

ACUTE CORONARY SYNDROME

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Disclosures

- ☐ None

Objectives

- Definitions
 - 4th Universal Definition of MI
- Be able to differentiate between and describe the 3 clinical presentations which make up the acute coronary syndromes
- Evaluation and management of USA/MIs
- Be able to list differential diagnoses

Chest pain



4th Universal Definition of MI

- Myocardial infarction: *acute* myocardial injury, as evidenced by an *acute* rise/fall of cTn over the normal value
- And at least one of the following:
 - ▣ Symptoms of myocardial ischemia
 - ▣ New ischemic ECG changes
 - ▣ New pathological Q waves
 - ▣ Imaging evidence of a new loss of viable myocardium or new RWMA in a pattern consistent with an ischemic etiology
 - ▣ Identification of a coronary thrombus by angiography or autopsy

Thygesen K, Alpert JS, Jaffe AS, et al. Fourth Universal Definition of Myocardial Infarction. *J Am Coll Cardiol*. 2018;1616(10).
http://www.onlinejacc.org/content/early/2018/08/22/j.jacc.2018.08.1038?_ga=2.150925814.1556574279.1535316755-617251857.1531964026. Published [August 42,

4th Universal Definition of MI

- Previous definition applies to Types 1-3
- Type I MI: MI caused by coronary plaque disruption
 - ▣ NSTEMI, STEMI
- Type II MI: O₂ supply/demand mismatch
 - ▣ Not caused by coronary plaque disruption
 - ▣ +/- CAD
 - ▣ Examples: acute GIB, sustained tachyarrhythmia
- Type III MI: cardiac death with symptoms consistent with myocardial ischemia with new ischemic EKG changes or VF
 - ▣ Cardiac Enzymes not actually measured
- Types IV and V: MIs occurring in setting of a coronary procedure

Definitions

- Acute Coronary Syndrome
 - Blanket term to describe the 3 clinical presentations caused by acute coronary plaque rupture and thrombosis, leading to acute myocardial ischemia or infarction

Definitions

- Acute Coronary Syndrome
 - Blanket term to describe the 3 clinical presentations caused by acute coronary plaque rupture and thrombosis, leading to acute myocardial ischemia or infarction
 - Consists of:
 - Unstable Angina
 - NSTEMI (non-STEMI, non Q wave MI)
 - STEMI

Unstable Angina

- Angina that is new in onset, has changed in frequency or severity or occurs at rest
- Caused by acute plaque rupture → myocardial ischemia
- EKG
 - May or may not be changed
- Cardiac enzymes
 - Negative

