



# 5 CAN'T MISS

# EKGs

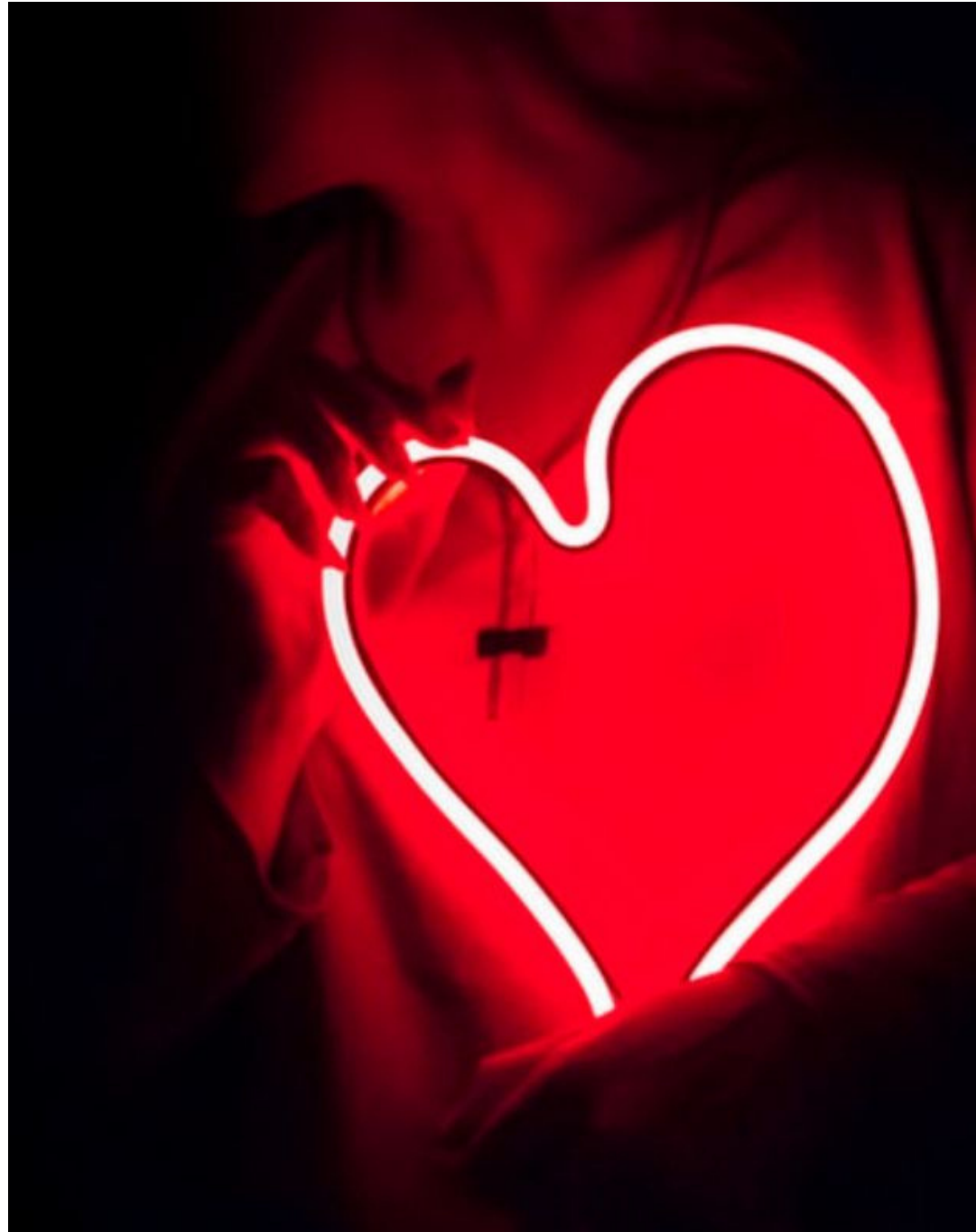


Faculty: Jennifer Carlquist, PA-C

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# DISCLOSURES



## **Teach EKG Courses to Zoll Lifevest**

- No real faces or patients in this presentation



**Room 1,  
Phil**







# CASE #1

**“Chest Pain”**

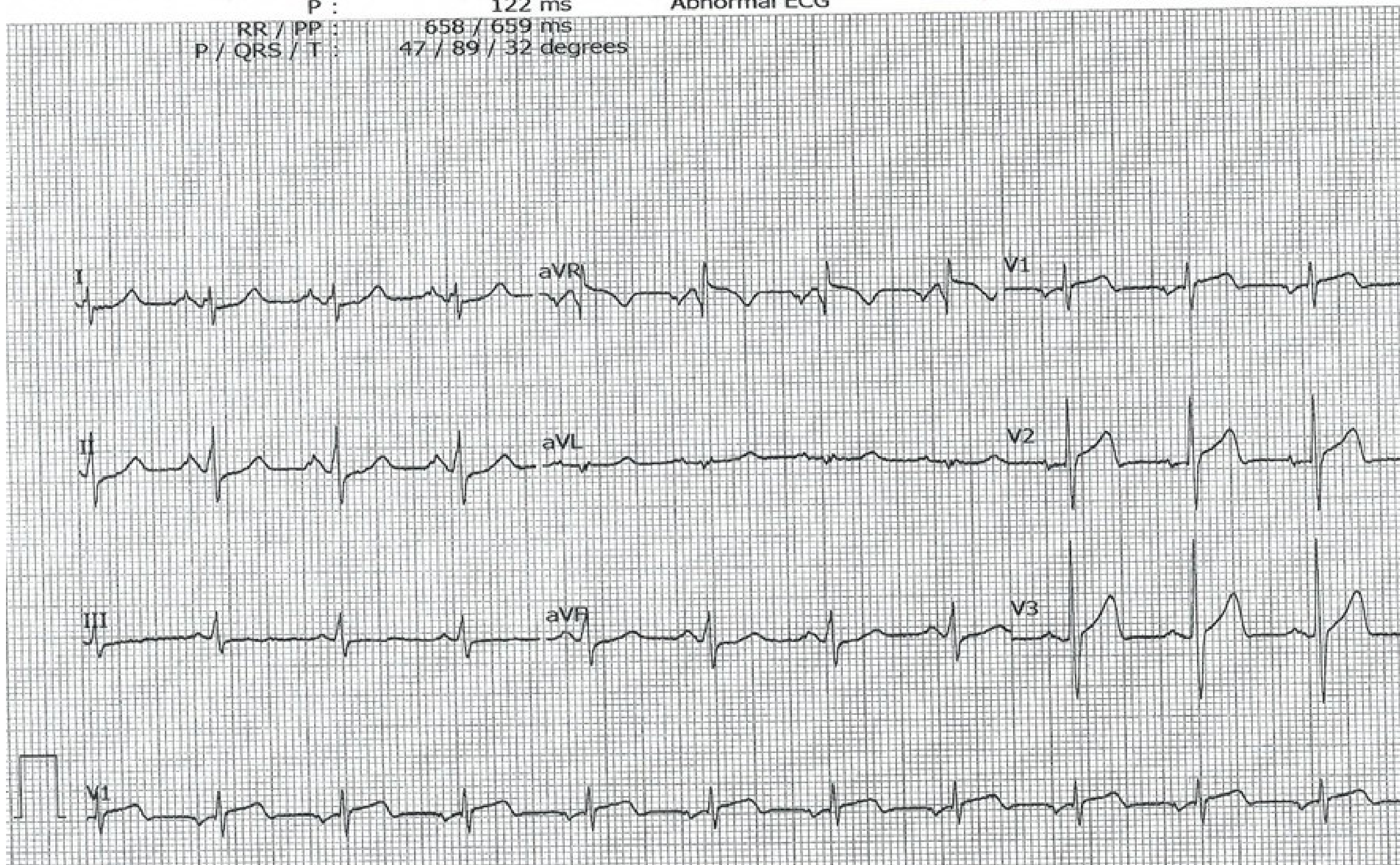
**Status:**

**Won't go to ER**



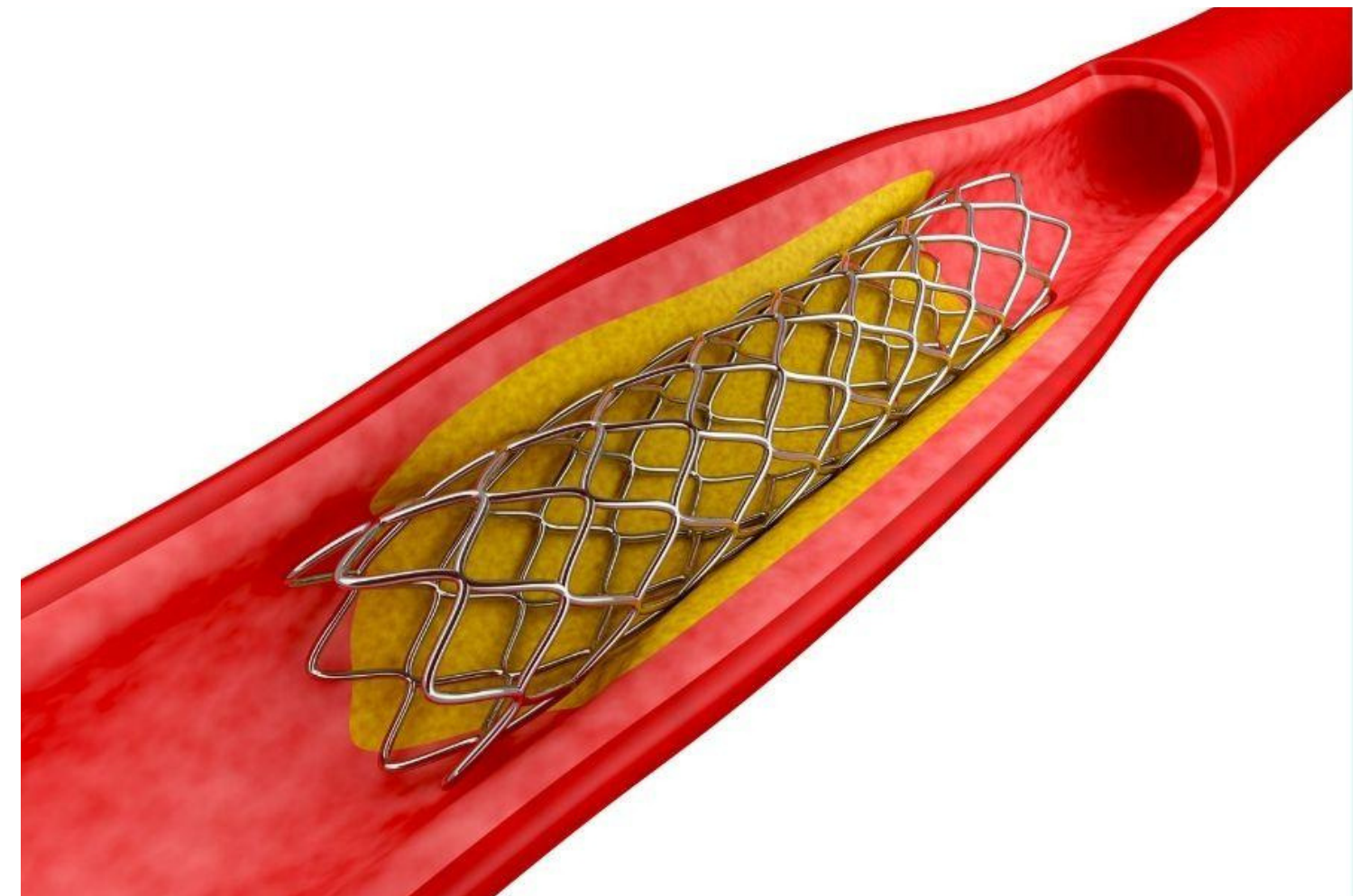
QRS : 80 ms  
QT / QTcBaz : 348 / 428 ms  
PR : 144 ms  
P : 122 ms  
RR / PP : 658 / 659 ms  
P / QRS / T : 47 / 89 / 32 degrees

