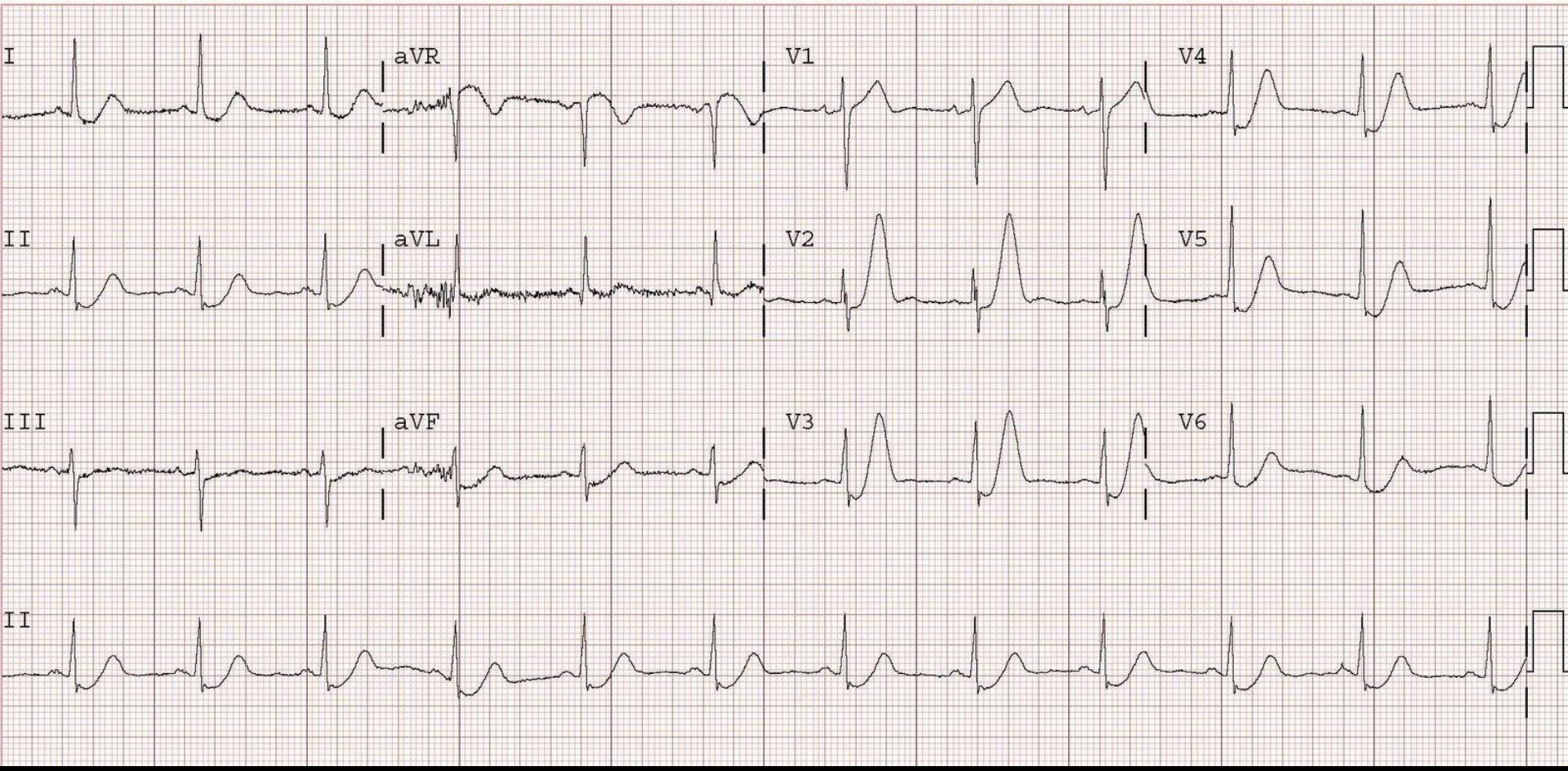
Incidence, angiographic features and outcomes of patients presenting with subtle ST-elevation myocardial infarction