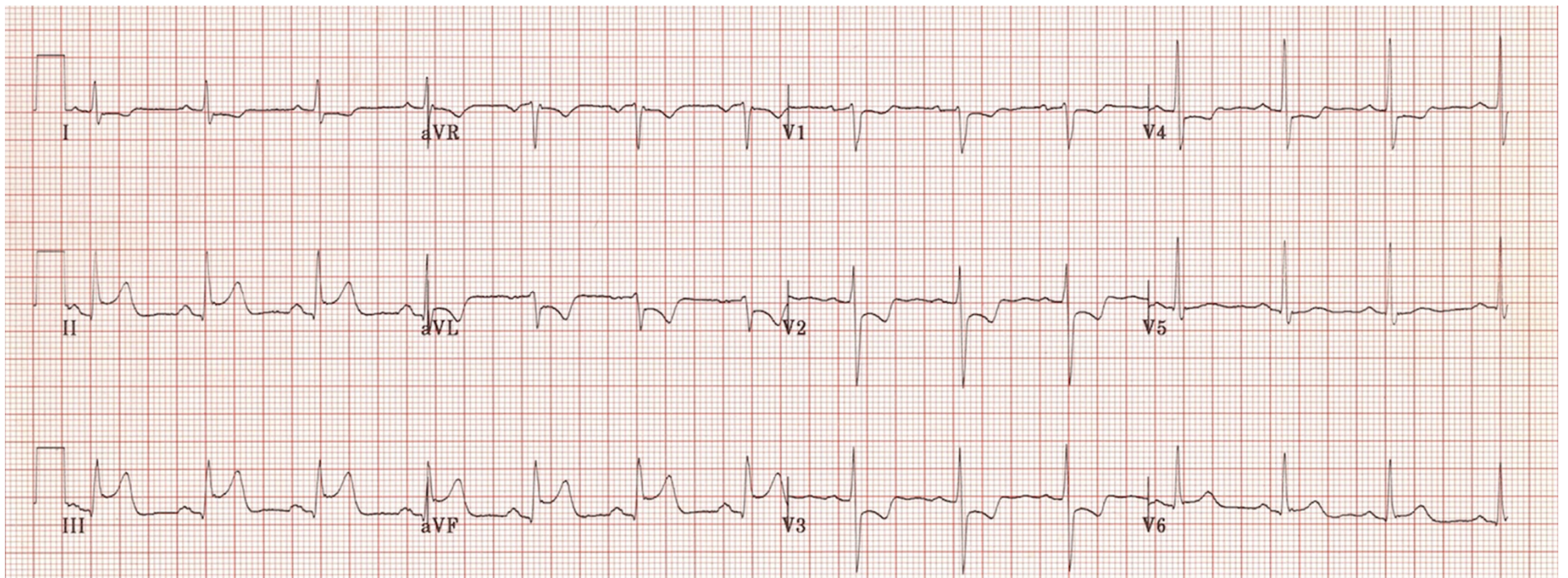
Non-ST Elevation Myocardial Infarction

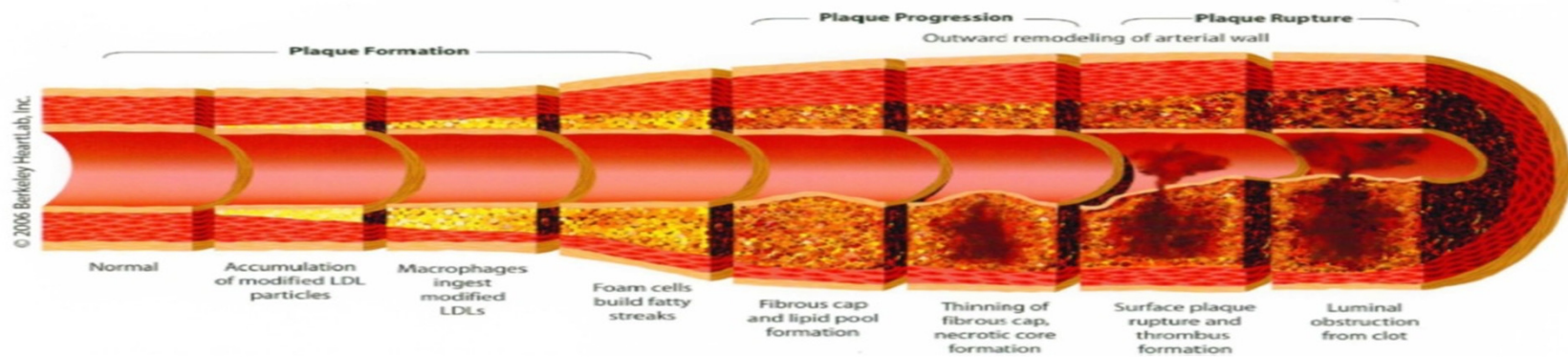
- NSTEMI
- Type of myocardial infarction, without evidence of ST segment elevation on EKG
- EKG
 - ▣ May or may not be changed
 - ▣ ST segment depression, T wave inversion
- Cardiac Enzymes
 - ▣ Elevated

ST-Elevation Myocardial Infarction

- STEMI
- Emergency
- Myocardial infarction caused by acute 100% occlusion of a coronary artery
- EKG
 - ▣ ST segment elevation
 - ▣ New (or presumed new) LBBB
- Cardiac Enzymes
 - ▣ Elevated

Inferior STEMI





	USA	NSTEMI	STEMI
% of blockage	$\geq 70\%$	$\geq 70\%$	100%
Symptoms	Yes	Yes	Yes
EKG changes	Possibly	Possibly	Yes – ST segment elevation
Cardiac Enzymes	Negative	Elevated	Elevated

