

# Acute coronary Syndrome

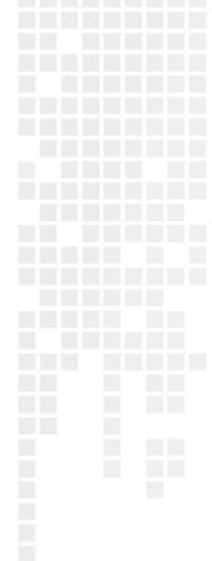
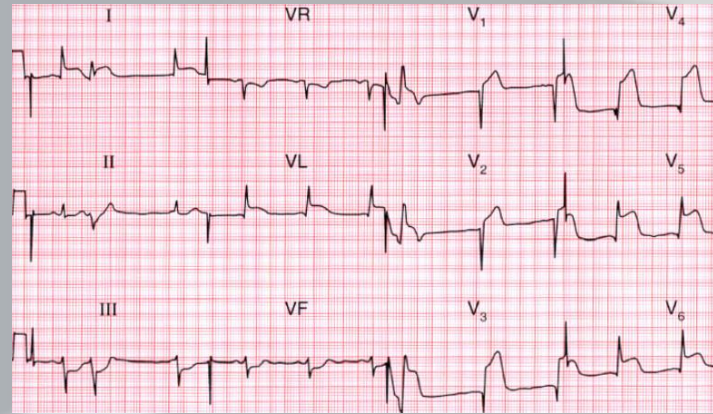
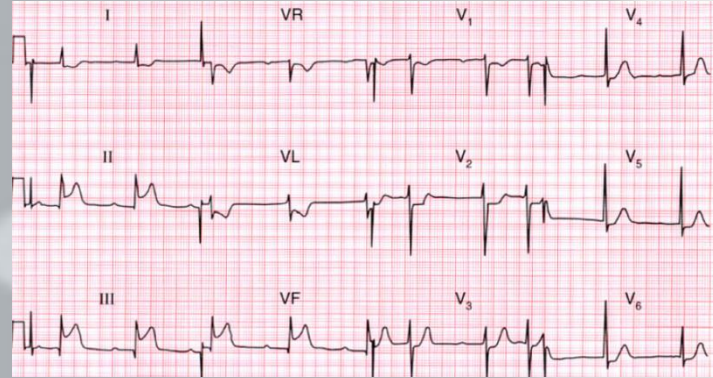
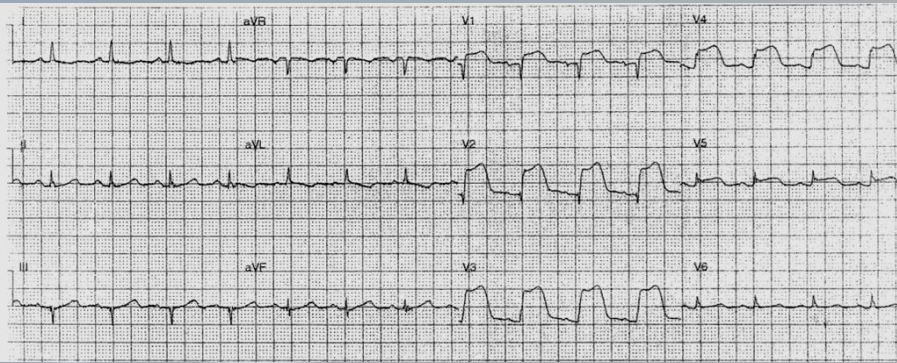
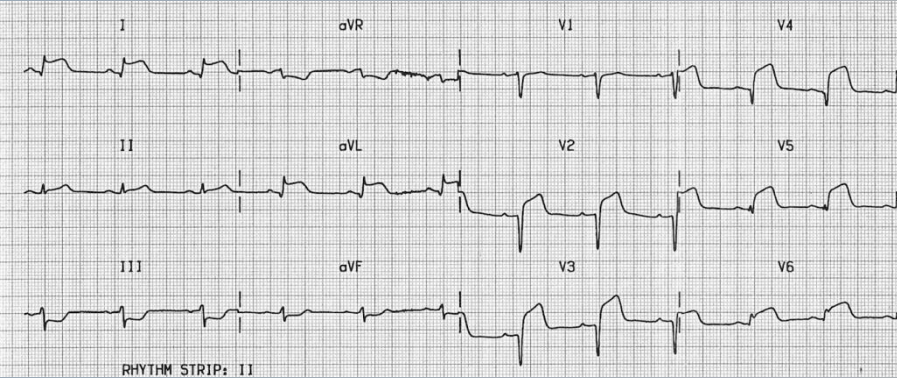


שתי תסמונות אקג שנדאי להכיר

חיים קטלן – EMT-P



# Acute coronary Syndrome

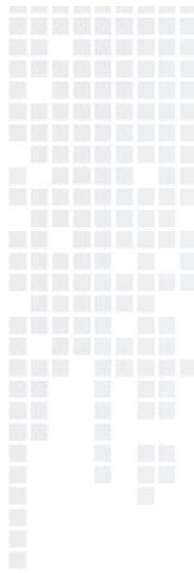
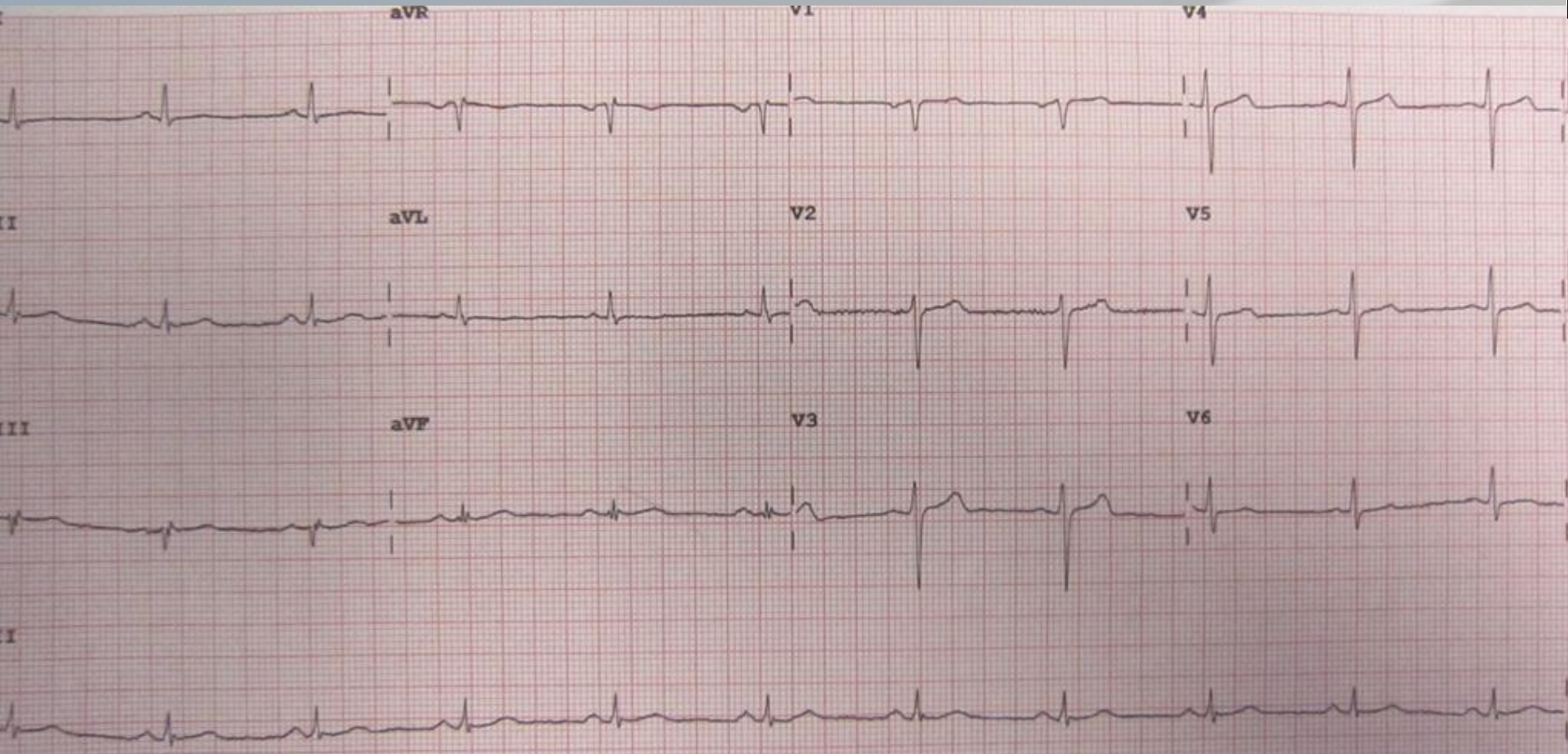


# תאור מקרה

בן 62 , כאבים בחזה שנמשכים כבר 10 דקות, לא ברור מהאנמנזה  
האם כאבים המתאימים ל ACS , משדר אקג למוקד.