Normal sinus rhythm  
Possible Left atrial enlargement  
ST & T wave abnormality, consider lateral ischemia  
Abnormal ECG



# CASE PROGRESSION

Goes to the cath lab:  
Stent to **Circumflex, LAD**





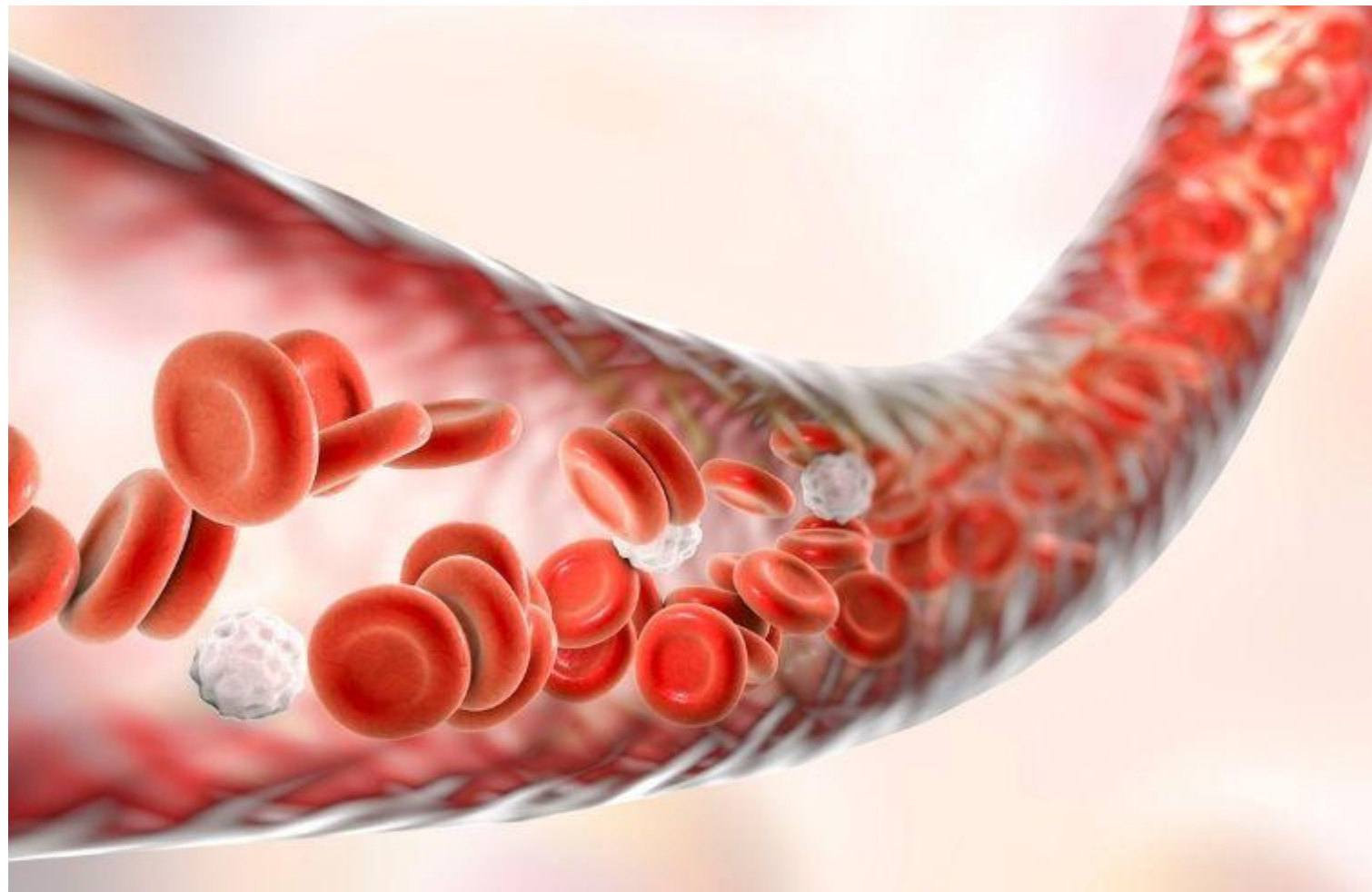
# THE NEXT DAY...



