

# LOVE CONNECTION

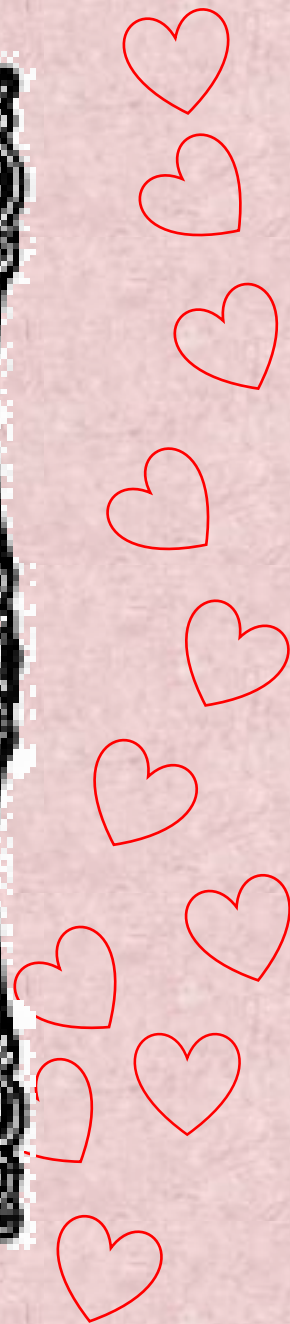
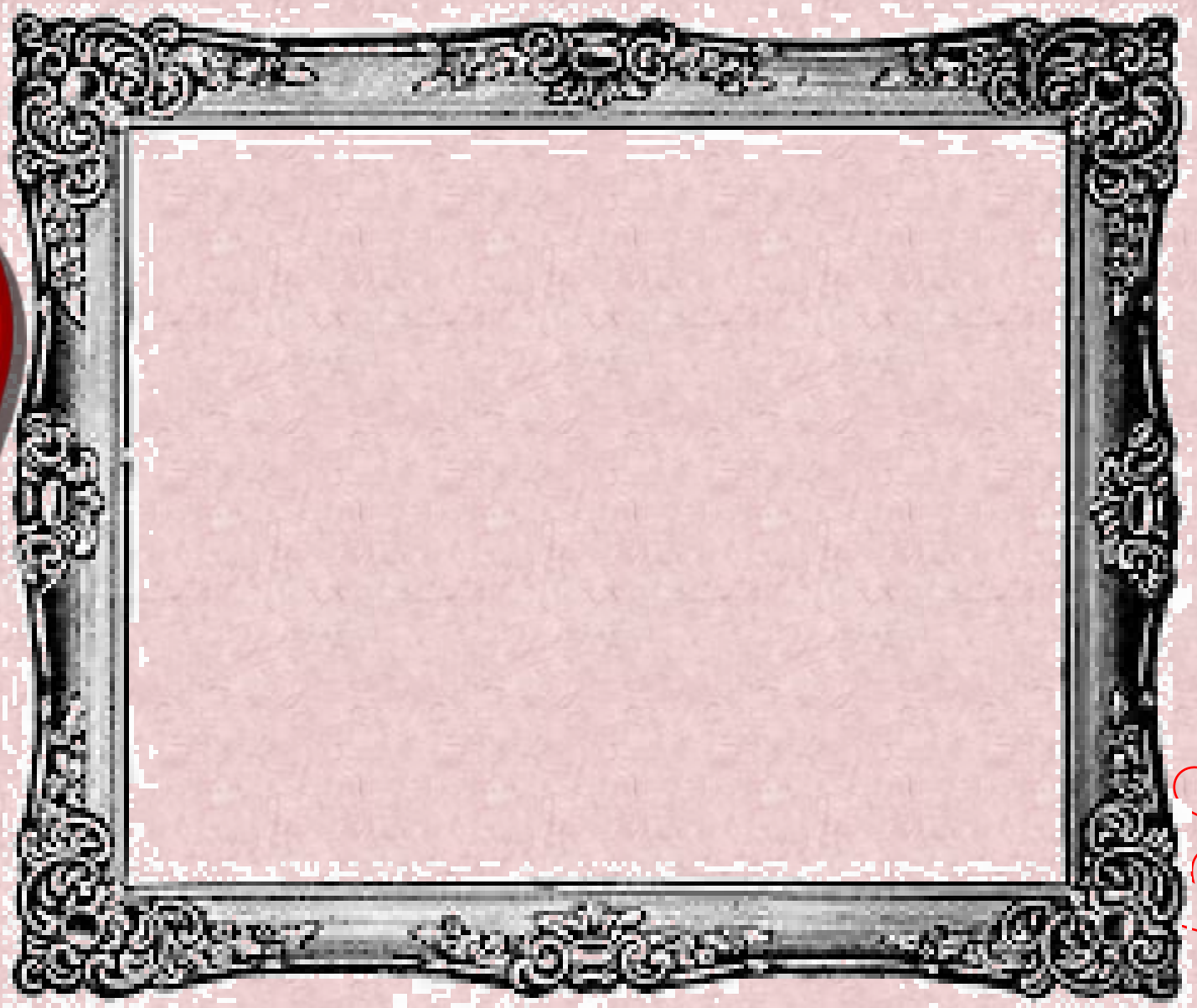
Host:

David A. Sandler, MD





Owen Obel  
1962 - 2015







Sherry Burma  
1964 - 2019



# LOVE CONNECTION

Host:

David A. Sandler, MD



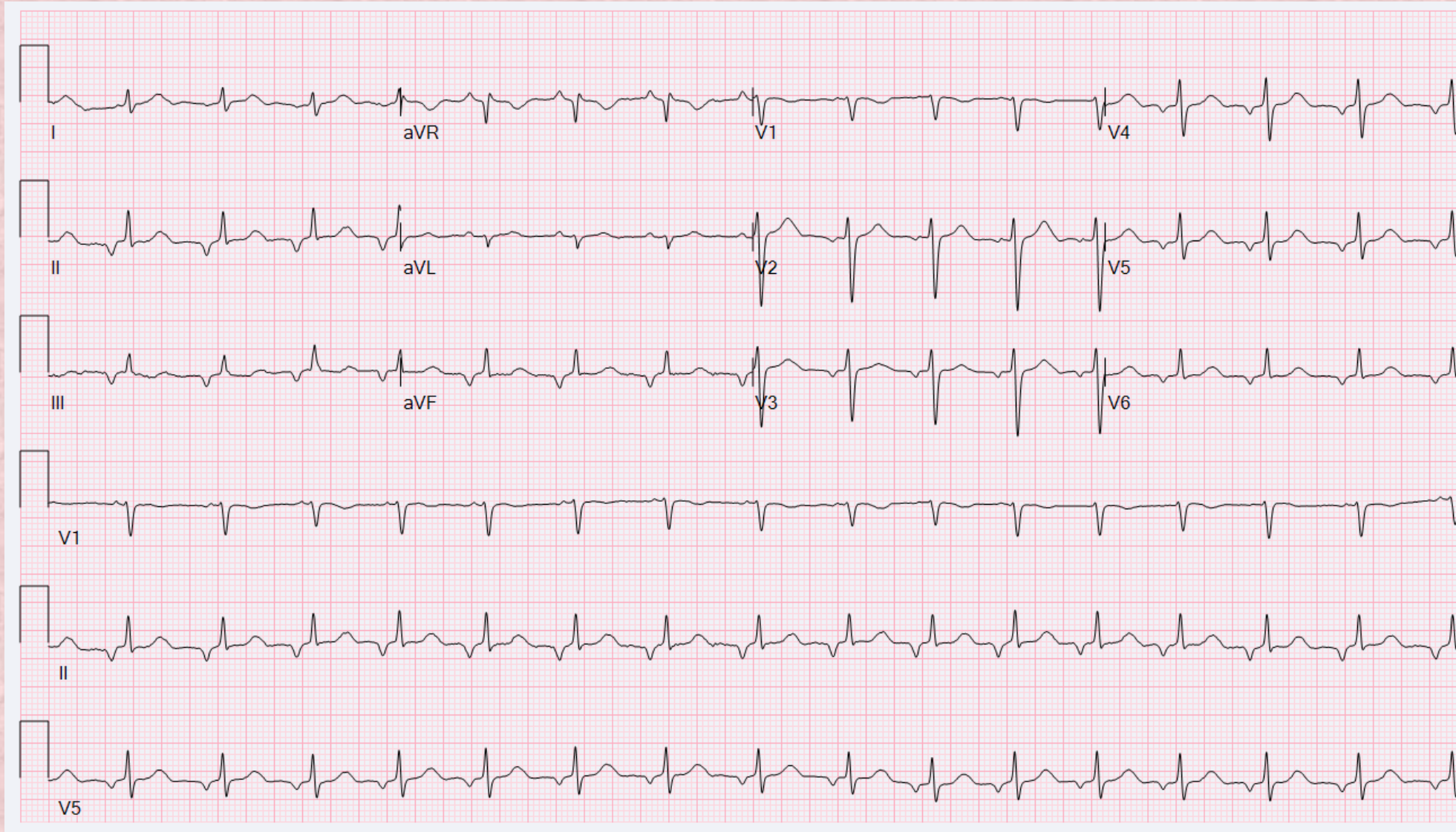


## Round I


# Meet the Bachelors and Bachelorettes



# What's the Rhythm?



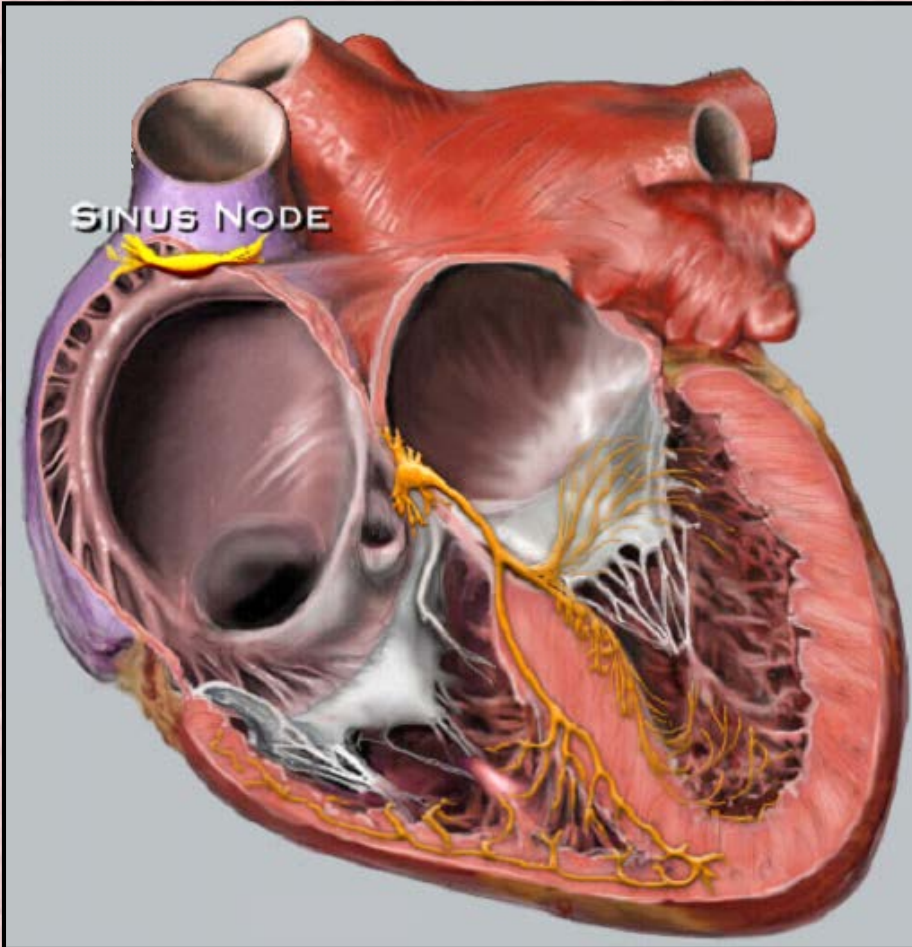
# What's the Rhythm?

1. Sinus rhythm
-  2. Atrial rhythm
3. Atrial flutter
4. Sinus rhythm with lead reversal





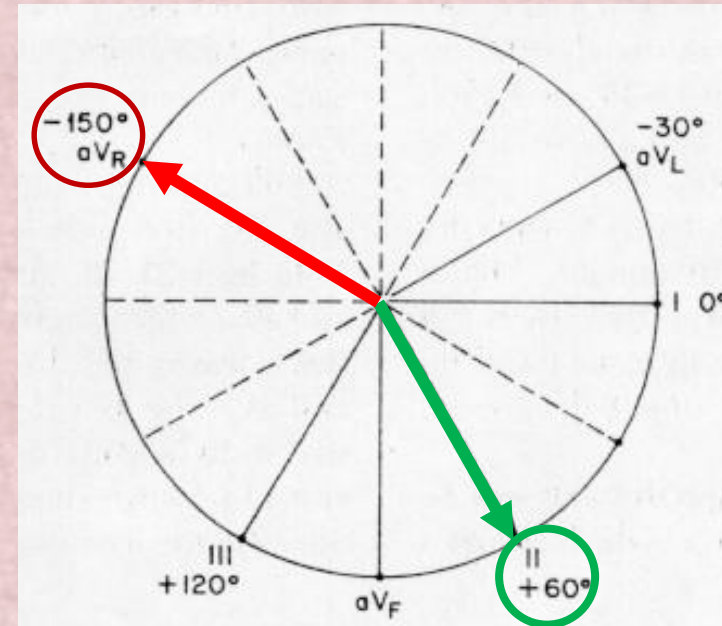
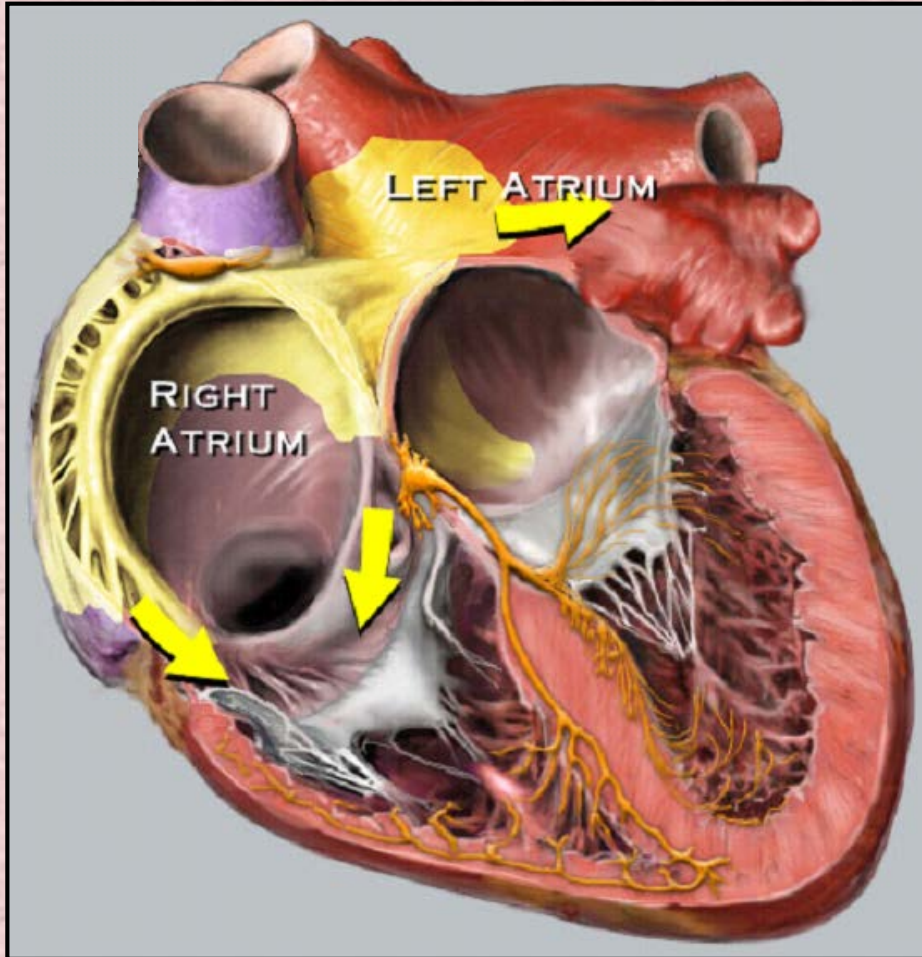
# Normal Sinus Rhythm



- Starts at the Sinus Node
  - Normal rate 60-100 BPM
  - Propagates across both RA and LA simultaneously

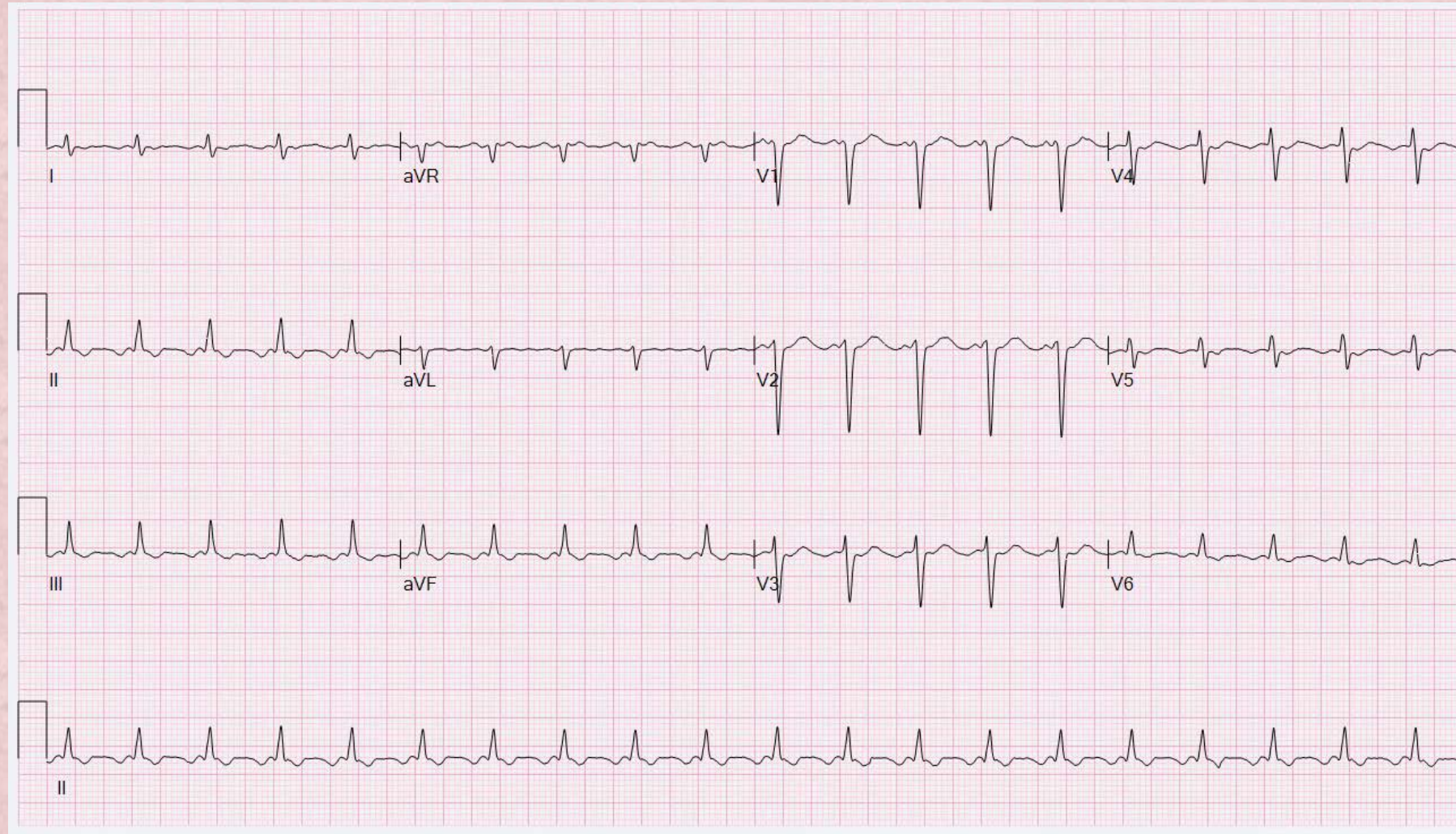


# Normal Sinus Rhythm






# What's the Rhythm?





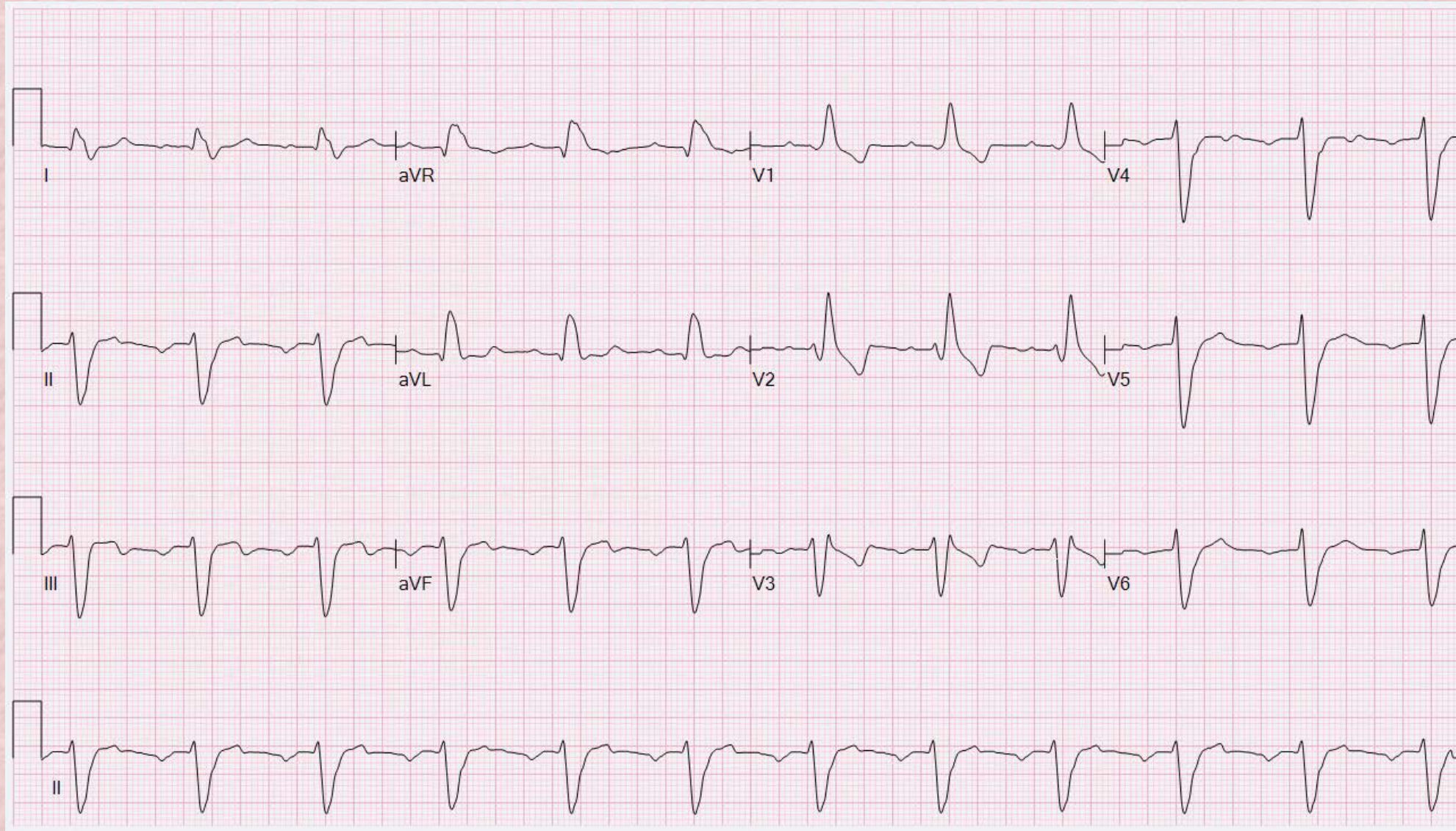
# What's the Rhythm?

1. Sinus rhythm
2. Atrial rhythm
-  3. Atrial flutter
4. Sinus rhythm with lead reversal






# What's the Rhythm?





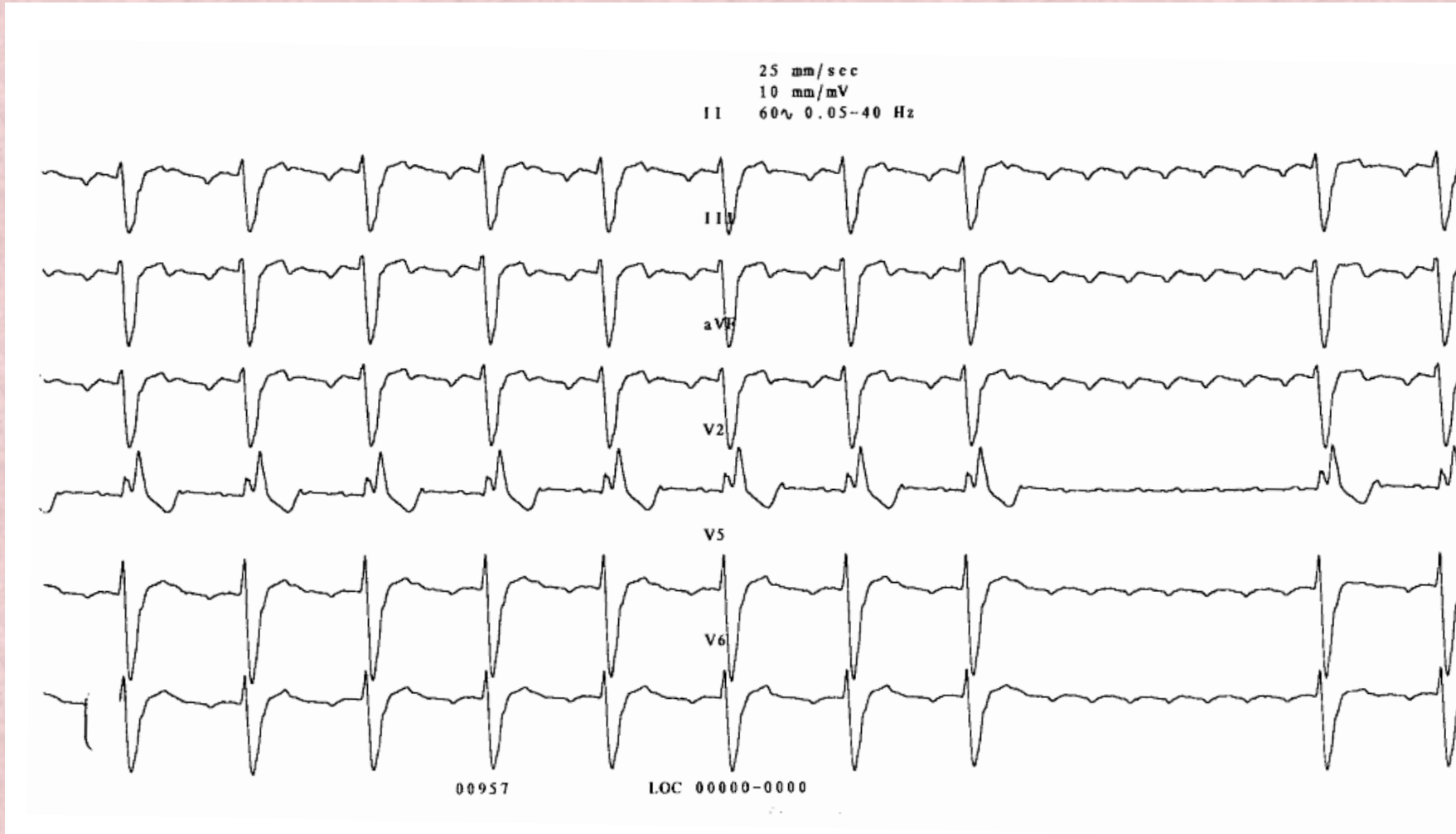
# What's the Rhythm?