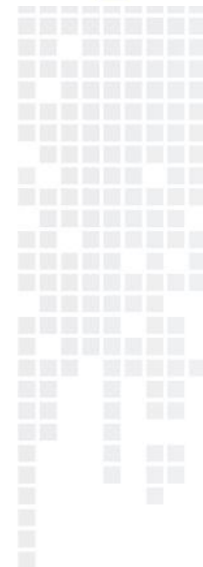


# שידור אקג למוקד



# תאור מקרה

לאחר אנמנזה ממושכת ומפורטת , אתם מוזנקים לחולה, מרחק  
הנסיעה כ 20 דקות.

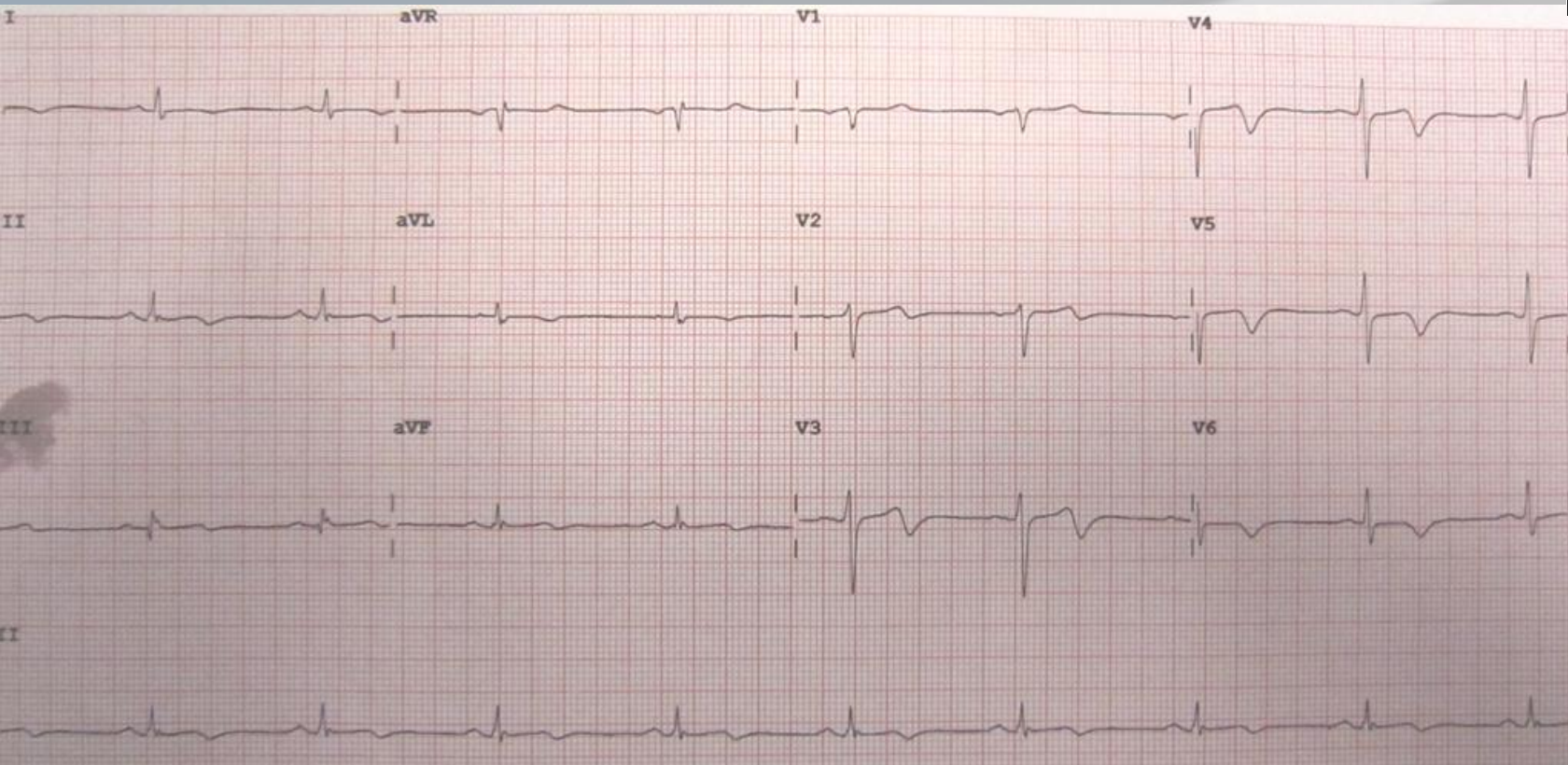


# תאור מקרה

בהגעה :

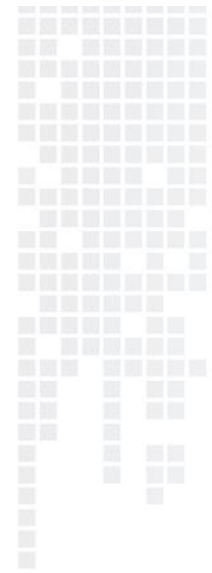
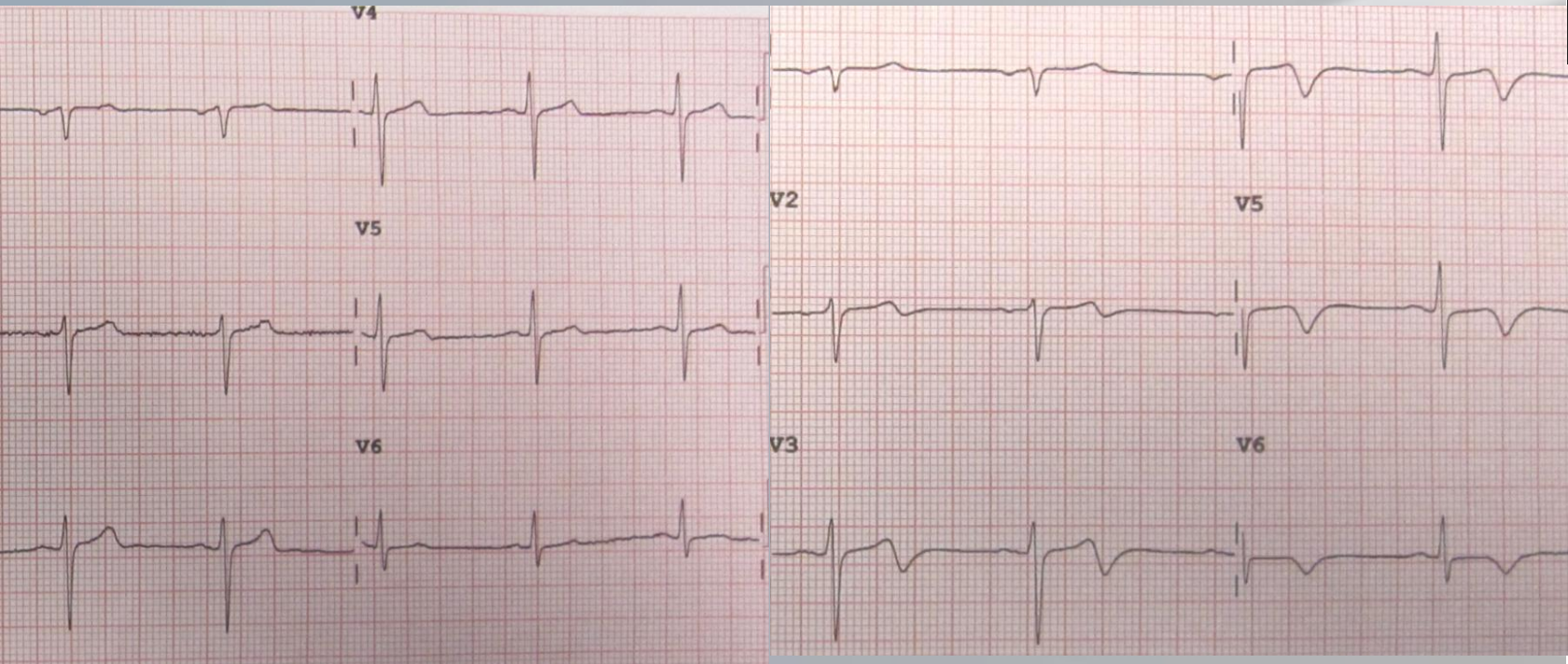
בן 62 , מתאר כי לפני כעשרים דקות אפיזודה של כאבי חזה שנמשכו כ – 15 דקות, מלווים בחולשה , מעט הזעה . כעת , הכאבים חלפו כליל , מרגיש בטוב , אינו מעוניין בפינוי לבית החולים.