**"Rapid Response  
Heart Center"**

# CODE **STEMI** CALLED

**Circumflex:**  
Restented



**LAD:** Couldn't  
reopen



# THE NEXT DAY....

**RAPID**  
**RESPONSE!!!**



# WHAT IS **WRONG** NOW?

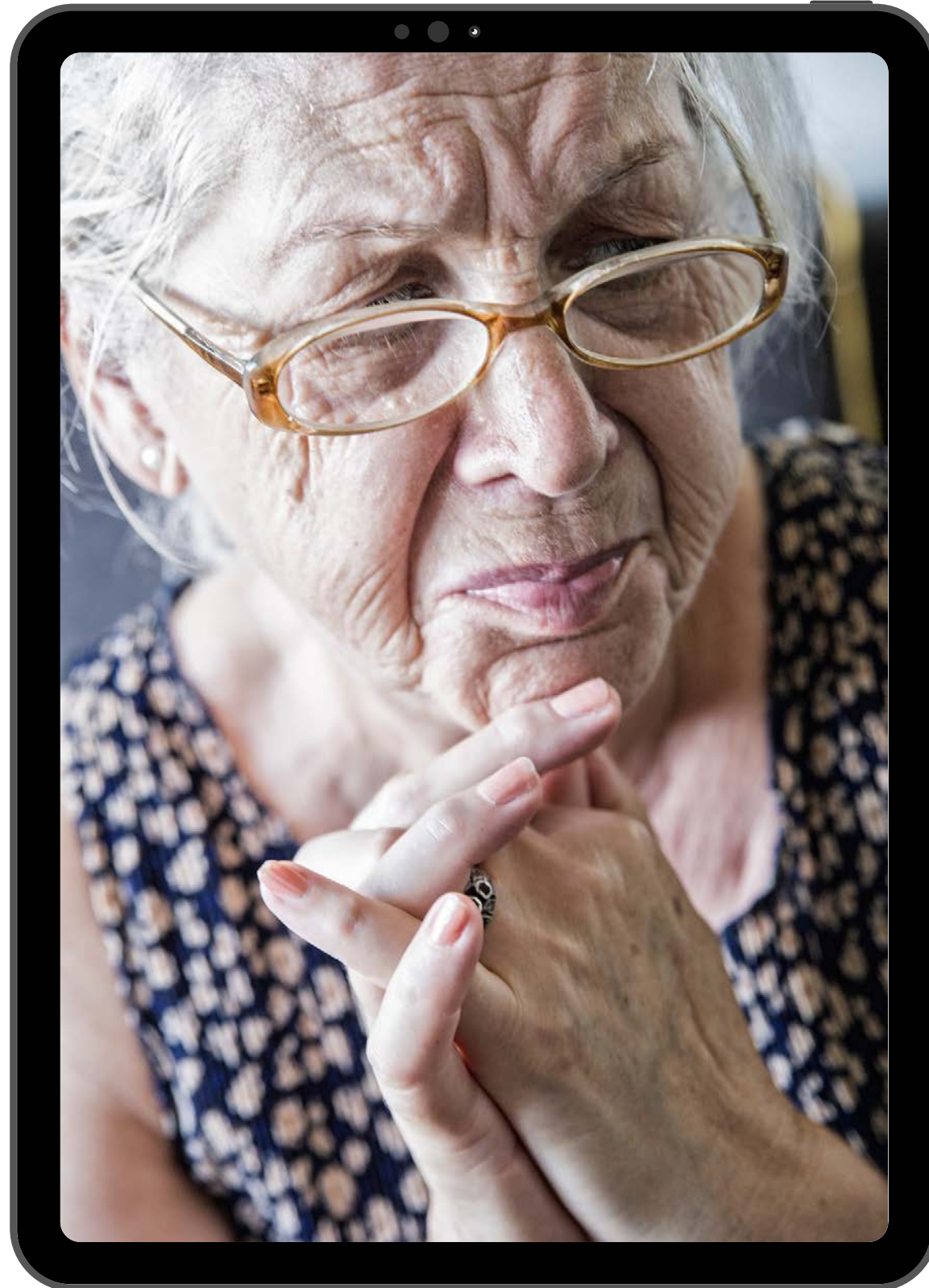






**Room 2,  
Roberta**





# CASE #2

89 Y/O FEMALE

## "Chest Pain"

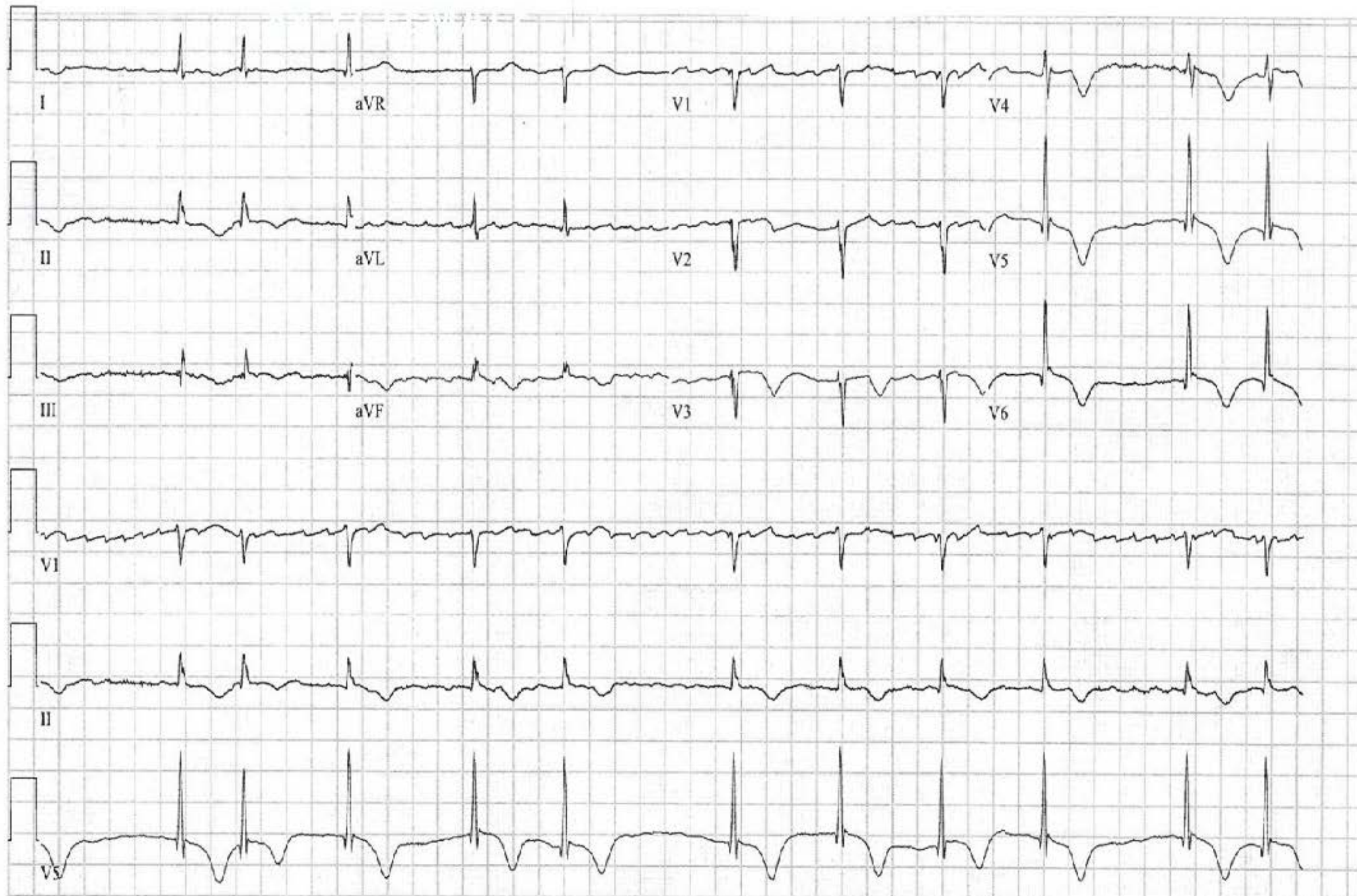
Feels dizzy with dyspnea, feels unwell

**Pmhx:** DM, HTN

**Meds:** Lisinopril, ASA, Metformin

**vs:** 118/90 (post meds) was 170/110





# ECHO

- Left ventricular distal-apical akinesis.
- Normal left ventricular chamber size with normal systolic function with EF 32%.
- Moderate concentric left ventricular hypertrophy.
- Indeterminate left ventricular diastolic function due to atrial fibrillation.
- Normal right ventricular chamber size with normal systolic function.
- Mildly dilated left atrium and normal sized right atrium. Moderate mitral regurgitation.
- Right ventricular systolic pressure of 32 mm Hg consistent with normal
- pulmonary artery pressure.
- No pericardial effusion.







# CASE #3

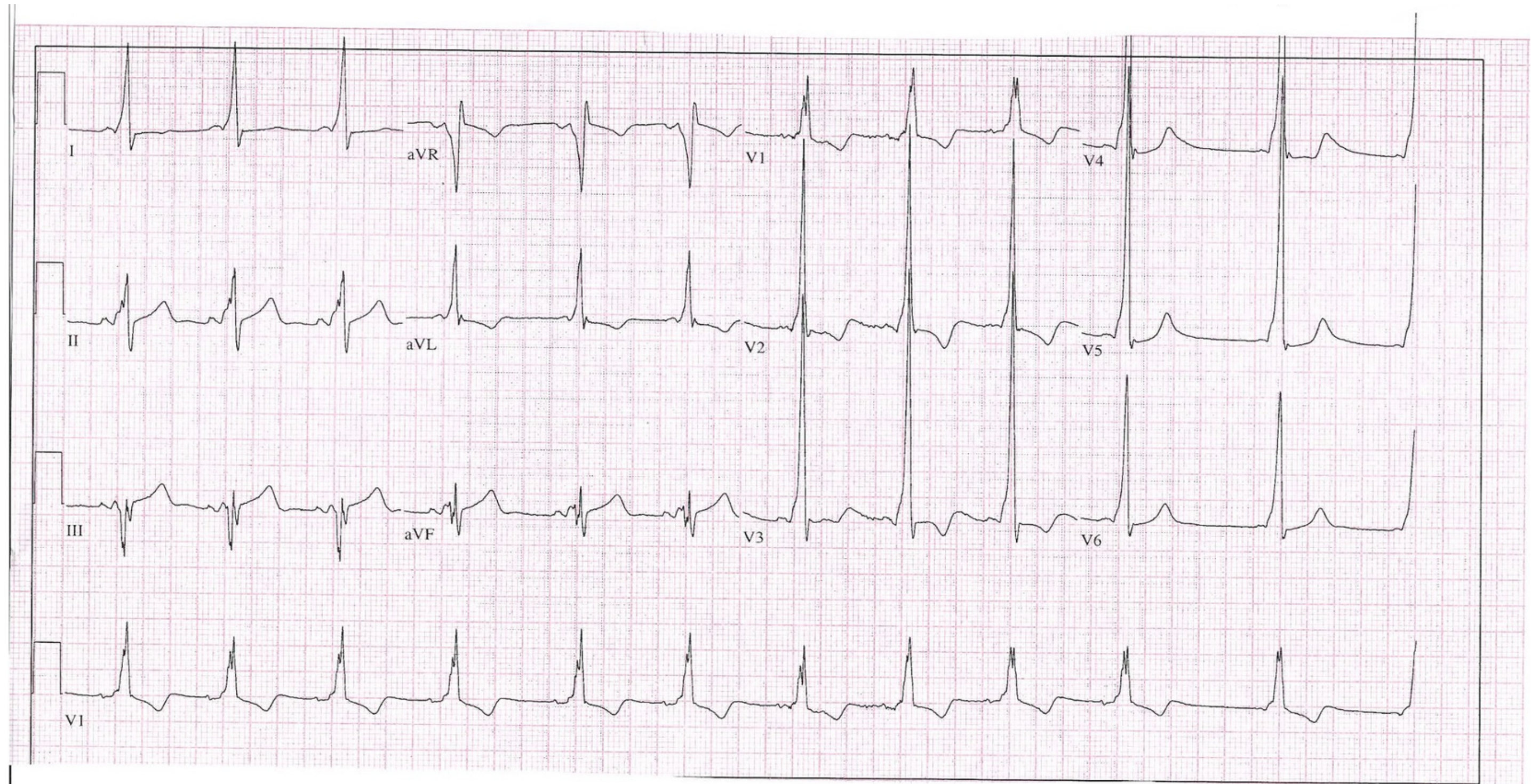
MARY

**“Anxiety  
follow up”**

Status:  
Still anxious

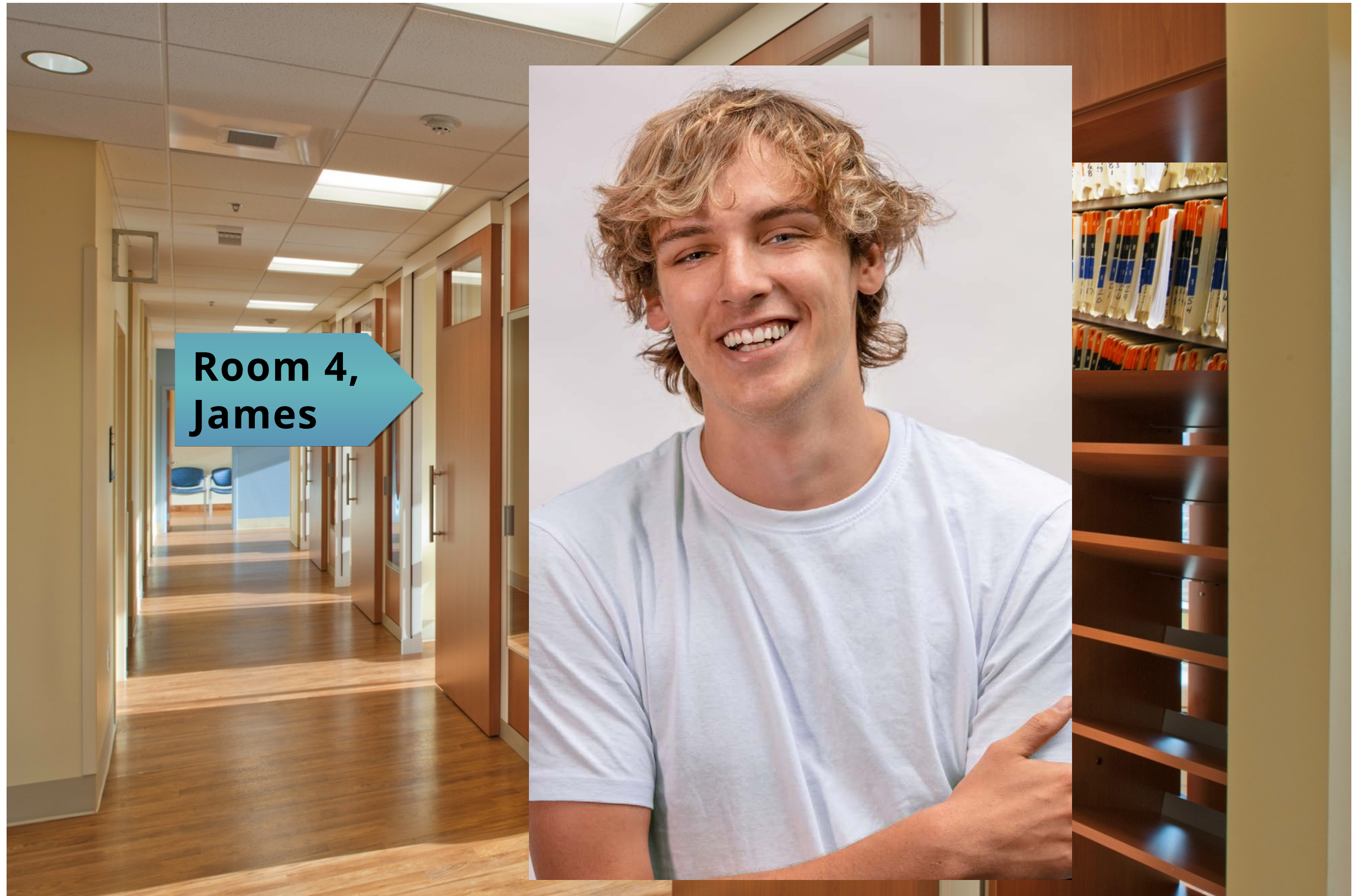


# “MARY’S” EKG





**Room 4,  
James**







# CASE #4

**JAMES**

**“Sports physical”**

“I really wanna  
play, can you just  
sign this form?”