1. Sinus rhythm
2. Atrial rhythm
-  3. Atrial flutter
4. Sinus rhythm with lead reversal

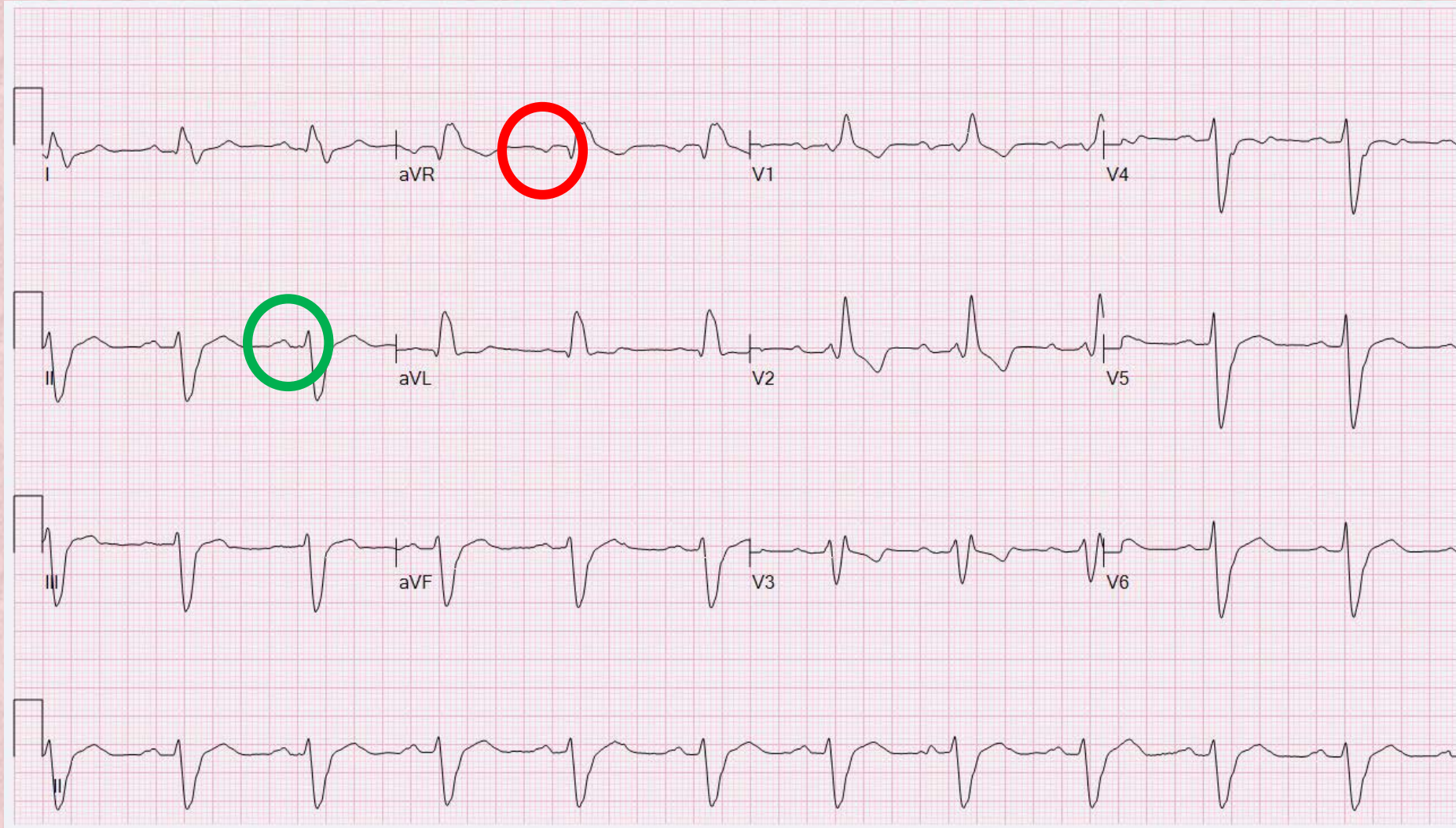




# Carotid Sinus Massage

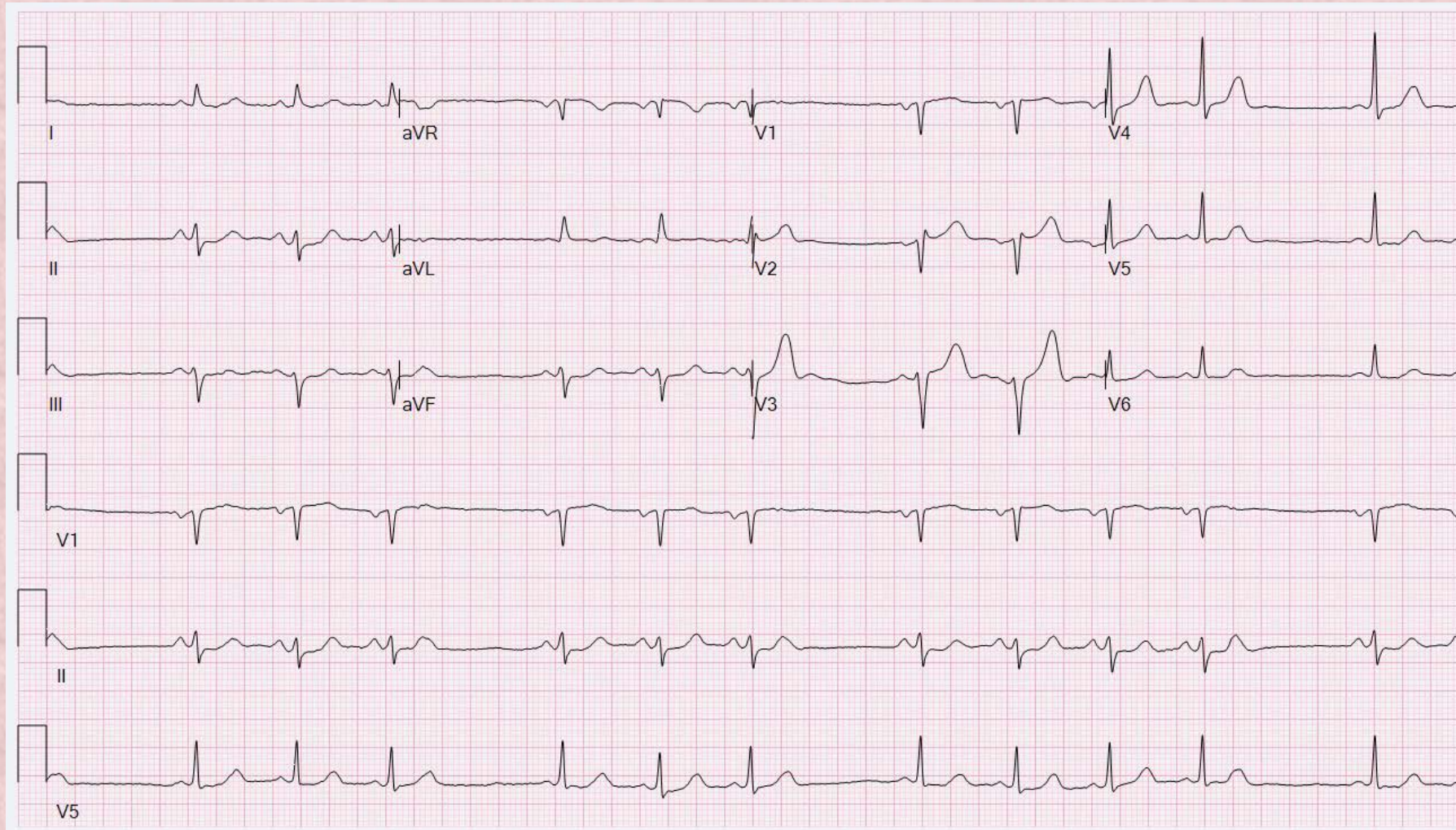


# Post-Ablation






# Loves to Skip



# Why is She Skipping?

1. Mobitz I AV Block
2. Mobitz II AV Block
3. Sinus Pauses
-  4. PACs
5. She's in love

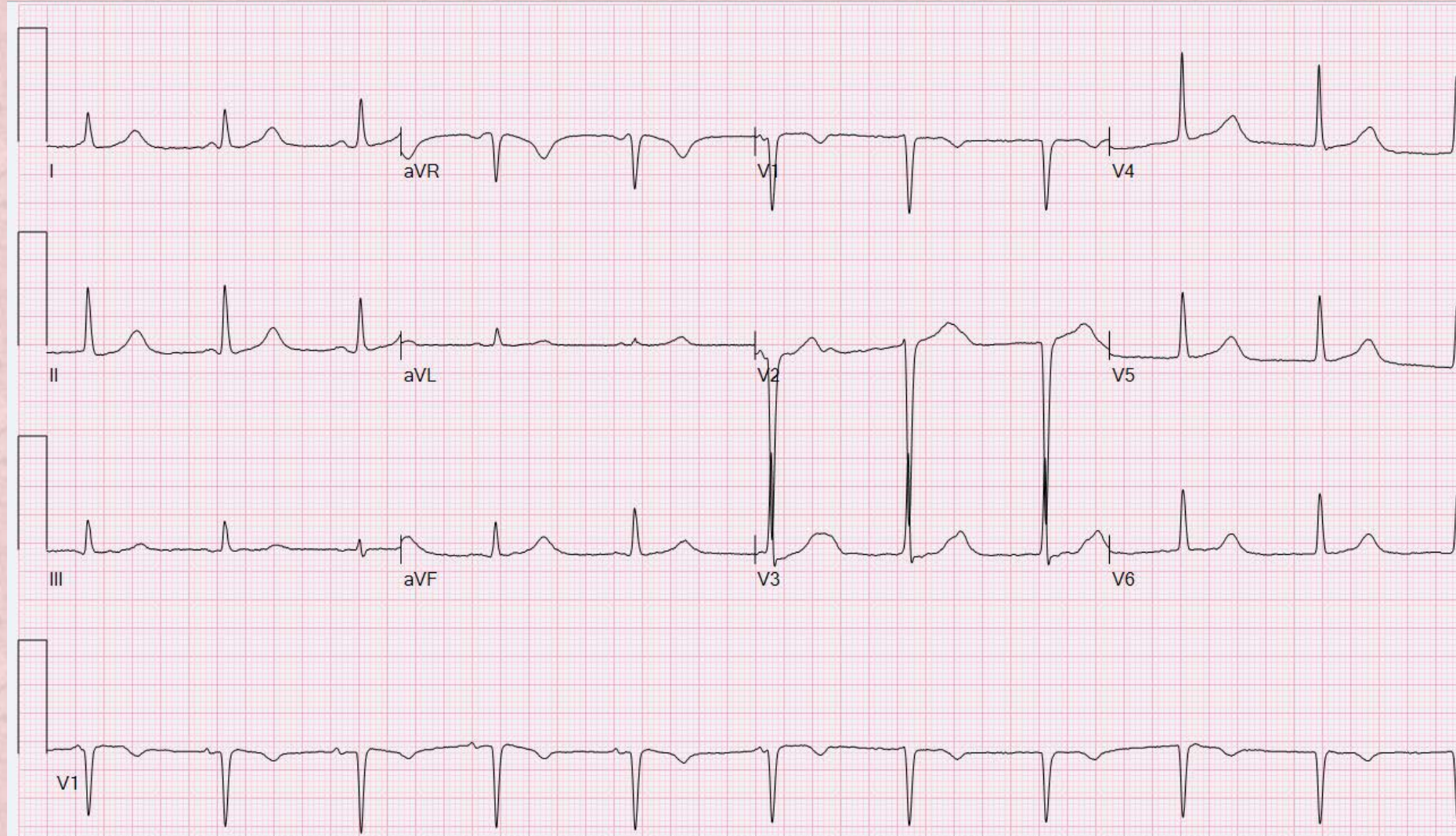




Another example




# What Happened to the P Waves?



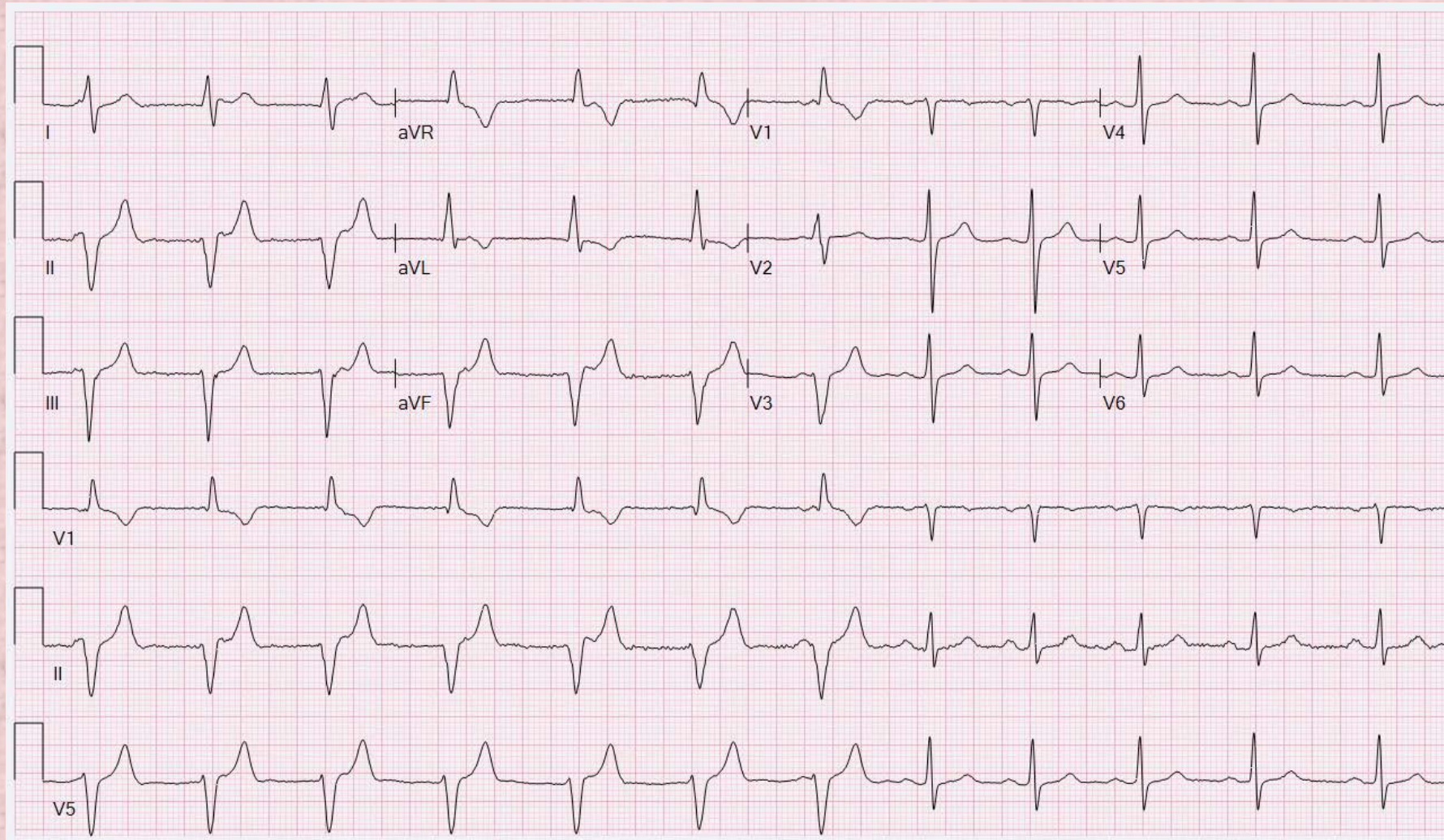


# What's the Rhythm?

1. Complete heart block
-  2. Accelerated junctional rhythm
3. Atrial flutter
4. Marked sinus bradycardia




# Name That Rhythm





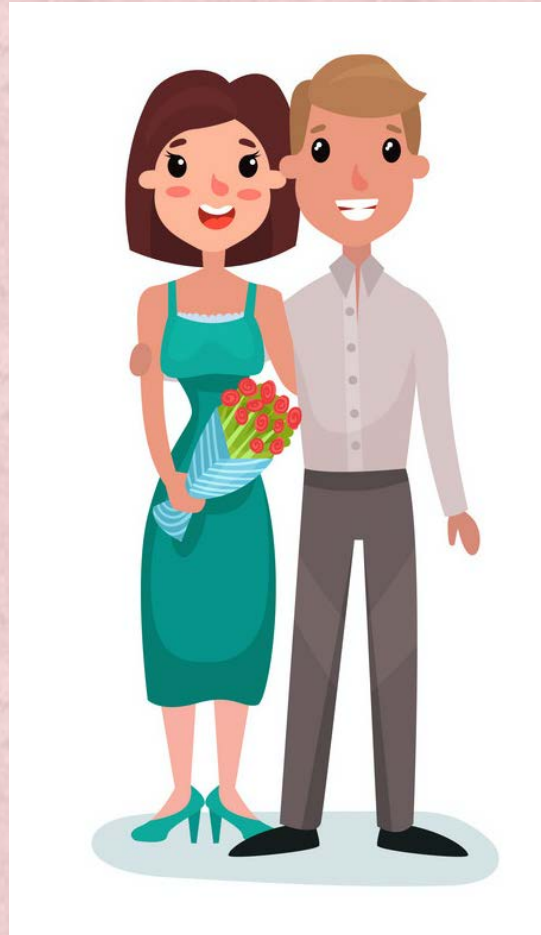
# What's the Rhythm?

1. Complete heart block
2. Accelerated junctional rhythm
-  3. Idioventricular rhythm
4. Intermittent ventricular pacing



Round II

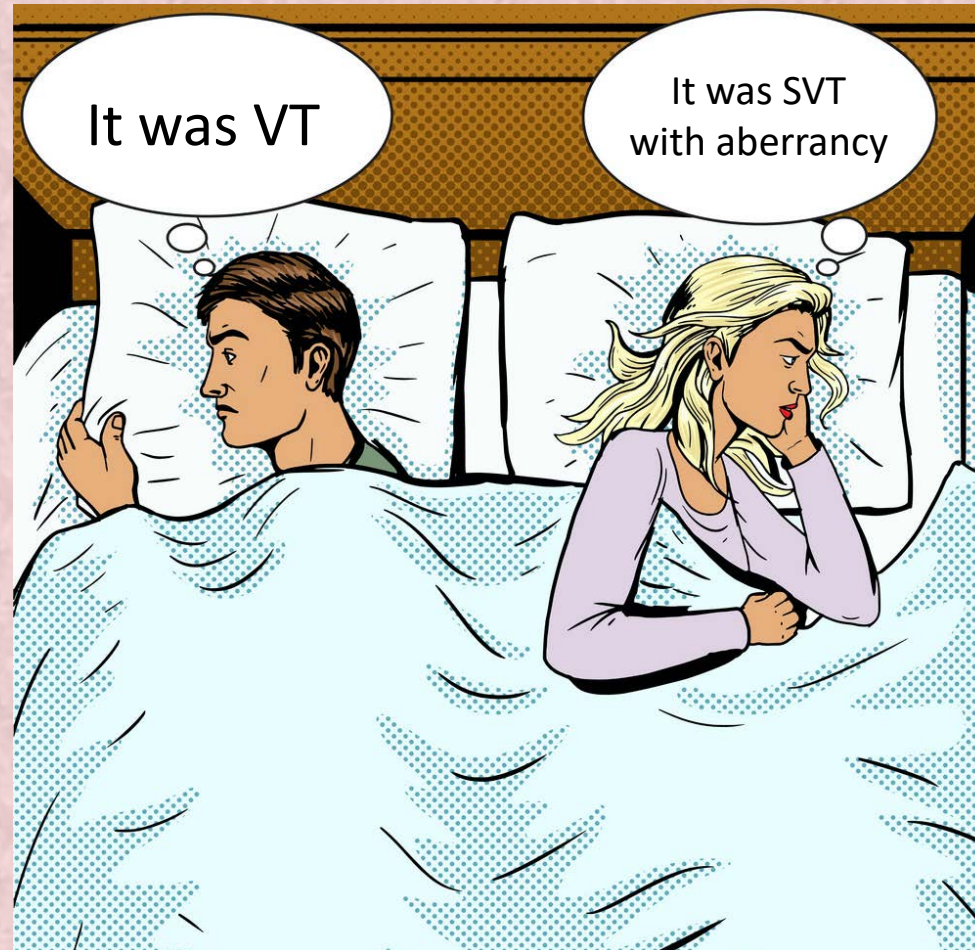
# Happy Couples





## Round II

# Unhappy Couples



Couple 1

Name That Couple





# Name That Couple

1. Atrial flutter and RBBB
2. Atrial flutter and acute MI
3. Sinus tachycardia and acute MI
4. SVT and acute MI



# Post-conversion





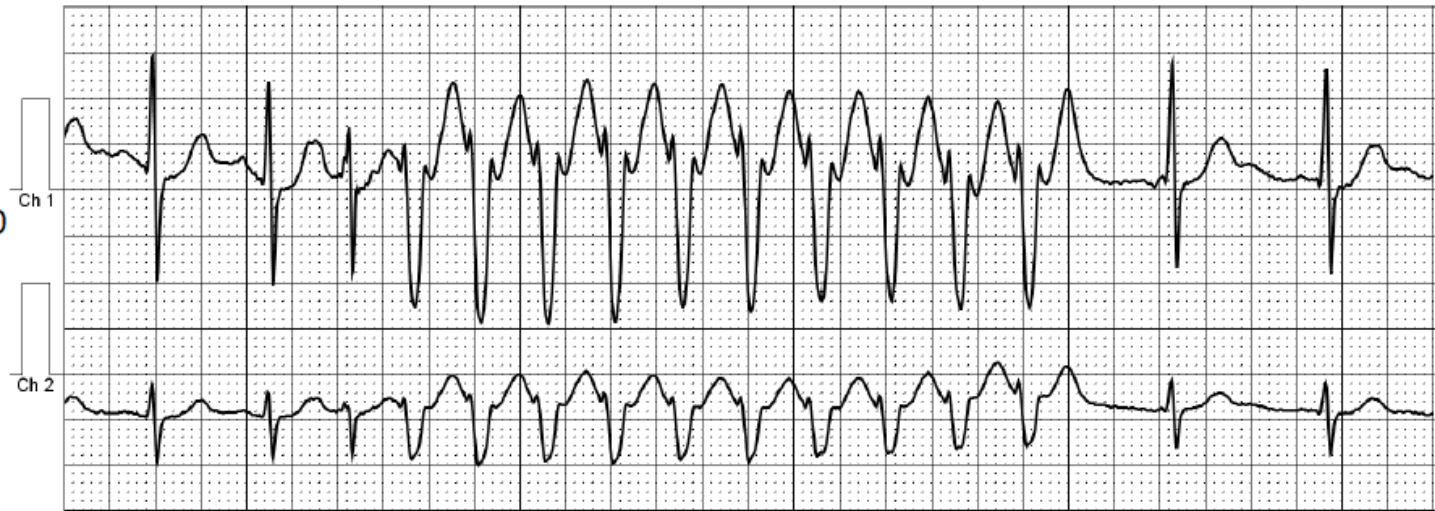
## Couple 2

# Palpitation on monitor

**Symptoms:** Auto Trigger

**Activities:** None Indicated

**Findings:** Urgent - Sinus Tachycardia with PAC and Ventricular Tachycardia 10 beats, Rate 200 BPM, post only notified on 11/09/2019 at 20:02 EST



**Date:** 11/09/2019 | 13:20:26 CST

**Findings:** PSVT 7 beats, Rate [149] BPM

**Symptom:** Automatic Trigger

**Activities:** None Indicated

**HR:** 149



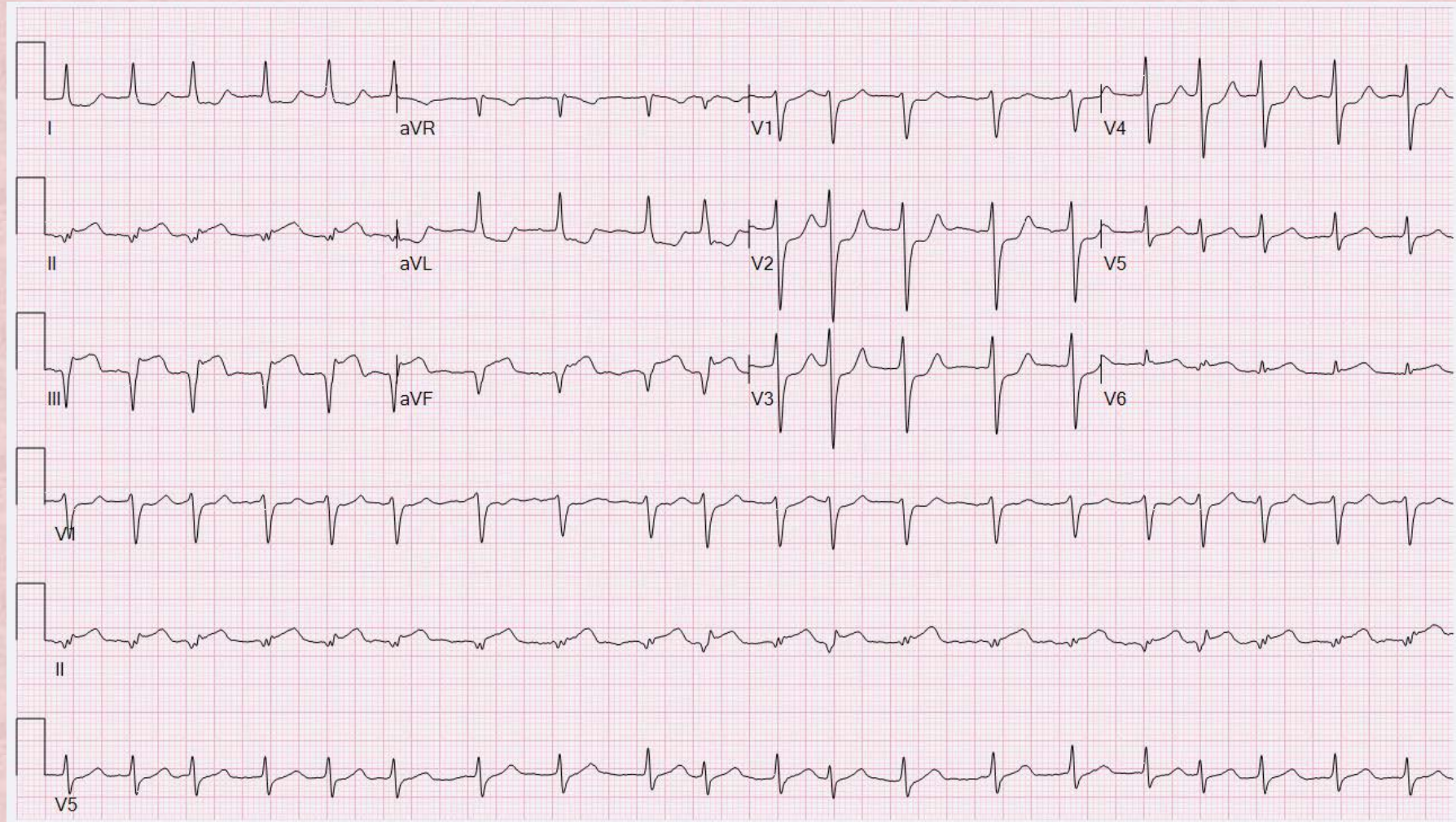
These strips represent:

1. SVT and VT
2. SVT and WPW
3. Atrial fibrillation and VT
4. Atrial tachycardia and aberrancy





# Palpitation and Indigestion



# Palpitation and Indigestion

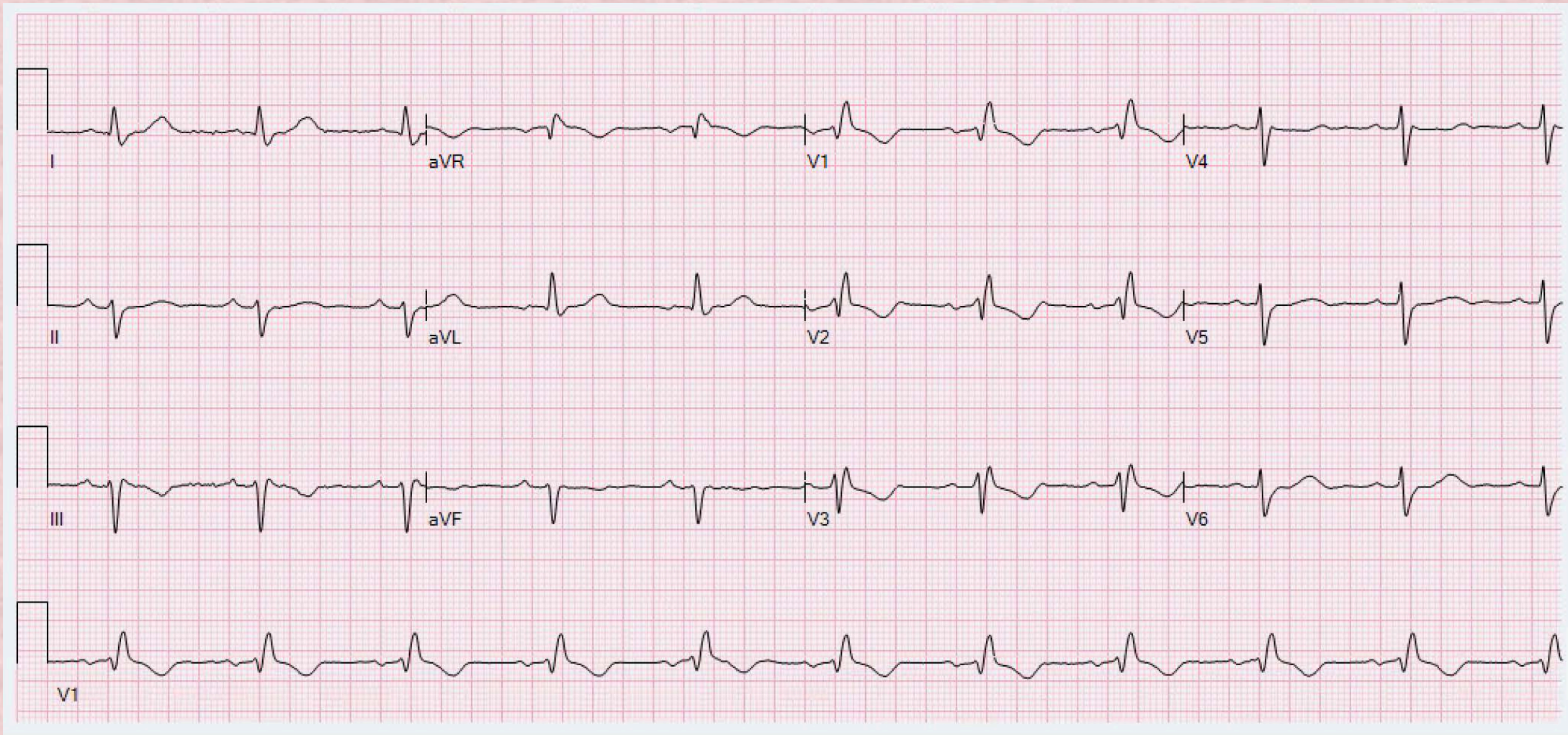
1. Atrial fibrillation and GERD
2. Atrial fibrillation and LBBB
3. Inferior MI and Wenckebach
4. Inferior MI and atrial fibrillation






## Couple 4

Exertional syncope in a guy who LOVES to workout





## Loves to Workout

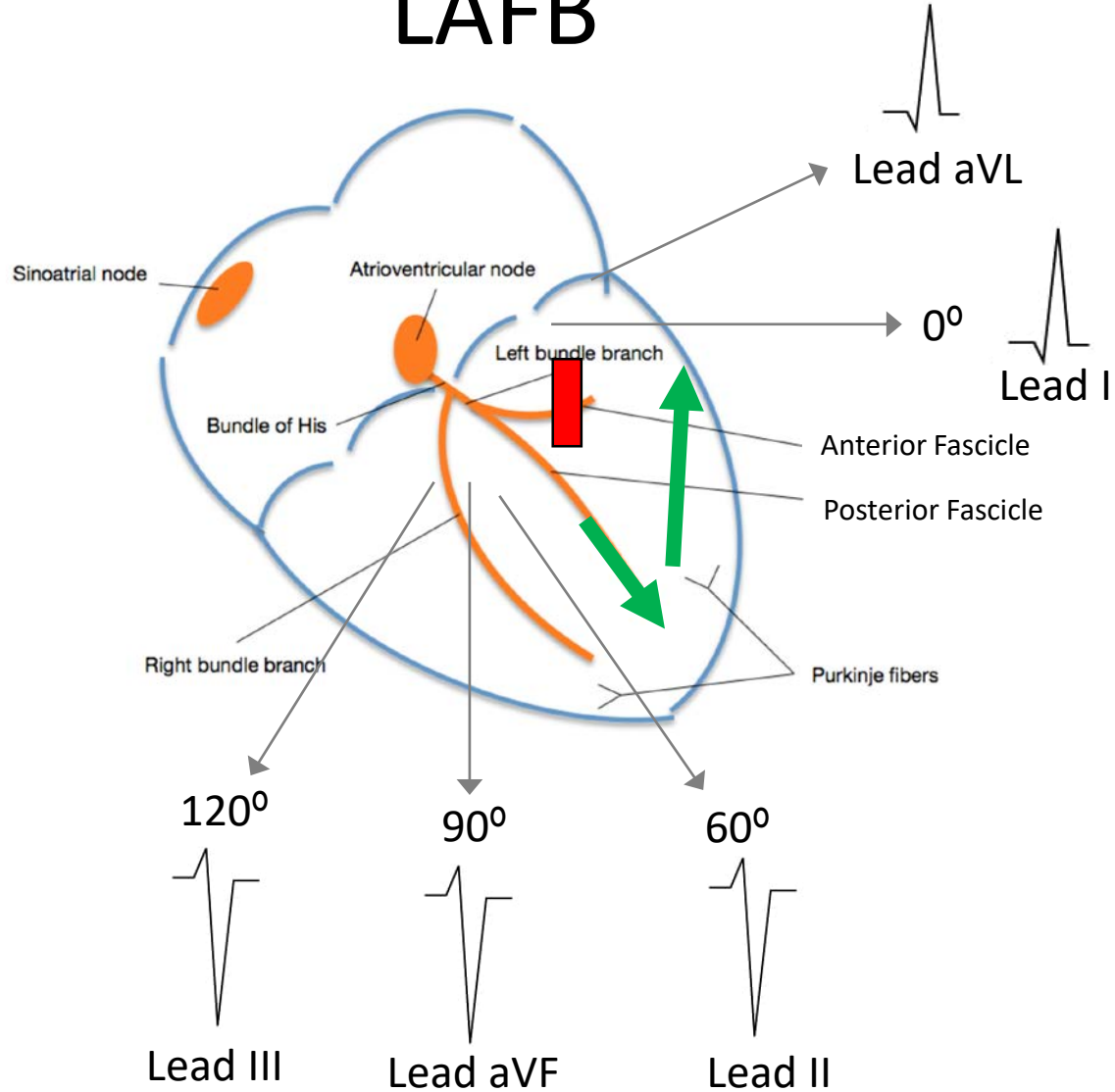
1. Sinus rhythm with LBBB
-  2. RBBB and LAFB
3. RBBB and LPFB
4. Sinus rhythm 2:1 AV Block





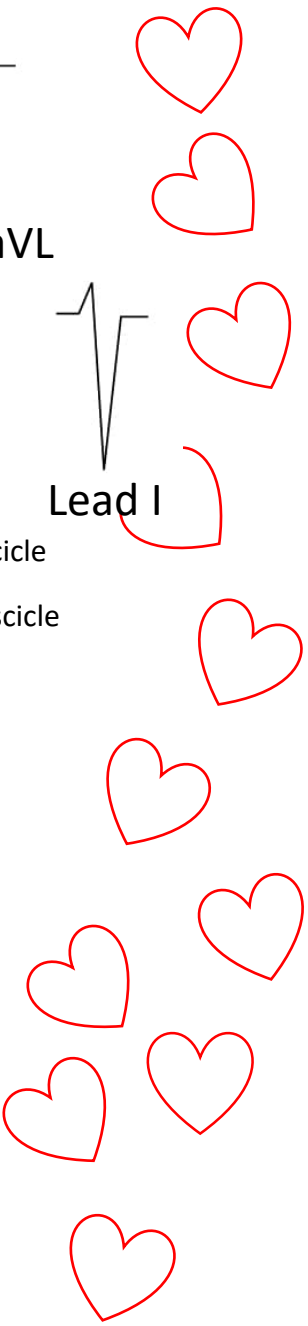
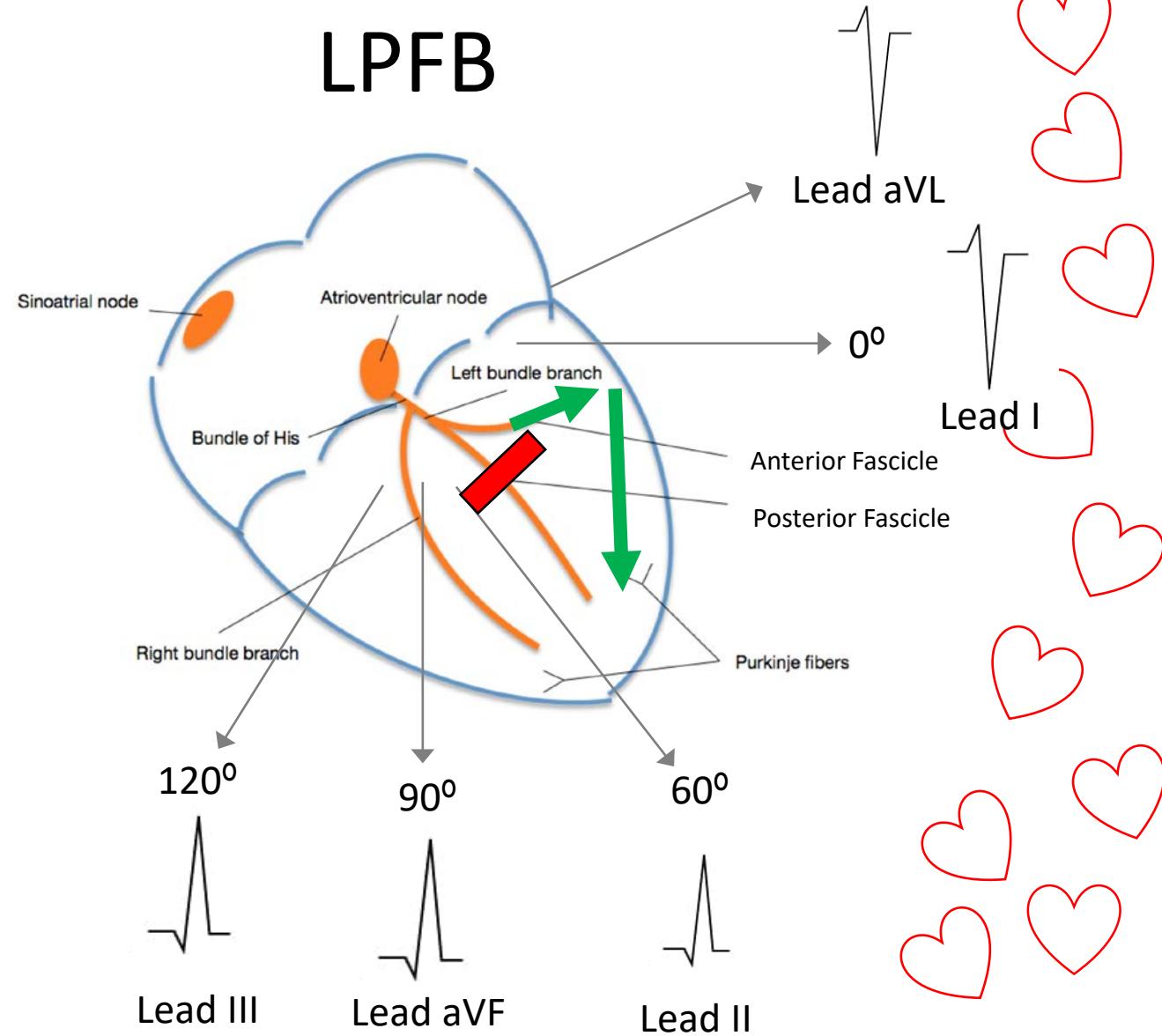
# Left Anterior Fascicular Block

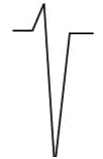

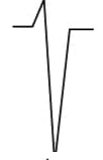







## LAFB



# Left Posterior Fascicular Block

## LPFB

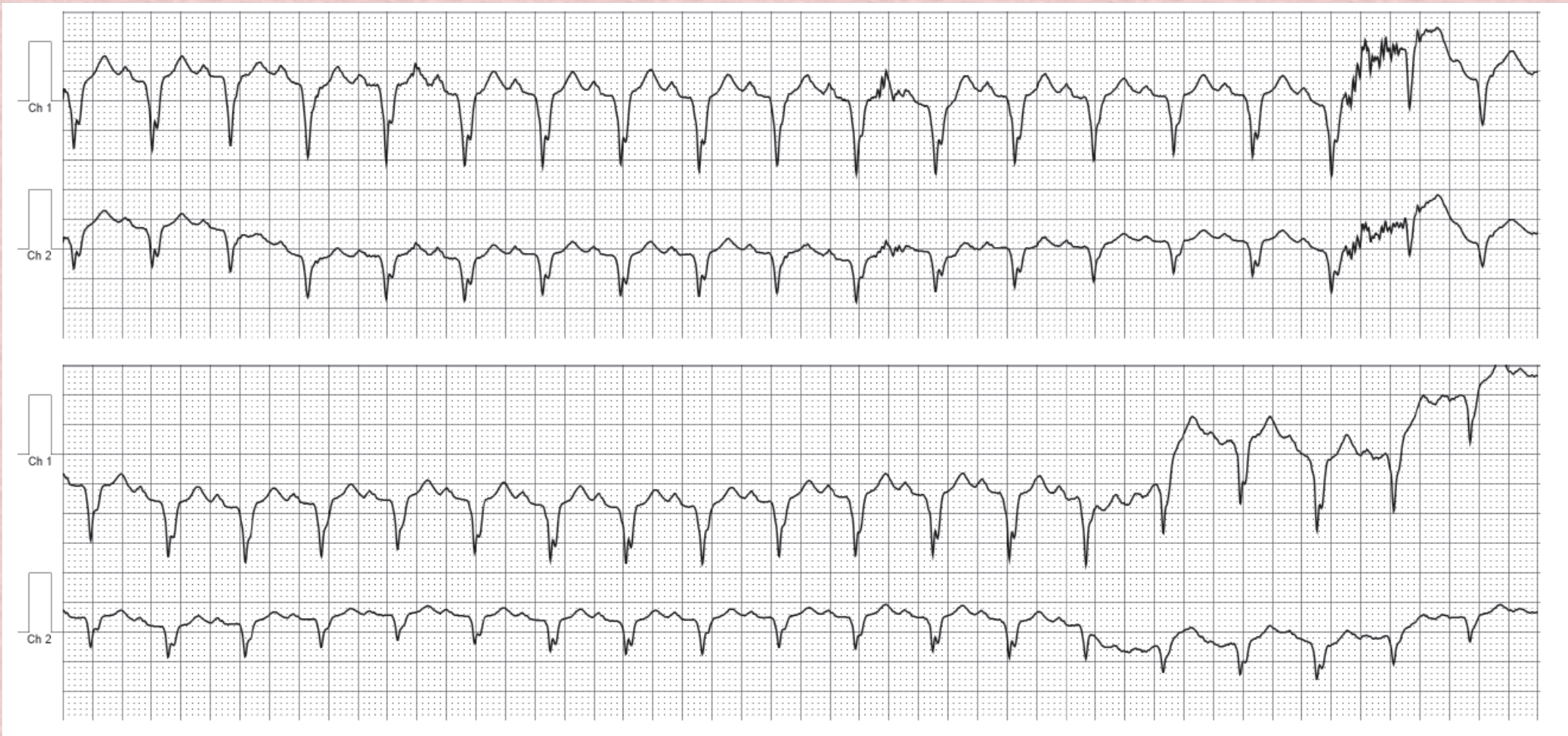


	LAFB	LPFB
II		
III		
aVF		
I		
aVL		
Axis	$-45^{\circ}$ to $-90^{\circ}$	$\geq 100^{\circ}$

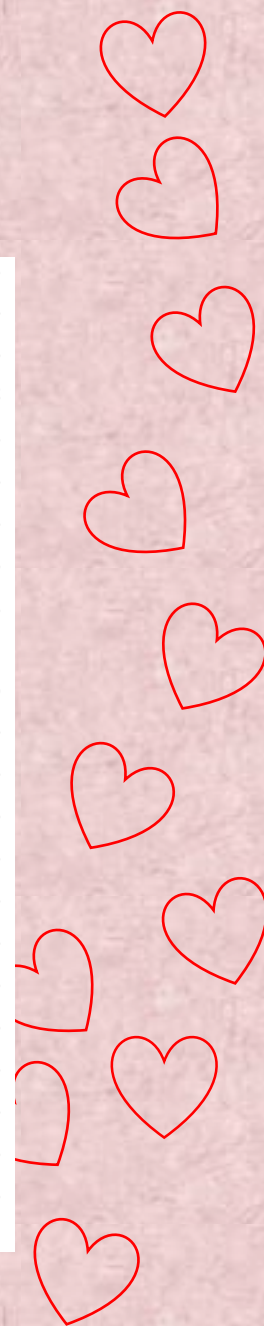




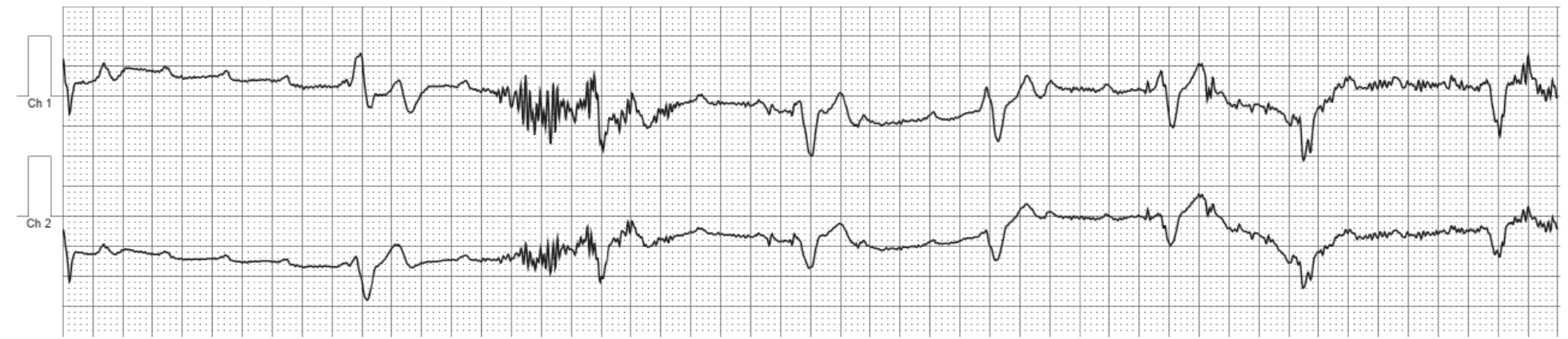
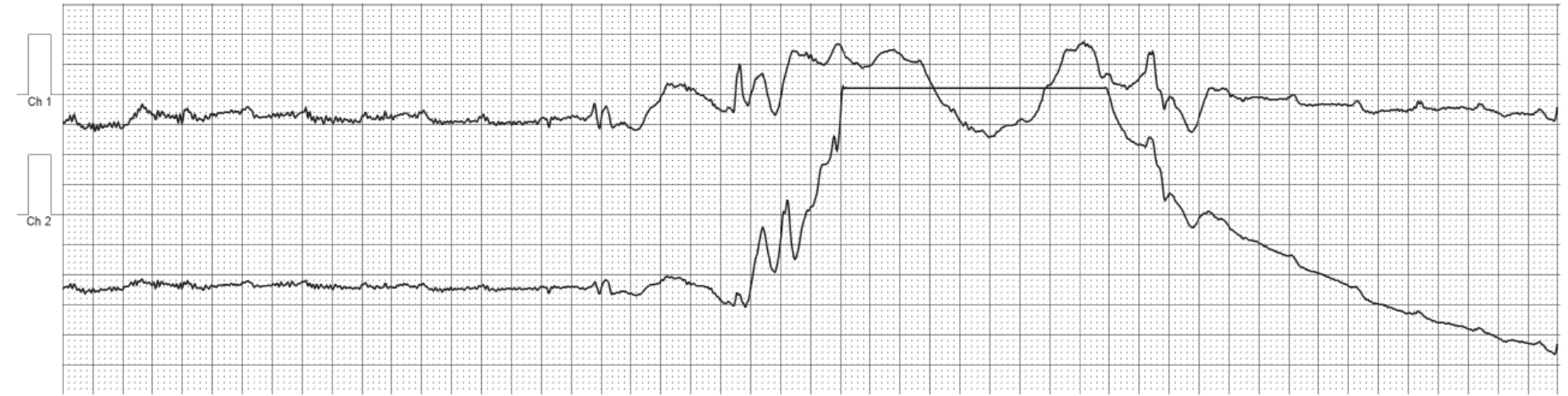
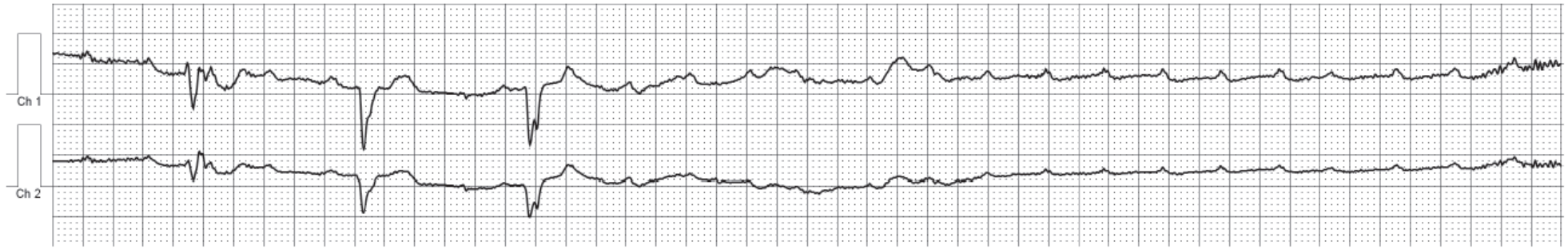
So he goes to the gym...



