



HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

Evaluation of Chest Pain

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GENERAL HOSPITAL

**CORRIGAN MINEHAN
HEART CENTER**

Objectives

- 1. Recognize the causes for chest pain*
- 2. Utilize a risk factor-based strategy to evaluate chest pain*
- 3. Identify patients who require tertiary care*

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Question 1

What percentage of patients who present with chest discomfort have a cardiac problem that is responsible for their symptoms?

- A. 50%
- B. 25%
- C. 5%
- D. 1%

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Question 2

Which of the following presentations of chest discomfort is least consistent with a cardiac etiology:

- A. 27-year-old man with no risk factors who experiences intermittent chest discomfort but no symptoms with physical exertion.
- B. 65-year-old man with HTN, DM2 who presents with chest discomfort while walking, palliated by rest.
- C. 36-year-old woman with chest burning when she takes a deep breath.
- D. 57-year-old woman with chest burning and palpitations.

Question 2

Which of the following presentations of chest discomfort is least consistent with a cardiac etiology:

- A. 27-year-old man with no risk factors who experiences intermittent chest discomfort but no symptoms with physical exertion.
- B. 65-year-old man with HTN, DM2 who presents with chest discomfort while walking, palliated by rest.
- C. 36-year-old woman with chest burning when she takes a deep breath.
- D. 57-year-old woman with chest burning and palpitations.

Question 3

Which of the following chest pain presentations is most likely to be due to an arrhythmia?

- A. Chest discomfort provoked by a consistent exertion level (every time) and palliated by rest.
- B. Chest discomfort only intermittently provoked by exertion and palliated by rest.
- C. Chest discomfort that is intermittent and not clearly related to physical exertion.
- D. Both B and C.

Question 3

Which of the following chest pain presentations is most likely to be due to an arrhythmia?

- A. Chest discomfort provoked by a consistent exertion level (every time) and palliated by rest.
- B. Chest discomfort only intermittently provoked by exertion and palliated by rest.
- C. Chest discomfort that is intermittent and not clearly related to physical exertion.
- D. **Both B and C.**

Objective 1: Causes of Chest Pain

Chest pain is the reason for 1% of primary care visits

Differential diagnosis for chest pain is very broad

Distinguishing between cardiac and non-cardiac pain is critical and time-sensitive

Objective 1: Causes of Chest Pain

Differential diagnosis for chest pain is very broad

Musculoskeletal/chest wall	up to 50%
Esophageal/GI	up to 20%
Psychiatric	up to 10%
Angina	<5%

Objective 1: Causes of Chest Pain

Distinguishing between cardiac and non-cardiac pain is critical and time-sensitive

Finding the “needle in a haystack”

Evaluation needs to be rapid and efficient

Objective 1: Causes of Chest Pain

Focus on high-yield items to quickly differentiate between cardiac and non-cardiac chest pain

History:

Presence of CAD/heart disease or risk factors

Physical:

Evidence of heart failure or hypoxemia

Studies:

Abnormal ECG or positive cardiac biomarkers

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Objective 2: Use of Risk Factors

Case 1: 24-year-old man with chest pain

HPI: Constant chest discomfort for two days. Not related to exertion.