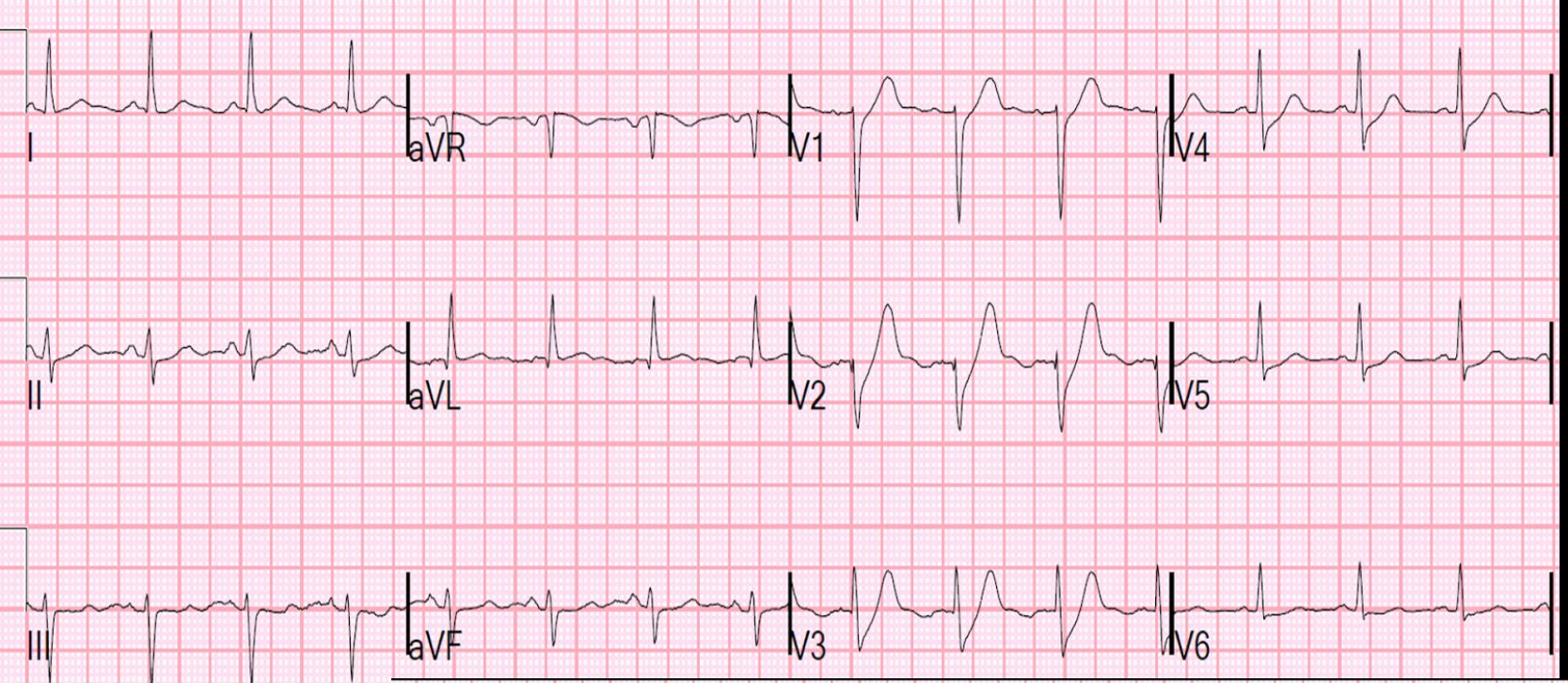
- 504 patients taken to the cardiac cath lab for suspected coronary artery occlusion
- **18% of patients** with an occluded coronary artery had a **subtle STEMI** (0.1-1mm of STE)
- Extensive coronary disease and **similar outcomes** compared with those with obvious STE

AHJ American Heart Journal

	Subtle STE (n = 82)	Marked STE (n = 365)	P
Age (y)	62 (52-73)	64 (53-76)	.21
Male sex	64 (78)	269 (74)	.41
Hypertension	49 (60)	188 (52)	.18
Diabetes mellitus	20 (24)	61 (17)	.10
Smoking	45 (56)	195 (54)	.78
Dyslipidemia	40 (49)	150 (41)	.20
Chronic kidney disease	11 (14)	29 (8)	.10
Prior MI	13 (16)	29 (8)	.02
Infarct location			.001
Anterior	16 (19)	140 (38)	
Inferior	54 (66)	218 (60)	
Lateral or inferobasal	12 (15)	7 (2)	
Symptoms duration (min)	161 (67-307)	125 (79-211)	.26
Door-to-device time (min)	90 (60-139)	84 (62-110)	.07
IRA			.001
Left main	0 (0)	3 (1)	
Left anterior descending	20 (24)	137 (38)	
Left circumflex	25 (30)	45 (12)	
Right coronary artery	36 (44)	177 (49)	
Graft	1 (1)	2 (1)	
Multivessel disease	47 (57)	159 (44)	.02