# And this happens....

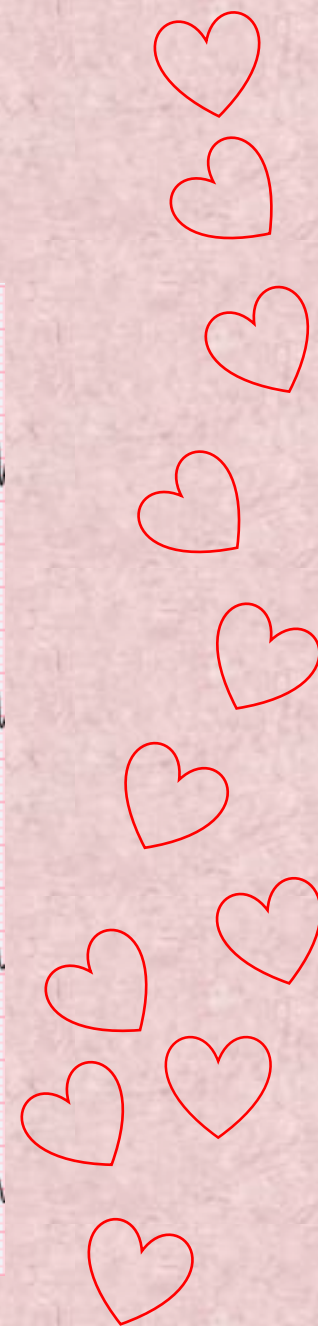
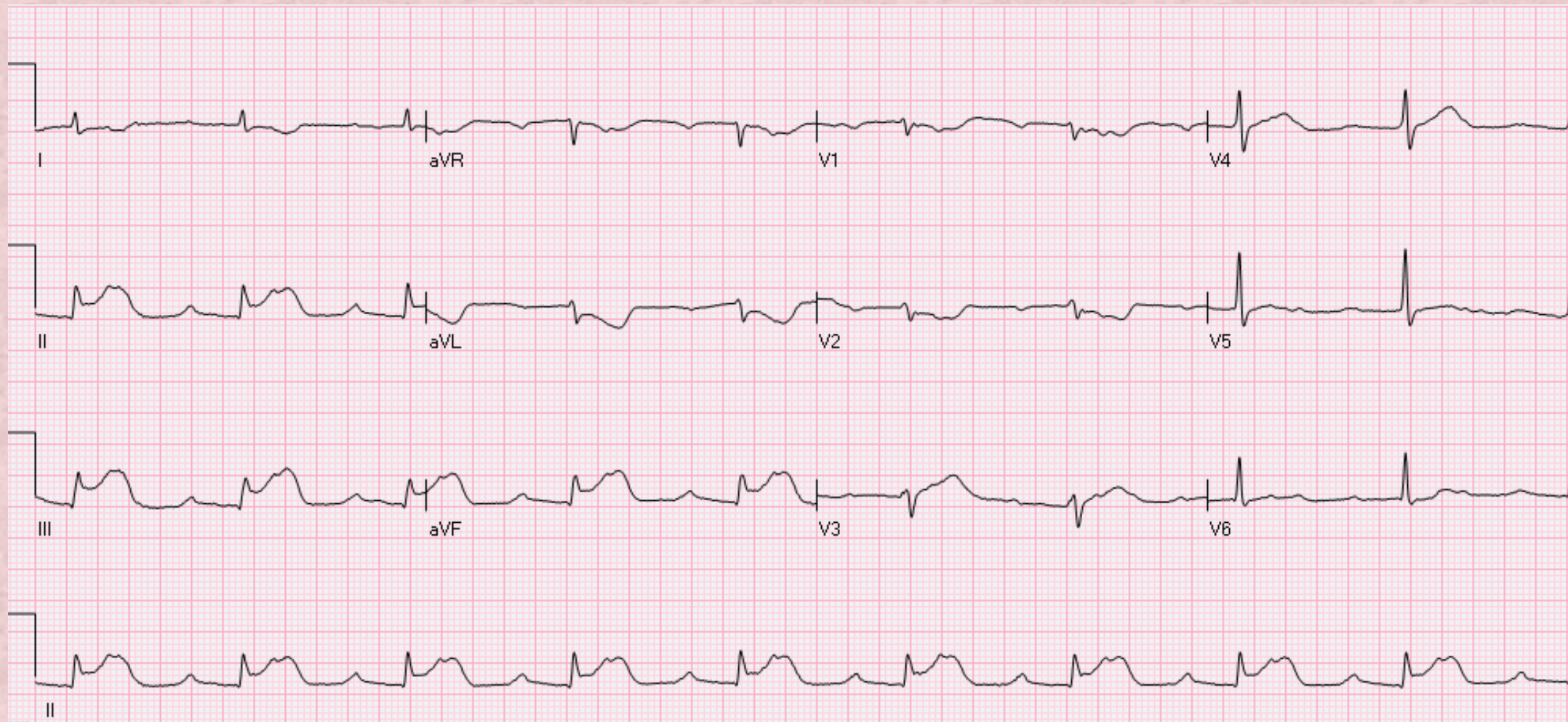






Couple 5

# Heartburn





# What is going on?

1. STEMI and Atrial Flutter
2. STEMI and 1<sup>st</sup> Degree AV Block
3. STEMI and Mobitz II AV Block
4. STEMI and AV Nodal Block



# AV Block

## First Degree

Long PR no dropped beats

## Second Degree

Mobitz I (AKA Wenckebach)

PR interval lengthens

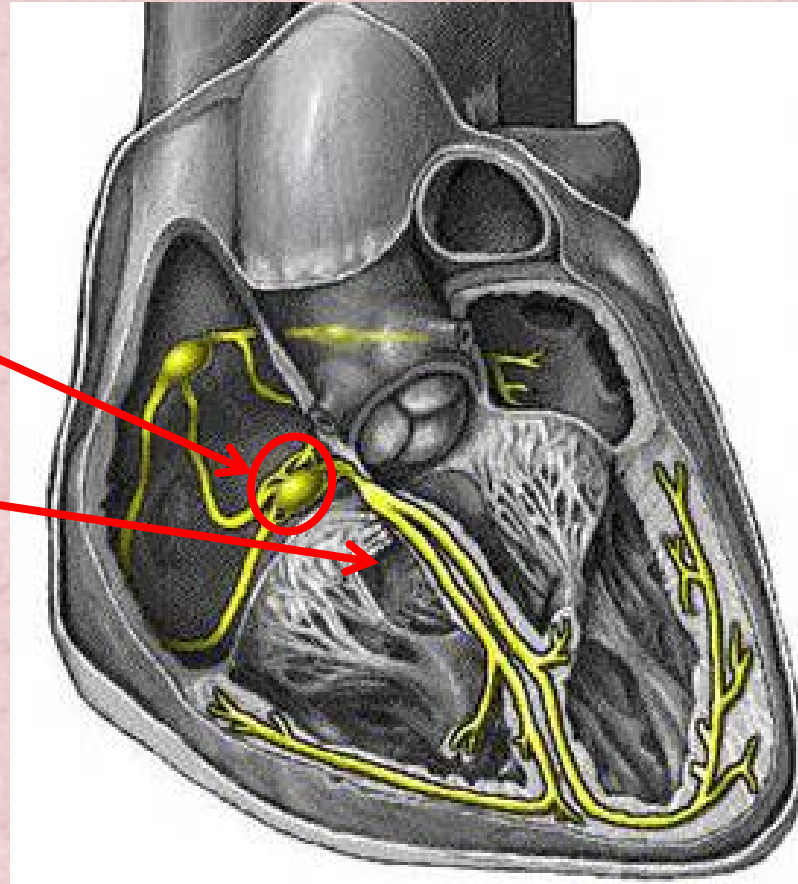
Mobitz II

Fixed PR, dropped QRS

2:1 Block

## Third Degree

Complete AV Block





# AV Block

## First Degree

Long PR no dropped beats

## Second Degree

Mobitz I (AKA Wenckebach)

PR interval lengthens

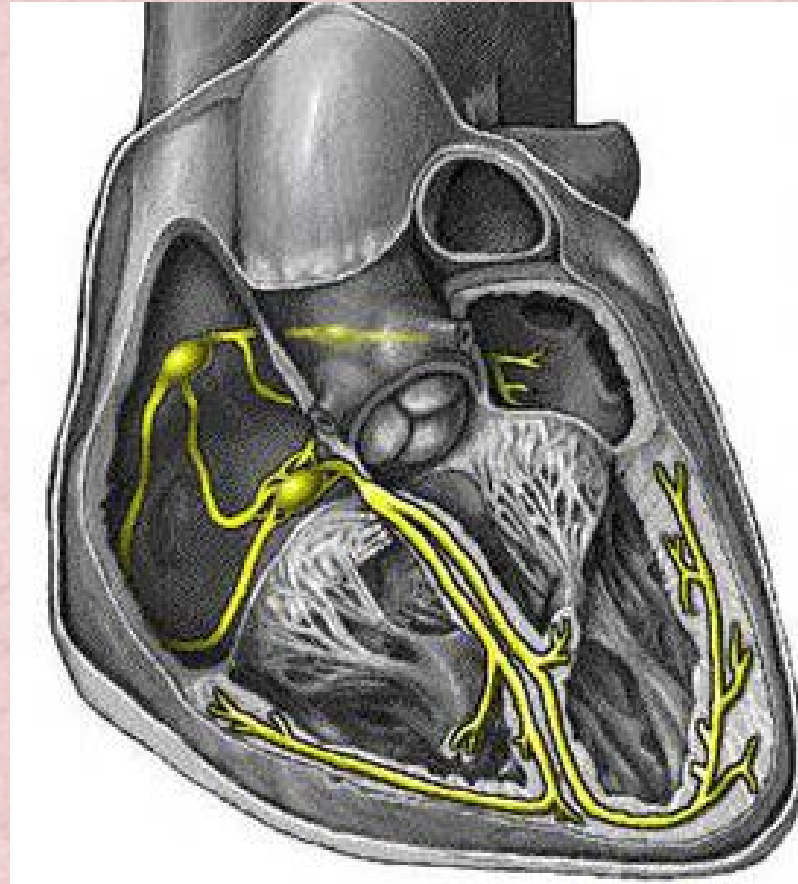
Mobitz II

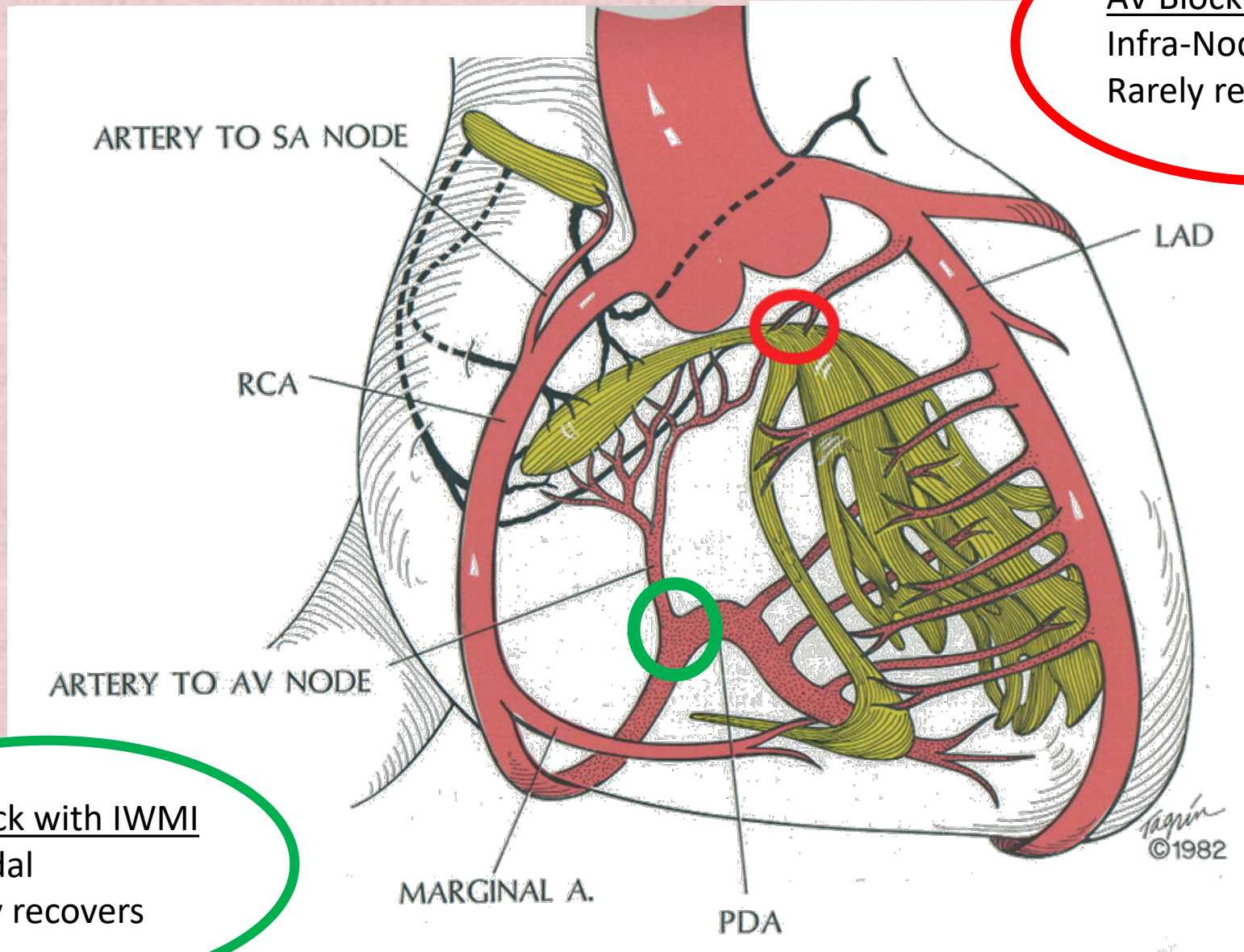
Fixed PR, dropped QRS

2:1 Block

## Third Degree

Complete AV Block





AV Block with AWMi  
Infra-Nodal  
Rarely recovers

AV Block with IWMI  
AV Nodal  
Usually recovers





Couple 6

# 77-Year-Old with Extensive Cardiac History



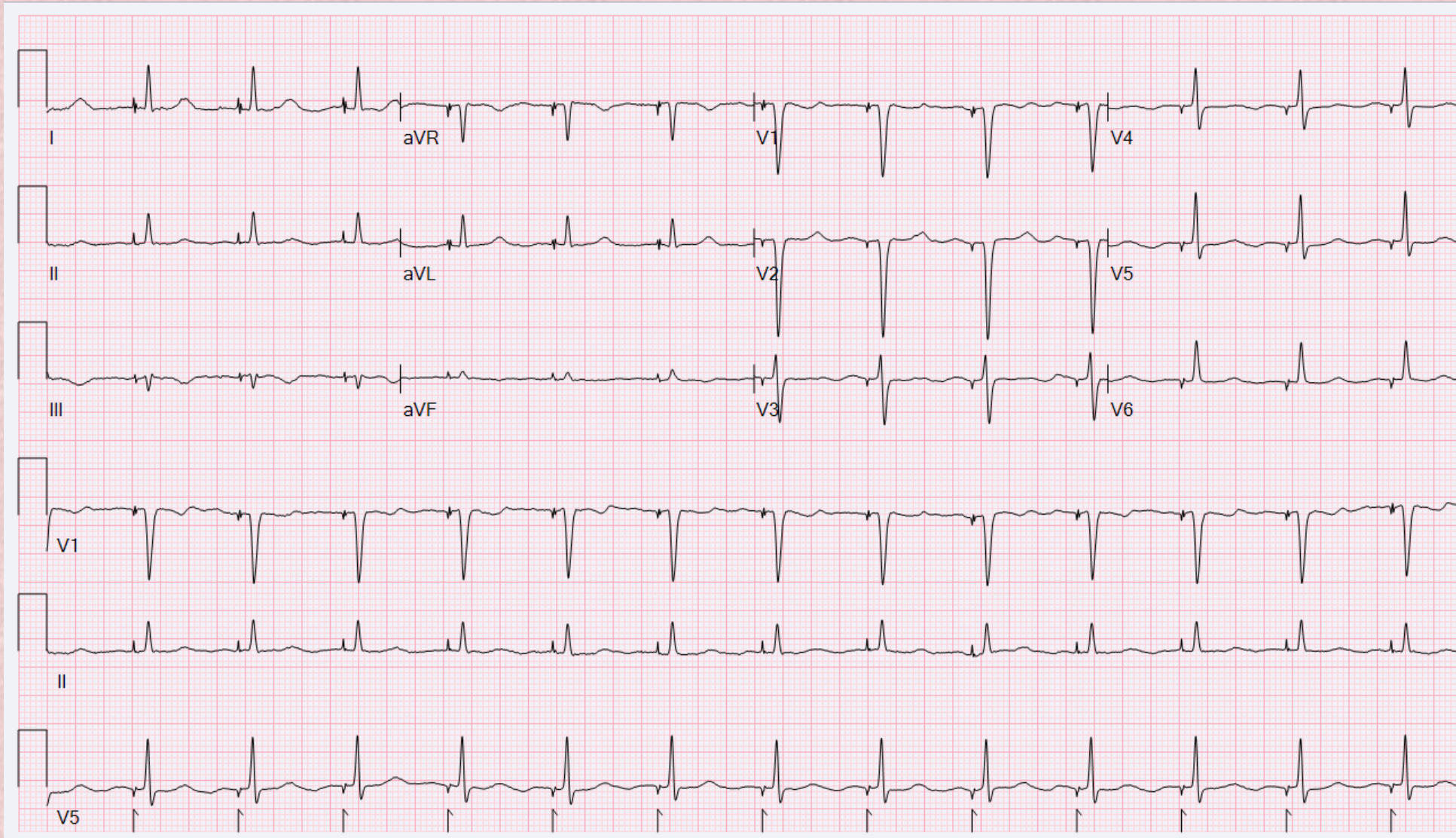
## What Two Things are Represented?

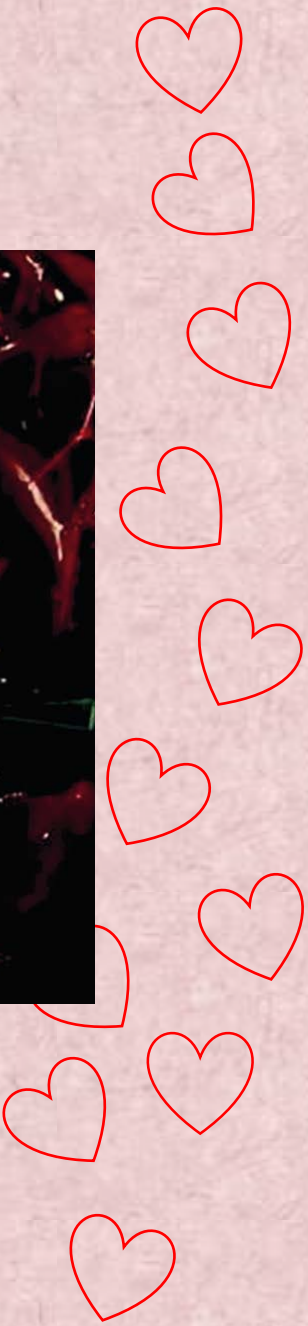
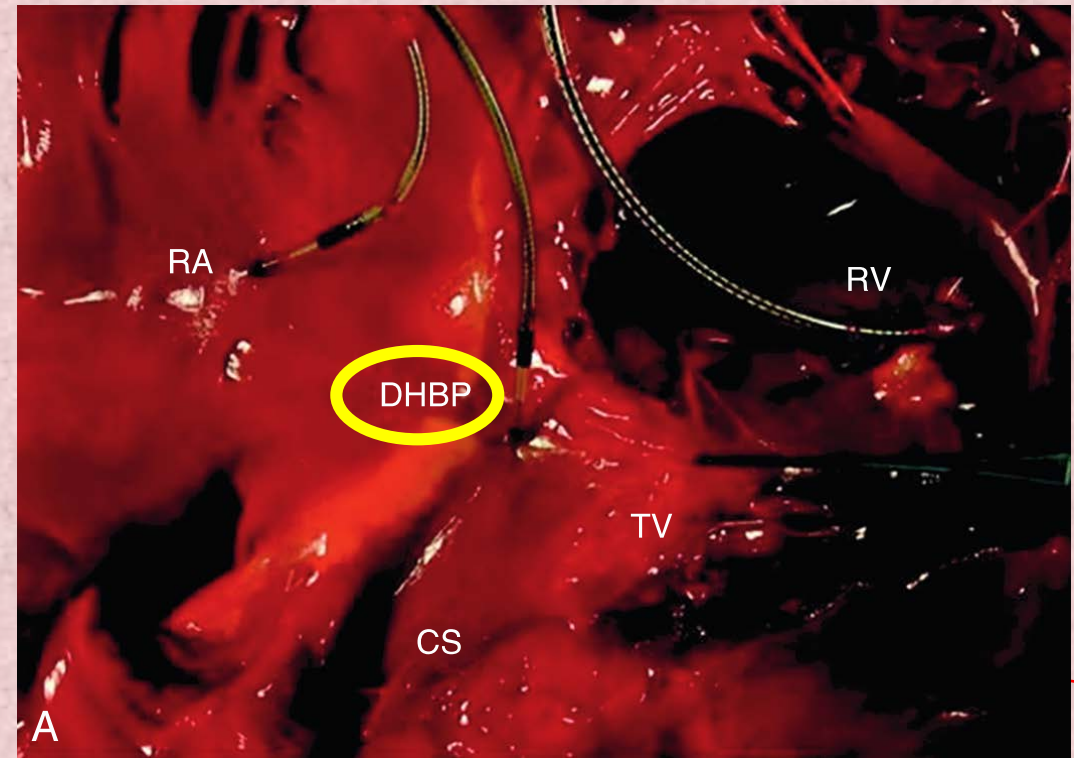
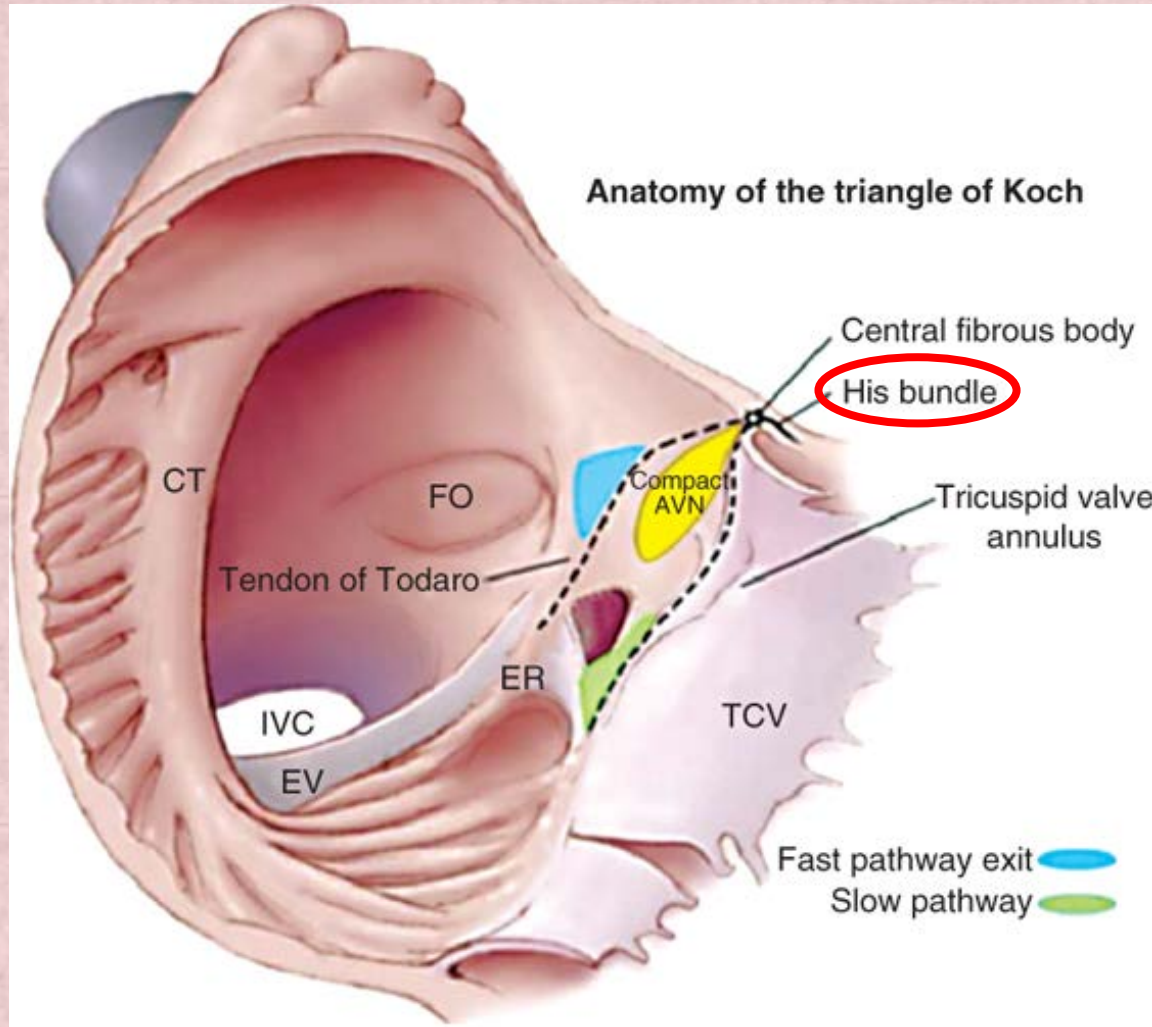
1. Atrial fibrillation and pacemaker
2. Atrial fibrillation and WPW
3. Sinus rhythm and WPW
4. Sinus rhythm and pacemaker



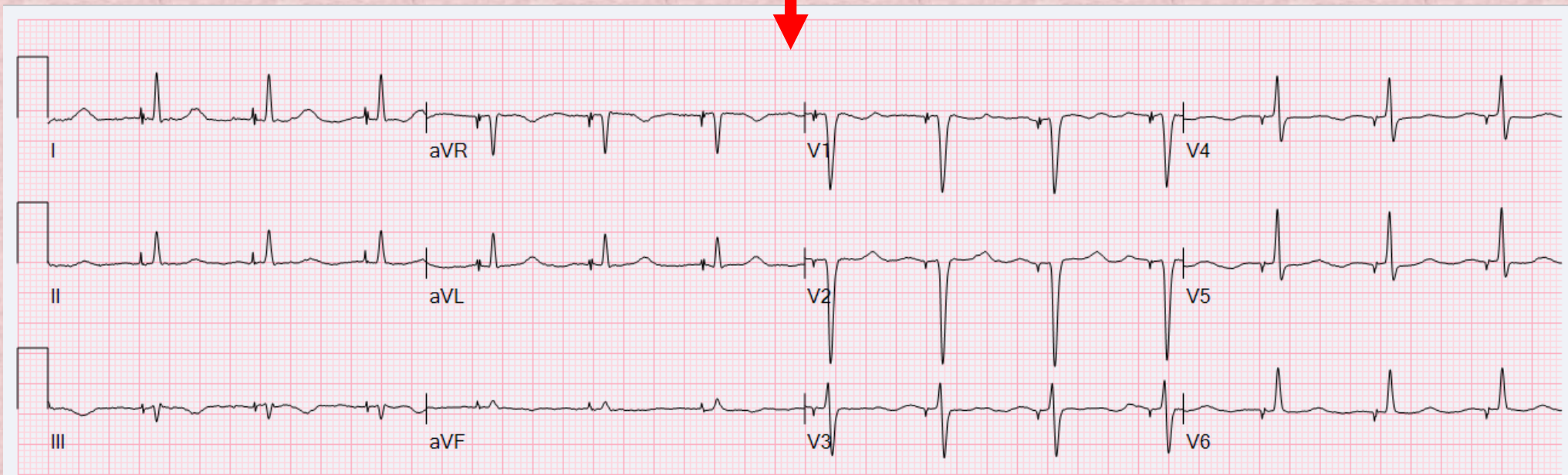
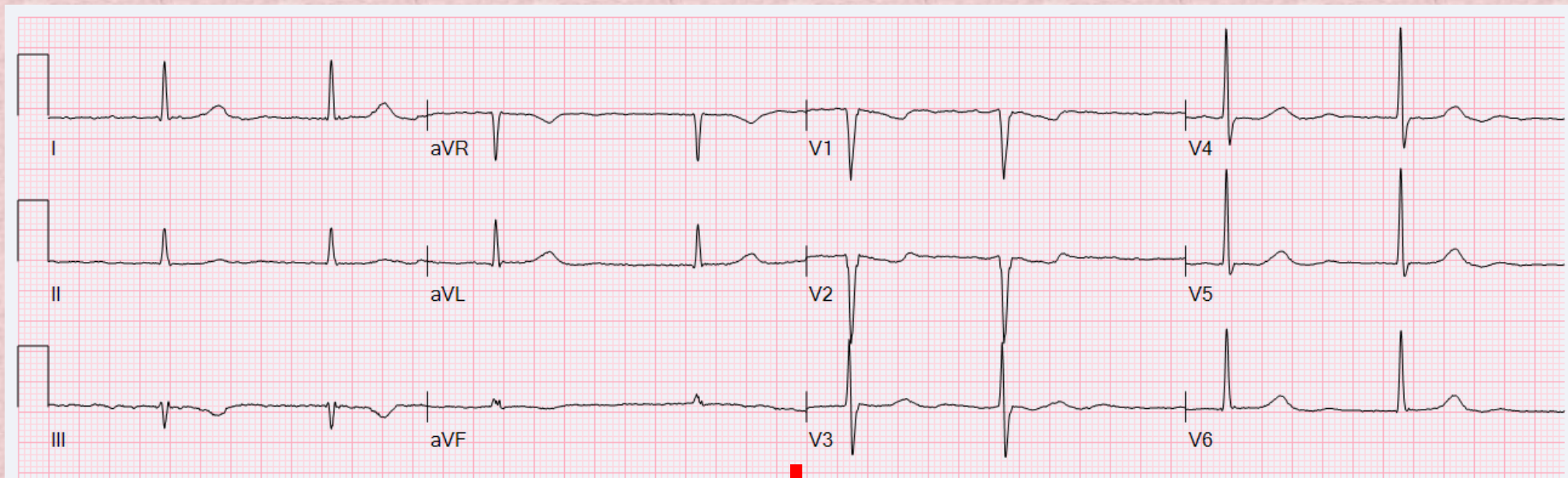