# אקג בבית המנוי – ללא כאבים





# אקג בבית המנוי – ללא כאבים





# Wellens' Syndrome (or sign, or warning)

103  
4, part 2

*Recognition of high-risk patients for myocardial infarction*

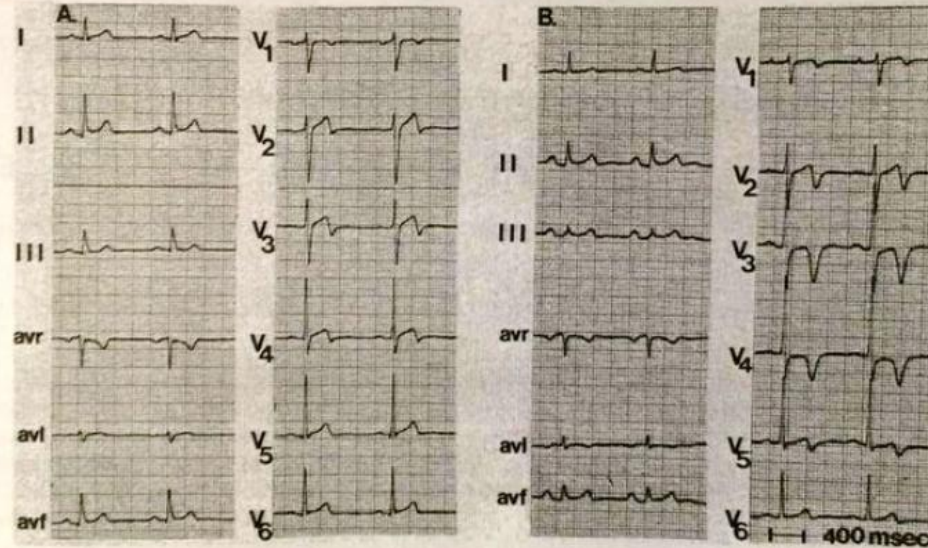
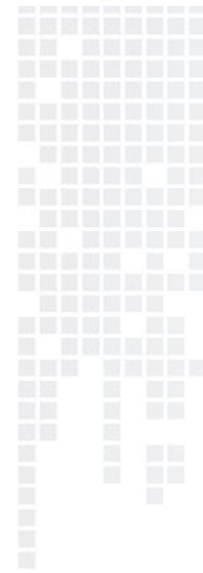


Fig. 1. ECG patterns in precordial leads of the patients reported. Pattern A was found in four patients; pattern B, in 22 patients. See text.

Classification of Wellens ECG patterns, from the original paper. de Zwaan C, Bär FW, Wellens HJ.

Characteristic electrocardiographic pattern indicating a critical stenosis high in left anterior descending coronary artery in patients admitted because of impending myocardial infarction. *Am Heart J.* 1982 Apr;103(4 Pt 2):730-6.



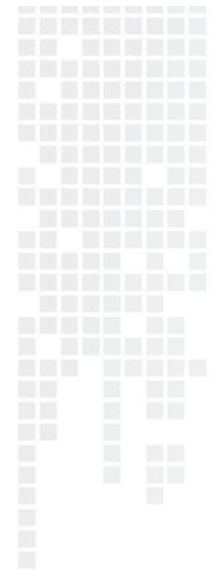
# Wellens' Syndrome (or sign, or warning)



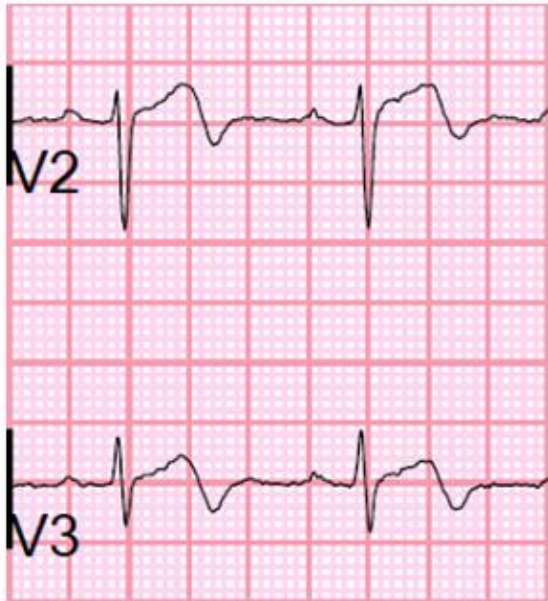
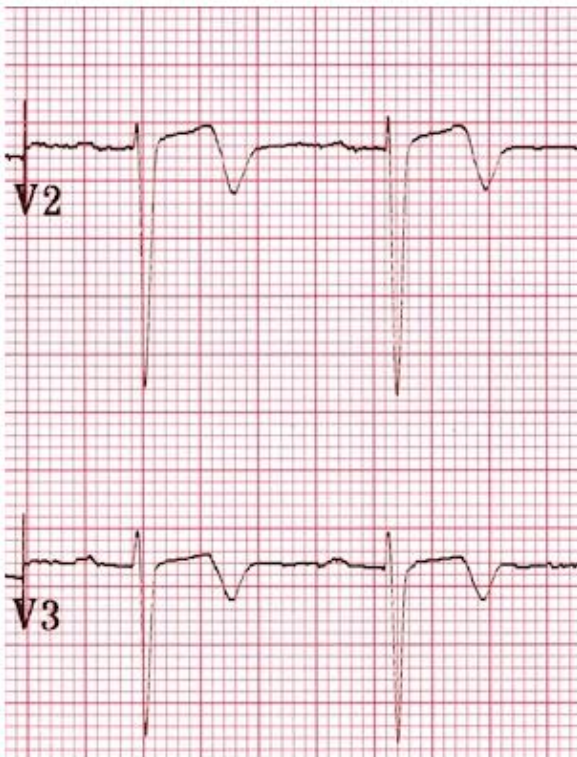
## Diagnostic Criteria

Rhinehart et al (2002) describe the following diagnostic criteria for Wellens' syndrome:

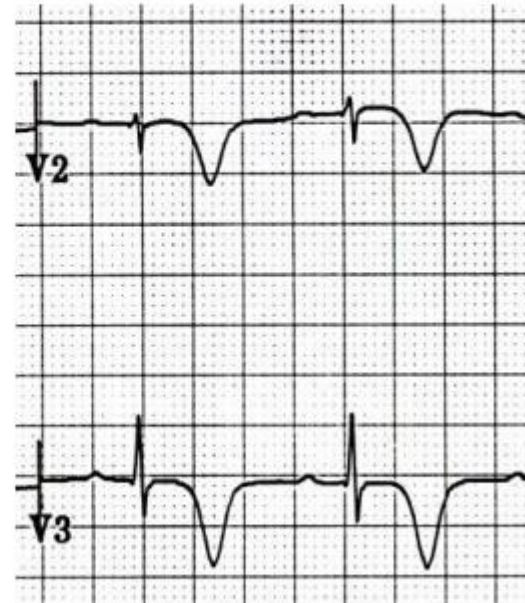
- Deeply-inverted or biphasic T waves in V2-3 (may extend to V1-6)
- Isoelectric or minimally-elevated ST segment (< 1mm)
- No precordial Q waves
- Preserved precordial R wave progression
- Recent history of angina
- ECG pattern present in pain-free state
- Normal or slightly elevated serum cardiac markers