CHEST PAIN




I
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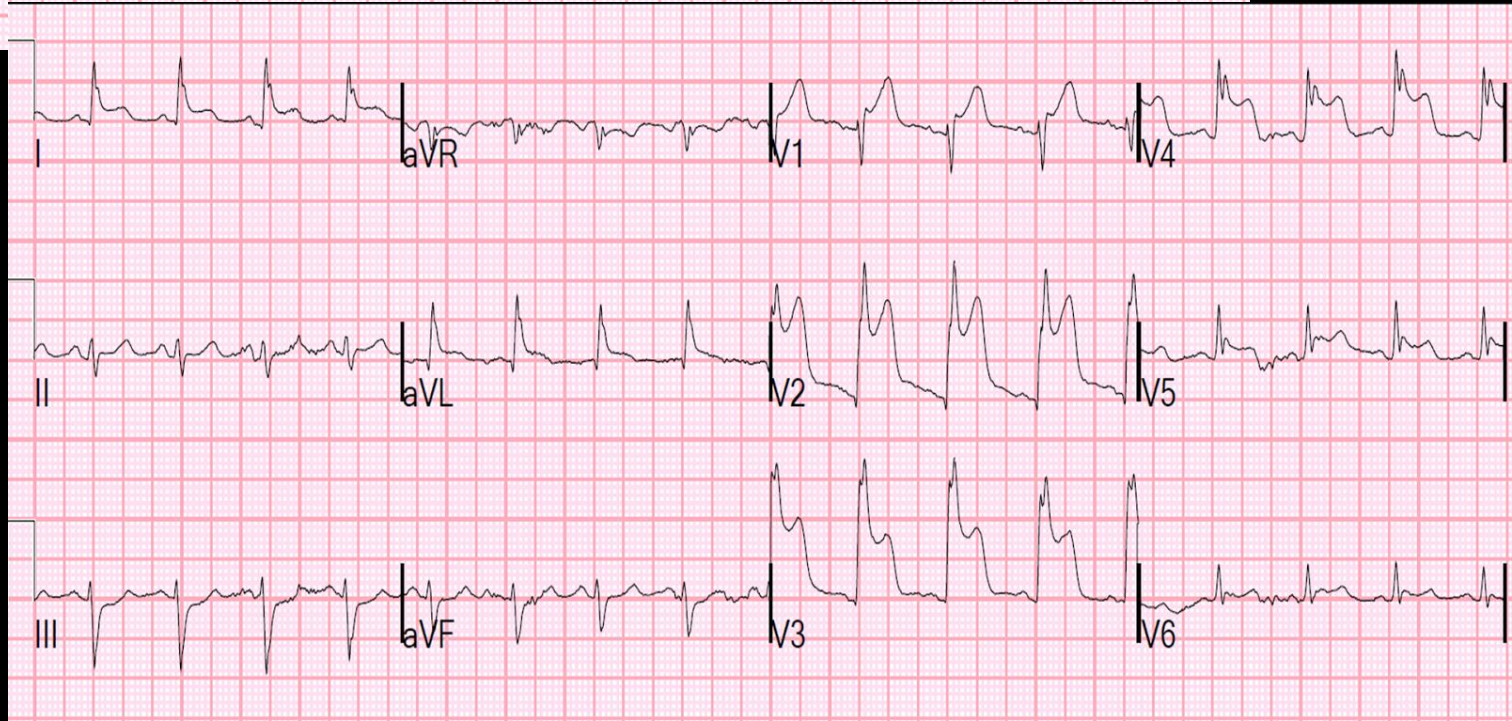
I