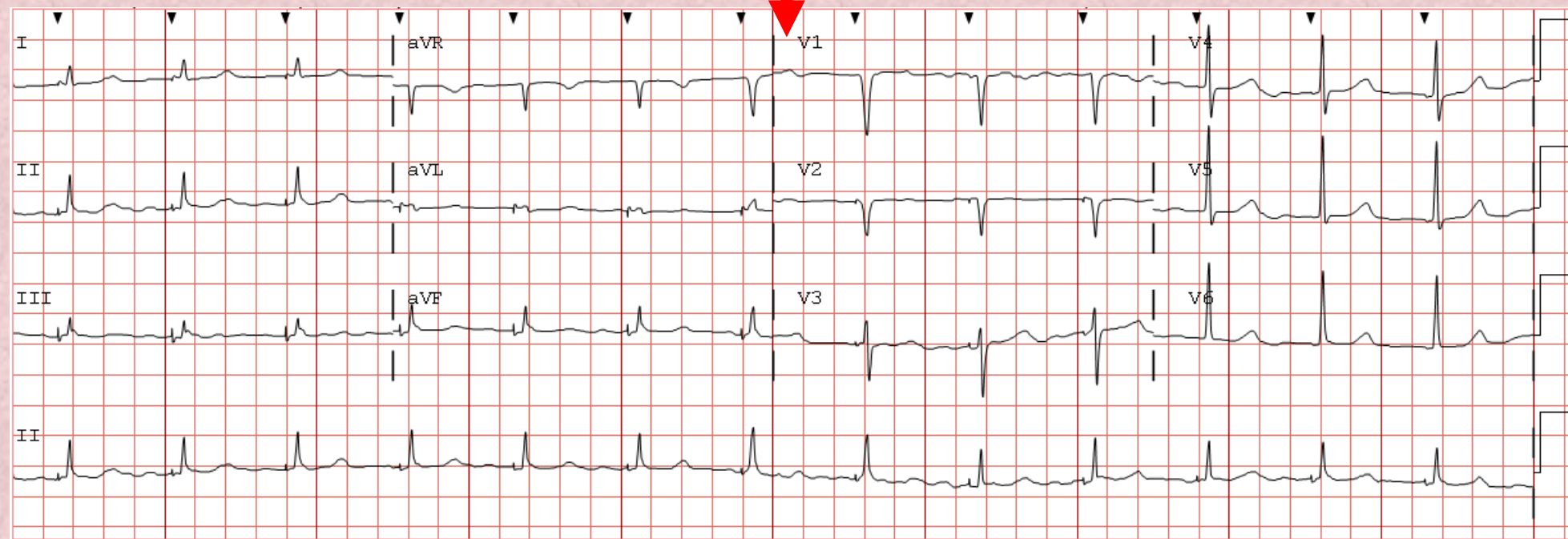
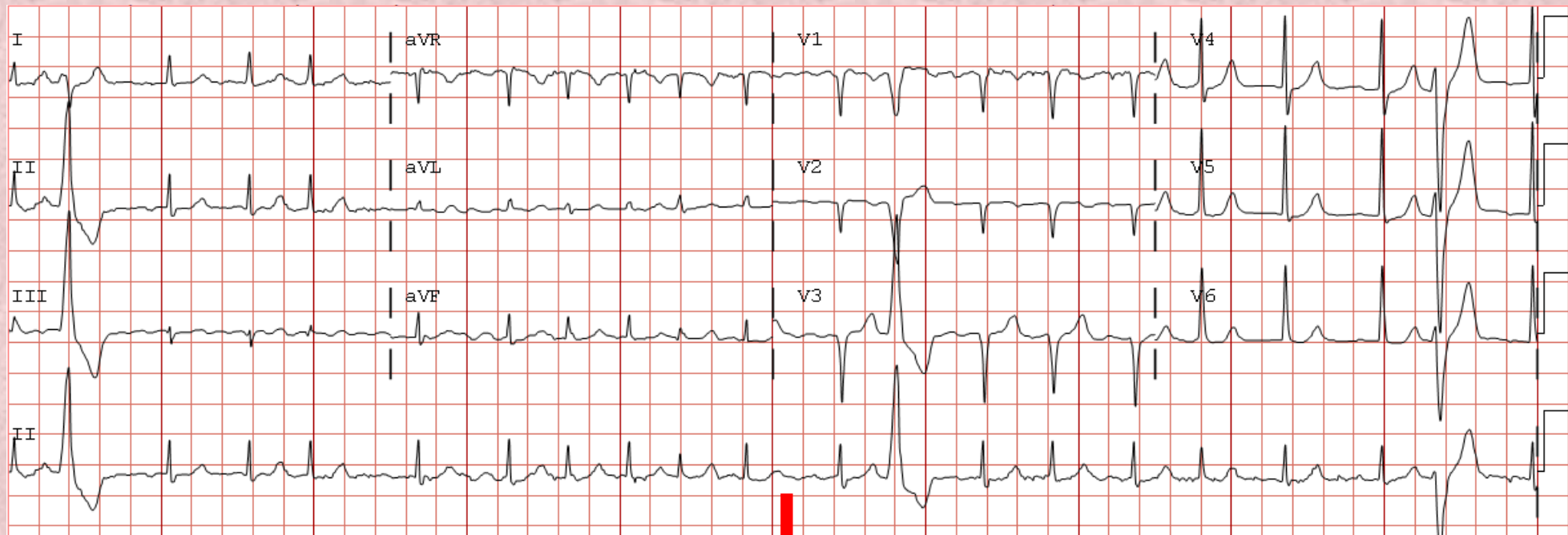
# From Last Year's Symposium







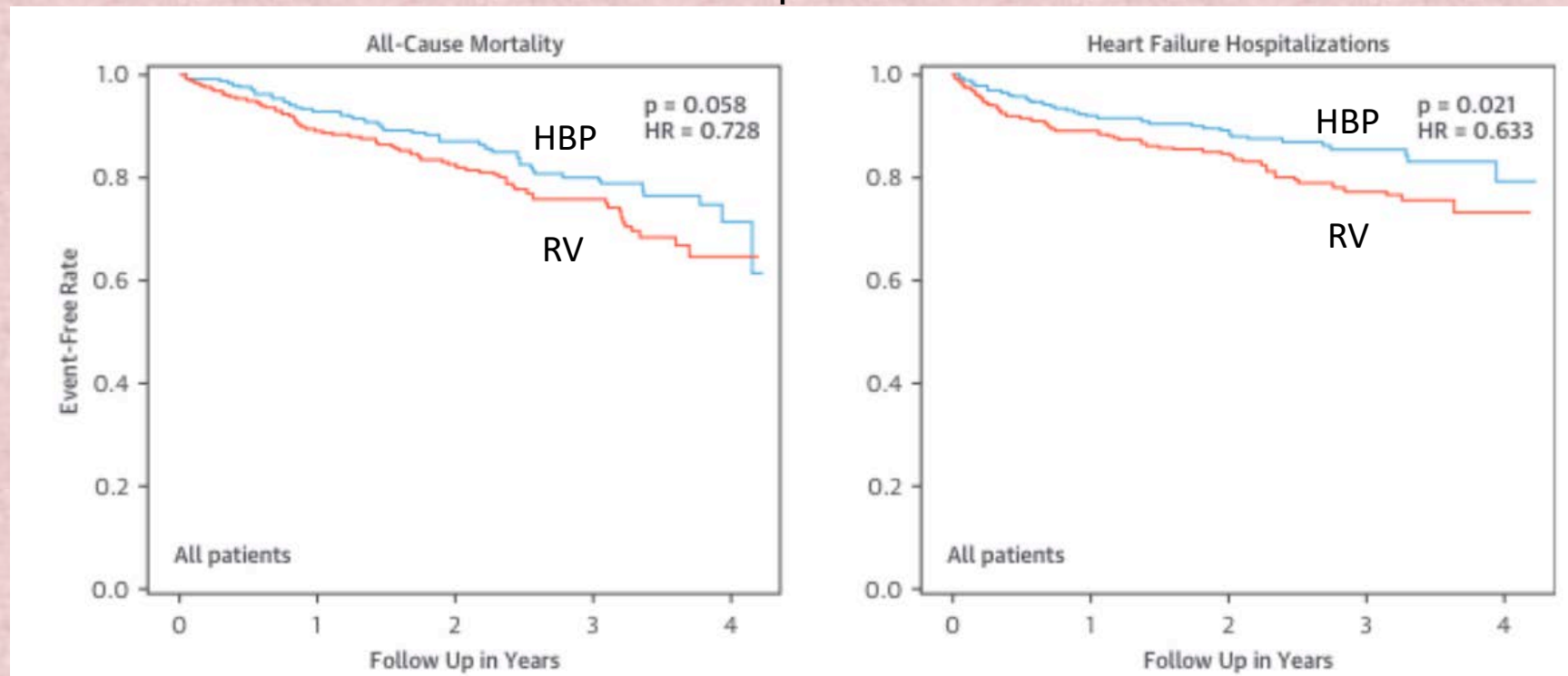






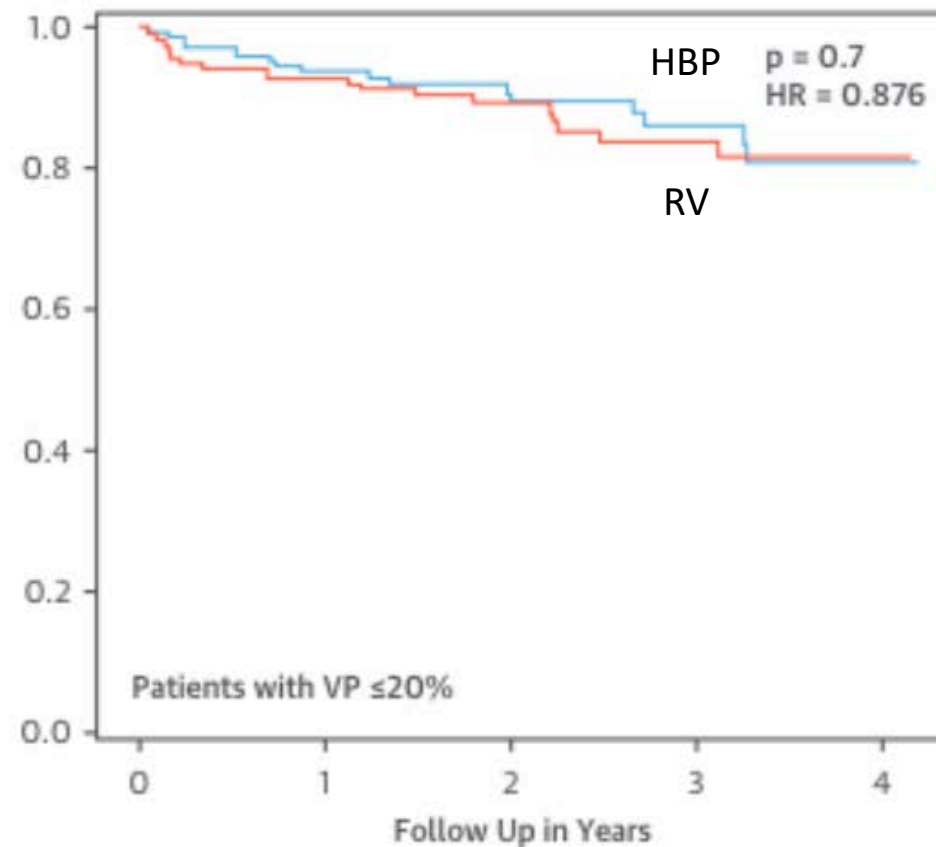
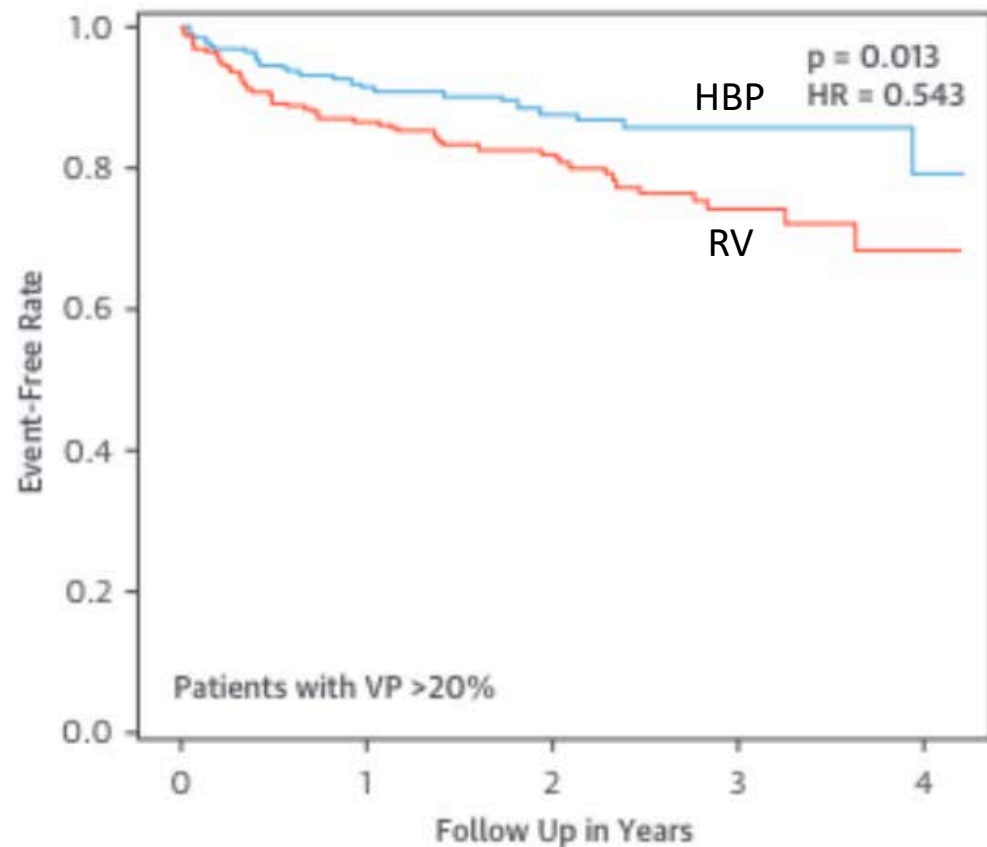
# Long-Term Outcomes with His Bundle Pacing

HBP was attempted in 332 consecutive patients at one hospital and 433 patients underwent RV Pacing at a second hospital



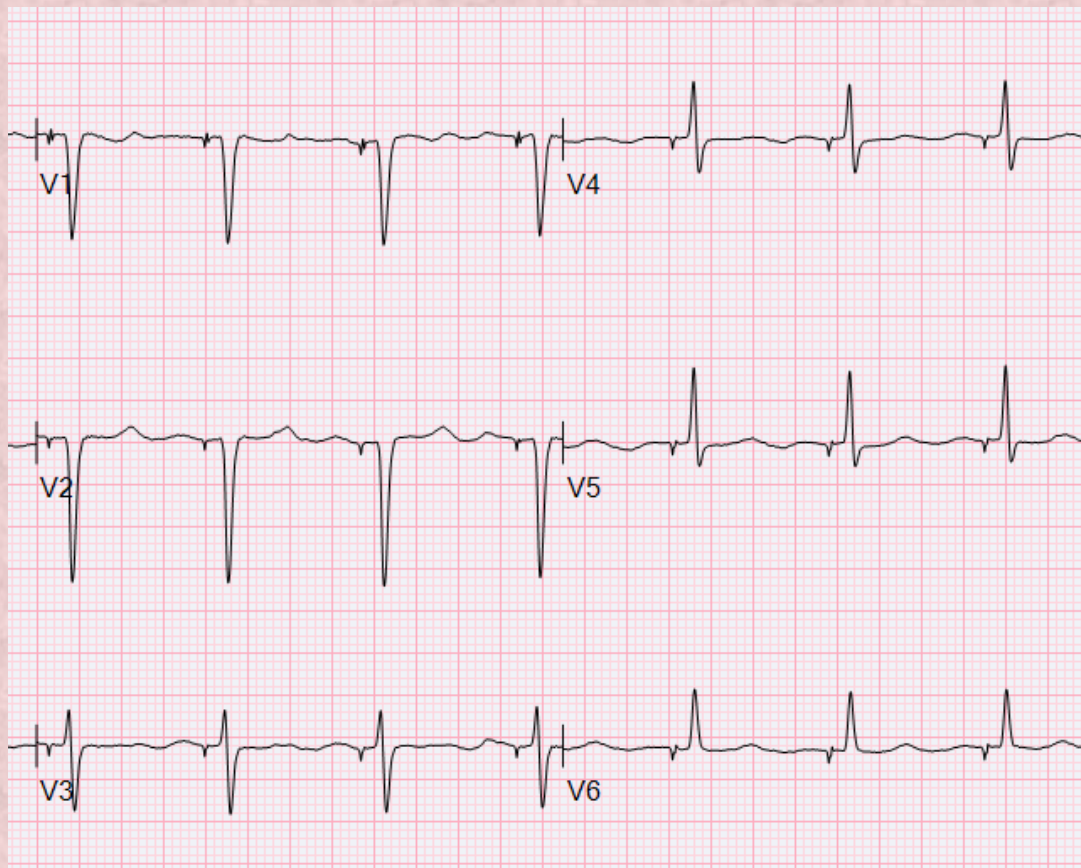
92% Successful His Bundle Attempts

### Heart Failure Hospitalizations

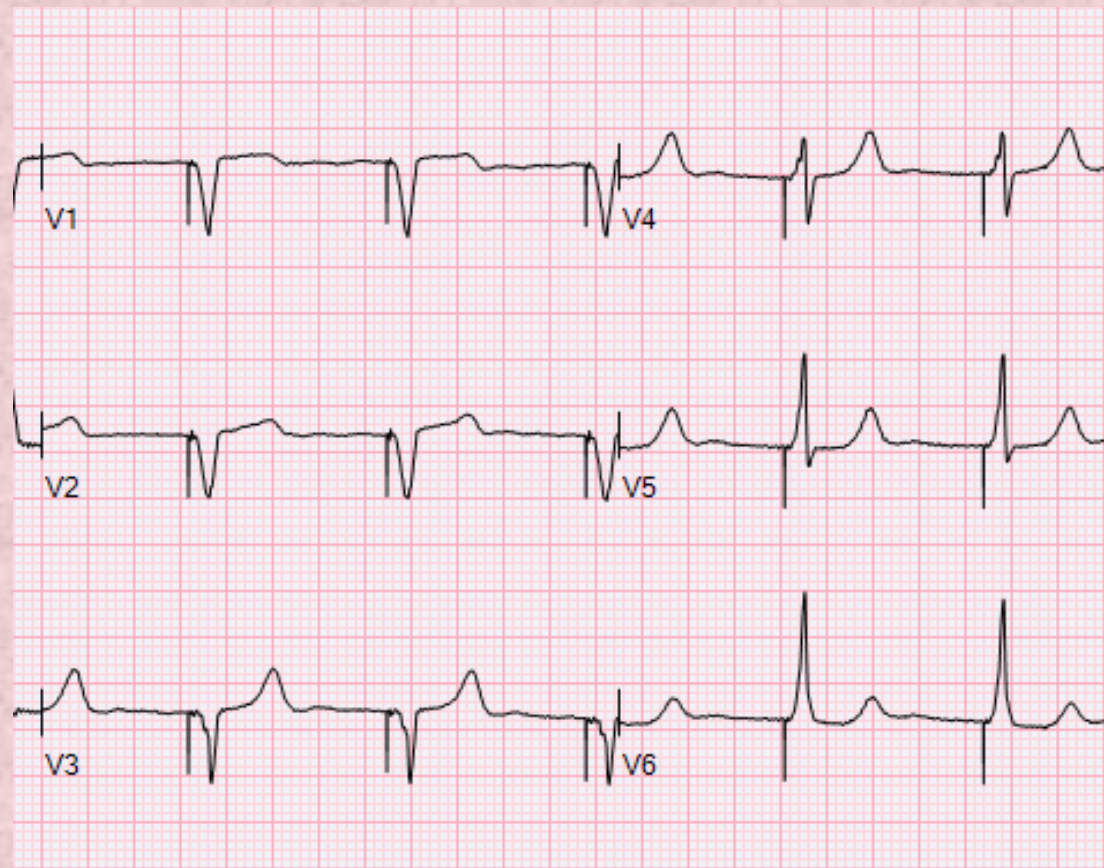




Selective His Bundle Pacing



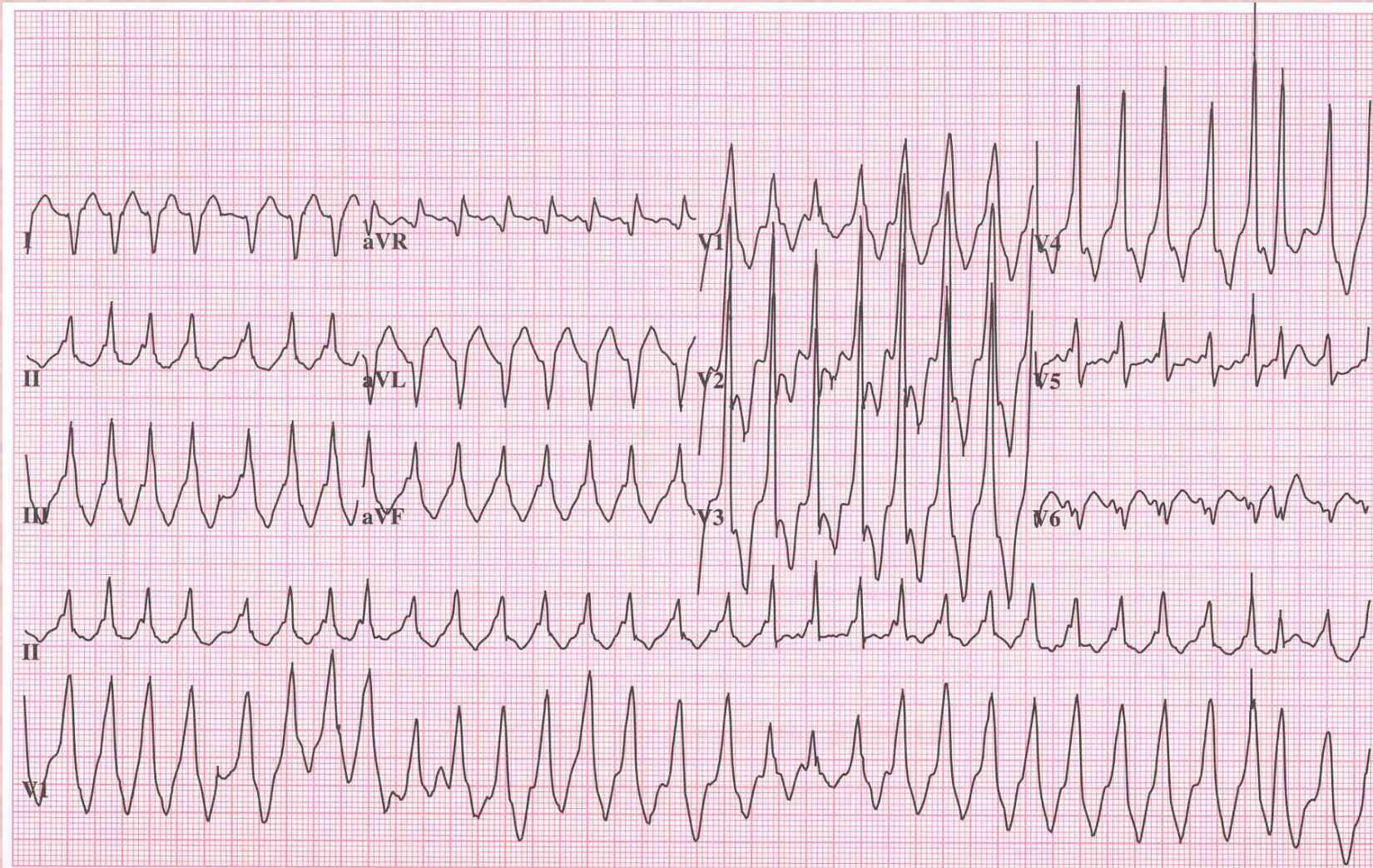
Non-Selective His Bundle Pacing






Couple 7

18-year-old with palpitation



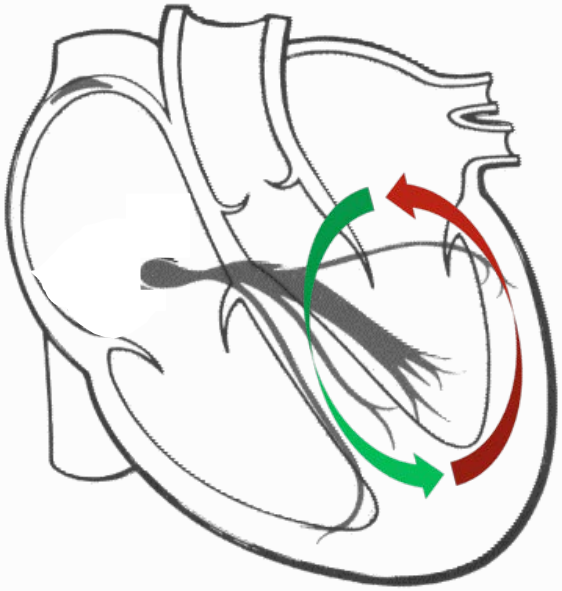


# 18-year-old with palpitation

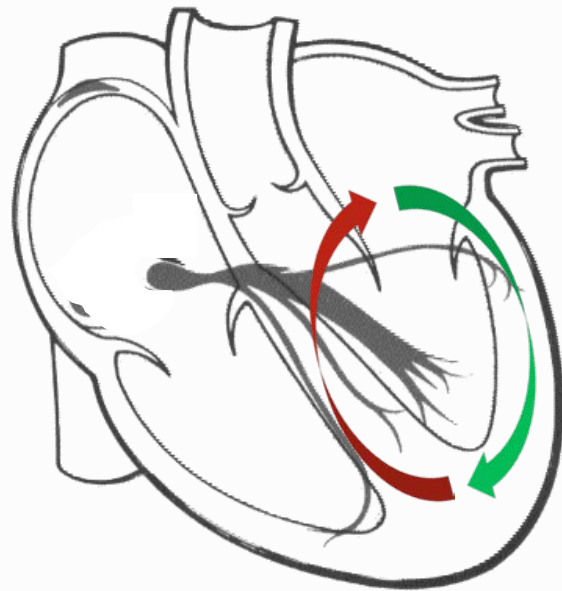
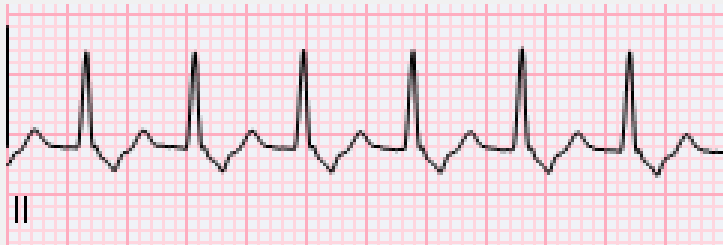
1. Torsade de Pointes with ICD malfunction
-  2. AF with WPW
3. SVT with RBBB aberrancy
4. AF with STEMI