PMH: Anxiety/depression

Exam: T 98 BP 110/70 HR 90 RR 12

JVP normal

Lungs clear

Heart sounds normal

Abdomen benign

No lower extremity edema

Objective 2: Use of Risk Factors

Case 1: 24-year-old man with chest pain

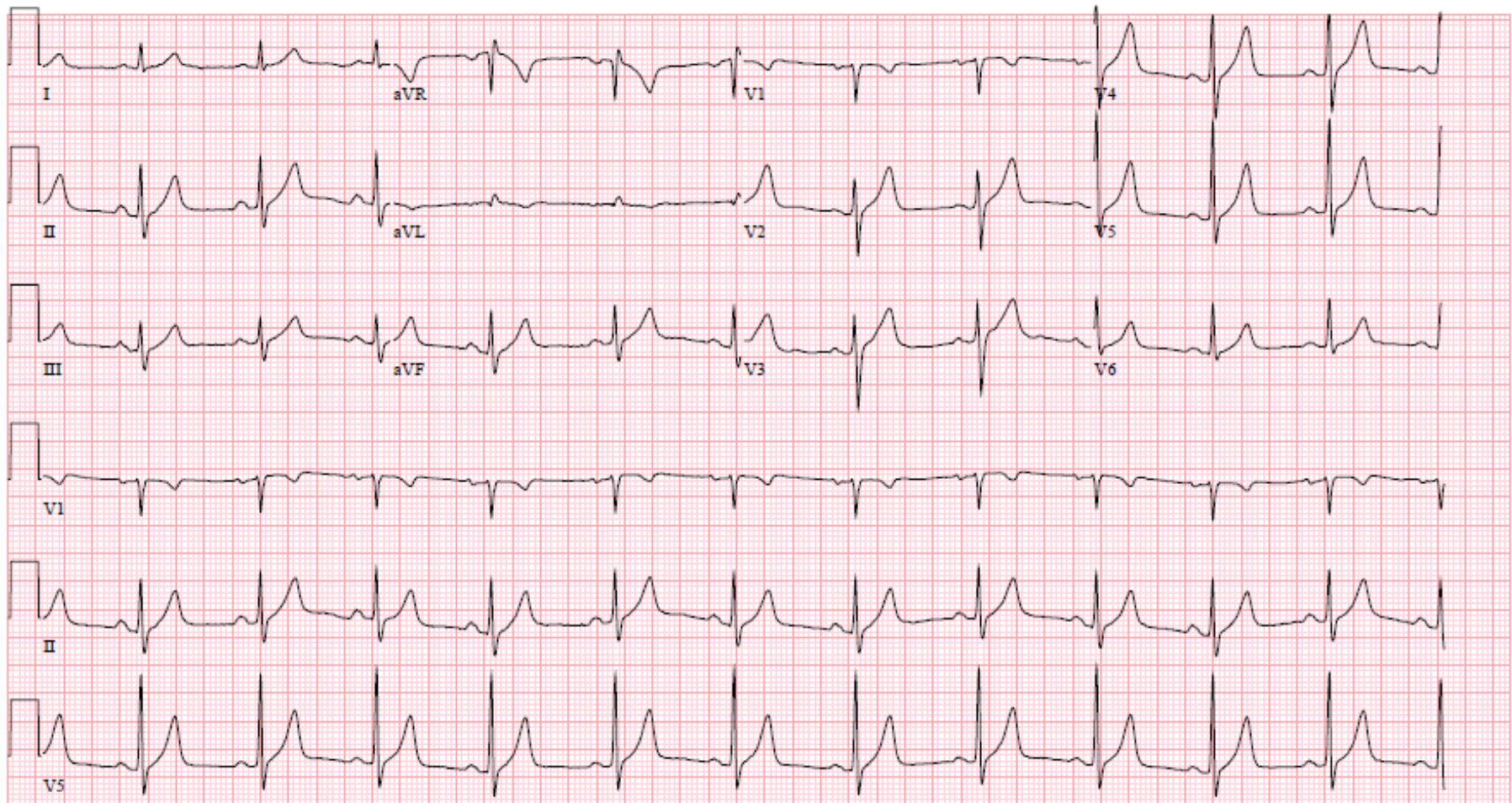
What findings are consistent with a cardiac etiology?

What findings are consistent with a non-cardiac etiology?

What tests do I need to perform in order to confirm?

Objective 2: Use of Risk Factors

Case 1: 24-year-old man with chest pain



Objective 2: Use of Risk Factors

Case 1: 24-year-old man with chest pain

What further evaluations could I perform in order to confirm my suspicion that this patient's chest pain is non-cardiac?

Physical exam / Labs / Other studies

Objective 2: Use of Risk Factors

Case 1: 24-year-old man with chest pain

What further evaluations could I perform in order to confirm my suspicion that this patient's chest pain is non-cardiac?

Physical exam / Labs / Other studies

Palpate chest wall to determine if point tenderness is present

Objective 2: Use of Risk Factors

Case 2: 44-year-old man with chest pain

HPI: Intermittent exertional chest discomfort that is palliated by rest. Symptoms present for 2 days, progressive.

PMH: HTN, pre-diabetes

FamH: Early-onset CAD in father

Exam: T 98 BP 110/70 HR 90 RR 12

JVP elevated

Lungs clear

Heart sounds normal

Abdomen benign

No lower extremity edema



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Objective 2: Use of Risk Factors