Ischemic Discomfort Acute Coronary Syndrome

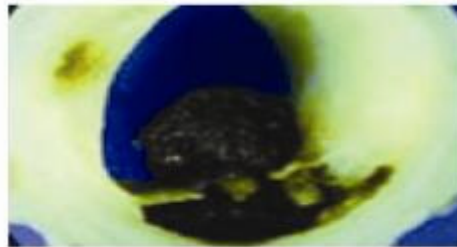
Presentation

Working Dx

ECG

*Cardiac
Biomarker*

Final Dx



No ST Elevation



ST Elevation

Non-ST ACS

UA

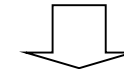


Unstable
Angina

NSTEMI



Myocardial Infarction
NQMI



Qw MI

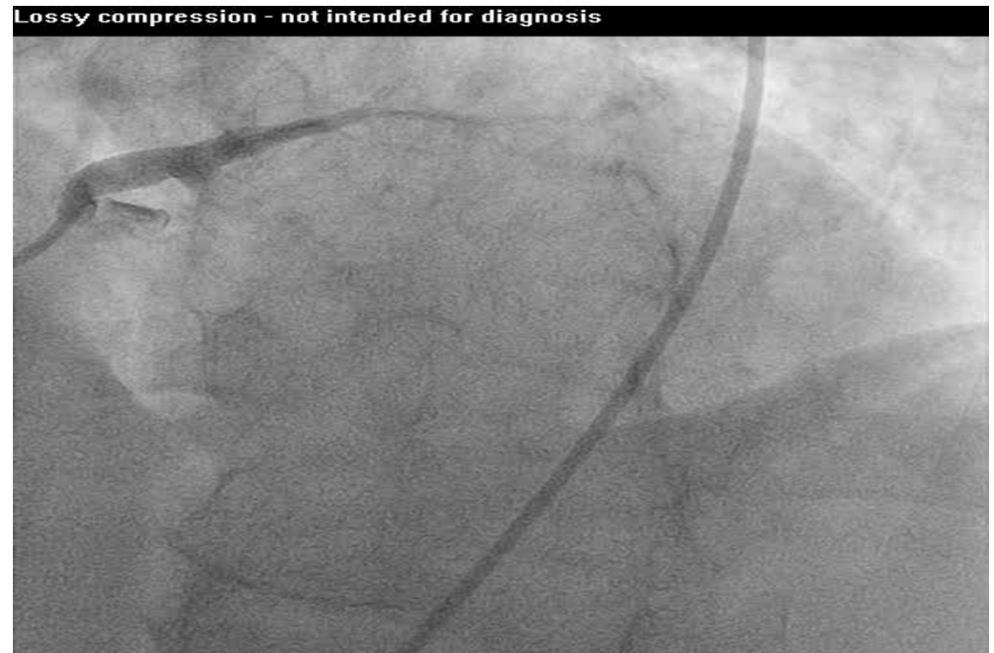
Management

- EKG
 - ▣ Within 10 minutes of presentation
- Lab work
- Meds:
 - ▣ MONA BASH
 - ▣ Acute setting:
 - Everyone: FD ASA, NTG
 - NSTEMI, STEMI
 - Anticoagulation
 - P2Y₁₂ receptor inhibitors load (Brilinta 180 mg or Plavix 600 mg)
 - STEMI
 - +/- NSTEMI
 - ▣ Can be added later:
 - Statin, beta-blocker

Management

- EKG
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- Cardiology Consult
- Left heart catheterization
 - ▣ PCI or CABG



Risk Stratification

- USA/NSTEMI
 - ▣ TIMI Risk Score
 - ▣ GRACE
 - ▣ PURSUIT
- Unsure if ACS
 - ▣ HEART

Risk Stratification

□ TIMI Risk Score

- Estimation of a patient's 14 day risk of mortality, new or recurrent MI or severe ischemia requiring revascularization
- Age 65 or older
- At least 3 risk factors for ASHD (HTN, HLD, DM, tobacco abuse, obesity, age, family or personal history of ASHD)
- Known CAD of at least 50% stenosis
- ASA use within the last week
- At least 2 episodes of angina in the last 24 hours
- EKG changes (ST segment)
- Elevated cardiac enzymes

Risk Stratification

- TIMI Risk Score, cont.