# DIFFERENTIALS

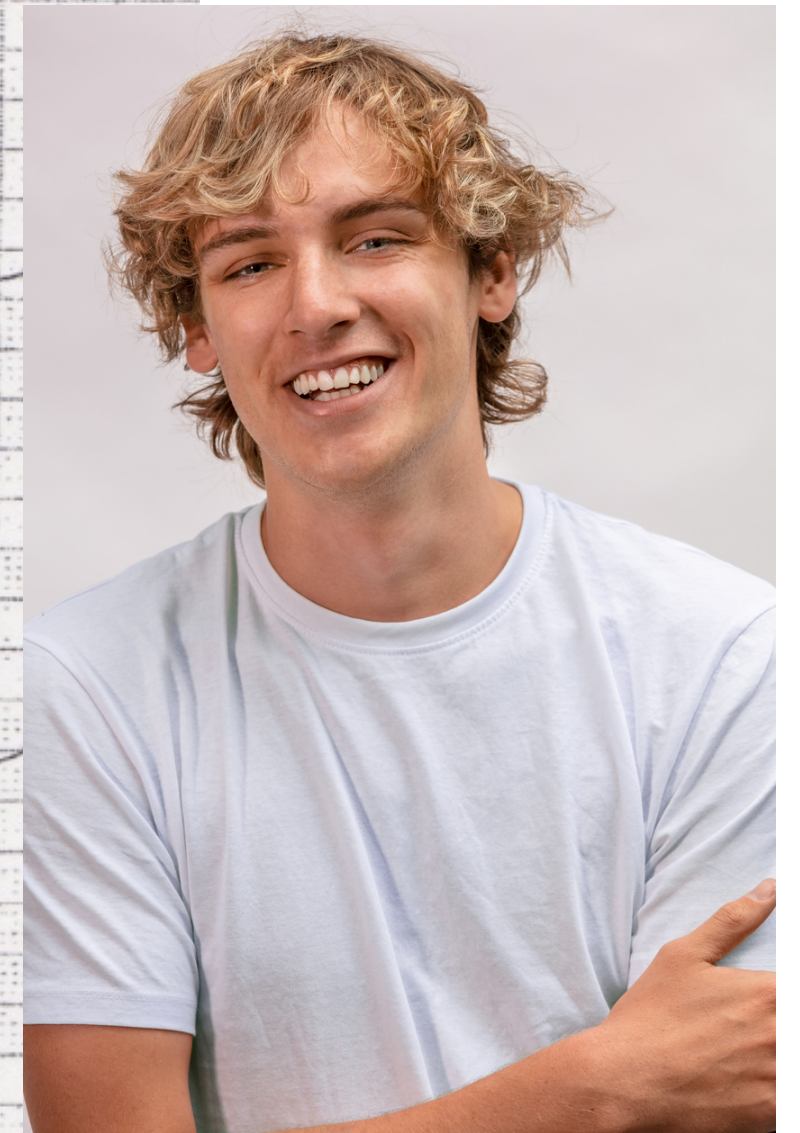
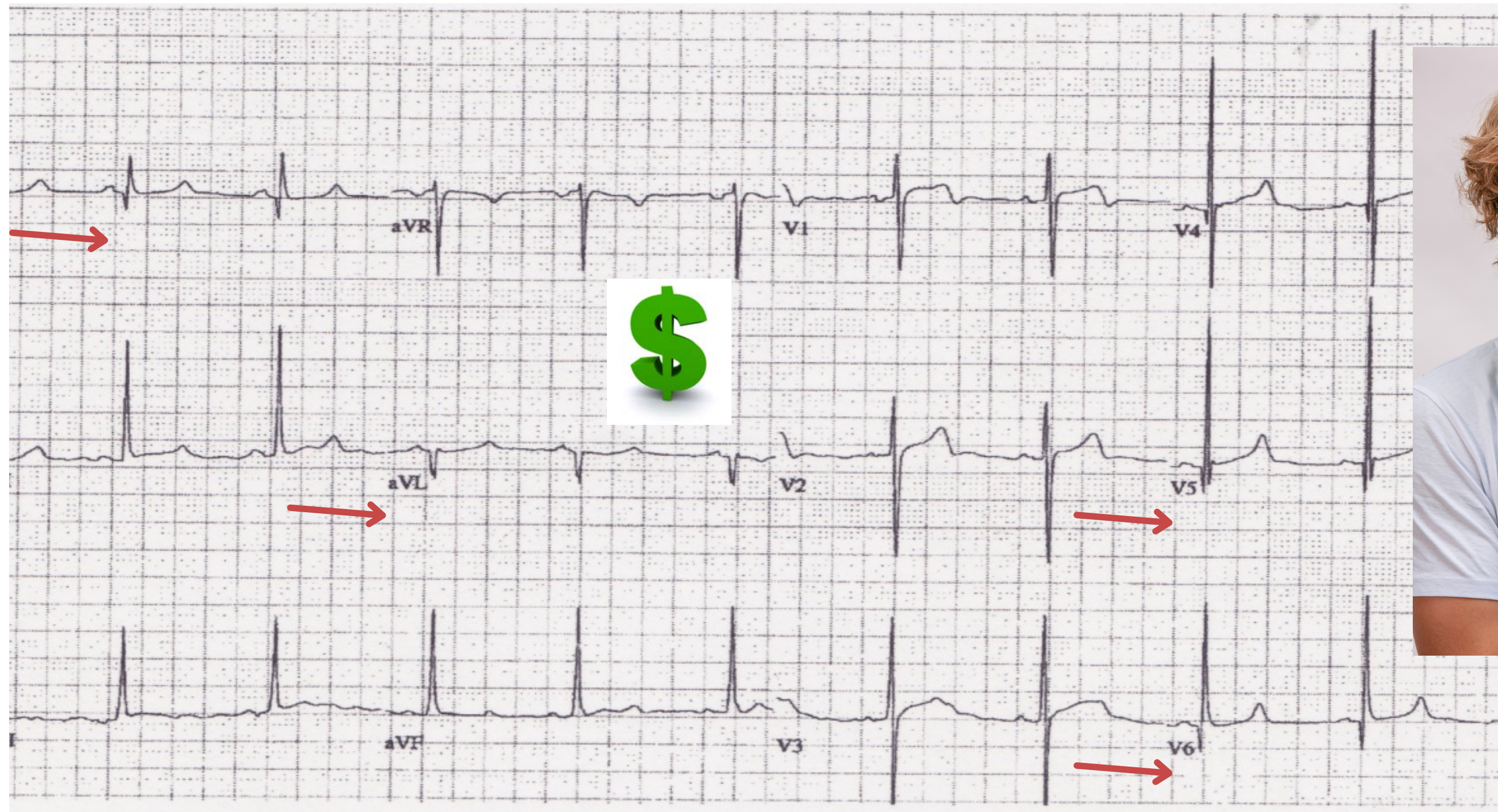
- **“Lightheaded with running”**
- **Syncopal episode**
- **Chest tightness with running**
- **Occasional dyspnea, dizziness with exertion**
- **“ I feel fine. Really.”**

# HIS EXAM

- **Long midsystolic murmur, rough.**
- Heard best close to the sternum, toward the apex, left 4<sup>th</sup> intercostal space.
- Louder with standing or valsalva. Squatting widens the outflow tract and makes it softer.



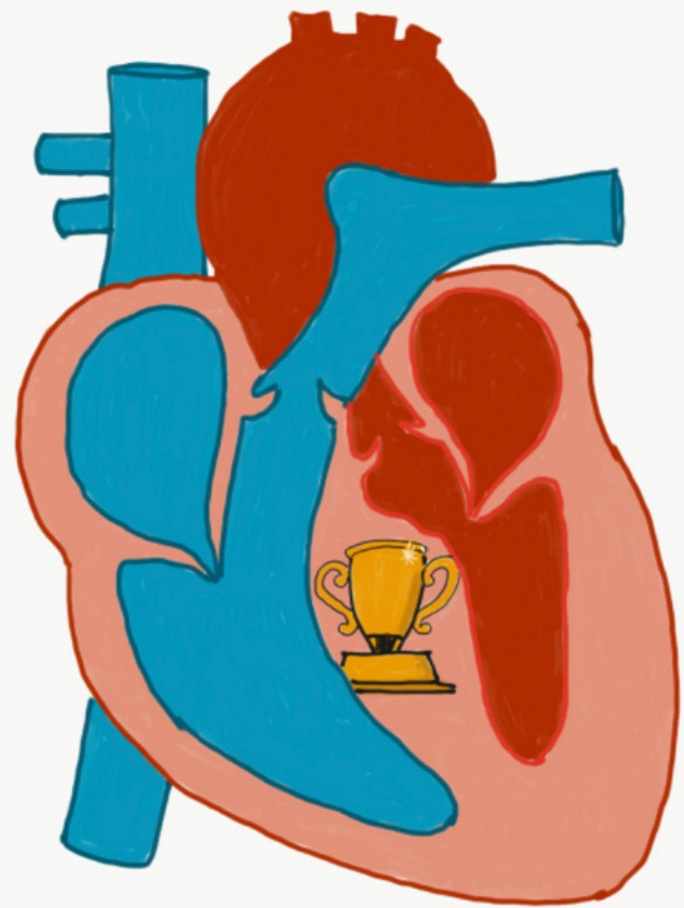
# JAMES – THE EKG



Electrocardiogram image reprinted from *The American Journal of Emergency Medicine*, Vol. 24/Issue 1, Brian S. Kelly, Amal Mattu, William J. Brady, Hypertrophic cardiomyopathy: electrocardiographic manifestations and other important considerations for the emergency physician, Pages 72-79, Copyright (2007), with permission from Elsevier.