Case 2: 44-year-old man with chest pain

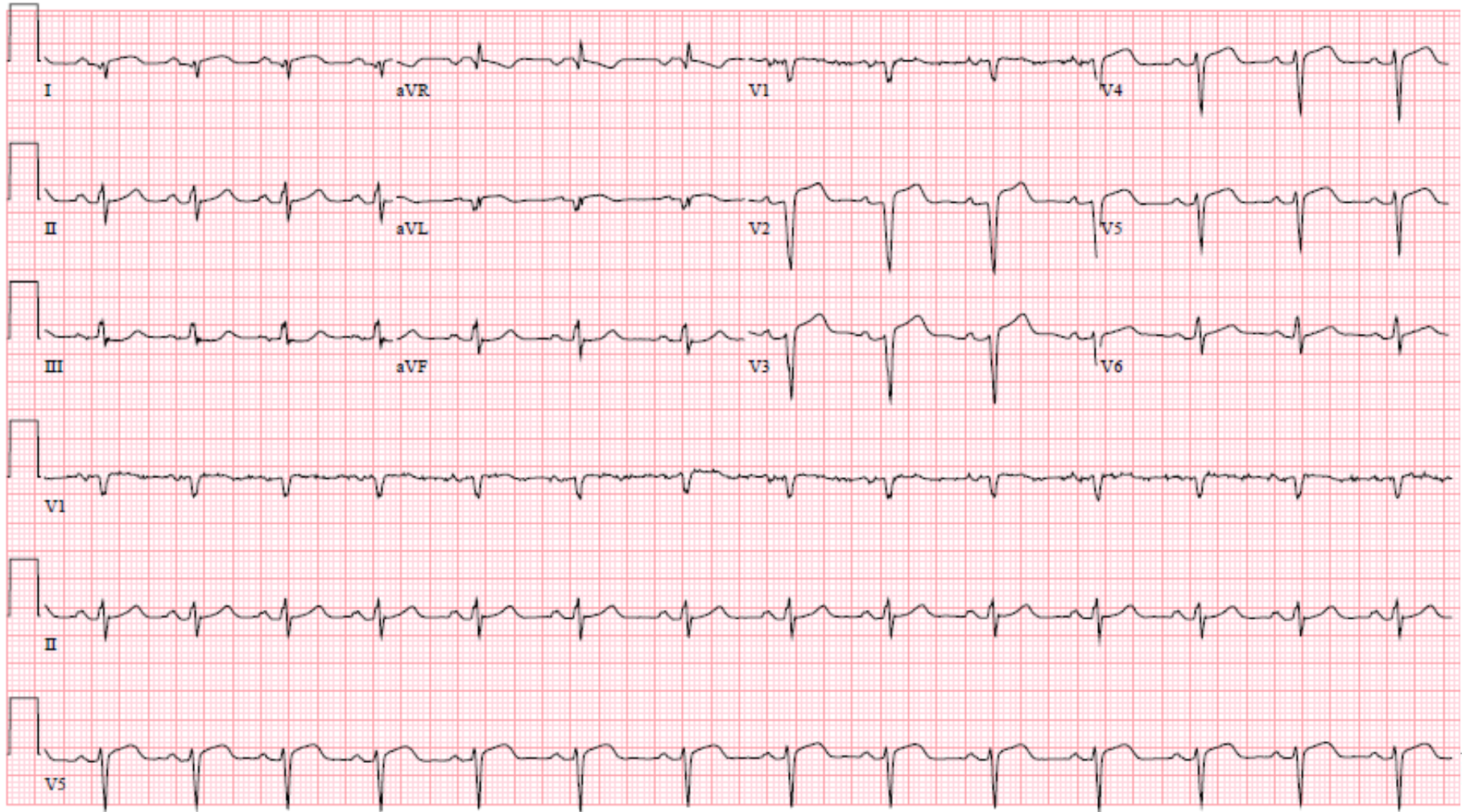
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What findings are consistent with a non-cardiac etiology?

What tests do I need to perform in order to confirm?

Objective 2: Use of Risk Factors

Case 2: 44-year-old man with chest pain



Objective 2: Use of Risk Factors

Case 2: 44-year-old man with chest pain

Presentation consistent with STEMI – now what?

- Arrange for immediate transport to tertiary care center
- Oxygen
- Aspirin 325mg
- Sublingual NTG (depending on BP)

Objective 2: Use of Risk Factors

Case 3: 62-year-old woman with chest pain

HPI: Progressive chest heaviness for 5 days, not sure if it is worse with exertion.

PMH: Known CAD with prior MI, HTN, DM, Obesity

Exam: T 98 BP 110/70 HR 90 RR 18

JVP not elevated

Lungs clear

Heart sounds normal

Abdomen benign

No lower extremity edema



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Objective 2: Use of Risk Factors