**Biphasic T Waves (Type A)**



## Deeply Inverted T Waves (Type B)





# Understanding The T Wave Changes

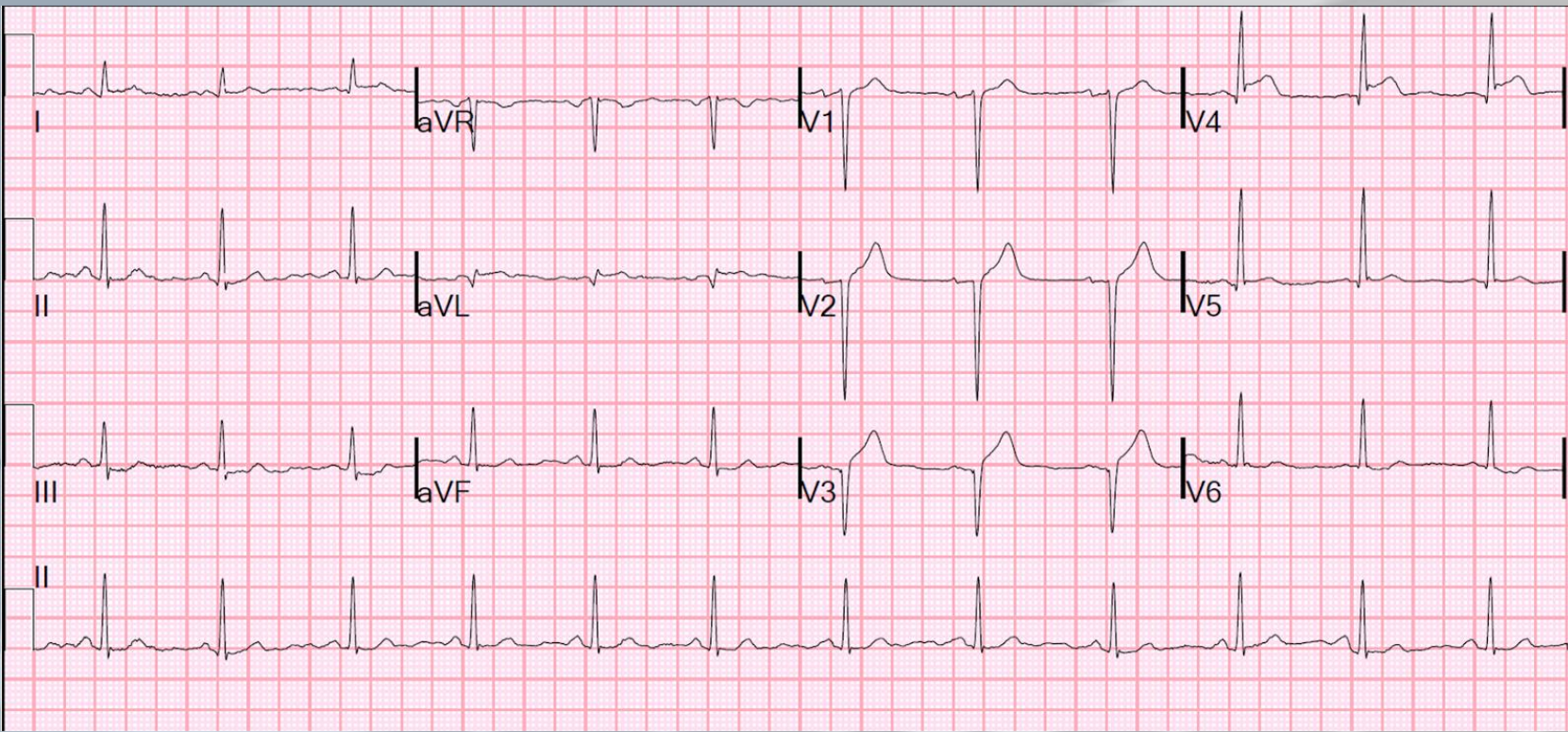
- חסימה פתאומית של LAD גורמת ל – "STEMI חולף" (מפוספס באקג)
- רפרפוזיה ספונטנית כתוצאה מפיברינוליזיס משני פיזיולוגי גלי T הופכים ביפזיים – Wellens T Waves
- חסימה חוזרת של LAD בגלל היצרות משמעותית, האקג משתנה לנורמלי או יותר נכון - Pseudo Normalization
- מעבר בין תצורות אקג, יכול להראות "תקין" בזמן כאבים ובתצורת Wellen כשאין כאבים.