- ▣ 1 point per question answered 'Yes'

- ▣ 0-1 points: 5%

- ▣ 2 points: 8%

- ▣ 3 points: 13%

- ▣ 4 points: 20%

- ▣ 5 points: 26%

- ▣ 6-7 points: 41%

0-2 = low risk

3-4 = intermediate
risk

5+ = high risk

- mdcalc.com

Risk Stratification

- HEART Risk Score
 - ▣ Assess risk of MACE

 - ▣ History
 - ▣ EKG
 - ▣ AGE
 - ▣ Risk factors
 - ▣ Troponin

 - ▣ Each section is 0-2 points
 - More points → higher risk of MACE

Mahler SA, Hiestand BC, Goff DC Jr, et al. Can the HEART score safely reduce stress testing and cardiac imaging in patients at low risk for major adverse cardiac events? *Crit Pathw Cardiol.* 2011;10(3):128-33.

Differentials

□ Cardiac

- ▣ Aortic dissection
- ▣ Prinzmetal Angina
- ▣ Pericarditis

□ Noncardiac

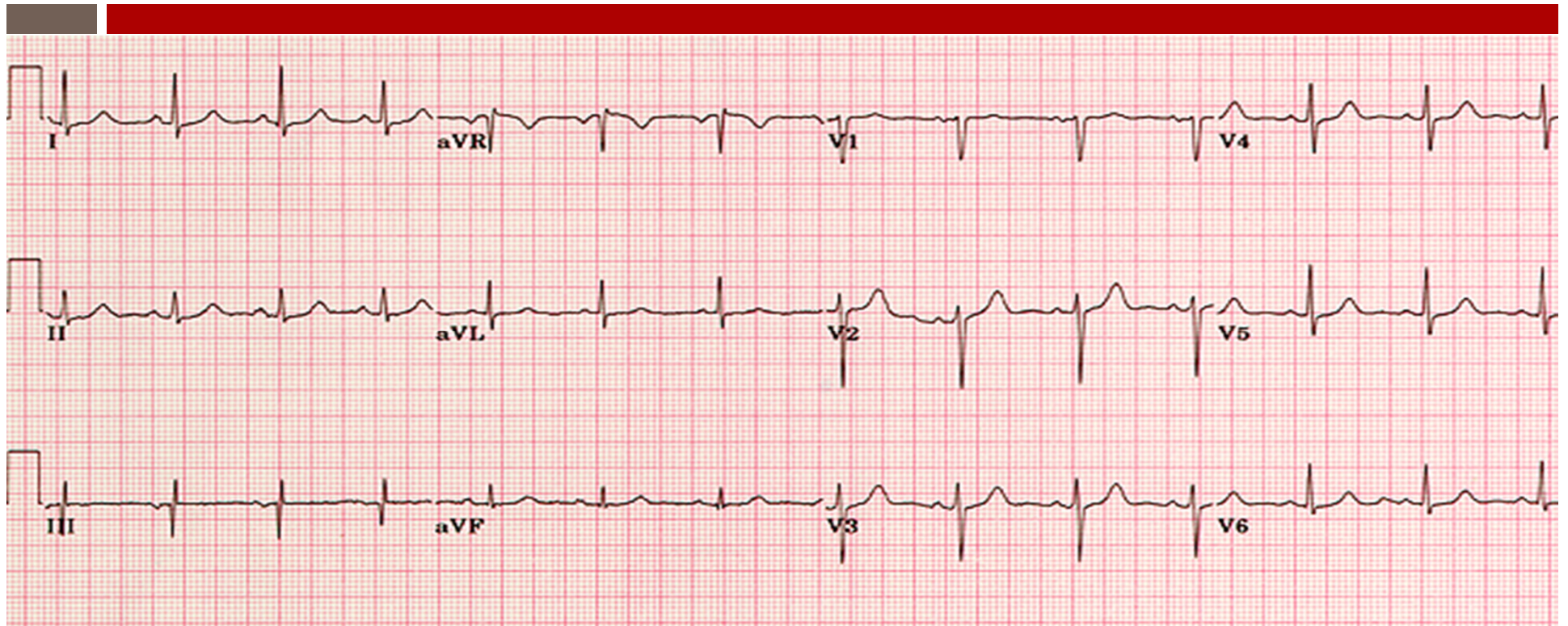
- ▣ GI (most common)
- ▣ Musculoskeletal
- ▣ Respiratory
 - PE
 - PTX
- ▣ Anxiety

Back to Adam...