Case 3: 62-year-old woman with chest pain

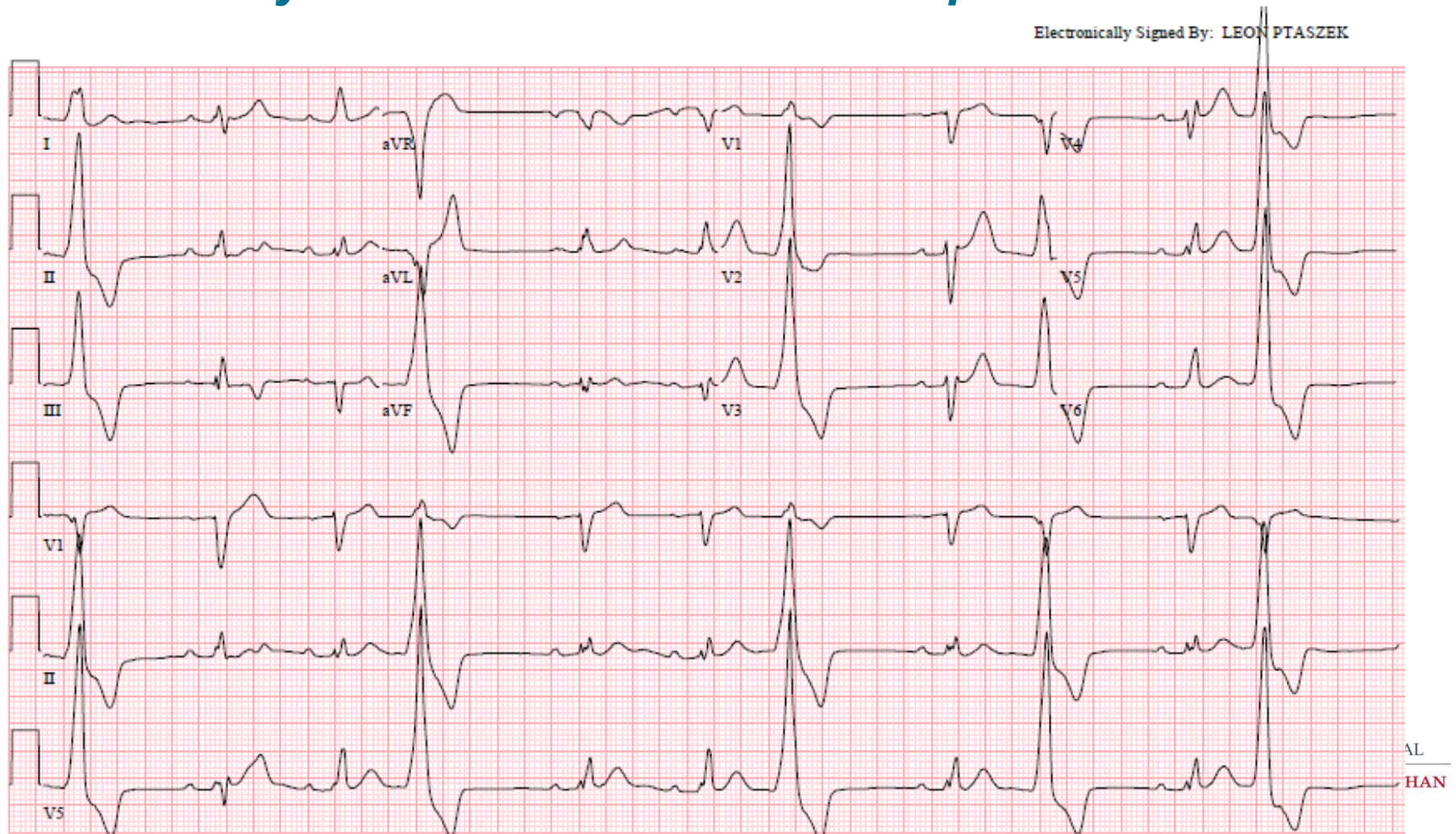
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What findings are consistent with a non-cardiac etiology?

What tests do I need to perform in order to confirm?

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Objective 2: Use of Risk Factors

Case 3: 62-year-old woman with chest pain

What further evaluations could I perform in order to confirm my suspicion that this patient's chest pain is non-cardiac?

Physical exam / Labs / Other studies

Objective 2: Use of Risk Factors

Case 3: 62-year-old woman with chest pain

HPI: Progressive chest heaviness for 5 days, not sure if it is worse with exertion. **Sprained ankle, sedentary for 2 weeks.**

PMH: Known CAD with prior MI, HTN, DM, Obesity

Exam: T 98 BP 110/70 HR 90 RR 18 **O2 sat: 88% on RA**

JVP not elevated

Lungs clear

Heart sounds normal

Abdomen benign

No lower extremity edema **but pain and palpable cord in left calf**



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Objective 2: Use of Risk Factors

Case 3: 62-year-old woman with chest pain

Presentation possibly consistent with PE – now what?

- Arrange for immediate transport to ED
- Oxygen
- Consideration for heparin IV

Objective 2: Use of Risk Factors

Case 4: 49-year-old woman with chest pain

HPI: Stuttering chest pressure, mostly with physical activity, over the past 4 weeks.