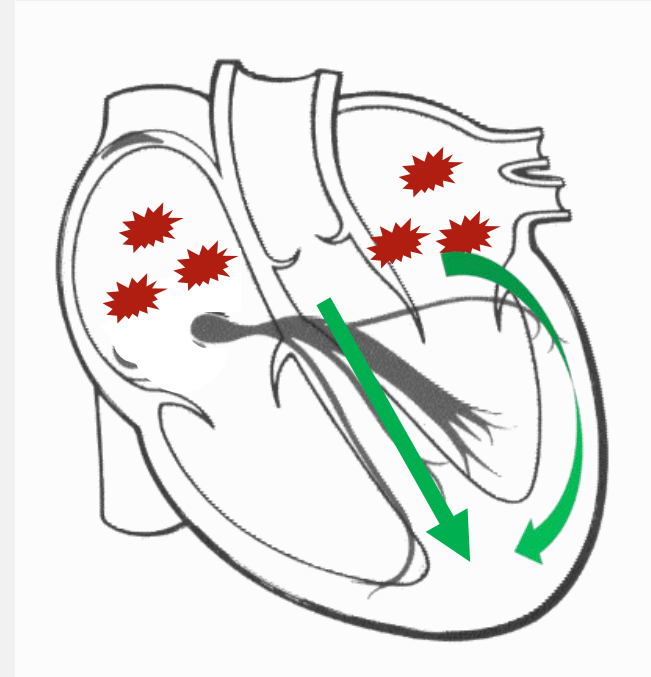
# WPW Arrhythmia Mechanisms



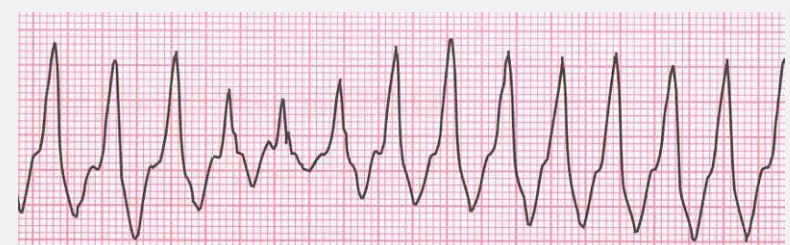
Orthodromic



Antidromic

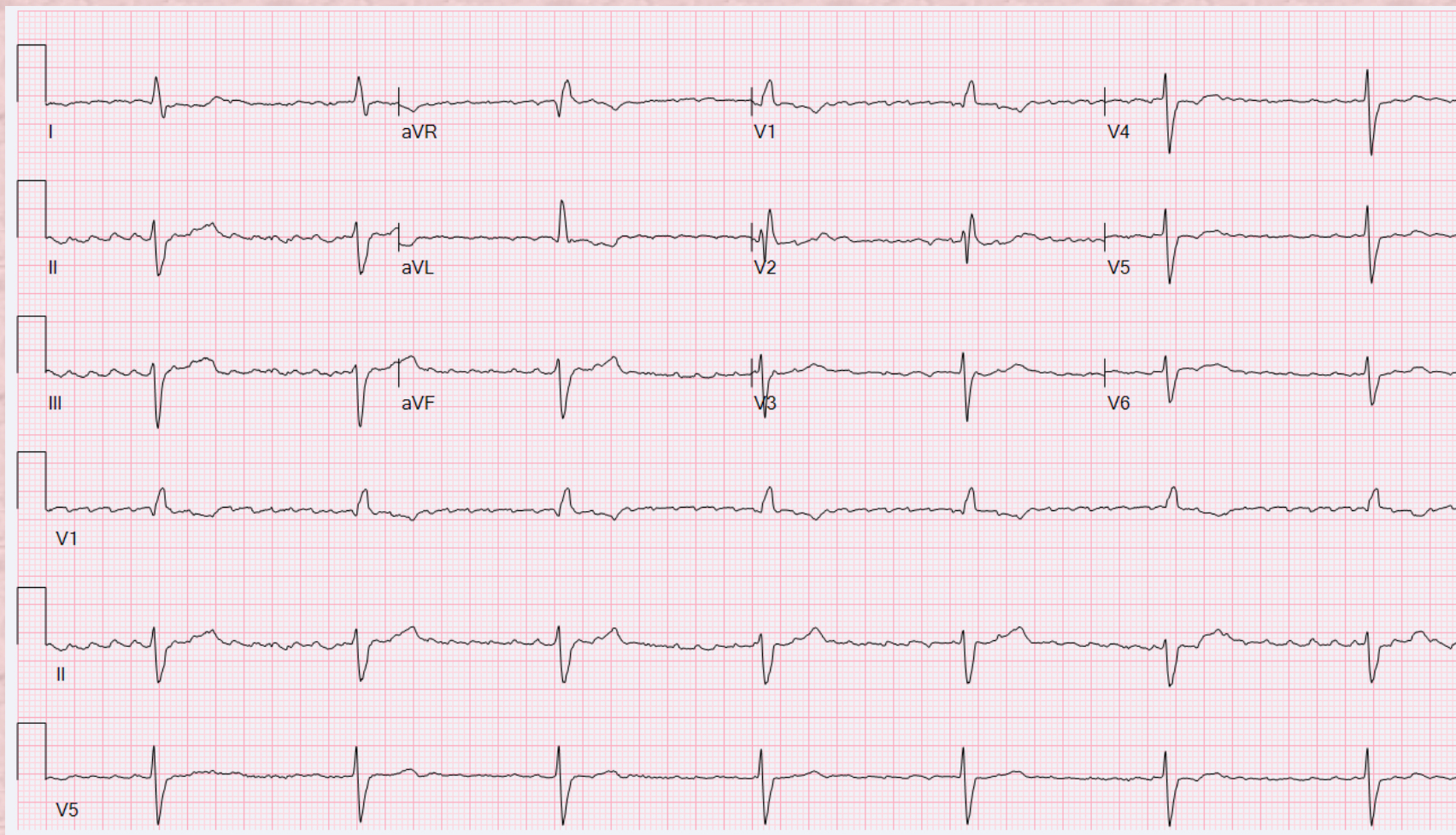


Atrial Fibrillation





# Slow and Regular



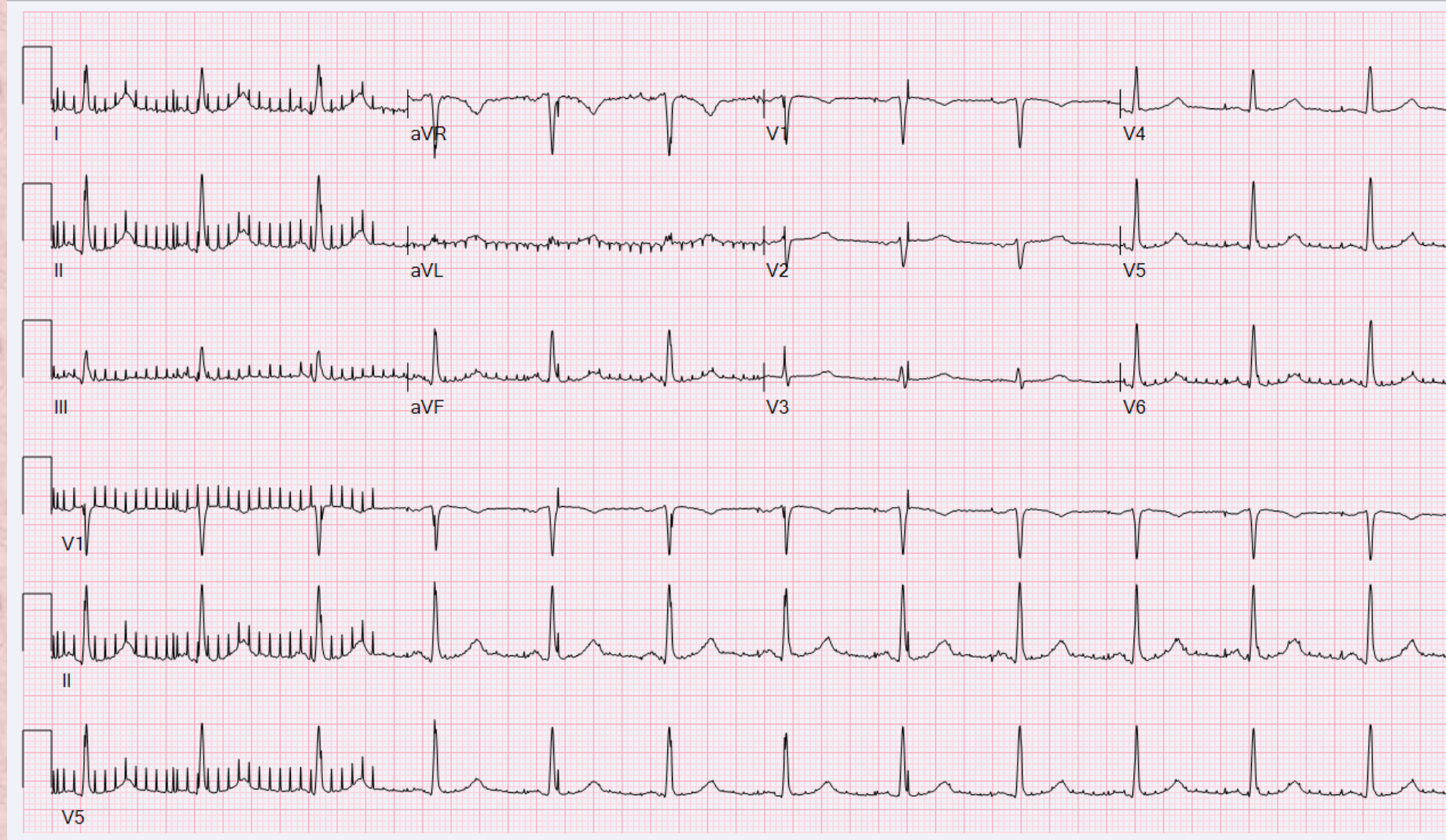
## Slow and regular

1. Atrial fibrillation and complete heart block
2. Sinus bradycardia and RBBB
3. Atrial fibrillation and LBBB
4. Typical atrial flutter and RBBB





# What's All the Noise About?



# What are we looking at?

1. Non-cardiac stimulator and cardiac pacemaker
2. Atrial rhythm and brain stimulator
3. Sinus rhythm and artifact
4. Atrial fibrillation and non-cardiac stimulator





## **Past Surgical History:**

Appendectomy

Cholecystectomy

Hysterectomy

**Pacemaker Insertion**

Portacath Placement

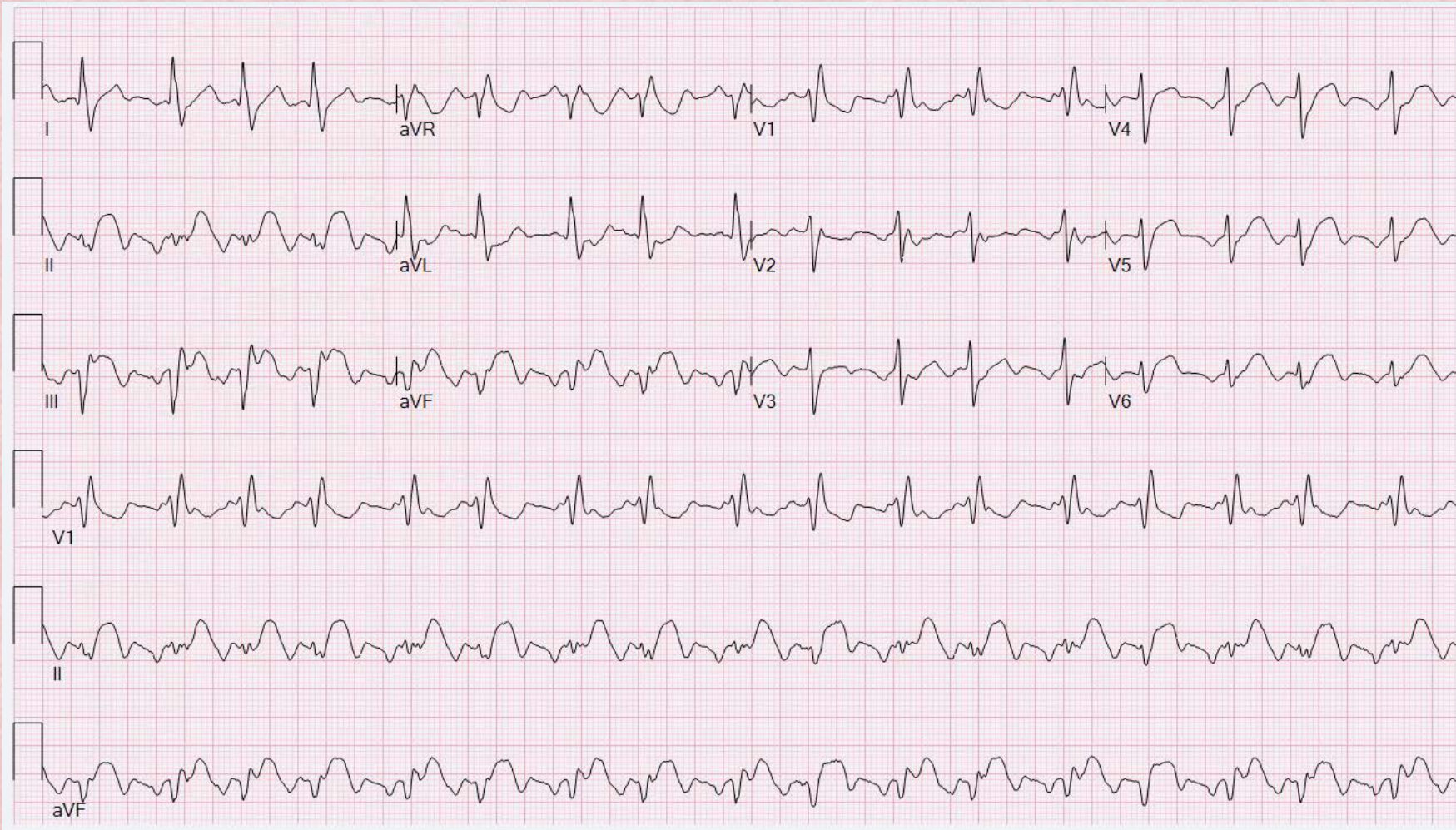
Rectal Surgery

**Sacral Nerve Stimulator Placement**




Couple 10

And the Unhappy Couple is?



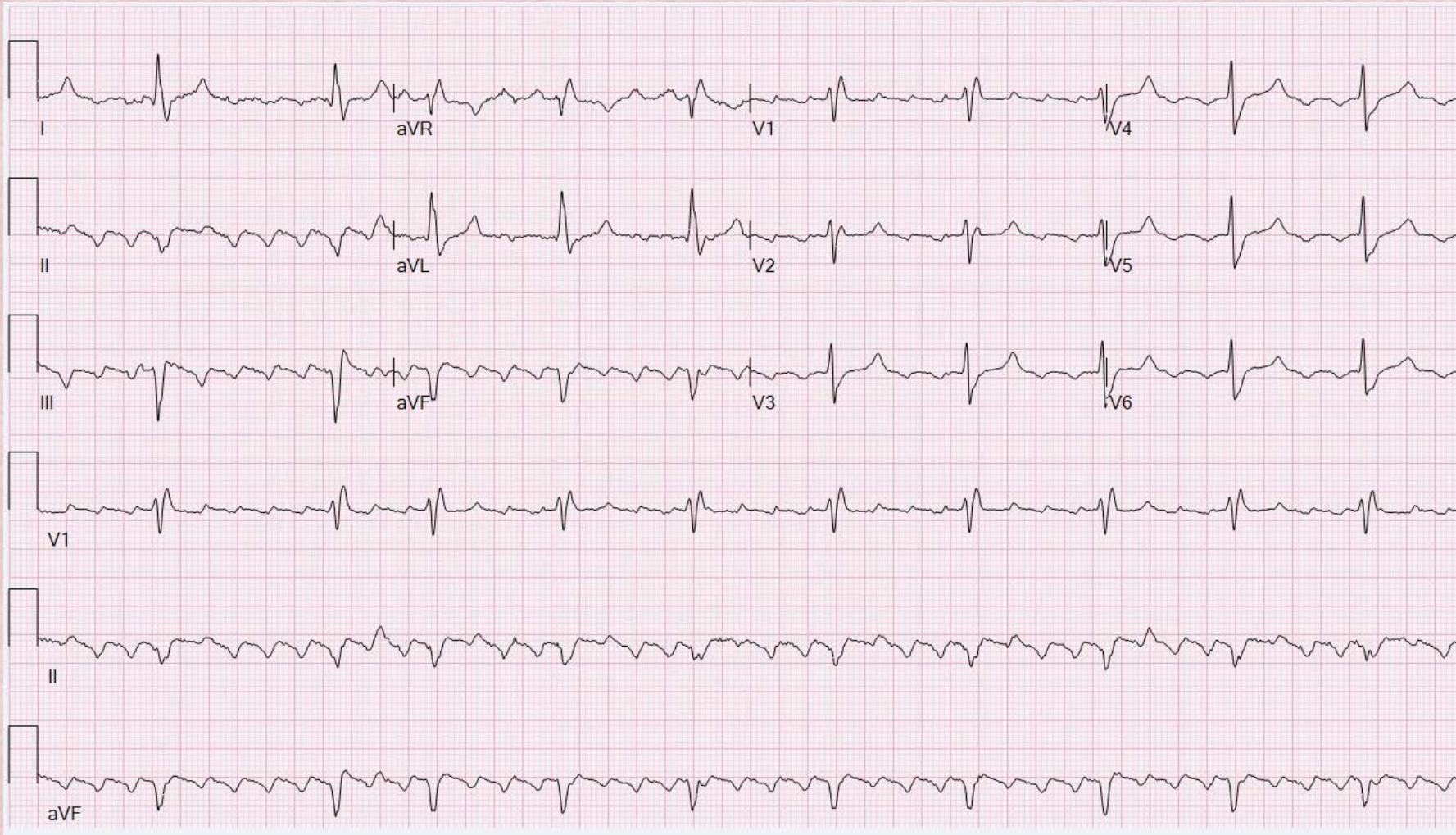


## And the Unhappy Couple is?

1. Atrial flutter and RBBB
-  2. Atrial flutter and acute MI
3. Sinus tachycardia and acute MI
4. SVT and acute MI



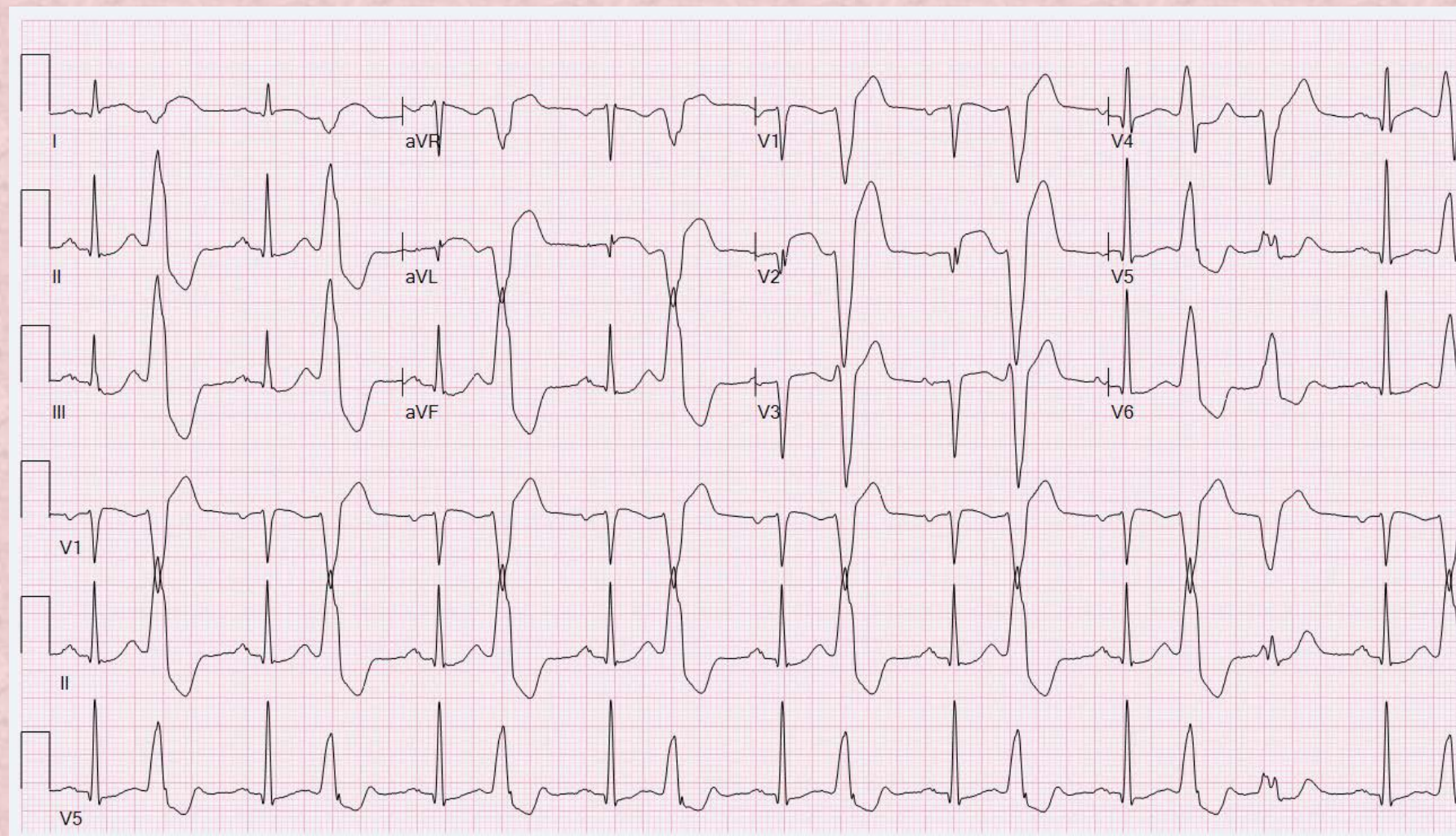
# With rate slowing (and 10 hours...)