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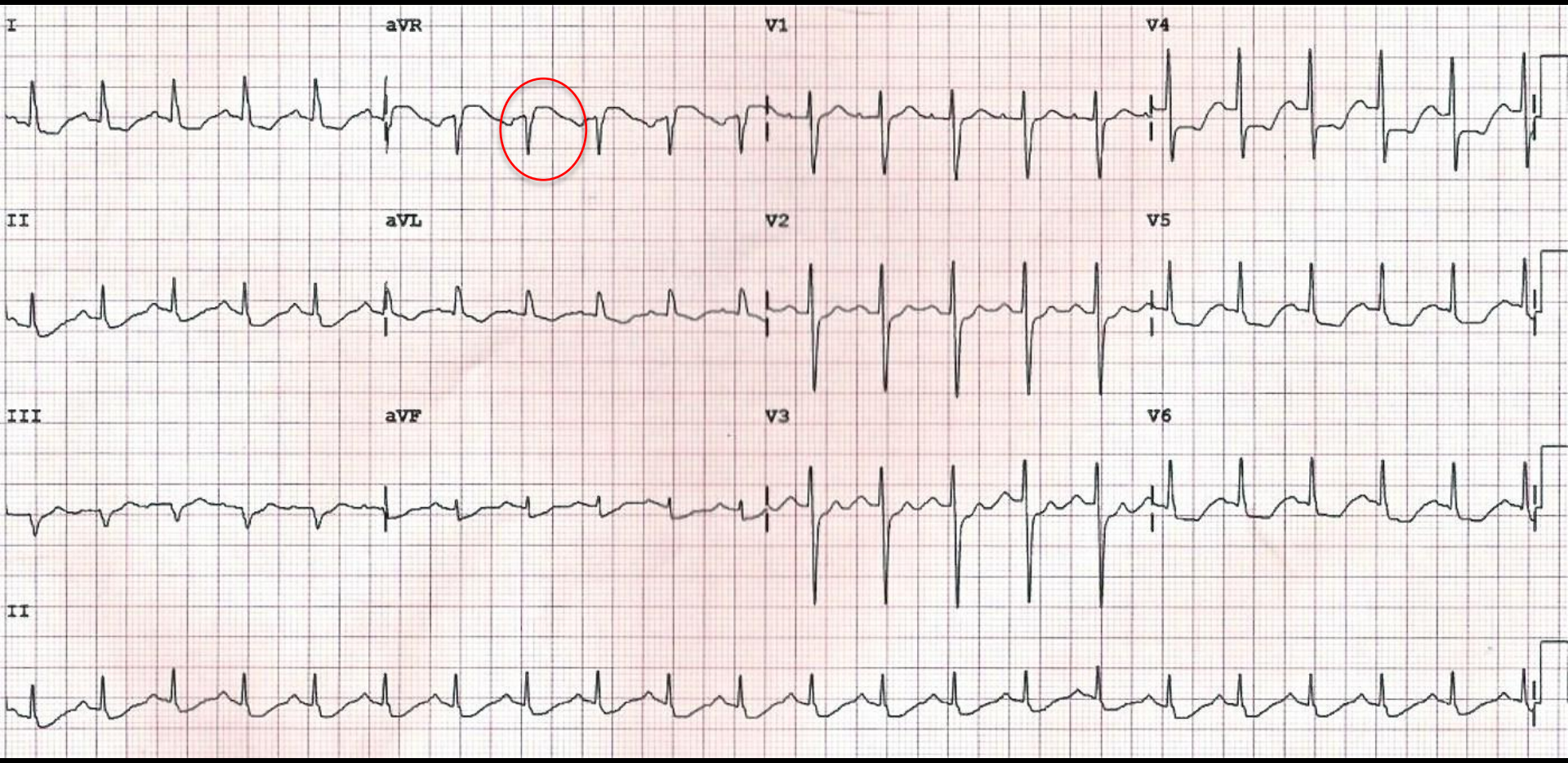
aVL
V2
V5
III
aVF
V3
V6