PMH: Anxiety/depression, Obesity, Prior substance use

Exam: T 98 BP 110/70 HR 90 RR 12

JVP normal

Lungs clear

Heart sounds normal

Abdomen benign

No lower extremity edema



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Objective 2: Use of Risk Factors

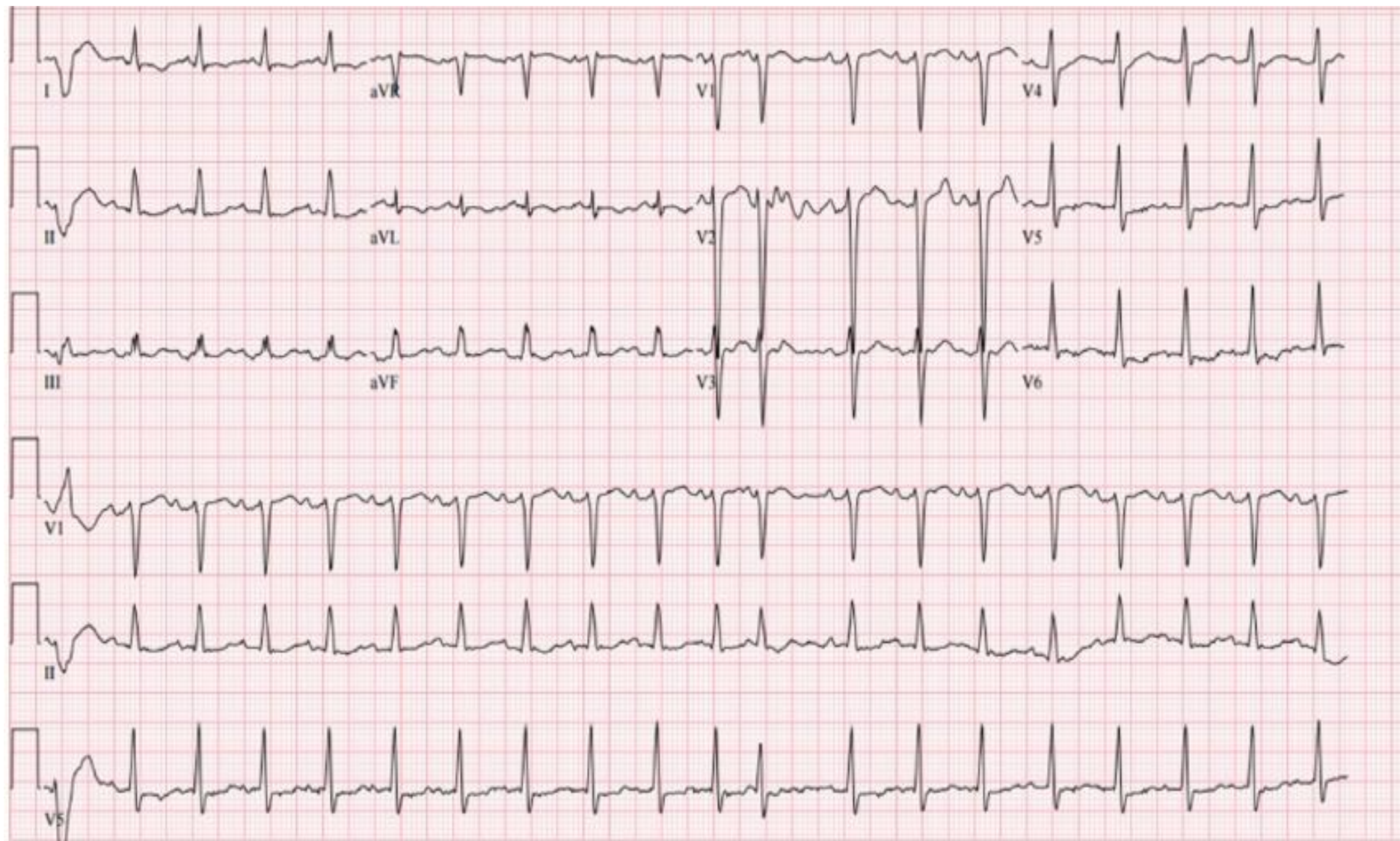
Case 4: 49-year-old woman with chest pain

What findings are consistent with a cardiac etiology?

What findings are consistent with a non-cardiac etiology?

What tests do I need to perform in order to confirm?

Objective 2: Use of Risk Factors



Objective 2: Use of Risk Factors

Case 4: 49-year-old woman with chest pain

HPI: Stuttering chest pressure, mostly with physical activity, over the past 4 weeks. **Has not seen a doctor in years.**

PMH: Anxiety/depression, Obesity, **Prior** substance use

Exam: T 98 BP 110/70 HR 90 RR 12

JVP normal

Lungs clear

Heart sounds normal

Abdomen benign

No lower extremity edema

Objective 2: Use of Risk Factors

Case 4: 49-year-old woman with chest pain

What further evaluations should I perform to evaluate this patient's presenting complaint?

Objective 2: Use of Risk Factors

Case 4: 49-year-old woman with chest pain

What further evaluations should I perform to evaluate this patient's presenting complaint?