# WHEN IS IT USUALLY DIAGNOSED?

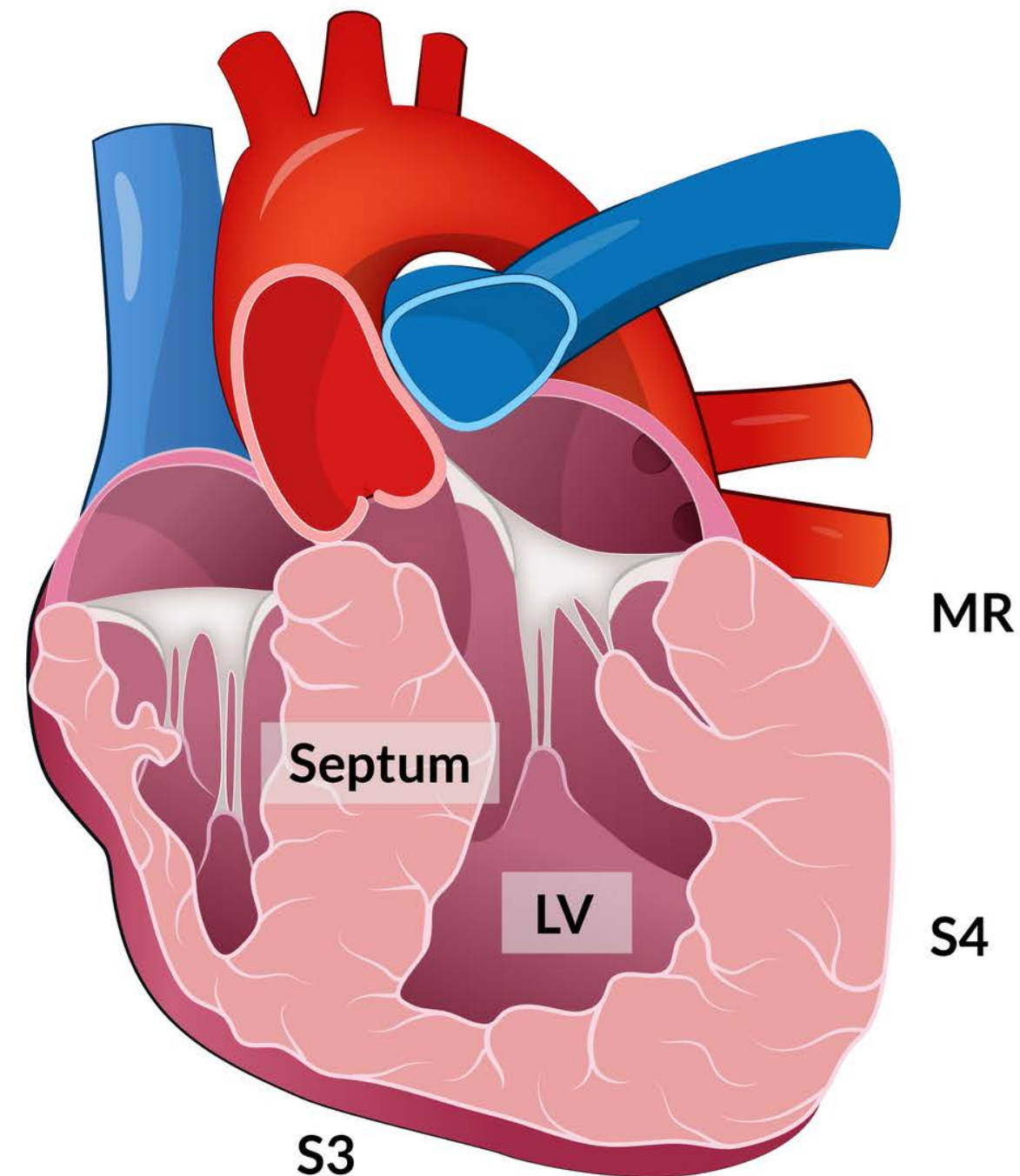


**Autopsy!!!**

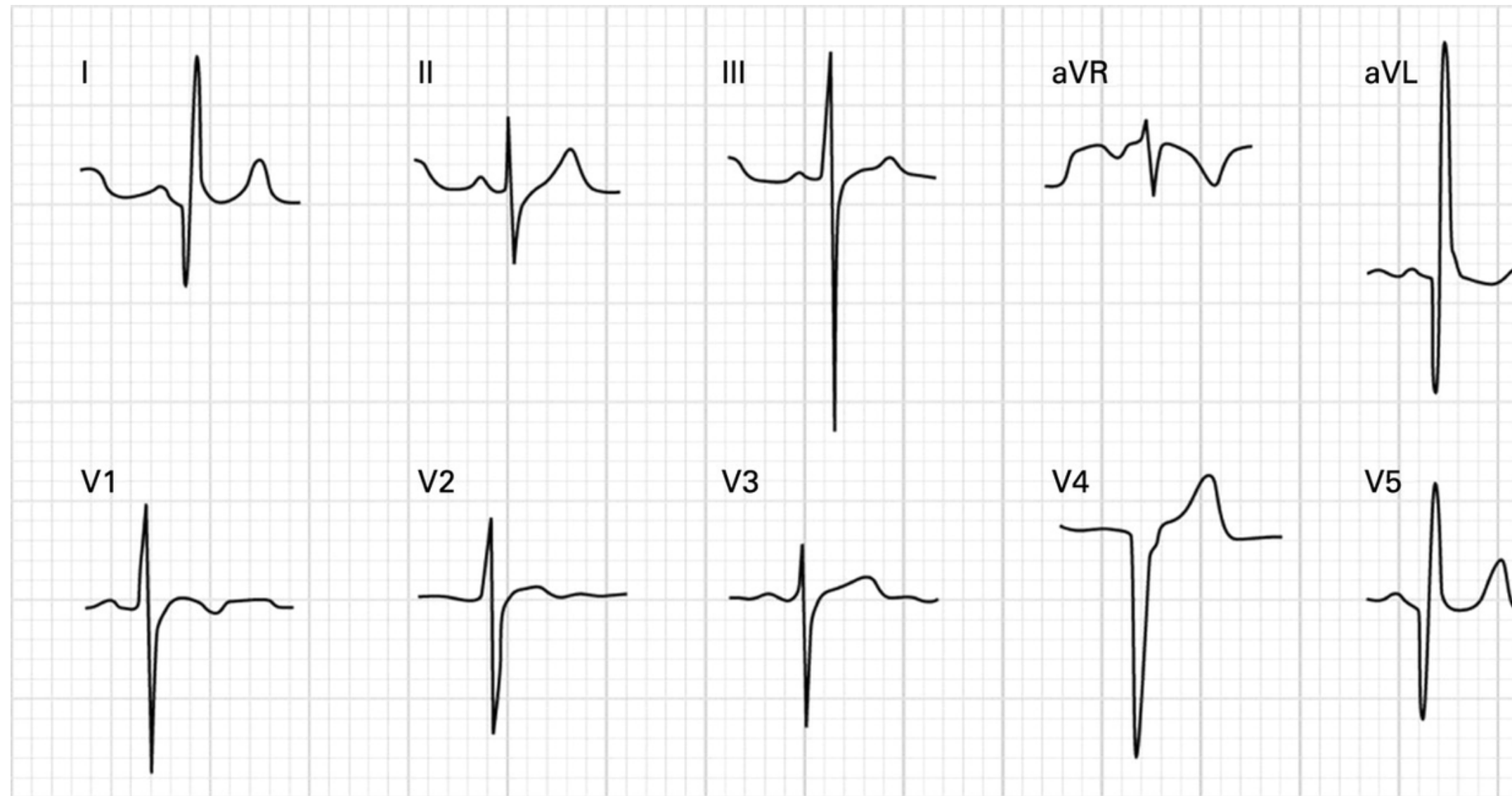


# SOMETHING IS IN THE WAY.

- **Syncope**
- **Chest pain**
- **DOE**
- **Dyspnea at rest**
- **Palpitations**



# HOCM CLUES



- DOE in a young patient
- Athlete syncopal during exercise
- Palpitations, orthopnea



**"You have a  
walk in..."**

**Hallway,  
Russell**







# RUSSELL — ROOM #3

"I have chest pain"  
This feels like my last  
heart attack.  
"weak and short of  
breath".



Vent. rate	96	BPM
PR interval	216	ms
QRS duration	96	ms
QT/QTc	376/475	ms

SINUS RHYTHM WITH 1ST DEGREE A-V BLOCK  
MARKED ST ABNORMALITY, POSSIBLE ANTERSEPTAL SUBENDOCARDIAL INJURY  
ABNORMAL ECG  
NO PREVIOUS ECGS AVAILABLE







**Room 4,  
Kevin**



# CASE #5

**KEVIN**

- Urgent Care Visit: "palpitations"
- Mom just wants to "be safe"







- VS: 110/90, 75. RR 20. T 98.8.
- No history.

“Will this  
take long?”





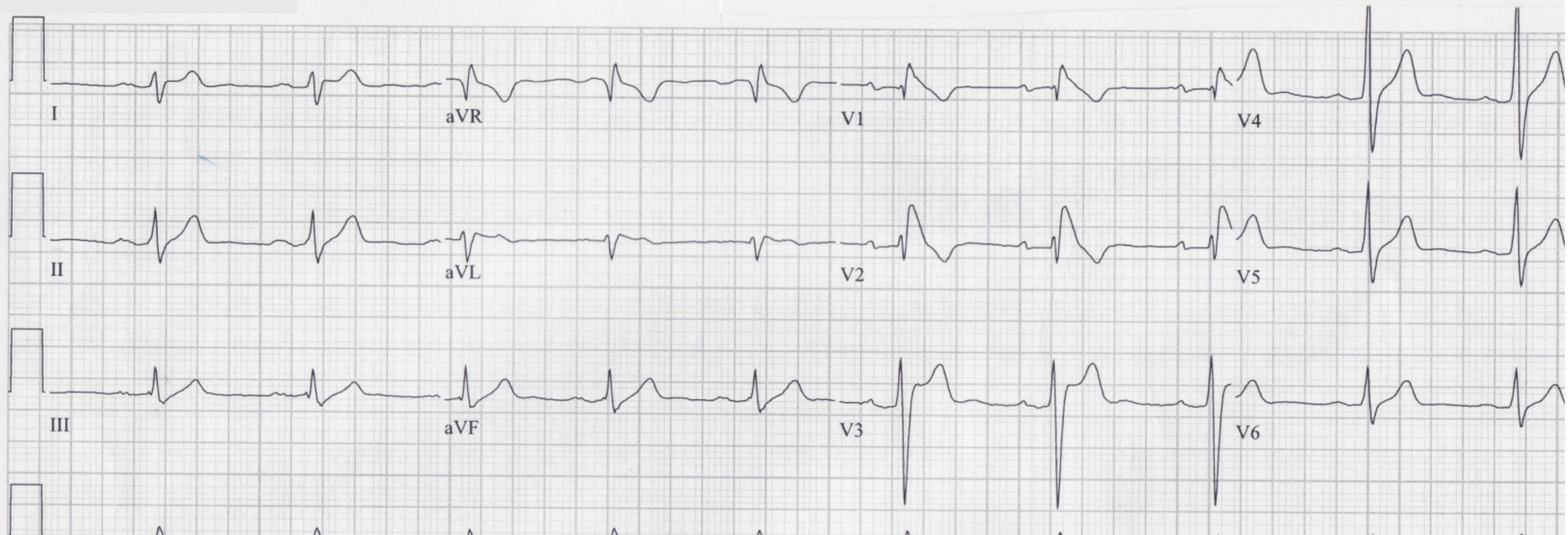
# ANY RED FLAGS?

- “Racing heart” X 30 seconds at 1100 today
- Felt like he was going to die. Called his mom.
- Feels better now. Had 3 episodes yesterday.
- His uncle died of “something wrong with his heart” last year at age 36.
- Mom just wants to “be safe”.

# “THAT’S ODD...”

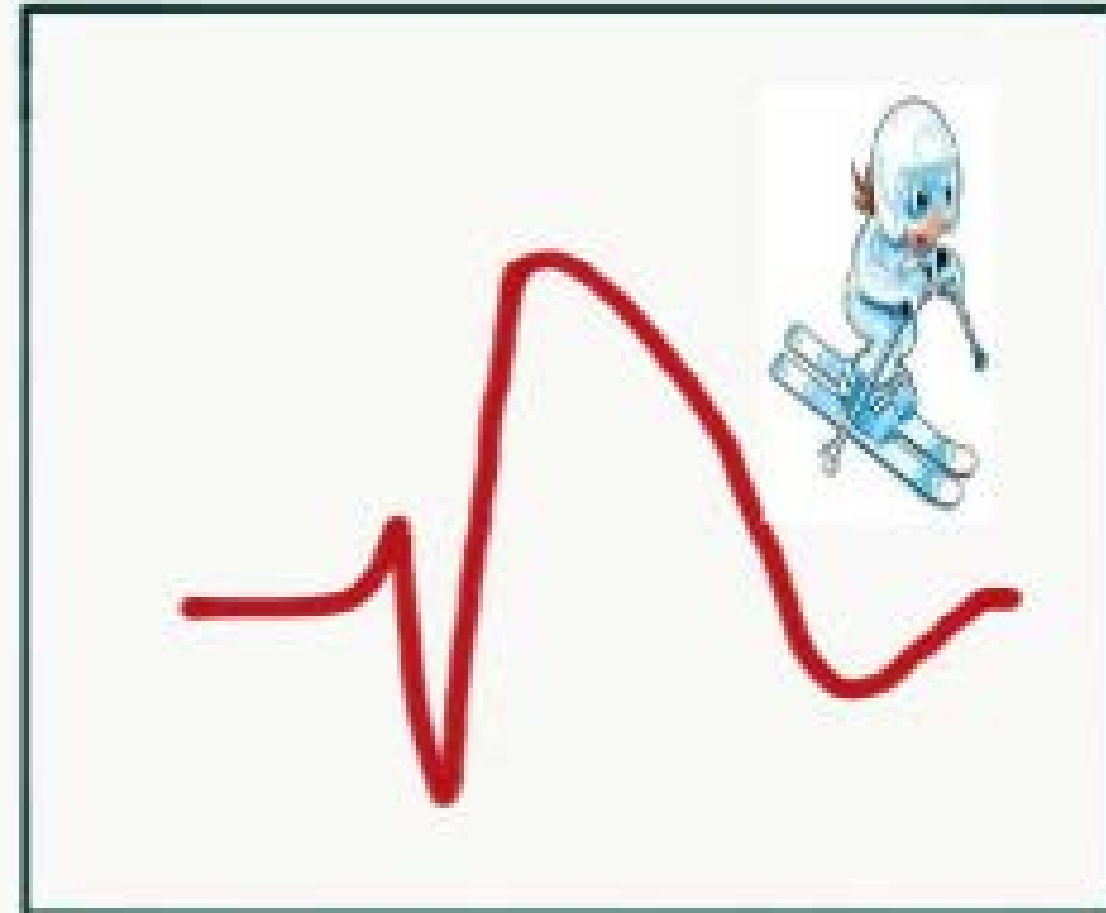
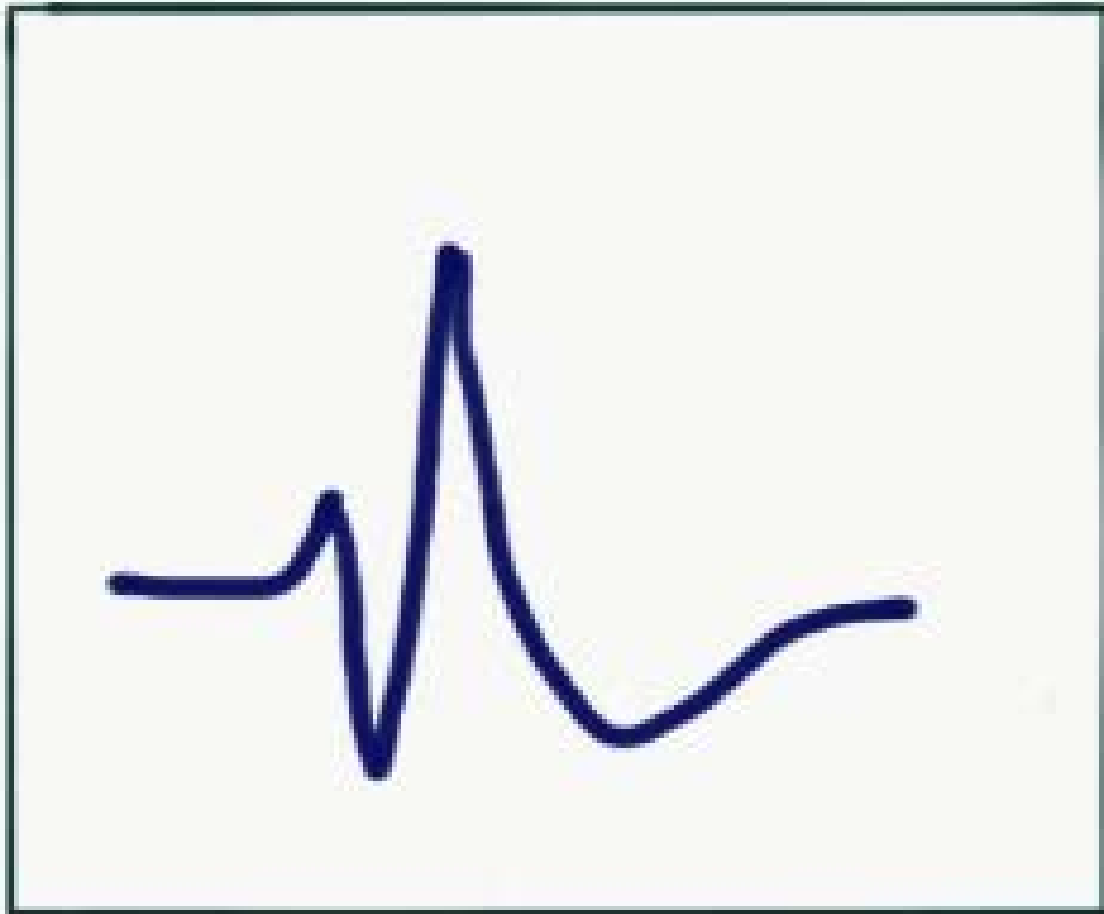
Vent. rate	62	BPM
PR interval	208	ms
QRS duration	112	ms
QT/QTc	386/391	ms
P-R-T axes	51 102	56