# משמעות קלינית

- הצרות סב אקוטית של מעל 90% ב – LAD
- ללא התערבות - Anterior STEMI

# דוגמאות

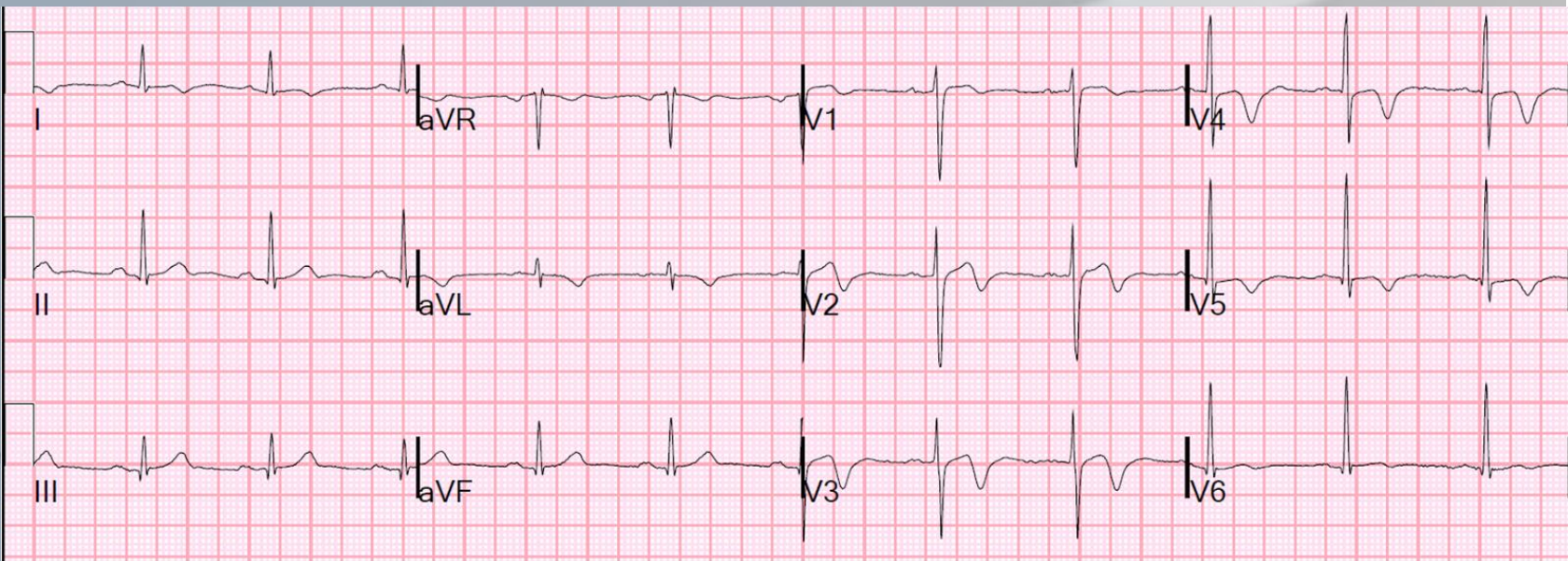
בן 55, כאבים בחזה





# דוגמאות

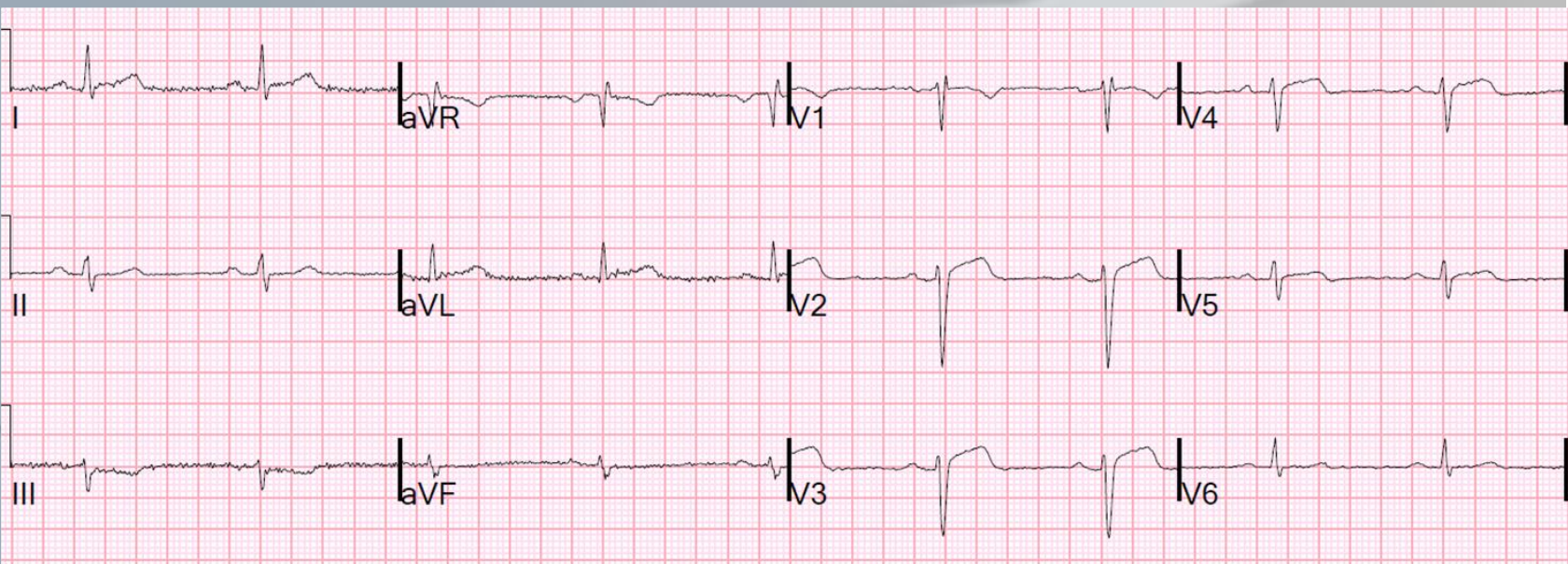
## נאבים בחזה חלפו לחלוטין





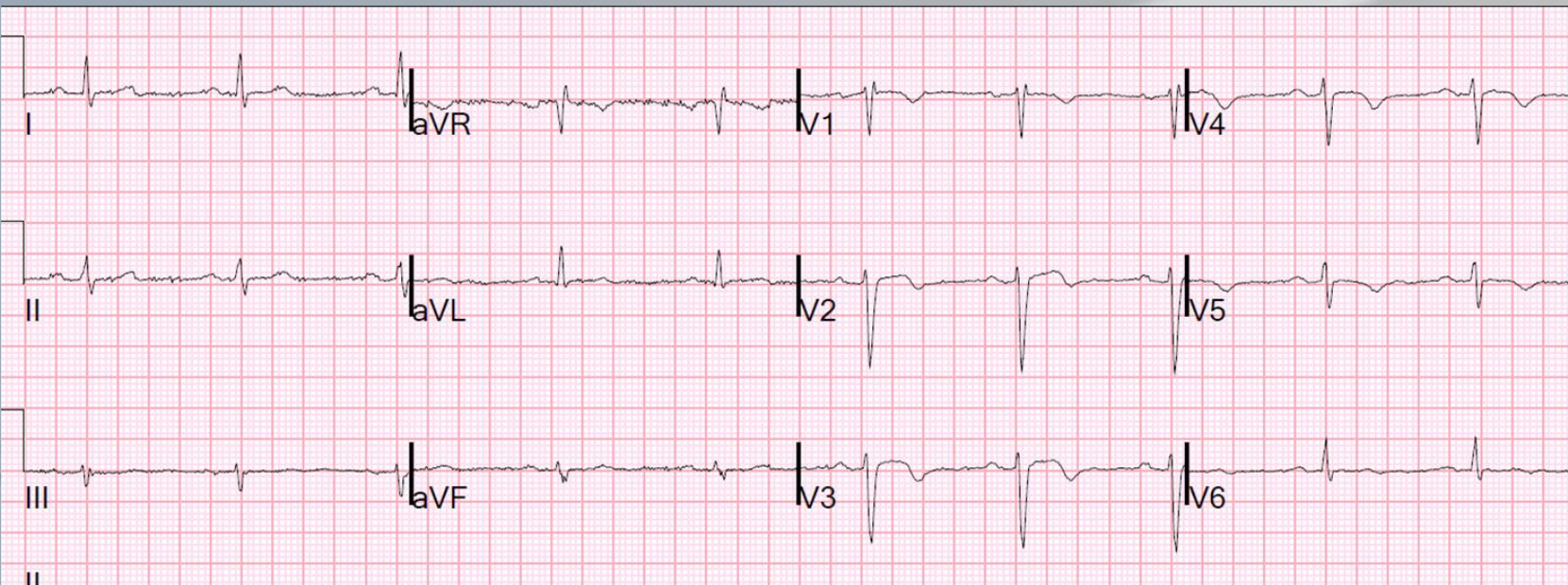
# דוגמאות

בן 65, כאבים בחזה



# דוגמאות

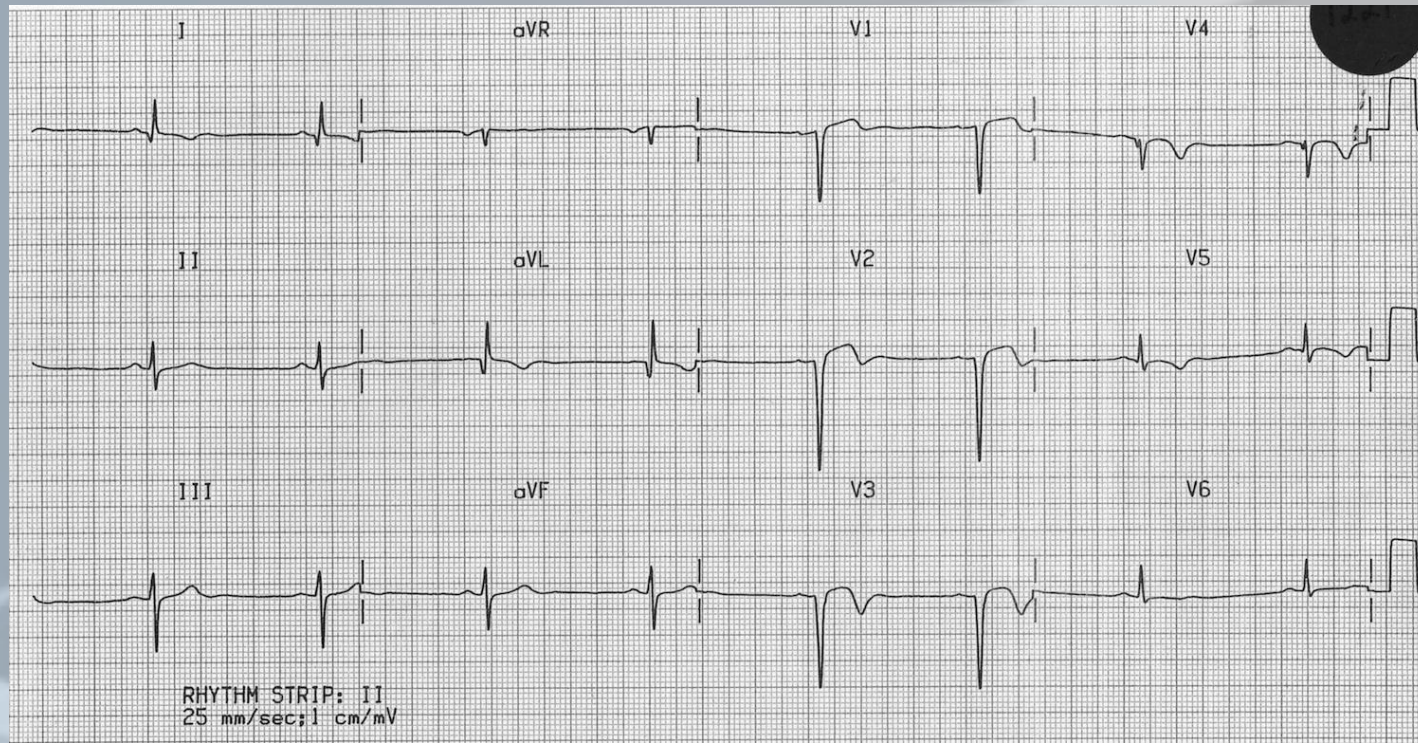
## נאבים בחזה חלפו לחלוטין





# דוגמאות Wellen ?

בן 70 , השתחרר לפני יומיים מאשפוז של 5 ימים בעקבות אוטם קדמי



# Wellens' Syndrome

## סיכום

- תסמונת של כאבי חזה שחולפים, ושינויי אקג בהעדר כאבים.
- מאפיין עיקרי - V1-V4 Terminal T Wave inversion
- ללא איבוד גלי R בחיבורי החזה
- ללא גלי Q בחיבורי החזה
- "פסאודו נורמליזציה" בזמן כאבים.