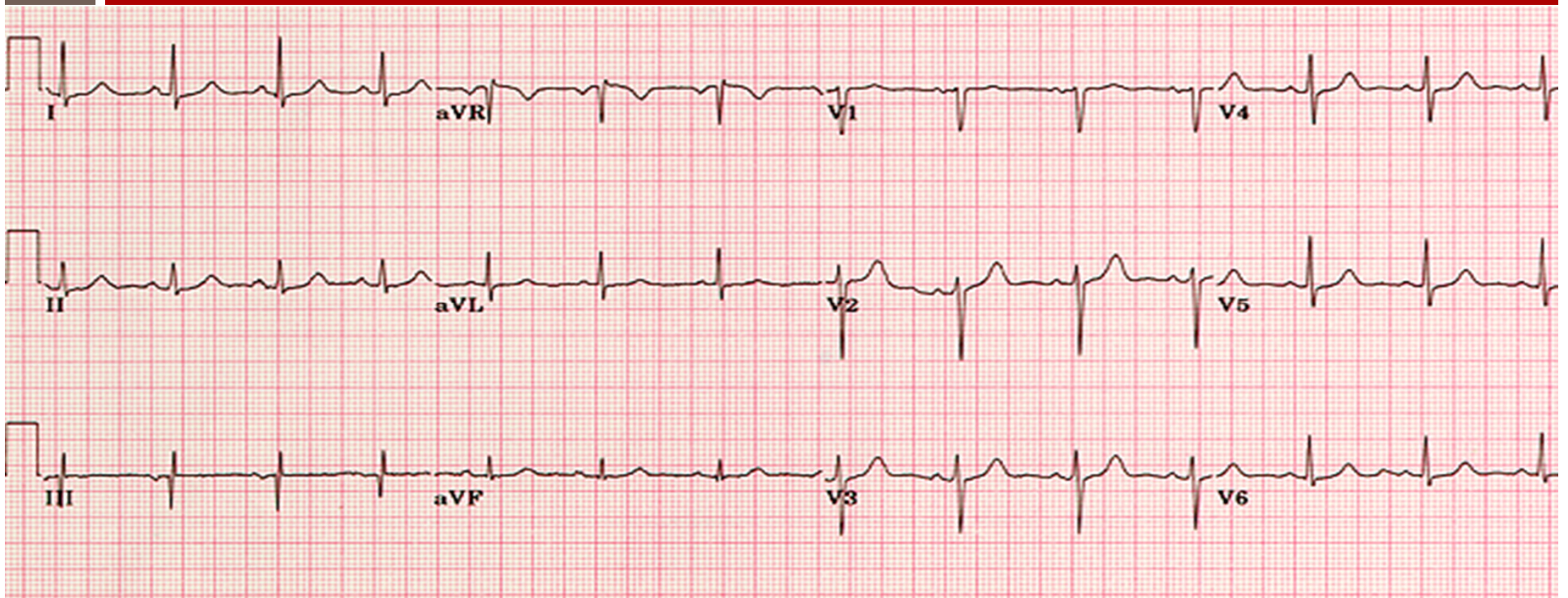
- 39 yo M
- Chest pain x1 week
 - ▣ Substernal
 - ▣ Intermittent
 - ▣ Somewhat worse with certain activity
 - ▣ Ibuprofen for relief



His EKG



His EKG



NSR, HR ~80

No concerning ischemic changes – no ST segment deviation or T wave inversions. No Q waves.

Back to Adam...

- 39 yo M
- Chest pain x1 week
 - ▣ Substernal
 - ▣ Intermittent
 - ▣ Somewhat worse with certain activity
 - ▣ Ibuprofen for relief
- RFs: h/o tobacco abuse, family hx ASHD*
- Troponin: 0.02 (normal)

*Hypothetical, Adam Levine's actual cardiac risk factors are unknown



Back to Adam...