NORMAL SINUS RHYTHM  
INCOMPLETE RIGHT BUNDLE BRANCH BLOCK  
POSSIBLE RIGHT VENTRICULAR HYPERTROPHY  
ABNORMAL ECG  
NO PREVIOUS ECGS AVAILABLE





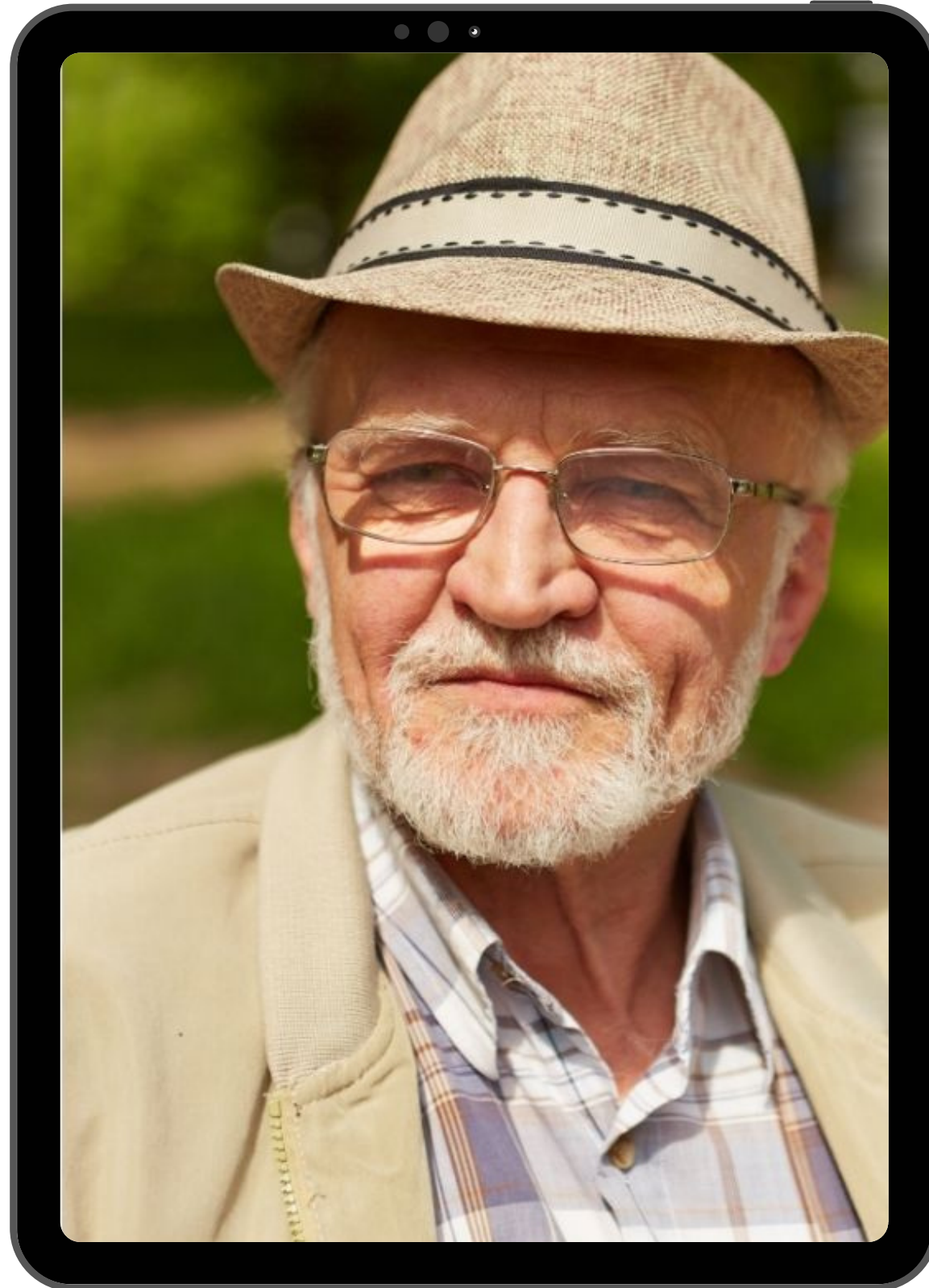
**RBBB**



**Brugadas**

# CASE #6

**68 Y.O. MALE WITH CHEST PAIN  
X 2 DAYS RADIATES INTO SHOULDERS**



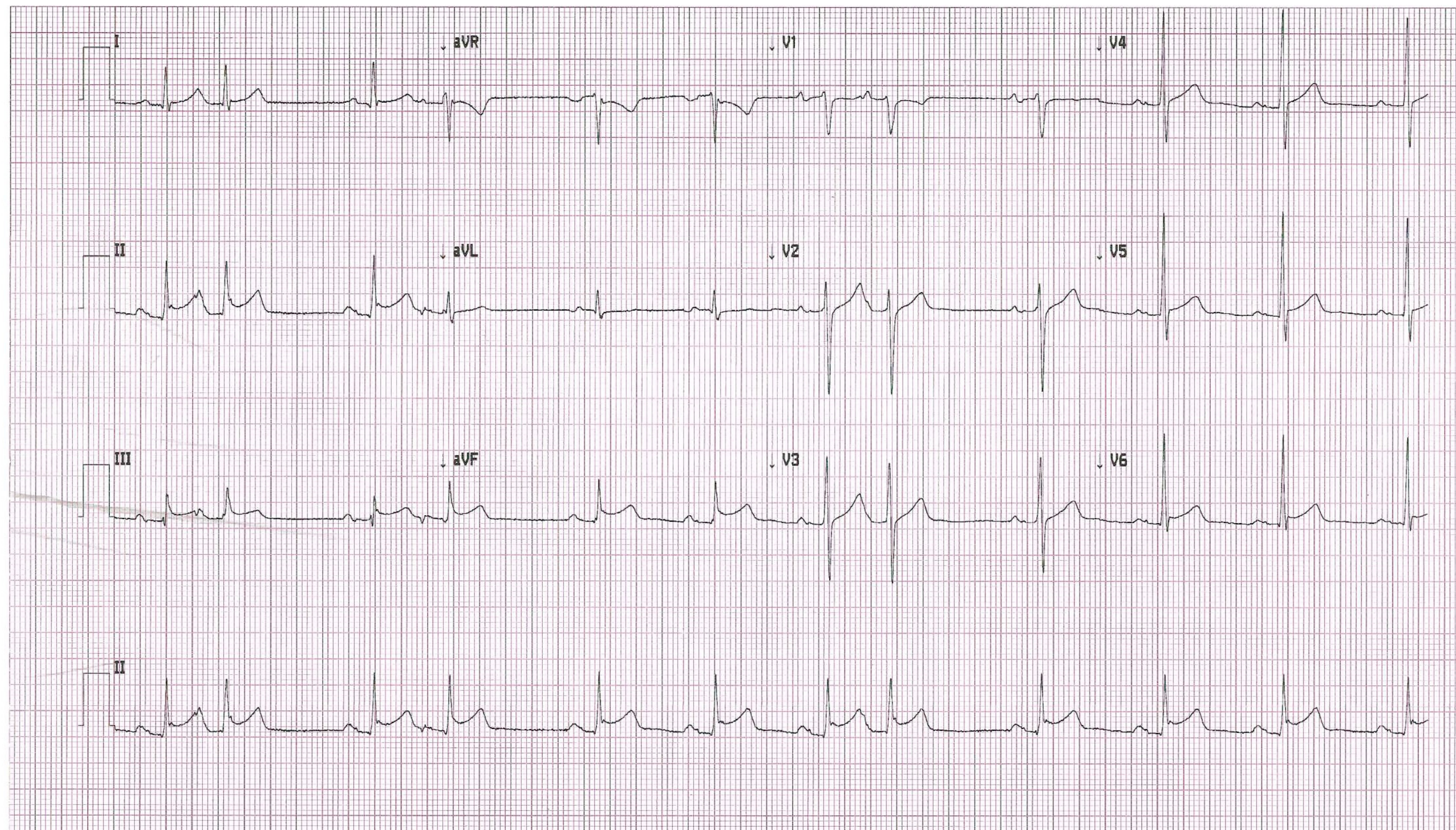
**"I'm just here for an  
EKG – I want to make  
sure I am okay"**

**"I got better with  
Motrin."**



Vent rate 70 BPM  
PR int 197 ms  
QRS dur 97 ms  
QT/QTc 376/397 ms  
P-R-T axes 59 51 59