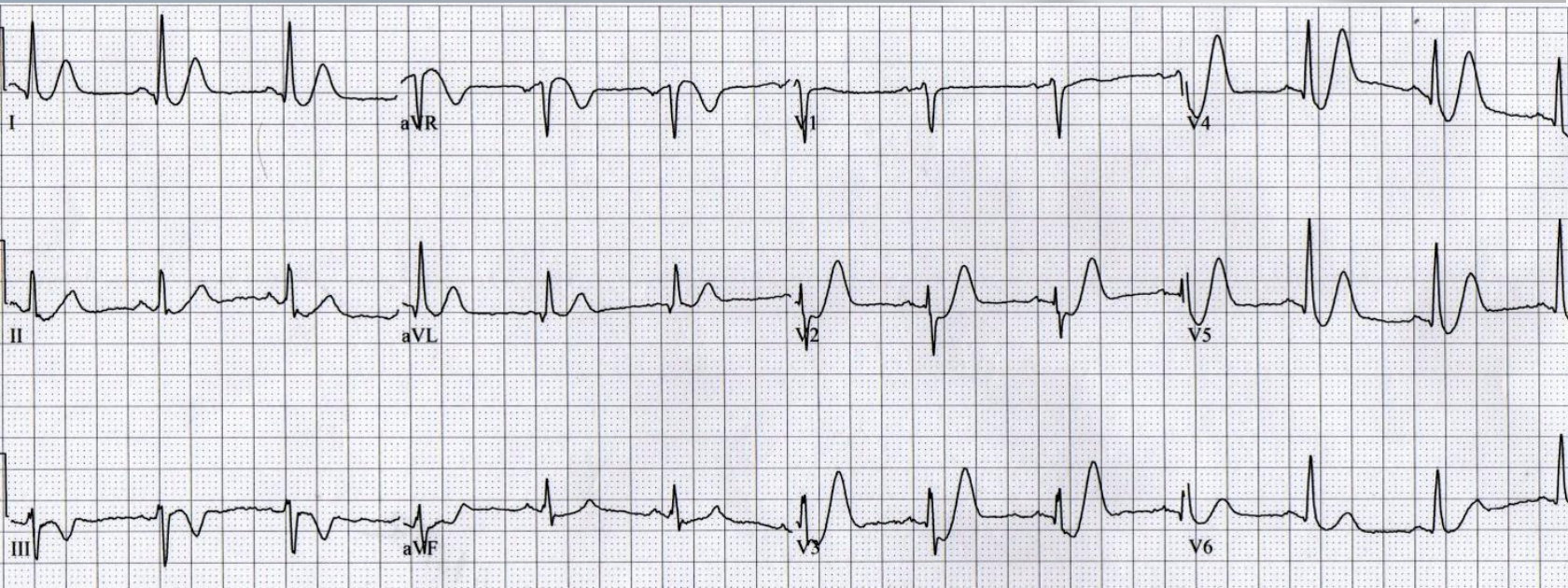




# תאור מקרה

בן 50 , כאבים חזקים בחזה שנמשכים כבר 30 דקות, מזיע חיזור

# אקג



**ניהול המקרה:**

**טיפול - ?**

**הודעה ליחידה – שליחת אקג?**

**הפעלת חדר צינטורים ?**

# תאור מקרה

בן 40 , כאבים חזקים בגב המקרינים לחזה שנמשכים כבר 30 דקות,  
מזיע חיזור



SUMMARY: BORDERLINE NORMAL

SINUS BRADYCARDIA

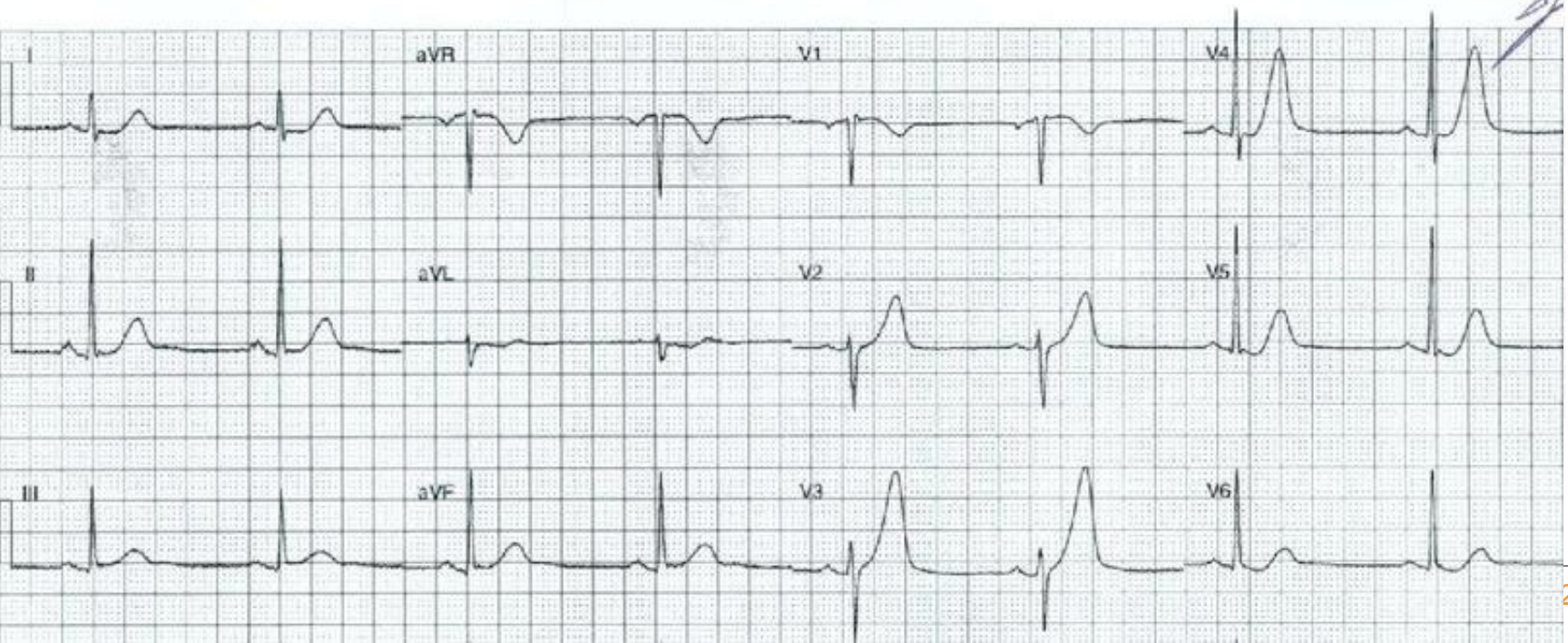
INTERPRETATION MADE WITHOUT KNOWLEDGE OF PATIENT'S SEX AND AGE

ST changes in the lateral leads  
THESE MINOR CHANGES ARE OF EQUIVOCAL SIGNIFICANCE ONLY

Age: ---  
 Date: 13-Nov-2012 11:16  
 HR 49 bpm BP -/  
 QRS-P-T-axes 74 58 57  
 QRS 90 ms P 116 ms  
 PR 164 ms QT 440 ms QTc 421 ms



Unconfirmed ECG



**באבחנה המבדלת:**

**דיסקציה של האורטה – נשלל ב CT**

**טרופונין – שלילי**

**החולה שוחרר**

# החולה חזר יום למחרת



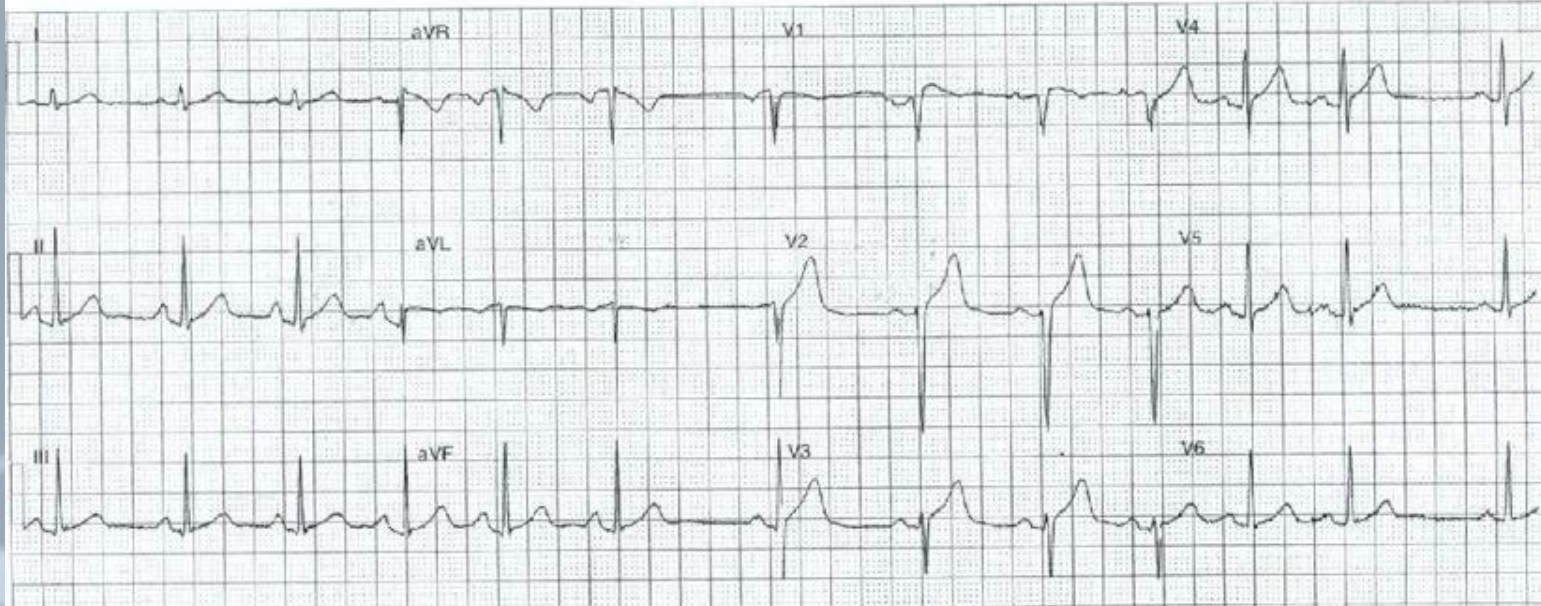
Id:  
Name:  
Sex: Unknown  
Age:  
Date: 14-Nov-2012 07:08  
HR 78 bpm BP 7/7  
QRS-P-T-axes 83 77 70  
QRS 74 ms P 96 ms  
PR 168 ms QT 362 ms QTc 393 ms