- Tox screen
- Serial ECGs
- Cardiac biomarkers (transfer to tertiary care center)

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Objective 3: Tertiary Care Referral

Tertiary care needs to be considered for any patient with chest pain in whom a cardiac and/or pulmonary etiology is suspected

- **History**
- **Physical**
- **Diagnostic Studies**

Objective 3: Tertiary Care Referral

Tertiary care needs to be considered for any patient with chest pain in whom a cardiac and/or pulmonary etiology is suspected

History:

- Strong family history of heart disease
- Known history of CAD in patient
- Risk factors (e.g., HTN, DM) in patient
- Substance abuse

Objective 3: Tertiary Care Referral

Tertiary care needs to be considered for any patient with chest pain in whom a cardiac and/or pulmonary etiology is suspected

Physical:

- Hypoxemia
- Hypotension
- Tachycardia
- Exam consistent with decompensated heart failure
- Unremitting chest discomfort

Objective 3: Tertiary Care Referral

Tertiary care needs to be considered for any patient with chest pain in whom a cardiac and/or pulmonary etiology is suspected

Diagnostic studies:

- 12-lead ECG
- Bedside Ultrasound
- Blood work (cardiac biomarkers)

Case 5

HPI:

62-year-old woman with known panic disorder who presents after a series of panic attacks following an argument with her husband. No prior exertional symptoms. Denies chest discomfort or dyspnea at any point.

PMH:

Cerebral palsy

Panic disorder

Type 2 DM, on oral meds (excellent control)

Exam:

Ht 5'1" Wt 126lbs BP 96/60 HR 90 RR 12

JVP: 9cm

Lungs: crackles at bases, good air movement

Card: reg S1S2 noS3S4 no rubs or murmurs

Abd: benign

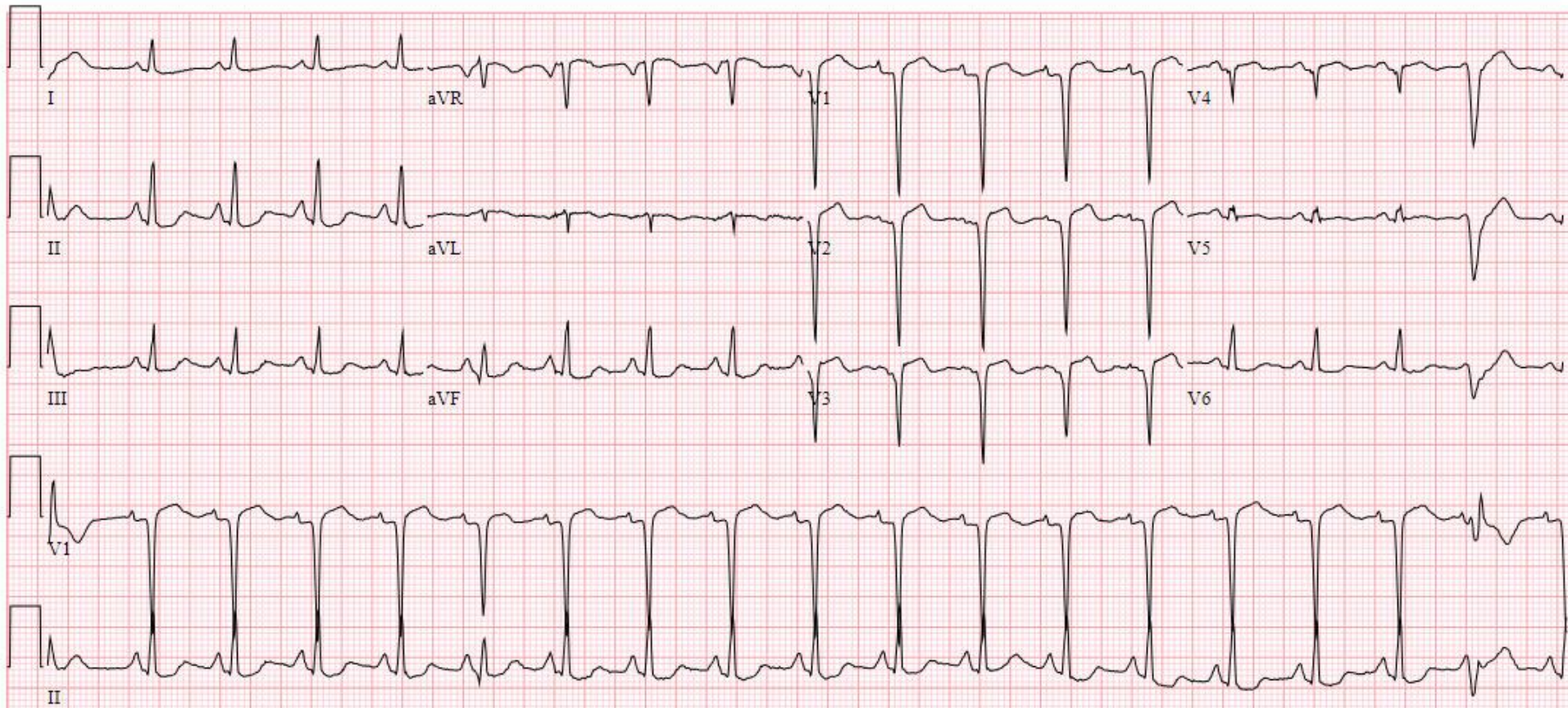
Extr: +1 edema to ankles bilaterally



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Case 5



Question 4

Which of the following represents the most appropriate next step in the management of this patient:

- A. Start aspirin and re-assess symptoms and repeat ECG.
- B. Start aspirin and beta blocker and re-assess symptoms and repeat ECG.
- C. Start aspirin and arrange for transfer to a tertiary care center.
- D. Start aspirin and beta blocker and arrange for transfer to a tertiary care center.

Question 4

Which of the following represents the most appropriate next step in the management of this patient:

- A. Start aspirin and re-assess symptoms and repeat ECG.
- B. Start aspirin and beta blocker and re-assess symptoms and repeat ECG.
- C. Start aspirin and arrange for transfer to a tertiary care center.
- D. Start aspirin and beta blocker and arrange for transfer to a tertiary care center.

Case 5: ED Evaluation

Exam and ECG:

No significant change from prior

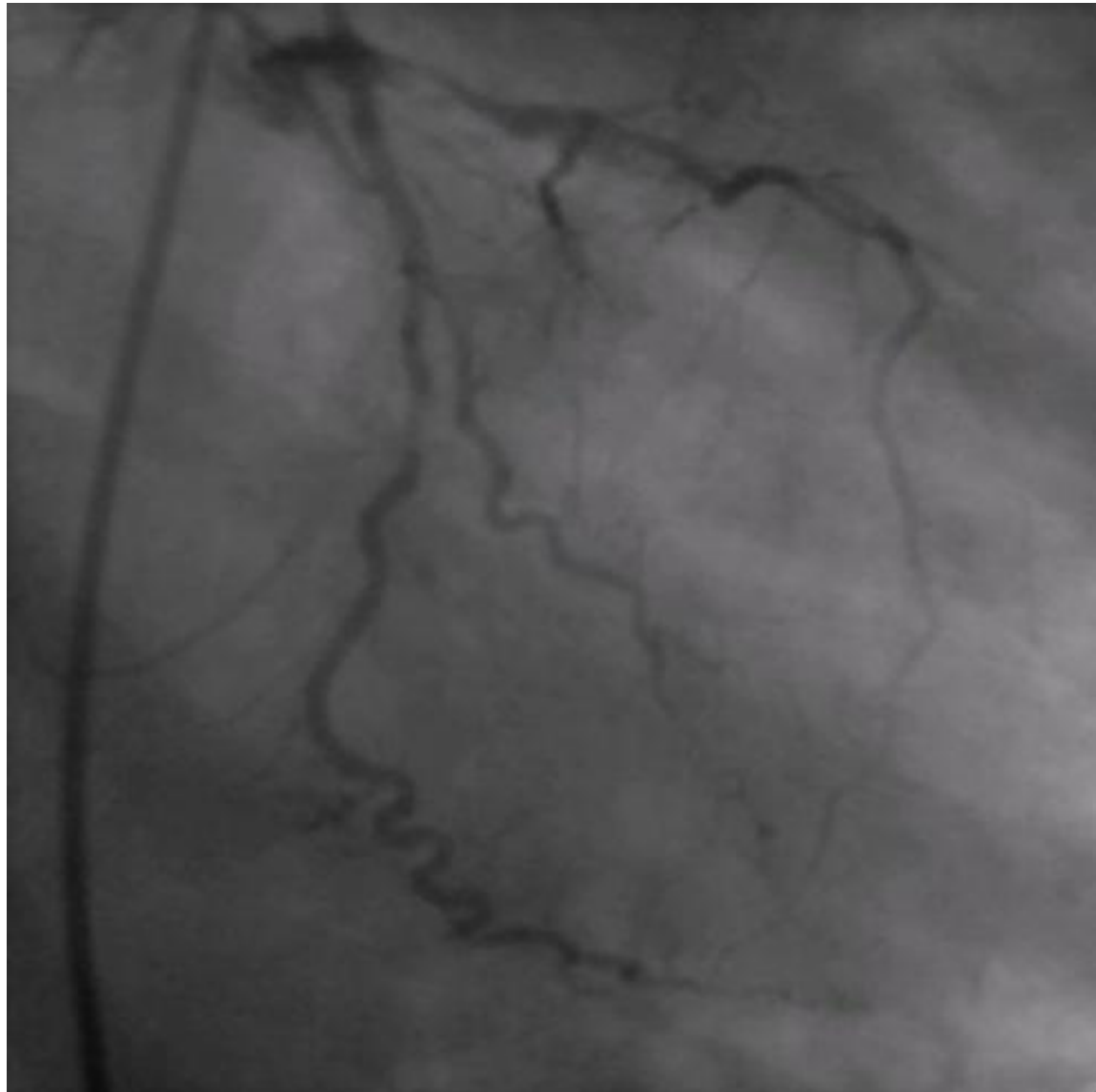
Labs:

CK	6756 (H)
CK-MB	491.5 (H)
TnI	17.51 (H)
ALT/SGPT	54 (H)
AST/SGOT	422 (H)
ALKP	68
TBILI	0.2
DBILI	0.0

TTE:

LVEF 35% with anterior wall hypokinesis

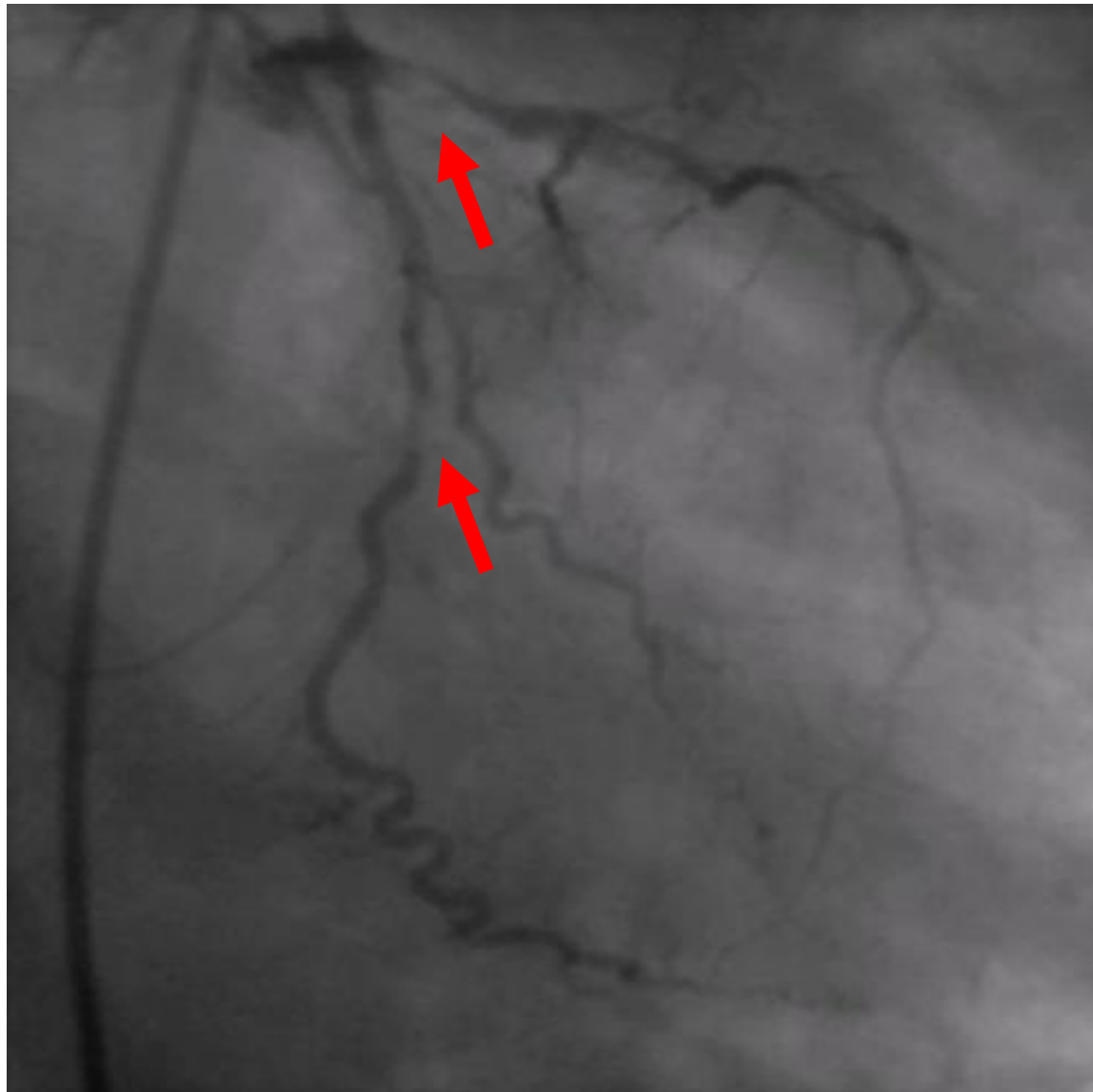
Case 5: Coronary Angiogram



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Case 5: Coronary Angiogram



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Case 2

- PCI performed for the culprit lesion in distal left main / proximal LAD
- Improvement in symptoms noted
- ST segment abnormalities improved
- LVEF improved to 45% on repeat TTE

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Thank you



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