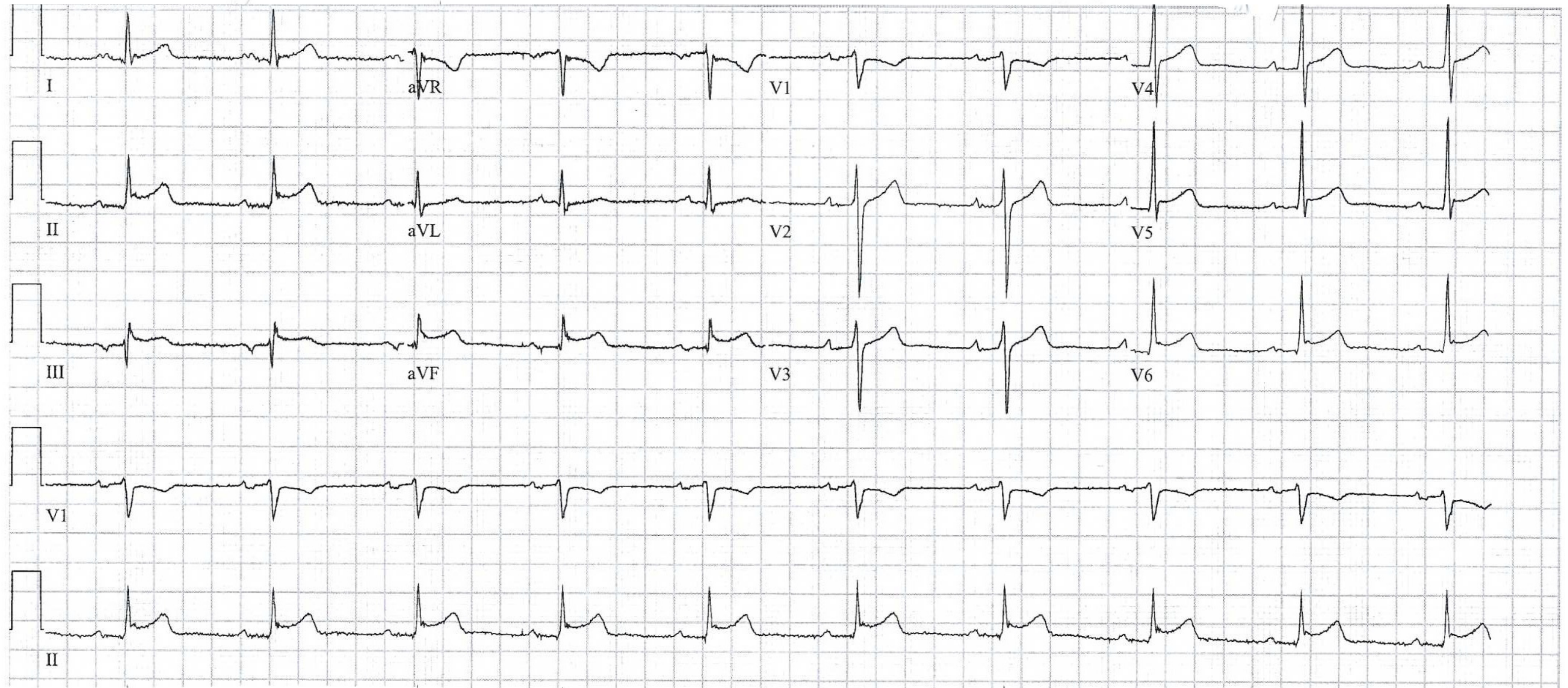
SINUS RHYTHM WITH OCCASIONAL SUPRAVENTRICULAR PREMATURE COMPLEXES  
ST ELEVATION, CONSIDER INFERIOR INJURY [MARKED ST ELEVATION W/O NORMALLY INFLECTED T WAVE  
IN II/aVF]  
\*\*\*ACUTE MI\*\*\*  
UNCONFIRMED REPORT





Vent. rate	59	BPM
PR interval	196	ms
QRS duration	94	ms
QT/QTc	386/382	ms
P-R-T axes	2 33	50

SINUS BRADYCARDIA  
POSSIBLE ACUTE PERICARDITIS  
ABNORMAL ECG  
WHEN COMPARED WITH ECG OF 02-FEB-2016 10:57,  
ST ELEVATION NOW PRESENT IN INFERIOR LEADS  
ST ELEVATION NOW PRESENT IN LATERAL LEADS





# MEDS



- Metoprolol 12.5 mg bid
- Eliquis 5 mg
- Propefenone 225
- Lisinopril 20 mg qd
- Zetia

**Vitals:** 138/80, pulse ox 98% RR 18 pulse 80



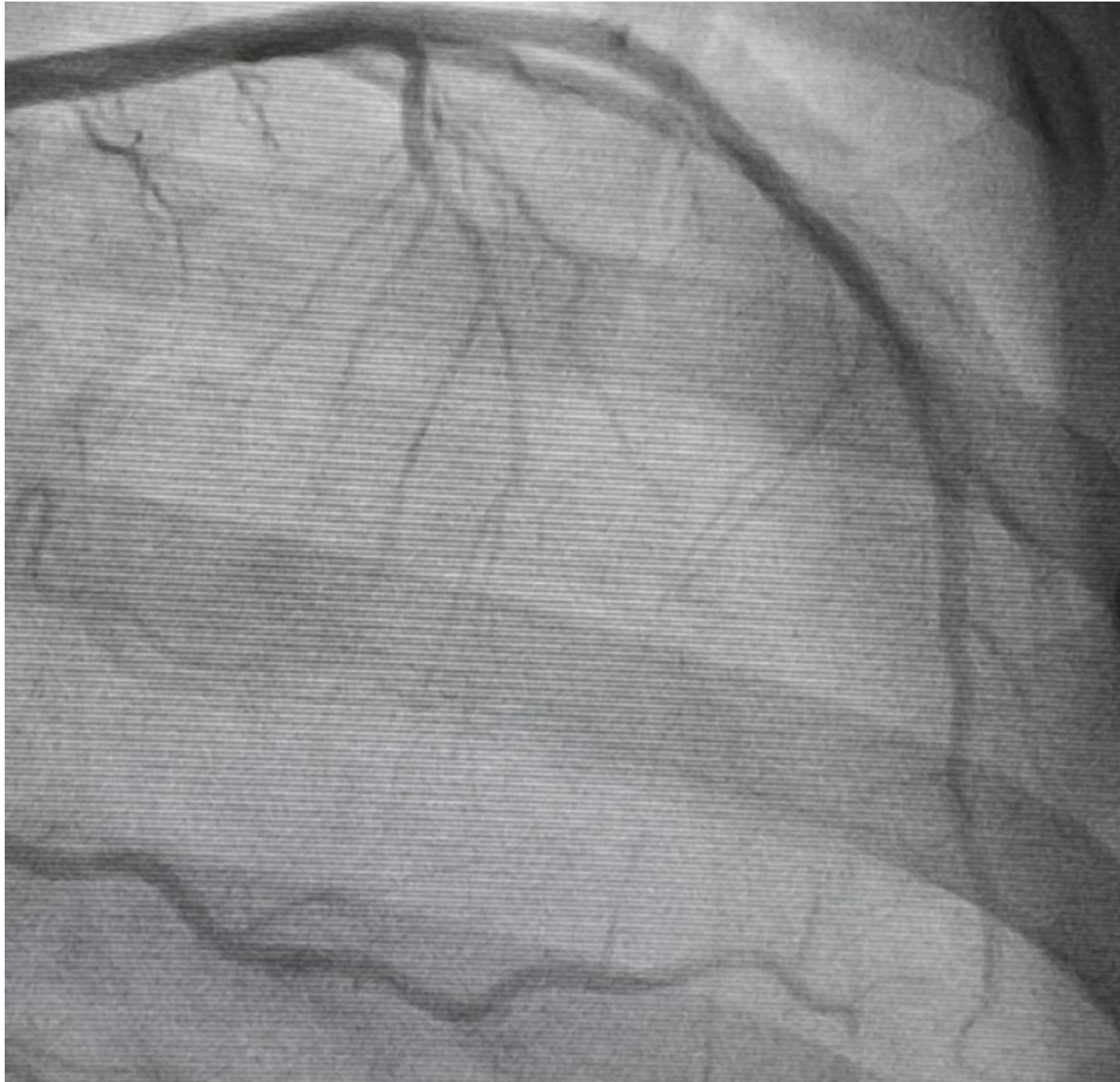
# LABS



- **Wbc:** 11.1
- **HGB:** 14.1
- **Trop:** negative



# CATH REPORT



**EF: 65**

**Circ: 20%**

**RCA 10%**

**Lmain widely  
patent**

**LAD 10%**

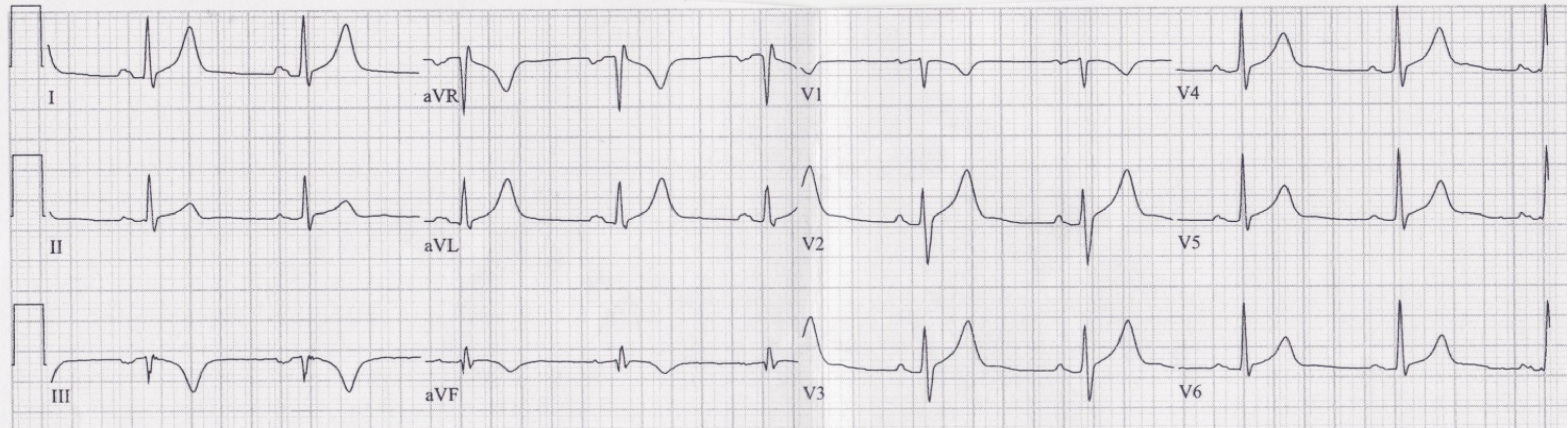




# MARY'S POST ABLATION EKG

Vent. rate	57	BPM
PR interval	168	ms
QRS duration	94	ms
QT/QTc	430/418	ms
P-R-T axes	-2 4	-14

SINUS BRADYCARDIA  
POSSIBLE INFERIOR INFARCT , AGE UNDETERMINED  
ABNORMAL ECG  
WHEN COMPARED WITH ECG OF 06-APR-2011 06:56,  
WOLFE-PARKINSON-WHITE IS NO LONGER PRESENT  
7:27 AM





# CASE OUTCOME: JAMES

- DX: HOCM
- Sports physical not signed.
- Benched.