SINUS ARRHYTHMIA  
INTERPRETATION MADE WITHOUT KNOWLEDGE OF  
PATIENT'S SEX AND AGE  
Abnormally high P amplitudes  
NON SPECIFIC P WAVE ABNORMALITIES  
Poor R wave progression V2-V4  
ST elevation also present  
PROBABLE NORMAL VARIANT  
Widespread ST elevation  
STRONGLY SUGGESTS PERICARDITIS

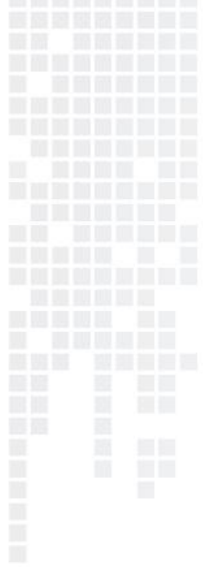
*backpain  
9/10*

*BP 167/115*

**Unconfirmed ECG**







Rate 69 b/min  
PR 168 ms  
QRSD 86 ms  
QT 352 ms  
QTc 377 ms

AGE IS NOT ENTERED, ASSUMED TO BE 50 YEARS OLD FOR PURPOSE OF ECG INTERPRETATION---  
 SINUS RHYTHM normal P axis, V-rate 50- 99  
 INFERIOR INJURY, PROBABLE EARLY ACUTE INFARCT ST>0.15mV, II III aVF  
 ANTERIOR INFARCT, ACUTE ST >0.25mV, T neg. V1-V5  
 LATERAL LEADS ARE ALSO INVOLVED lat Q or ST-T abnormalities

Axis  
P 76 deg  
QRS 76 deg  
T 74 deg

*Parhree*

- ABNORMAL ECG -

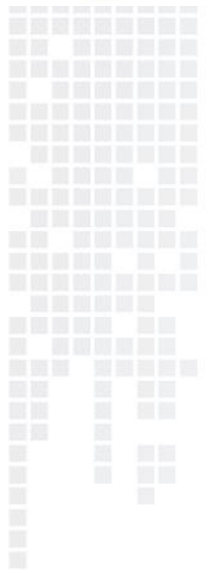
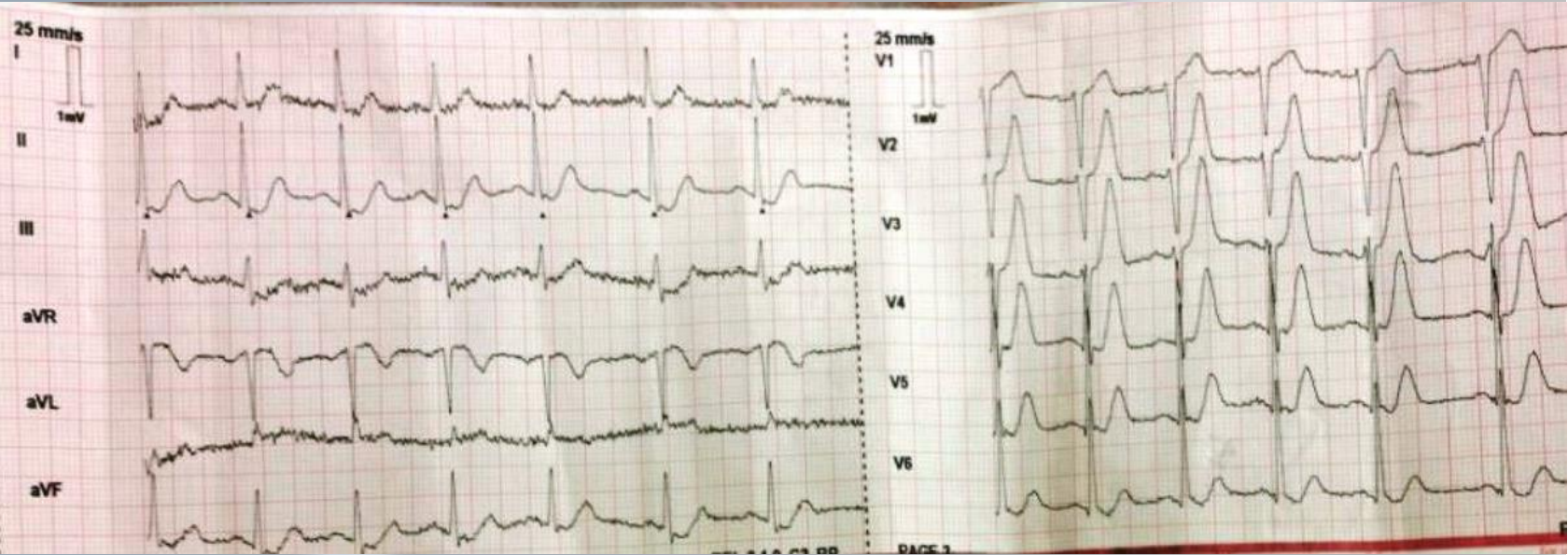
Unconfirr



# תאור מקרה

בן 42 , כאבי חזה , מזיע , בחילה

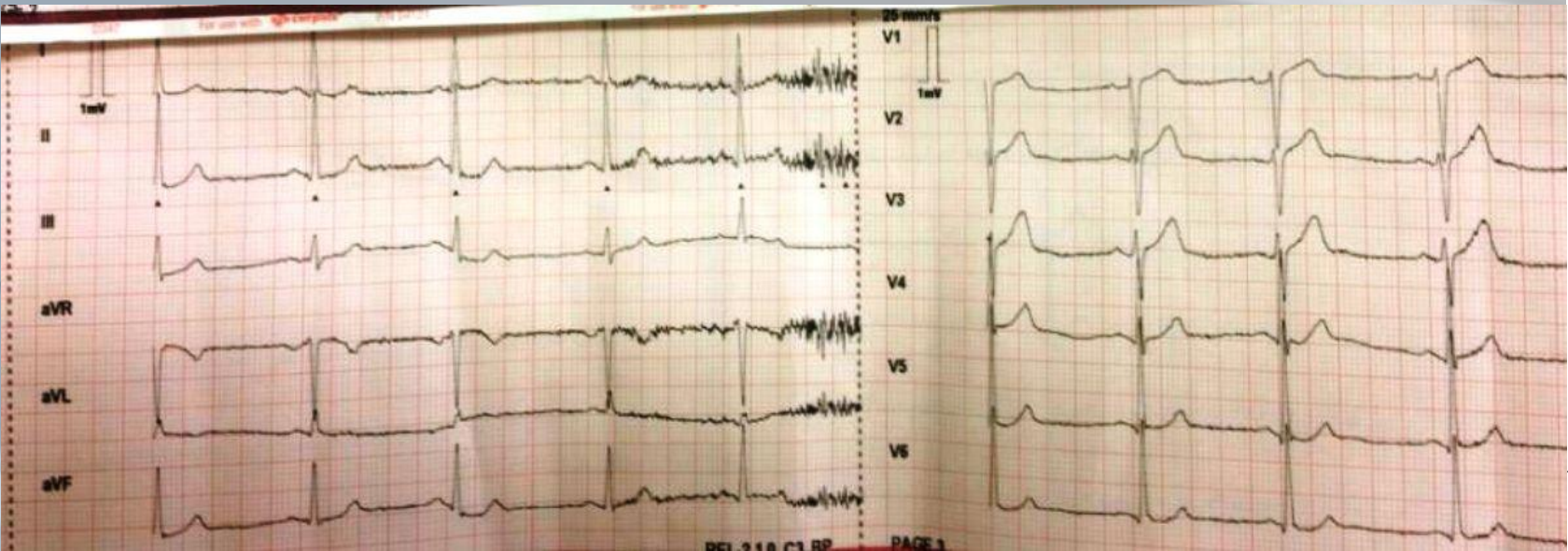






# טיפול בשטח

אספירין  
הפרין  
איזוקט  
הודעה ליחידה  
! הגעה למיון  
מיועד לצינטור לא דחוף



# De Winter's T Waves



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### CORRESPONDENCE

## A New ECG Sign of Proximal LAD Occlusion

N Engl J Med 2008; 359:2071-2073 | November 6, 2008 | DOI: 10.1056/NEJMc0804737

## A New ECG Sign of Proximal LAD Occlusion

**TO THE EDITOR:** Recognition of characteristic changes in an electrocardiogram (ECG) that are associated with acute occlusion of a coronary artery guides decisions regarding immediate reperfusion therapy.<sup>1-3</sup> Working from our primary database of percutaneous coronary interventions, which includes records of the ambulance, or admission, ECG (performed on first medical contact with the patient), the preprocedural ECG, and the coronary angiogram, we describe a new ECG pattern without ST-segment elevation that signifies occlusion of the proximal left anterior descending coronary artery (LAD). Instead of the signature ST-segment elevation, the ST segment showed a 1- to 3-mm upsloping ST-segment depression at the J point in leads V<sub>1</sub> to V<sub>6</sub> that continued into tall, positive symmetrical T waves. The QRS complexes were usually not widened or were only slightly widened, and in some there was a loss of precordial R-wave progression. In most patients there was a 1- to 2-mm ST-elevation in lead aVR (see Fig. 1 for representative examples of this ECG pattern). We recognized this characteristic ECG pattern in 30 of 1532 patients with anterior myocardial infarction (2.0%).