Couple 11

# Heart Throb



# What's going on?

1. Bigeminal PVCs and acute MI
2. Bigeminal PVCs and WPW
3. Atrial flutter with WPW
4. Atrial flutter with PVCs





# Vagal AV Block

## First Degree

Long PR no dropped beats

## Second Degree

Mobitz I (AKA Wenckebach)

PR interval lengthens

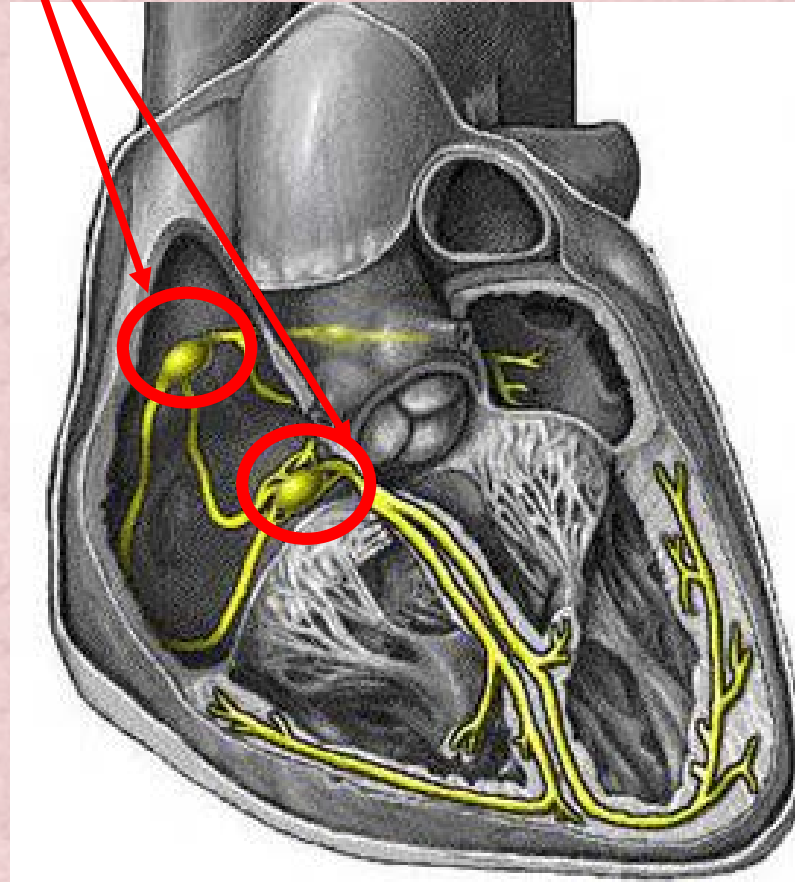
Mobitz II

Fixed PR, dropped QRS

2:1 Block

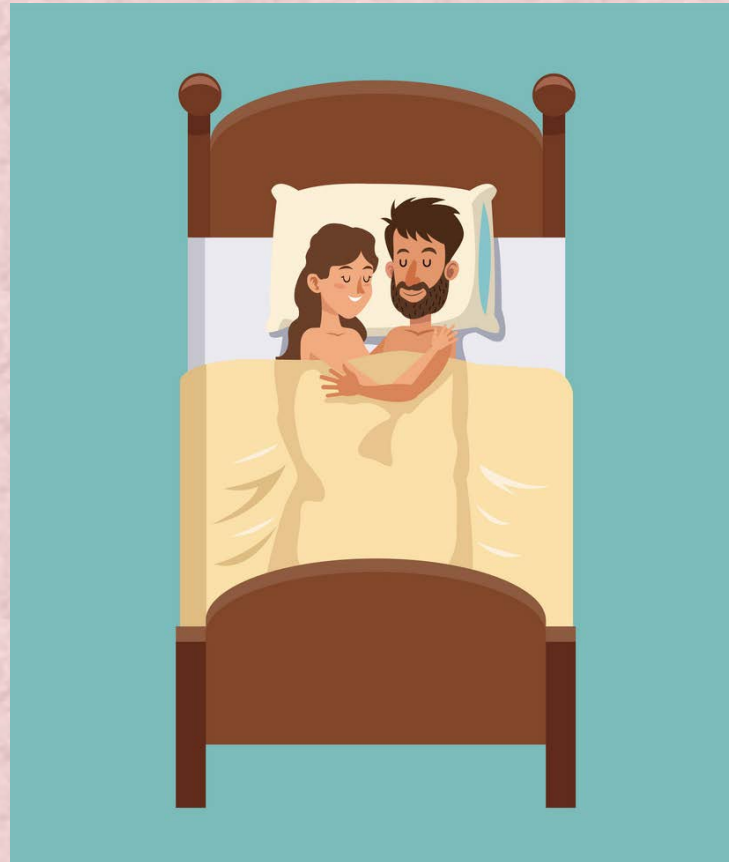
## Third Degree

Complete AV Block



Round III

# X-Rated Nightcap





X-Rated Image 1



## X-Rated Image 1

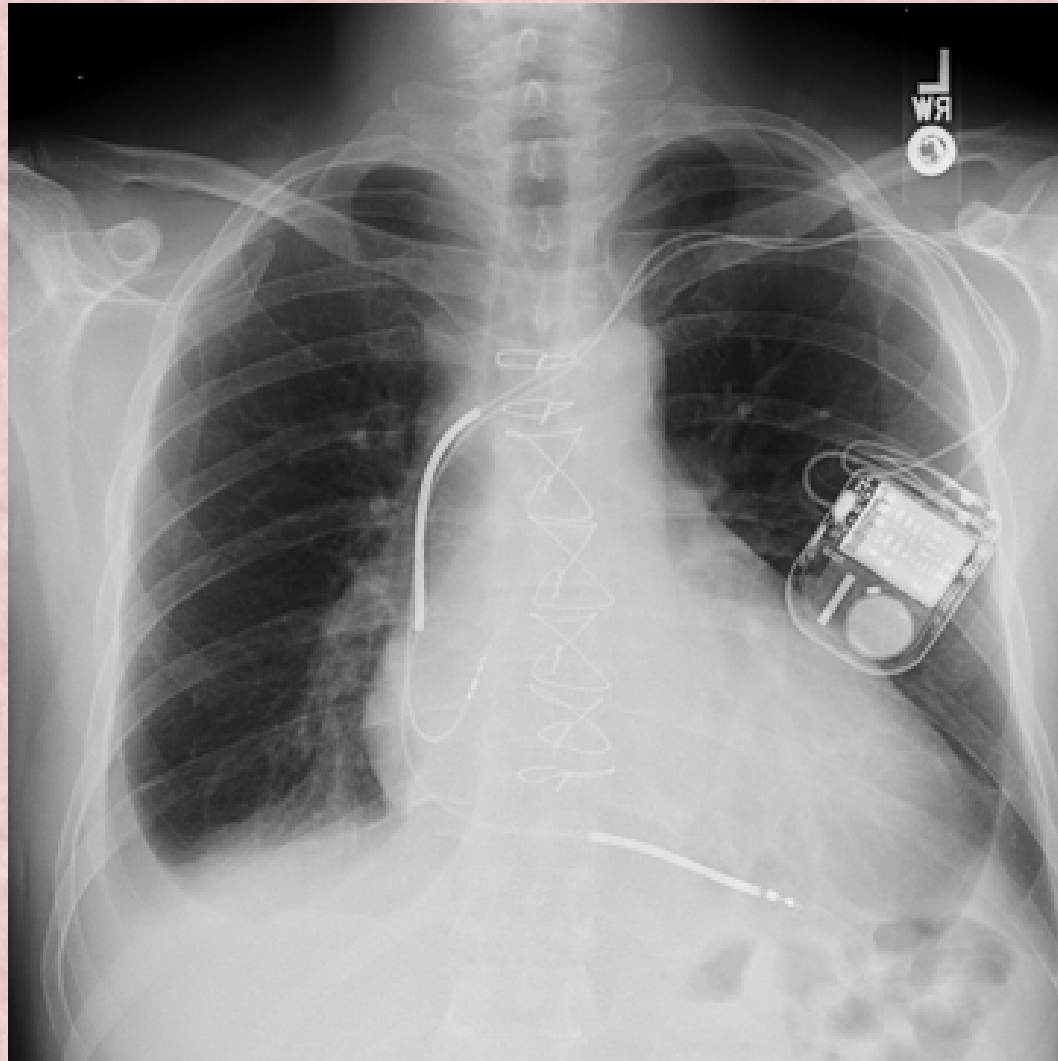
This is a...

- 1. Pacemaker
- 2. ICD without any pacemaker function
- 3. ICD with pacemaker function
- 4. Biventricular pacemaker






## X-Rated Image 2



## X-Rated Image 2

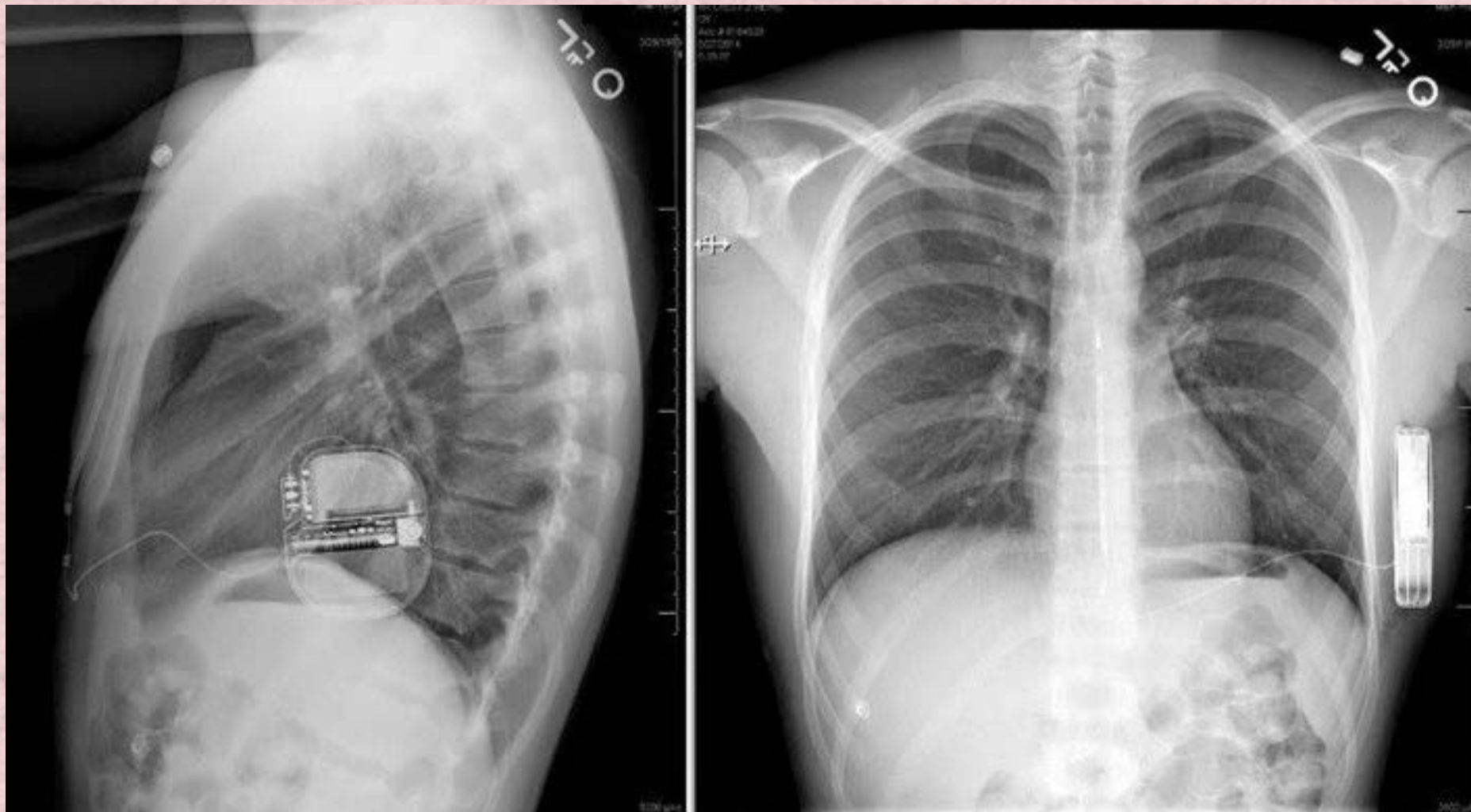
This is a...

1. Pacemaker
2. ICD without pacemaker function
-  3. ICD with pacemaker function
4. Biventricular pacemaker





## X-Rated Image 3



## X-Rated Image 3

This is a...

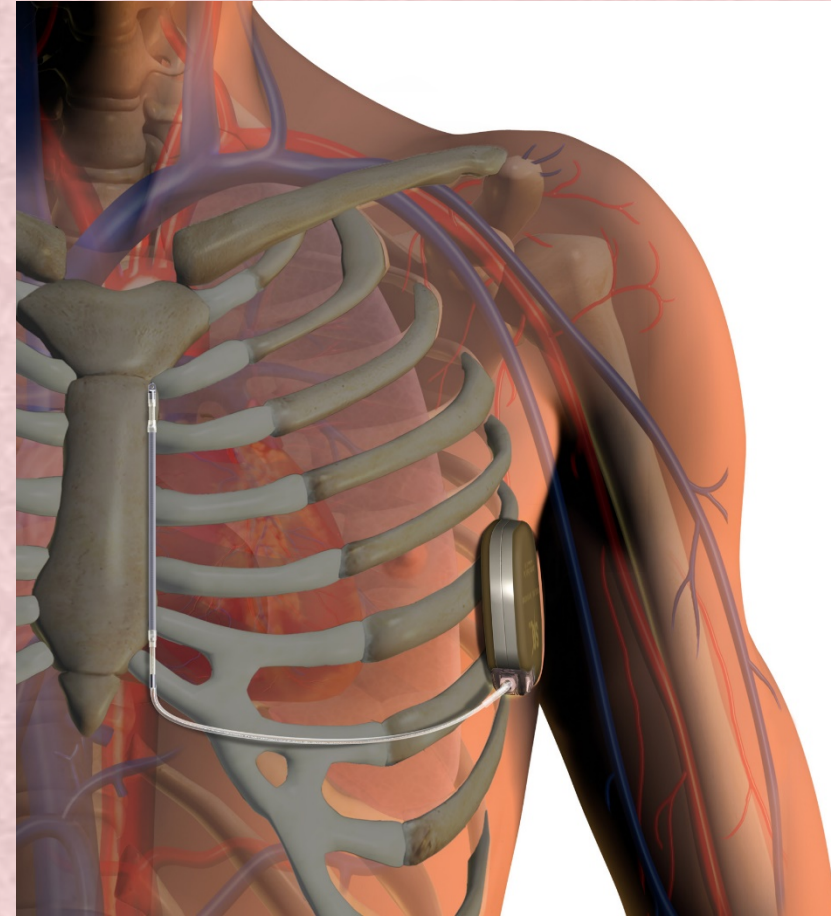
1. Pacemaker
2. ICD without any pacemaker function
3. ICD with pacemaker function
4. Biventricular pacemaker



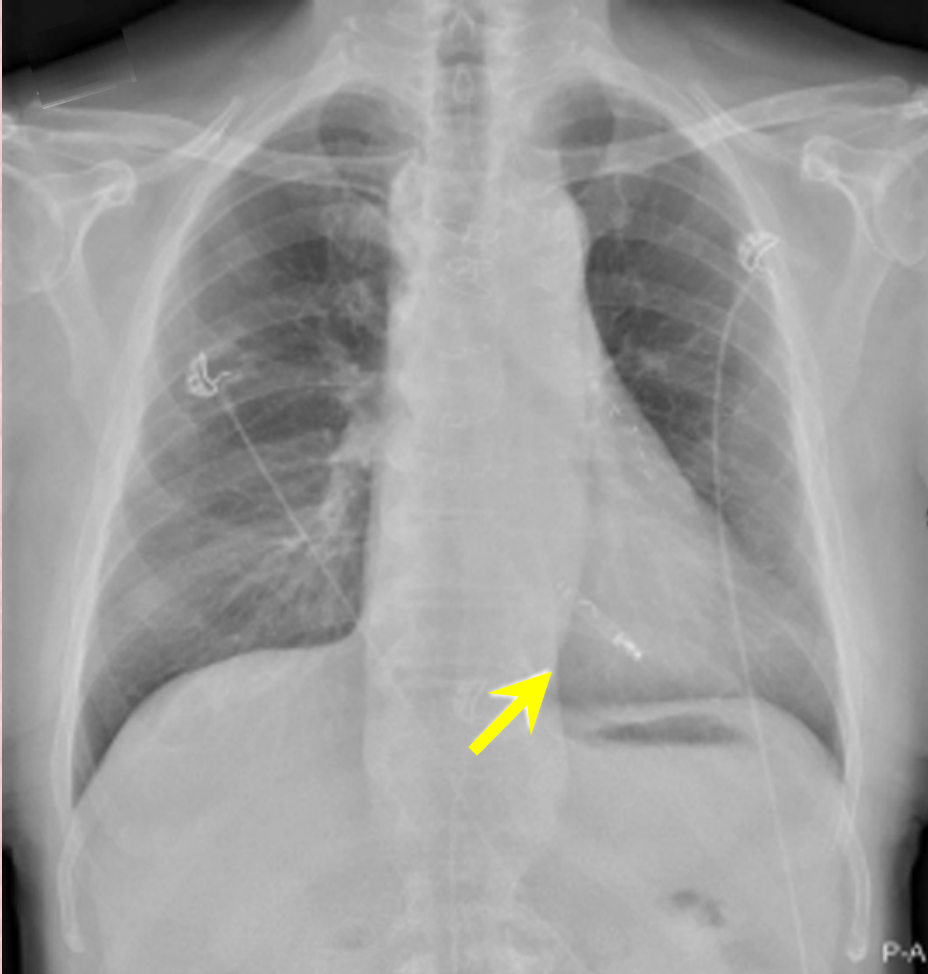


# Subcutaneous ICD (S-ICD)

- Leads are extra-cardiac
- No pacemaker function
- No anti-tachycardia pacing
- Inhibits with magnet placement (like traditional ICDs)



## X-Rated Image 4





## X-Rated Image 4

This is a...

1. Pacemaker
2. Bullet
3. Loop recorder
4. Heart failure diagnostic tool



# Leadless Pacemaker

- Implanted through the femoral vein
- Currently only in single chamber (VVI) version
- No response to magnet





TWO VIEWS, CHEST, PA AND LATERAL, 06/03/2017

INDICATION: POST PACEMAKER INSERTION.

REPORT:

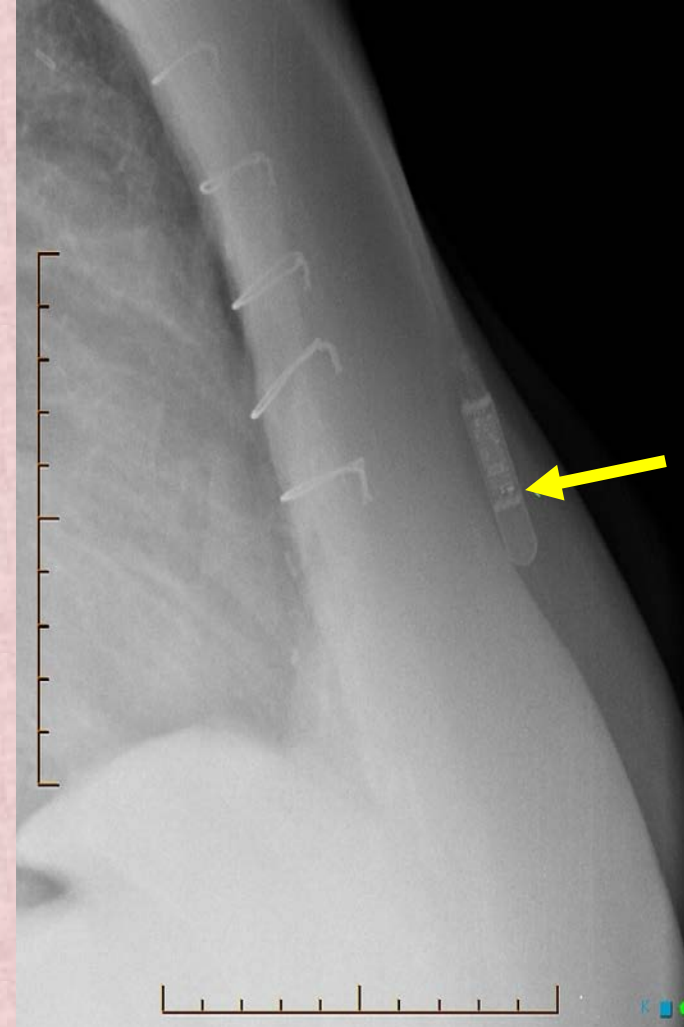
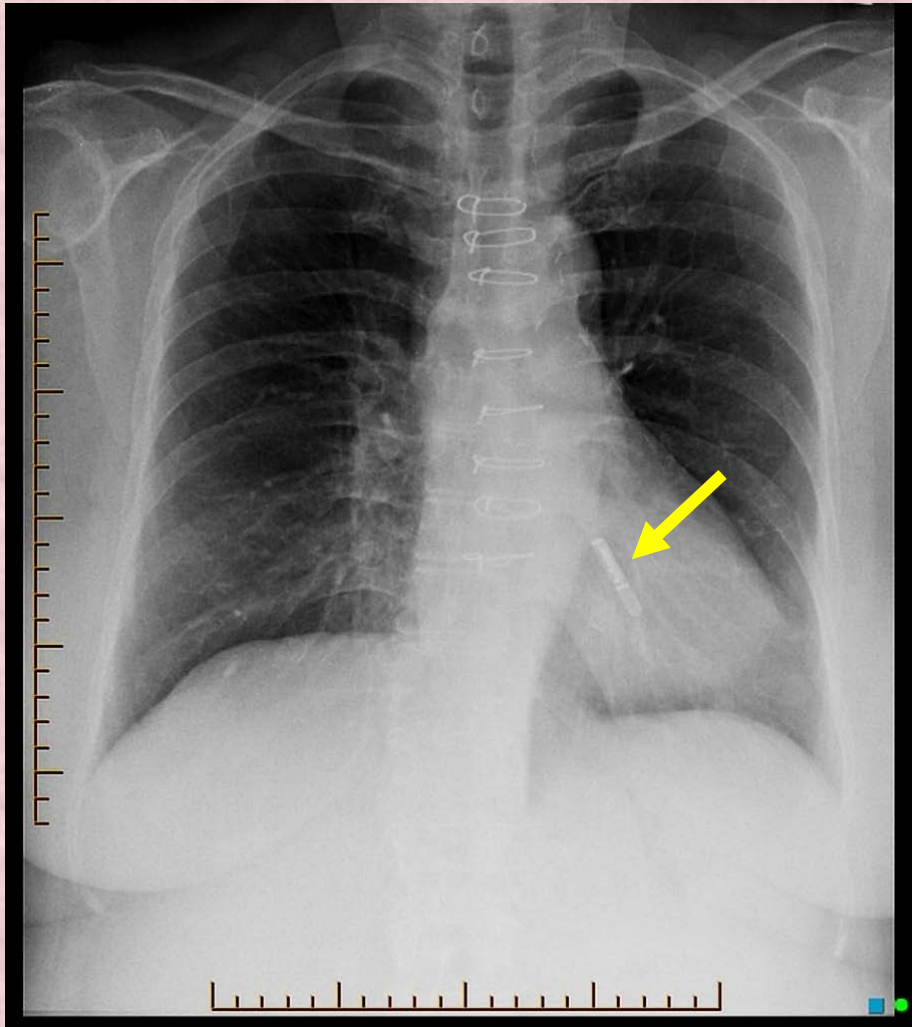
SMALL RADIOPAQUE DEVICE OVERLYING THE MEDIAL LEFT MID LUNG IS NOTED, WHICH IS OF UNKNOWN CLINICAL OR PATHOLOGIC SIGNIFICANCE. NO PLEURAL EFFUSION OR PNEUMOTHORAX IS PRESENT.

IMPRESSION:

1. INTERVAL PLACEMENT OF UNKNOWN SMALL RADIOPAQUE DEVICE POSSIBLY WITHIN THE LEFT PLEURAL SPACE OR EPICARDIAL SPACE ANTERIOR TO THE LEFT VENTRICLE ON THE CURRENT STUDY. CLINICAL CORRELATION IS SUGGESTED.
2. NO PNEUMOTHORAX.



## X-Rated Image 5



## X-Rated Image 5

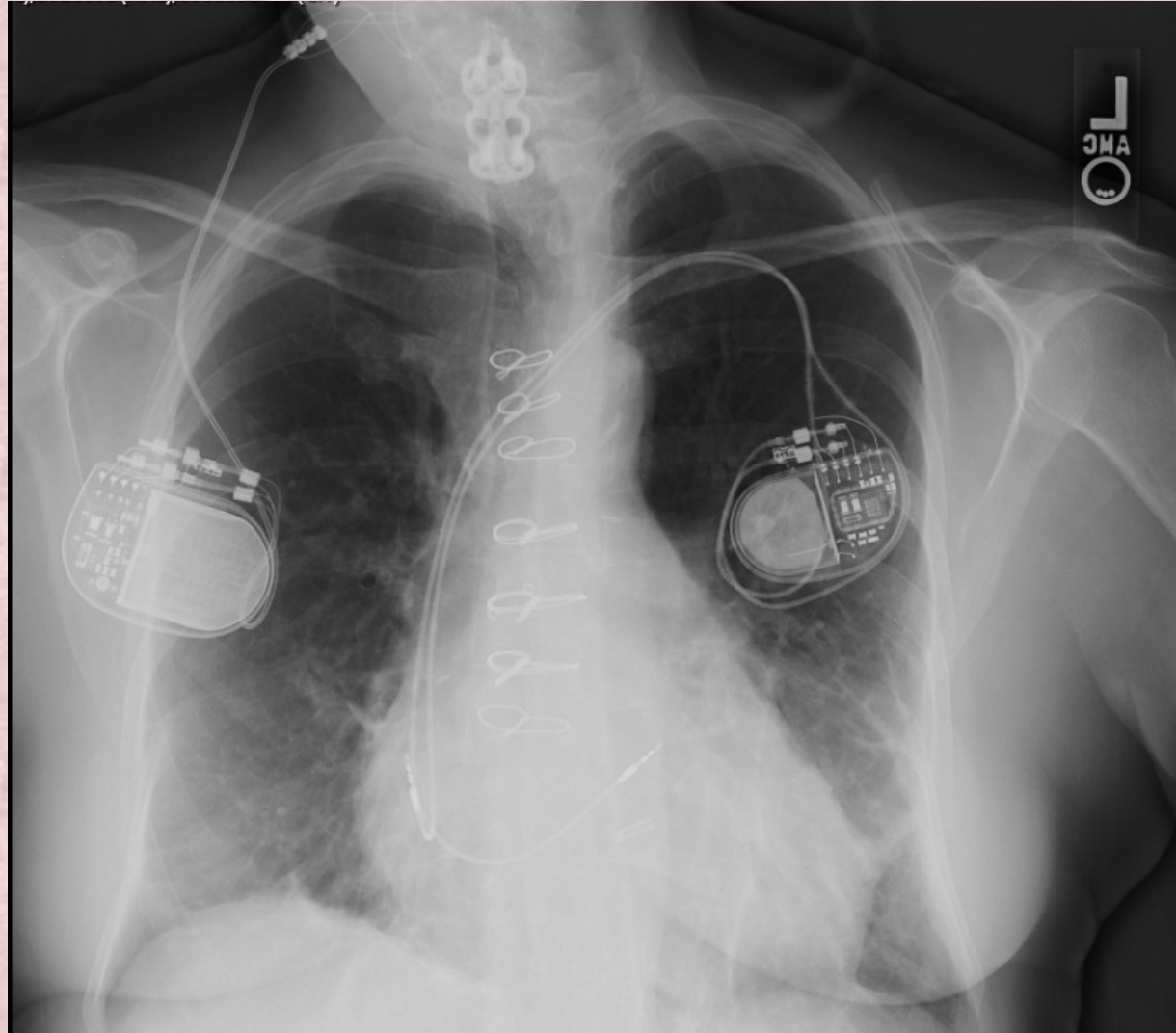
This is a...