**Prognosis:  
Guarded**

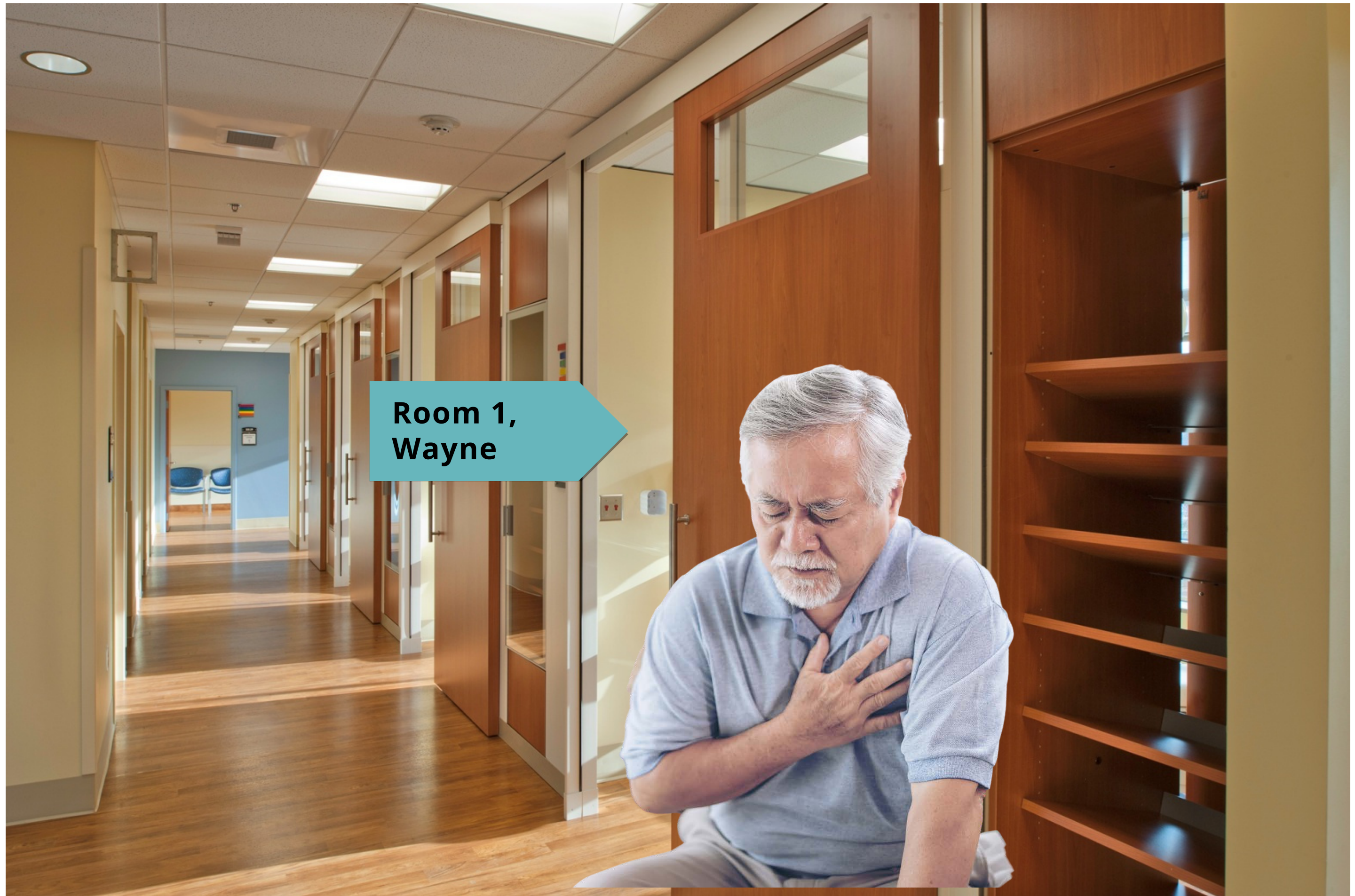


**“YOU HAVE A WALK IN...”**



“He says he knows you...”



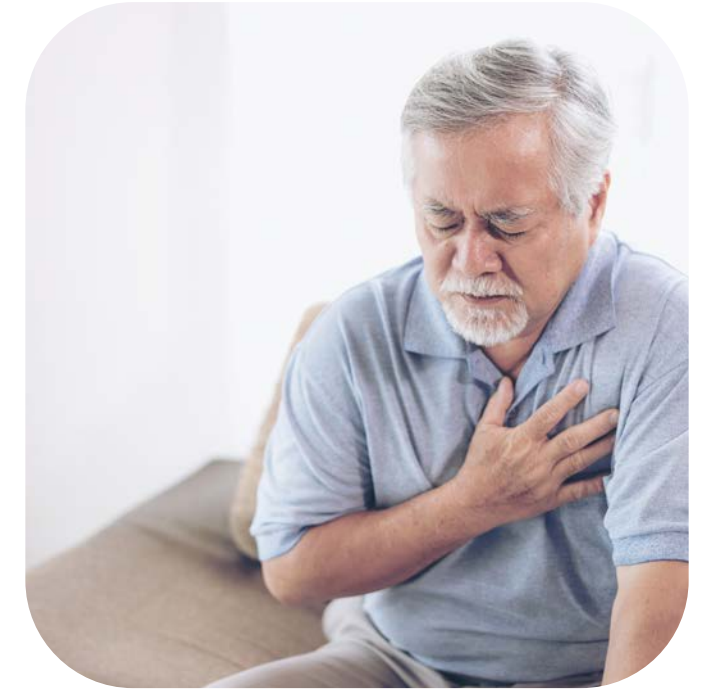


**Room 1,  
Wayne**



# WAYNE

- 47 year old male c/p
- T100.0, VS: 100/70, HR: 120, RR: 24.
- Missed dialysis two days ago



**911** is called....  
**meanwhile...**



# WAYNE - EXAM

- Restless, pale
- Continuous rub
- JVD
- Lungs: diminished
- Extremities: chronic venous stasis changes



**Not a good  
sign**

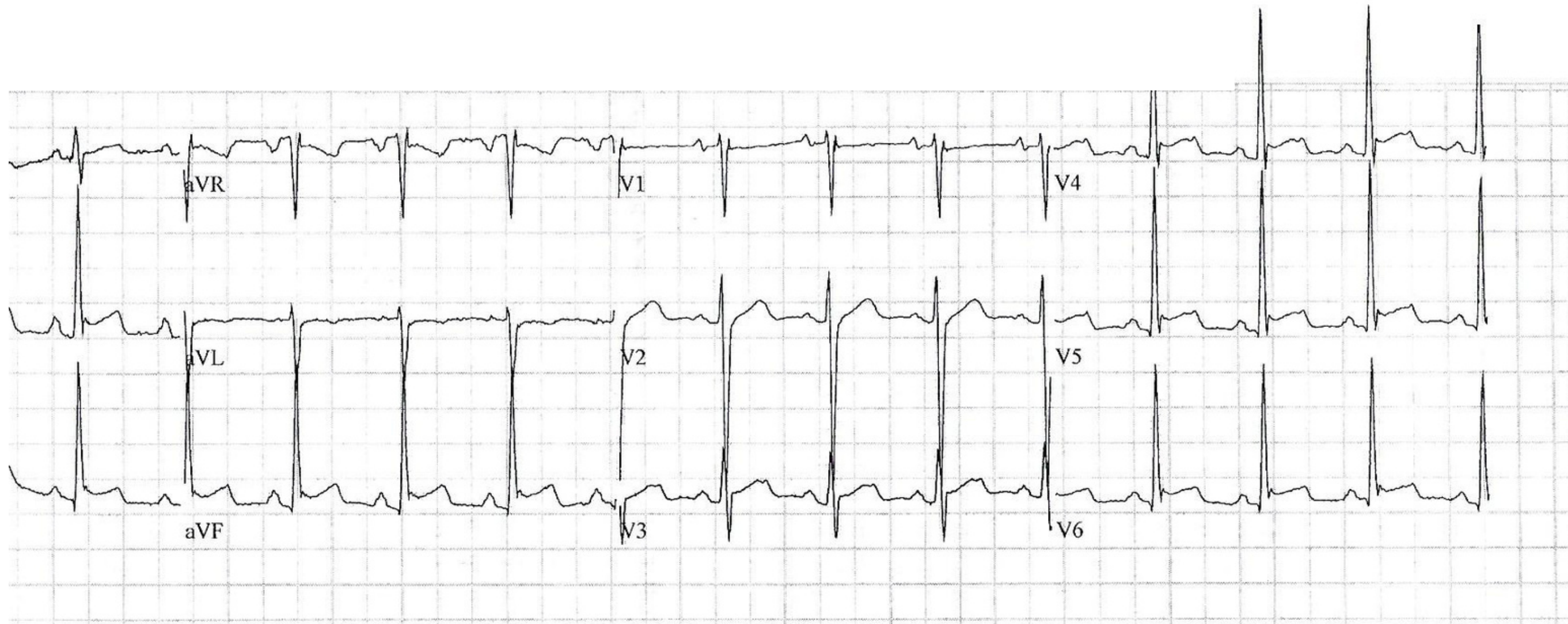


# HIS EKG



Vent. rate	97	BPM
PR interval	134	ms
QRS duration	82	ms
QT/QTc	344/436	ms
P-R-T axes	62 85	66

\*\*\* Critical Test Result: STEMI  
NORMAL SINUS RHYTHM  
RIGHT ATRIAL ENLARGEMENT  
ST ELEVATION CONSIDER INFEROLATERAL INJURY OR ACUTE INFARCT  
\*\*\* ACUTE MI / STEMI \*\*\*  
ABNORMAL ECG







# 2018 AHA 4TH UNIVERSAL DEFINITION OF MI



## In the absence of LVH & BBB:

- $\geq 2.5\text{mm}$  STE in V2 - V3 for males <40 years\*
- $\geq 2.0\text{mm}$  STE in V2 - V3 for males >40 years\*
- $\geq 1.5\text{mm}$  STE in V2 - V3 for females regardless of age
- $\geq 1.0\text{mm}$  STE in all other leads

\*New J point elevation  $\geq 1\text{mm}$  from prior EKG should be considered ischemic

**J Point** - Junction between the QRS termination & the onset of the ST segment; should be measured against the TP segment.



# SUMMARY

- Young people can have cardiac disease too.
- Anxiety is a diagnosis of exclusion.
- Some patients minimize things.



**YOU CAN'T FIND IT IF YOU  
DON'T LOOK FOR IT.**



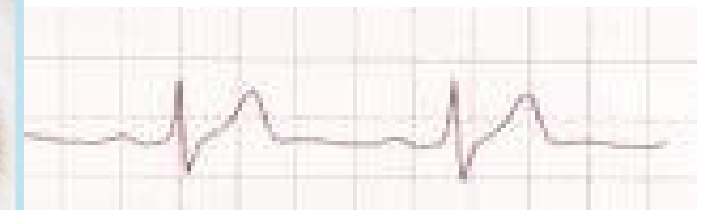
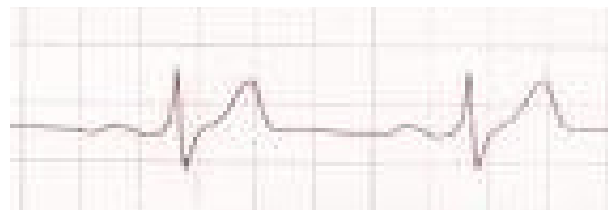
High index of suspicion



# 5 THINGS I LOOK FOR IN SYNCOPE

## The *less* obvious

- 1. Delta waves / short PR of WPW
- 2. QTc > 0.45
- 3. “Ski Slope” of Brugada
- 4. Signs of HOCM
- 5. Low voltage



**THANK  
YOU!**