Although tall symmetrical T waves have been recognized as a transient early feature that changes into overt ST elevation in the precordial leads, in these patients this pattern was static, persisting from the time of first ECG until the preprocedural ECG was performed and angiographic evi-

dence of an occluded LAD was obtained (i.e., 30 to 50 minutes). The ECGs with this pattern were on average recorded 1.5 hours after symptom onset. Collateral filling of the LAD ranged from Rentrop class 0 to class 3, and a wraparound LAD was present in 50% of patients. There was no evidence of involvement of the left main stem of the coronary artery, nor was there evidence of significant disease in the coronary arteries supplying the posterior or posterolateral myocardial territories. Potassium levels on admission were normal ( $3.9 \pm 0.5$  mmol per liter). Despite successful procedures in all cases, there was considerable loss of myocardium, with a median creatine kinase MB peak of 342  $\mu$ g per liter.

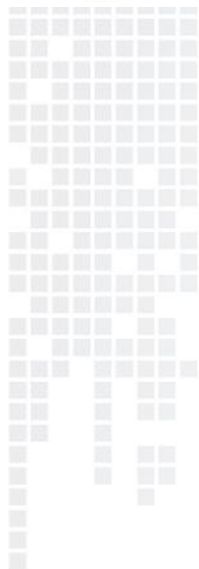
The electrophysiological explanation of the observed ECG pattern remains elusive. We could not establish patient characteristics, nor could we identify coronary angiographic characteristics that were unequivocally associated with the ECG pattern described as compared with a pattern of anterior ST elevation. Theoretically, an anatomical variant of the Purkinje fibers, with endocardial conduction delay, could be present. Alternatively, the absence of ST elevation may be related to the lack of activation of sarcolemmal ATP-sensitive potassium ( $K_{ATP}$ ) channels by ischemic ATP depletion, as has been shown in  $K_{ATP}$  knock-out animal models of acute ischemia.<sup>4</sup> It is of great importance for physicians and paramedics involved in the triage of patients with chest pain



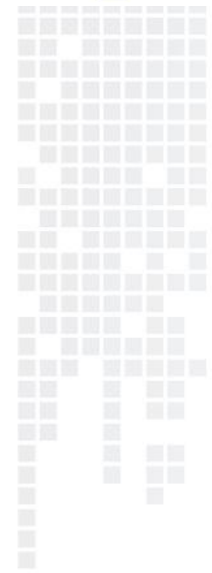


# De Winter's T Waves

we describe a new ECG pattern without ST-segment elevation that signifies occlusion of the proximal left anterior descending coronary artery (LAD). Instead of the signature ST-segment elevation, the ST segment showed a 1- to 3-mm upsloping ST-segment depression at the J point in leads  $V_1$  to  $V_6$  that continued into tall, positive symmetrical T waves. The QRS complexes were usually not widened or were only slightly widened, and in some there was a loss of precordial R-wave progression. In most patients there was a 1- to 2-mm ST-elevation in lead aVR (see Fig. 1 for representative examples of this ECG pattern). We recognized this characteristic ECG pattern in 30 of 1532 patients with anterior myocardial infarction (2.0%).



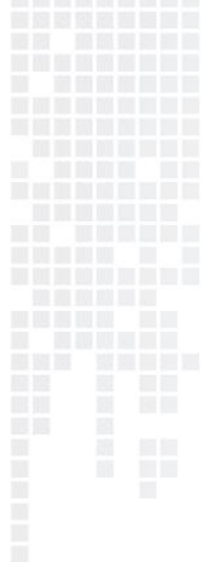
# De Winter's T Waves



## Clinical Significance

- The de Winter ECG pattern is an **anterior STEMI equivalent** that presents *without* obvious ST segment elevation.
- Key diagnostic features include **ST depression** and **peaked T waves** in the **precordial leads**.
- The de Winter pattern is seen in **~2% of acute LAD occlusions** and is under-recognised by clinicians.
- Unfamiliarity with this high-risk ECG pattern may lead to under-treatment (e.g. failure of cath lab activation), with attendant negative effects on morbidity and mortality.

# De Winter's T Waves



# De Winter's T Waves

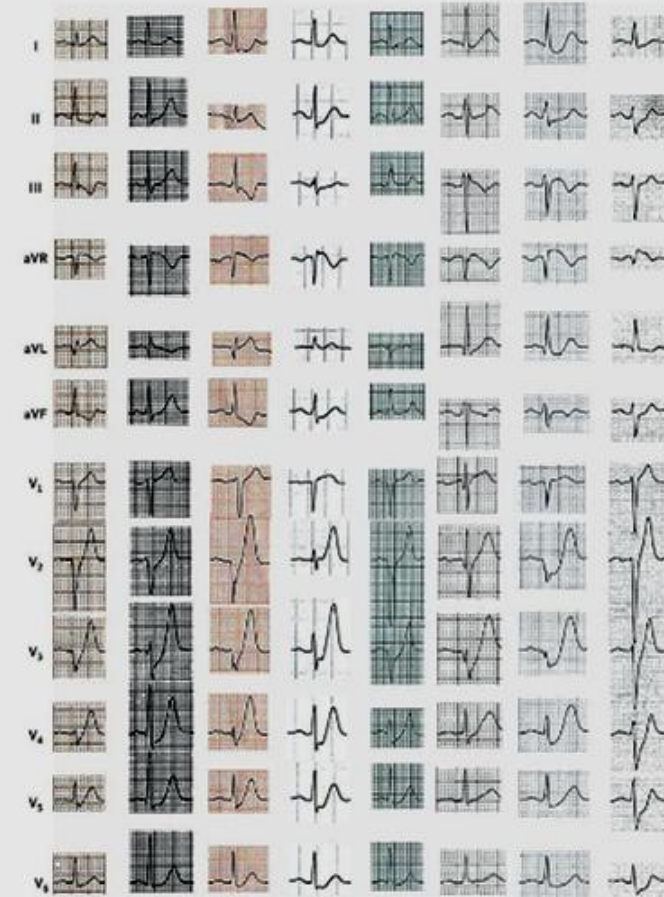


## Diagnostic Criteria

- Tall, prominent, symmetric T waves in the precordial leads
- Upsloping ST segment depression  $>1$  mm at the J-point in the precordial leads
- Absence of ST elevation in the precordial leads
- ST segment elevation (0.5mm-1mm) in aVR
- "Normal" STEMI morphology may precede or follow the deWinter pattern



# De Winter's T Waves



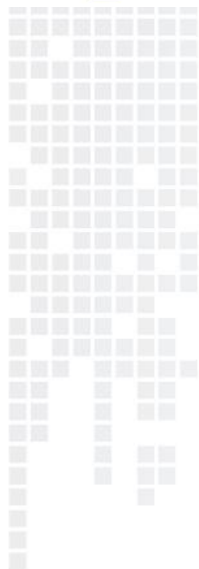
**Figure 1. Unique Precordial ST-Segment and T-Wave Morphology.**

These 12-lead ECG recordings of eight patients show precordial ST-segment depression at the J point followed by peaked, positive T waves. In addition, lead aVR shows slight ST-segment elevation in most cases. All eight of these patients underwent primary percutaneous coronary intervention because of an occlusion of the proximal LAD.



# De Winter's T Waves

- שווה ערך ל STEMI כ -2% מהמקרים של חסימה פרוקסימלית של LAD
- שליחת אקג ודיווח מתאים ליחידה לטיפול נמרץ לב
- טיפול מלא ל ACUTE STEMI



# Acute coronary Syndrome

שתי תסמונות אקג שכדאי להכיר

תודה רבה