DE WINTER PATTERN

- ✓ Tall, prominent, symmetric T waves in the precordial leads
- ✓ Upsloping ST segment depression >1mm at the J-point in the precordial leads
- ✓ ST segment elevation (0.5mm-1mm) in aVR

!! NB !! The de Winter pattern is seen in ~2% of acute LAD occlusions and is under-recognised by clinicians.

CHEST PAIN



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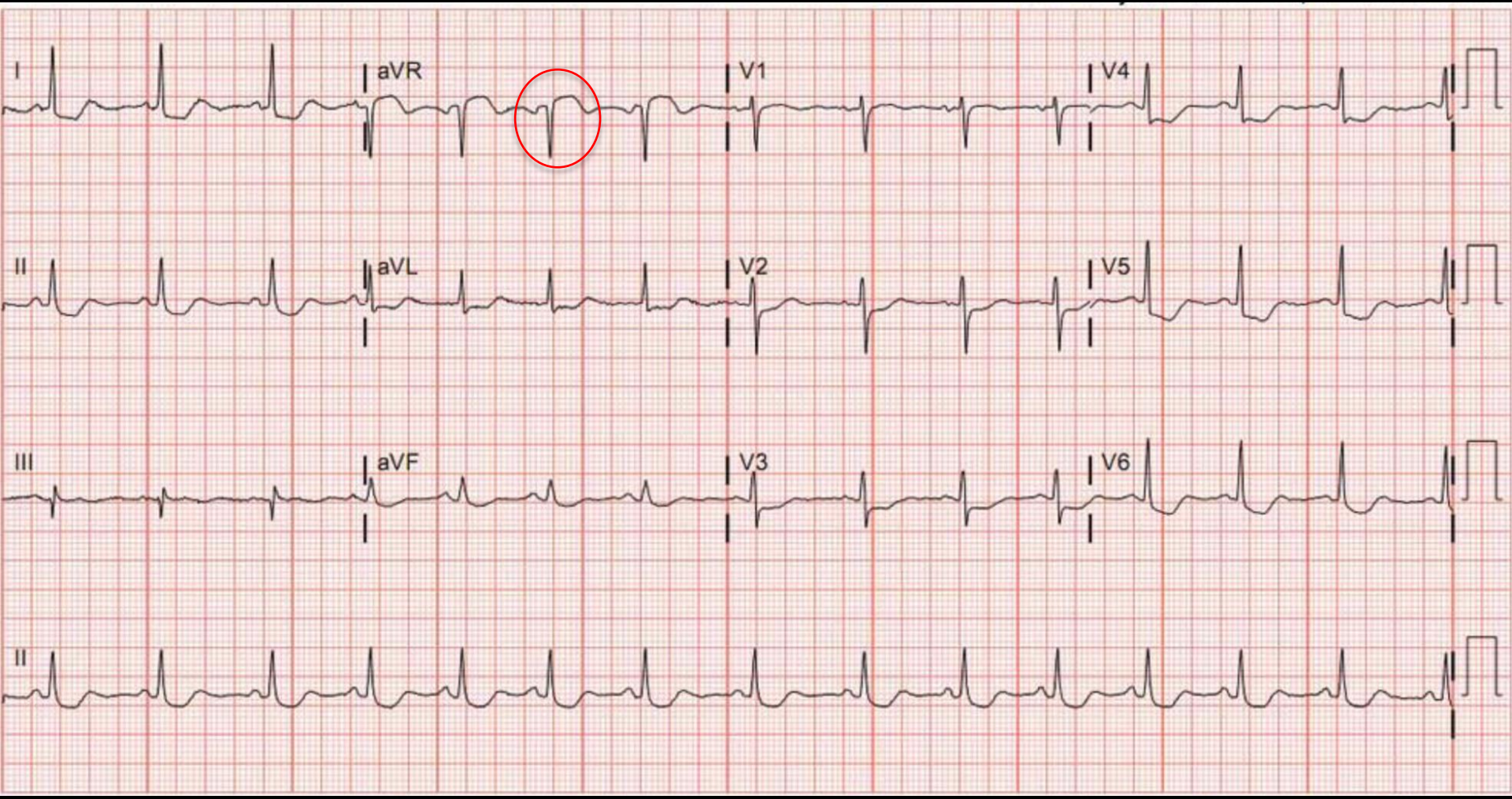

DON'T FORGET LEAD aVR…!

- ✓ Widespread ST depression (leads I, II and V4-6) + symptoms of myocardial ischaemia:
  - STE in aVR (reciprocal) ≥ 1mm indicates proximal LAD / LMCA insufficiency or severe 3VD

N.B. The majority of 100% LMCA occlusions do not make it alive to the ED, or arrive in arrest. At cath, only 0.19% - 1.3% of STEMI have LMCA occlusion.

STEMI MIMICS

- ✓ **E**lectrolytes (hyperkalemia)
- ✓ **L**eft bundle branch block
- ✓ **E**arly repolarization
- ✓ **V**entricular hypertrophy (left)
- ✓ **A**neurysm (ventricular)
- ✓ **T**hailand (Brugada syndrome)
- ✓ **I**nflammation (pericarditis / myocarditis)
- ✓ **O**sborne (J) waves
- ✓ **N**on-ischemic vasospasm

take-home points

- **25%-30% of occluded arteries may not meet criteria for STEMI**

- **The STEMI criteria are arbitrary, based solely on the size (in millimeters!) of ST-segment elevation**

- **One must evaluate the patient, with help from the ECG**

- **ECG is something that it can be learned!**

Dr. Smith's ECG Blog

STEPHEN W. SMITH, MD
University of Minnesota
in Minneapolis

ECG WEEKLY WORKOUT

AMAL MATTU, MD
University of
Maryland in
Baltimore

Grazie!

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