- ❑ 39 yo M
- ❑ Chest pain x1 week
 - ▣ Substernal
 - ▣ Intermittent
 - ▣ Somewhat worse with certain activity
 - ▣ Ibuprofen for relief
- ❑ RFs: h/o tobacco abuse, family hx ASHD*
- ❑ Troponin: 0.02 (normal)
- ❑ HEART Score: 1

*Hypothetical, Adam Levine's actual cardiac risk factors are unknown



Risk Stratification

- HEART Risk Score

- ▣ Assess risk of MACE

- ▣ History – slightly suspicious 0

- ▣ EKG – no ST segment changes 0

- ▣ AGE – <45 0

- ▣ Risk factors – 2 1

- ▣ Troponin – WNL 0

- ▣ Total score = 1

- 0.9-1.7% risk of MACE

Upon further questioning...

- ❑ The chest pain started after attempting a new pose in yoga
- ❑ Only worse with movements that involve his arms



Upon further questioning...

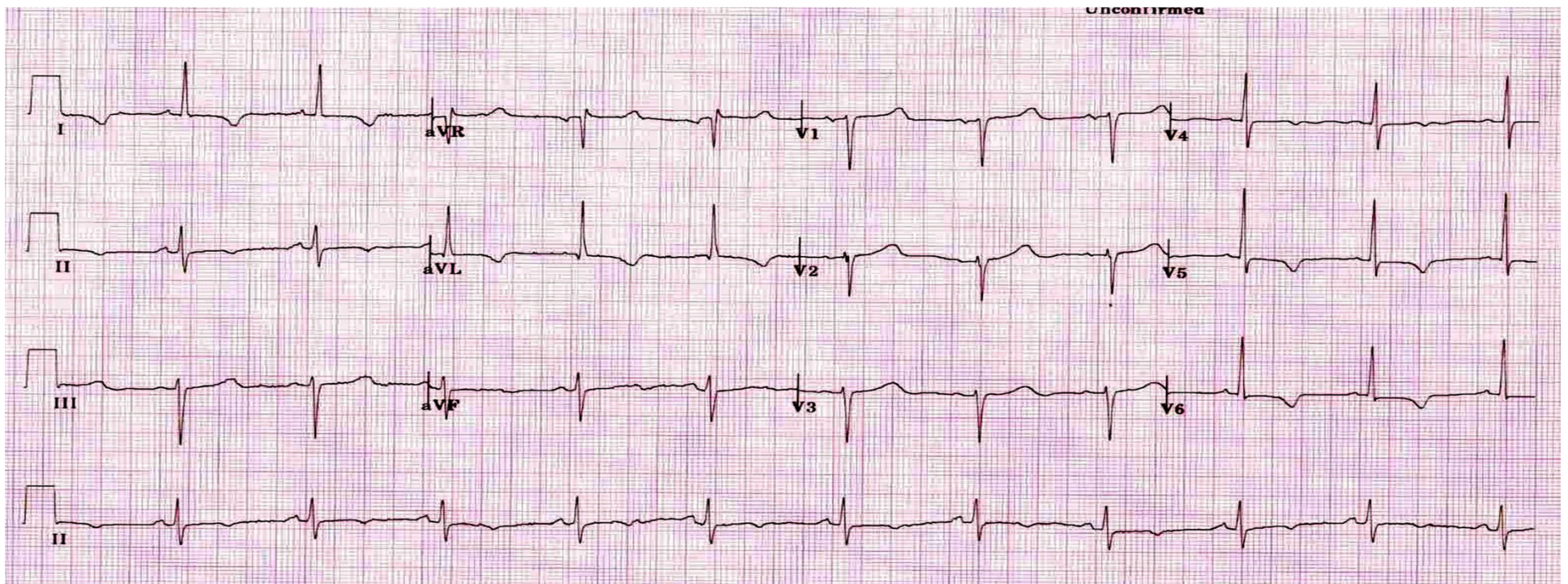
- The chest pain started after attempting a new pose in yoga
- Only worse with movements that involve his arms
- Dx: Musculoskeletal

John Smith

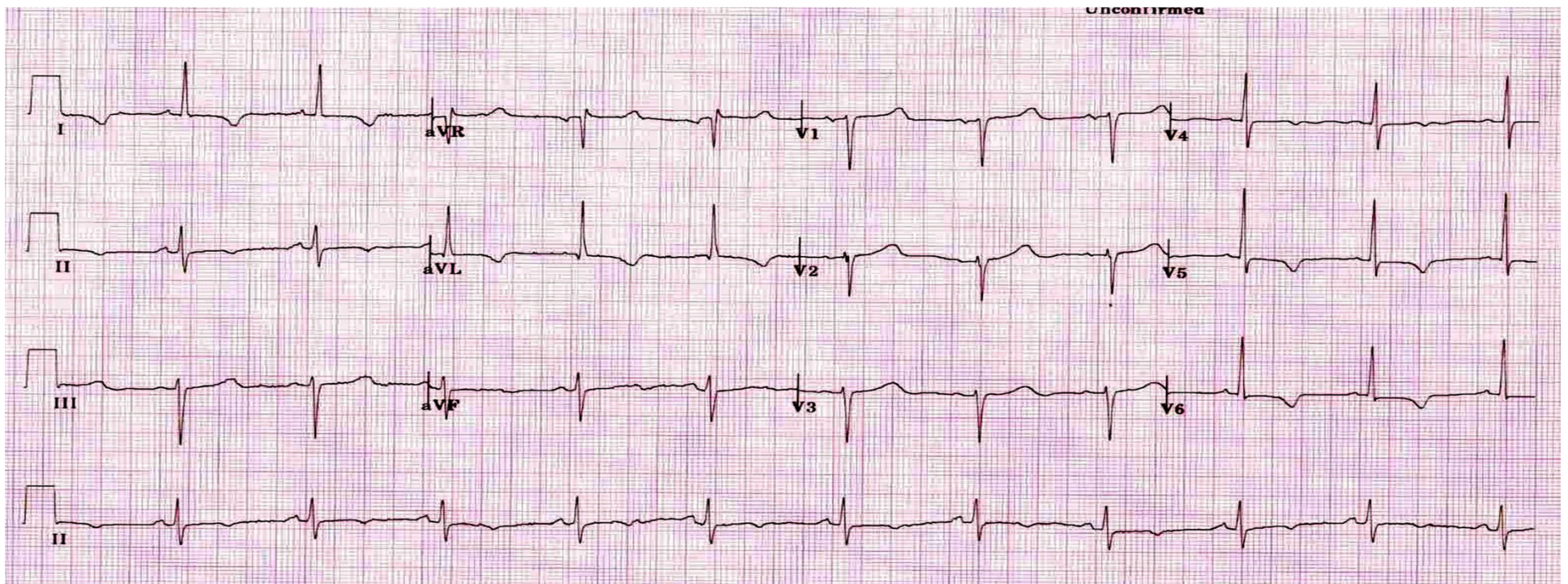
- 65 yo M
- Chest pain
 - ▣ Started acutely this morning while watching TV
 - ▣ Substernal with radiation to his jaw
 - ▣ For past week, worsening CP with walking, slightly improved with ASA and rest
 - ▣ NTG given by EMS improved



His EKG



His EKG



NSR, HR ~70

Ischemic changes: poor R wave progression, borderline ST depression and T wave inversion laterally

John Smith

- 65 yo M
- Chest pain
 - ▣ Started acutely this morning while watching TV
 - ▣ Substernal with radiation to his jaw
 - ▣ For past week, worsening CP with walking
 - ▣ NTG given by EMS improved
- RFs: HTN, unknown lipid status, NIDDM, tobacco abuse, age, family history of ASHD
- Initial troponin: 0.9
- TIMI Score: 5



Risk Stratification

- TIMI Risk Score, cont.

- ▣ 1 point per question answered 'Yes'

- ▣ 0-1 points: 5% risk at 14 days

- ▣ 2 points: 8%

- ▣ 3 points: 13%

- ▣ 4 points: 20%

- ▣ 5 points: 26%**

- ▣ 6-7 points: 41%

0-2 = low risk

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risk

5+ = high risk

John Smith

- Dx: NSTEMI
- Management:
 - ▣ ASA 324 mg
 - ▣ P2Y₁₂ Receptor Inhibitor load
 - ▣ Heparin bolus and gtt
 - ▣ NTG
- ▣ Cardiology consultation
 - LHC



Angiogram

Pre-PCI



Post-PCI



Questions?