1. Pacemaker
2. Bullet
3. Loop recorder
4. Heart failure diagnostic tool





## X-Rated Image 6



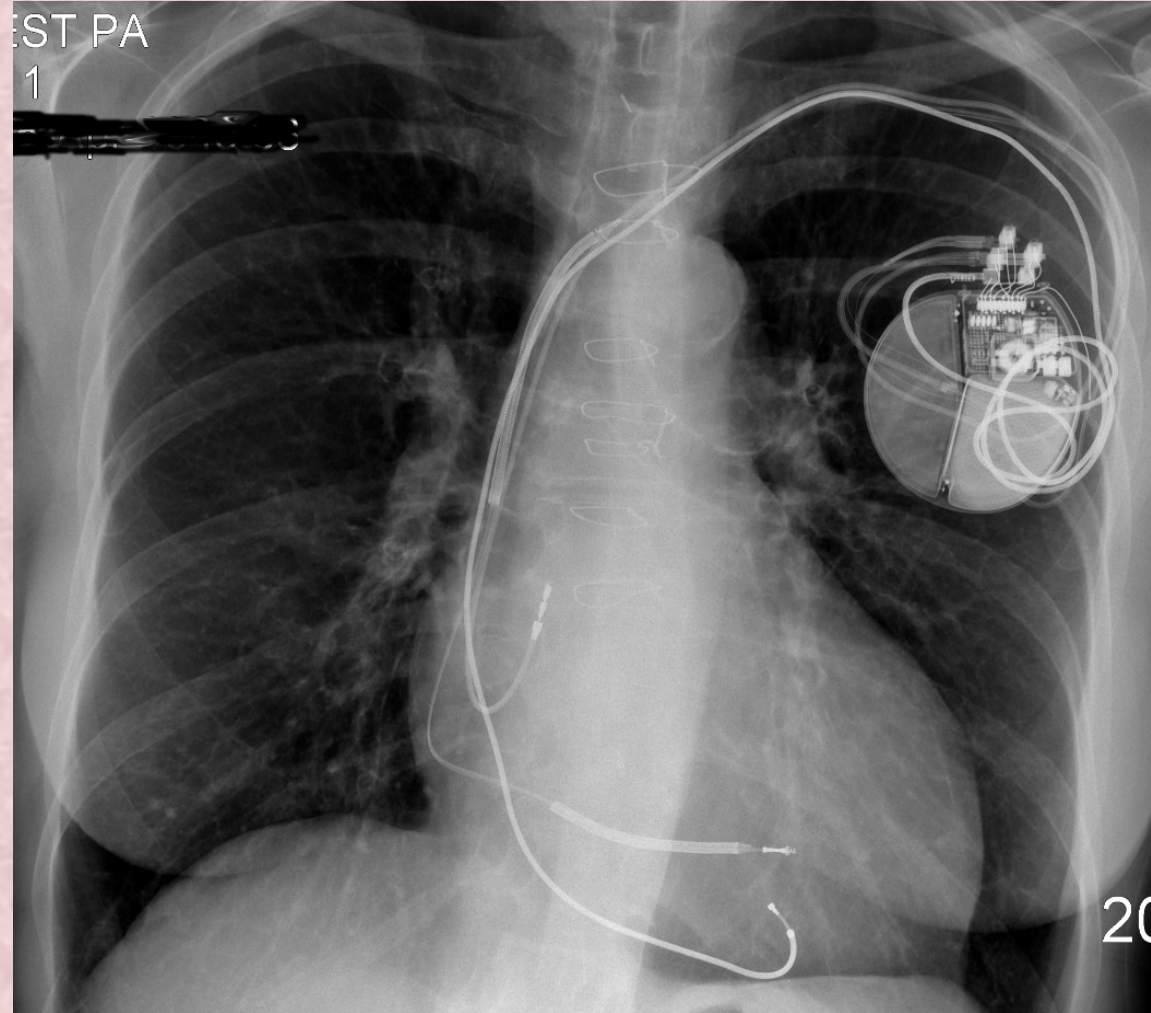
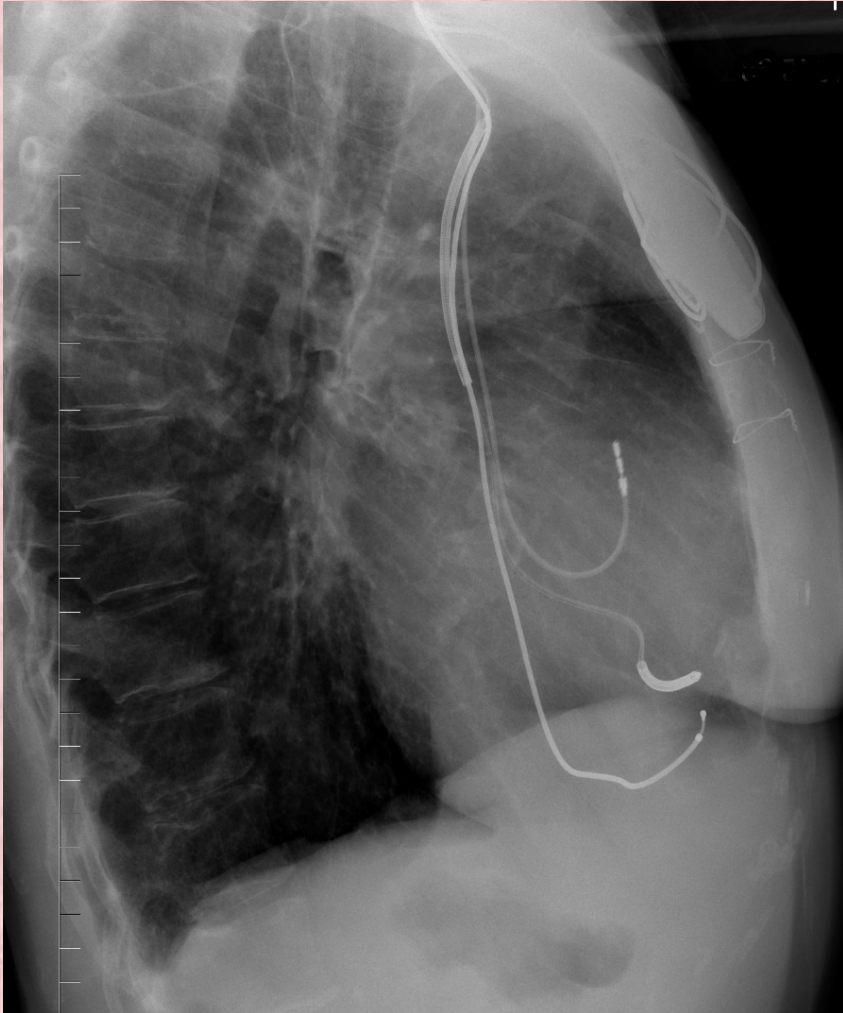
## X-Rated Image 6

Shown here:

1. 2 pacemakers with dislodged leads
2. 1 pacemaker with dislodged leads
3. 1 abandoned pacemaker, one active pacemaker
4. 1 pacemaker with stable leads, 1 non-cardiac stimulator




## X-Rated Image 7





## X-Rated Image 7

This is a...

1. Single chamber ICD
2. Dual chamber ICD
3.  Biventricular ICD



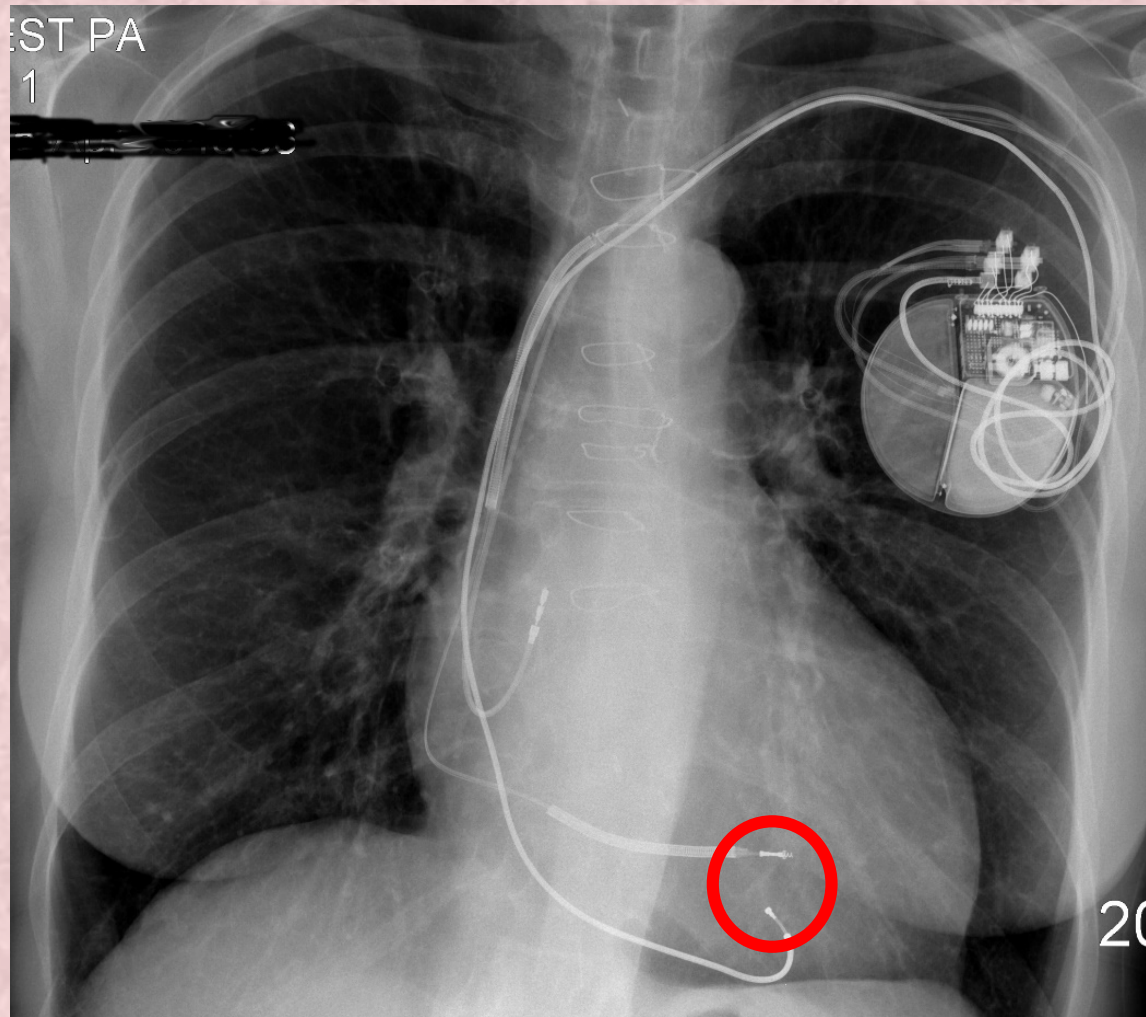
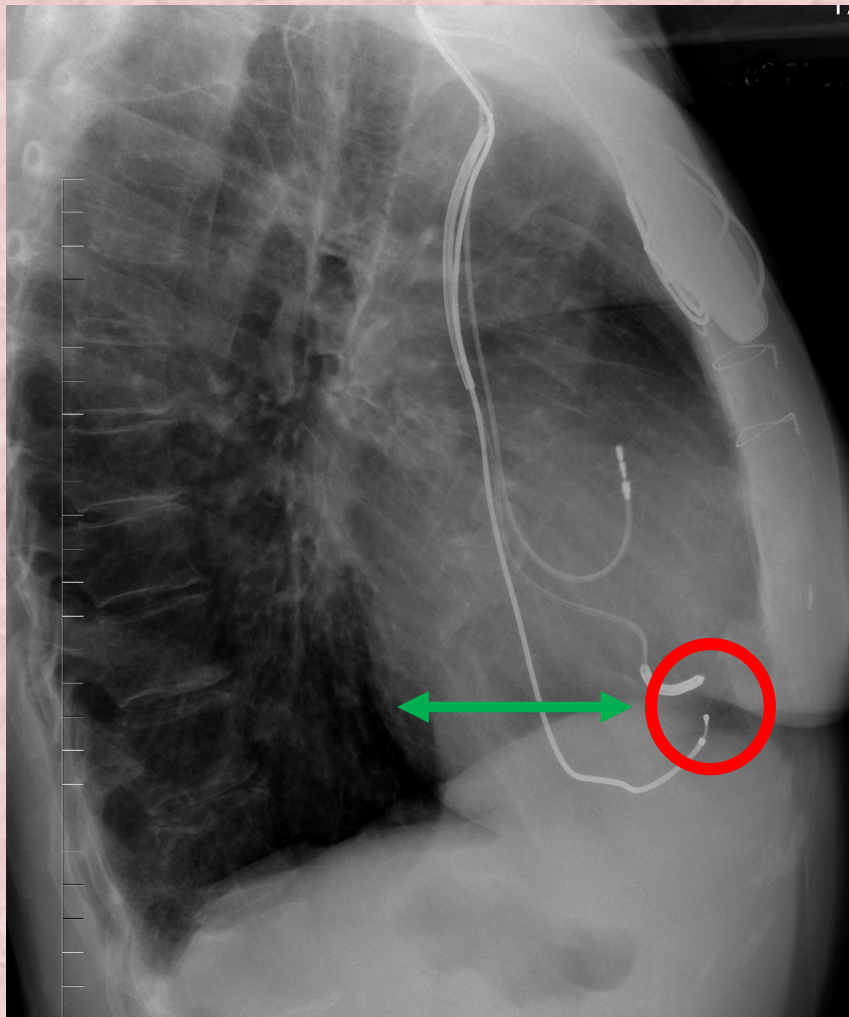
## X-Rated Image 7

The the LV Lead is:

1. In perfect position
2. In suboptimal position
3. Not even close

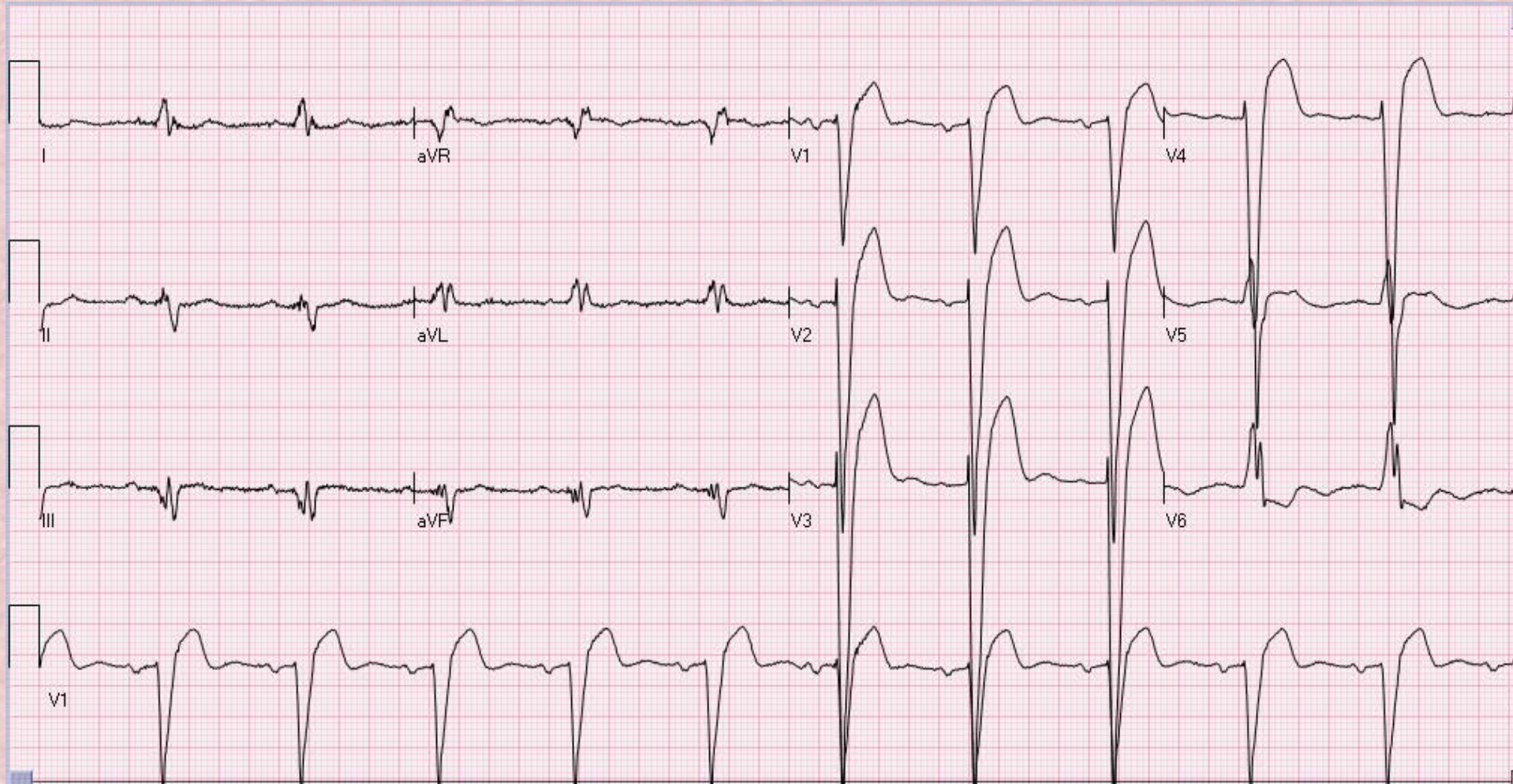


## X-Rated Image 7



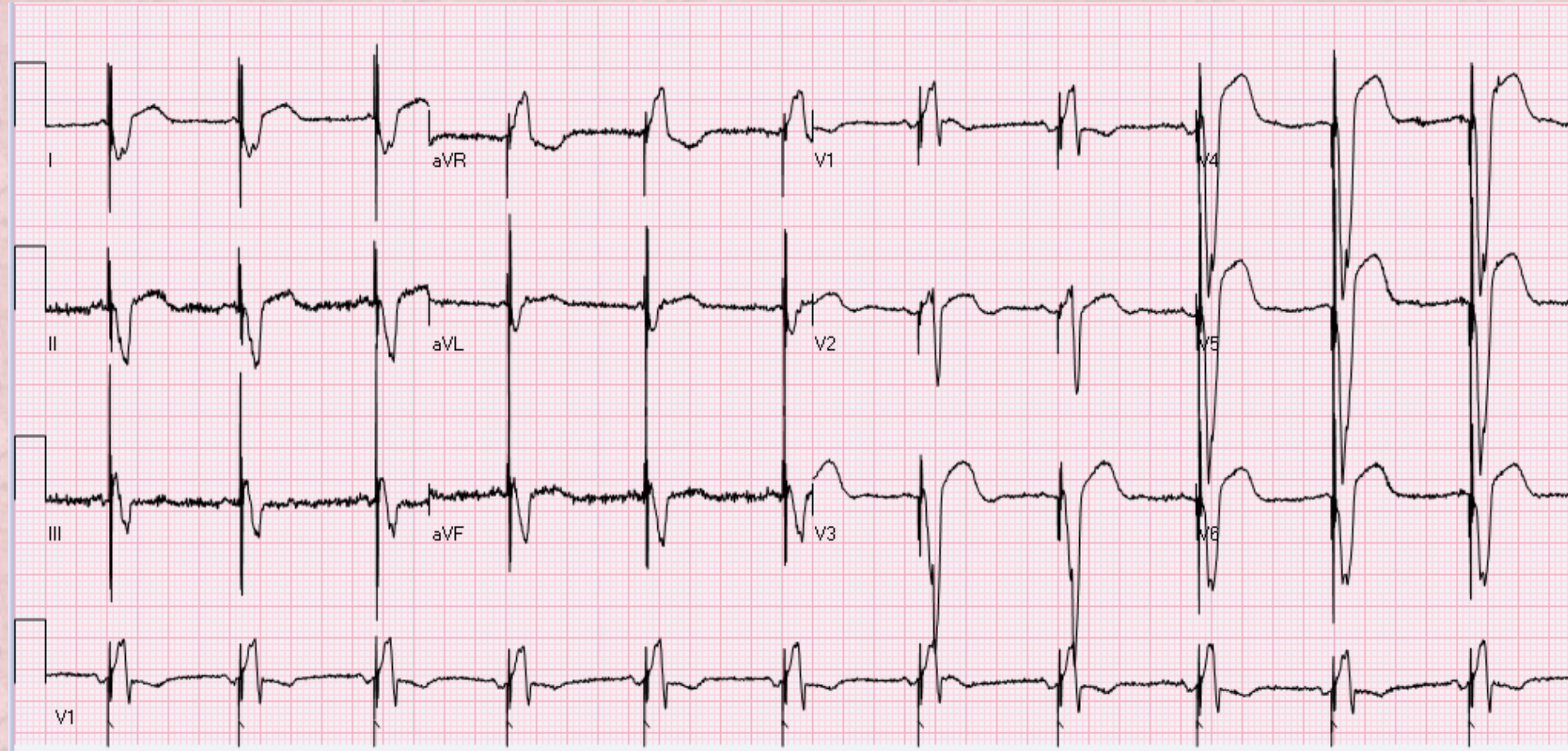


# Underlying ECG (QRS 168ms)

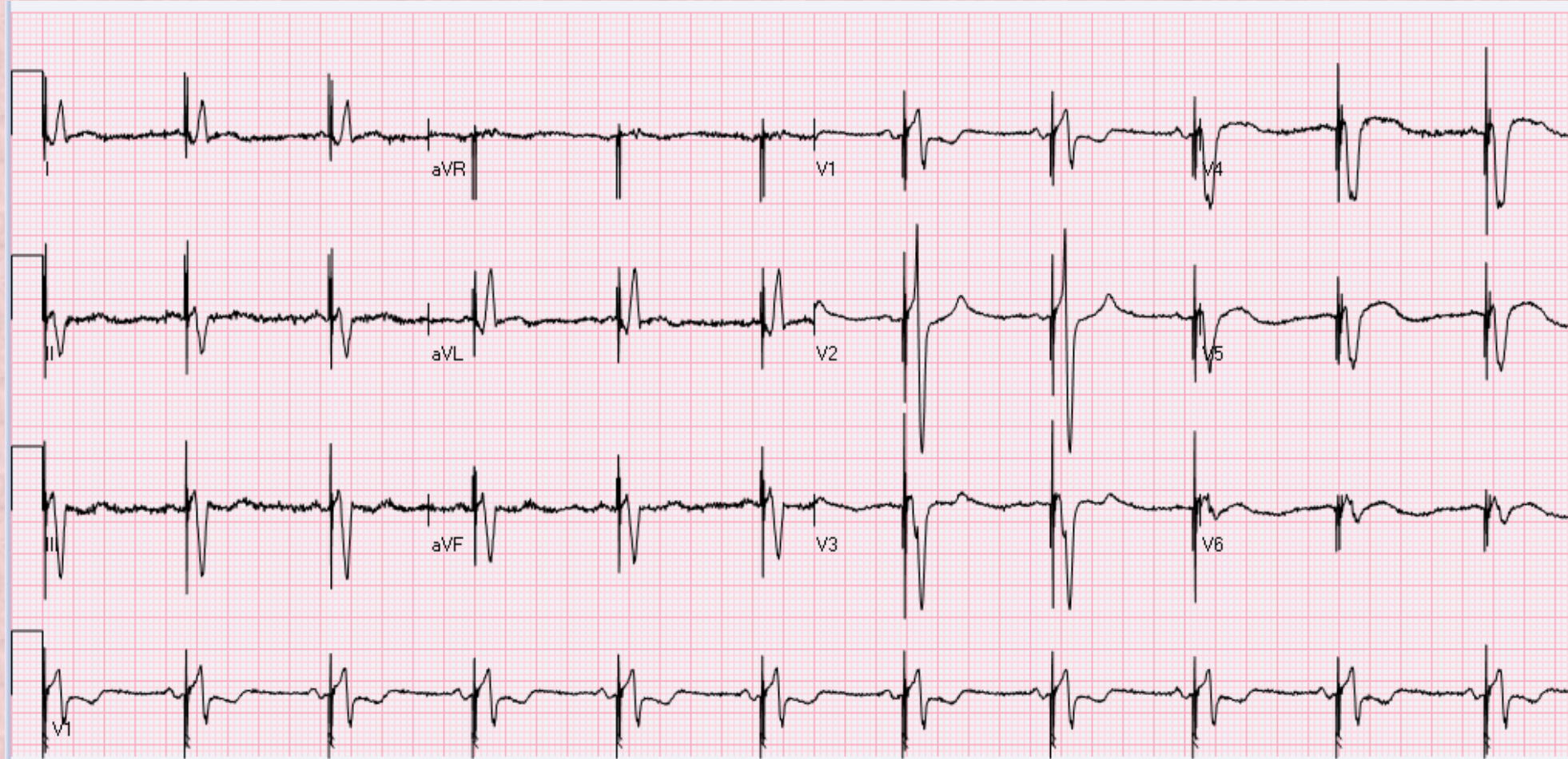




# “BiV Pacing” (QRS 152ms)



# Post Re-Positioned LV CRT-D (102ms)





# LOVE CONNECTION

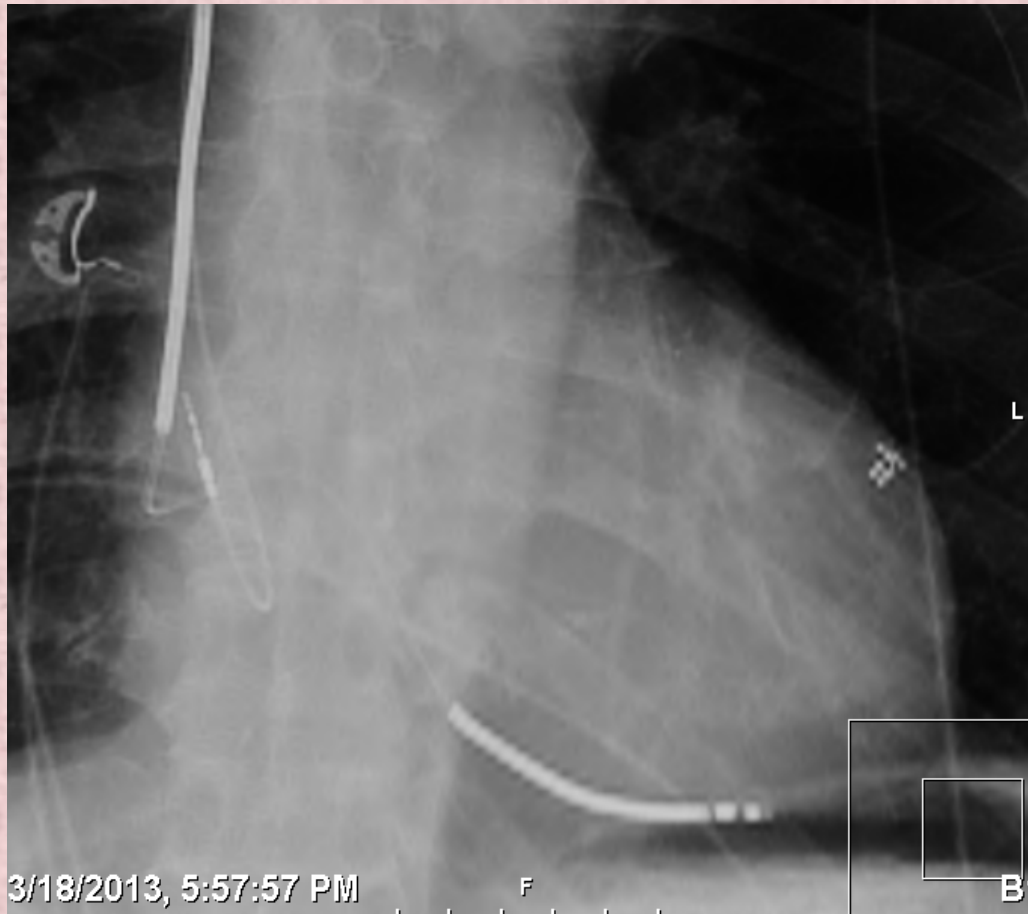
**Host:**

**David A. Sandler, MD**

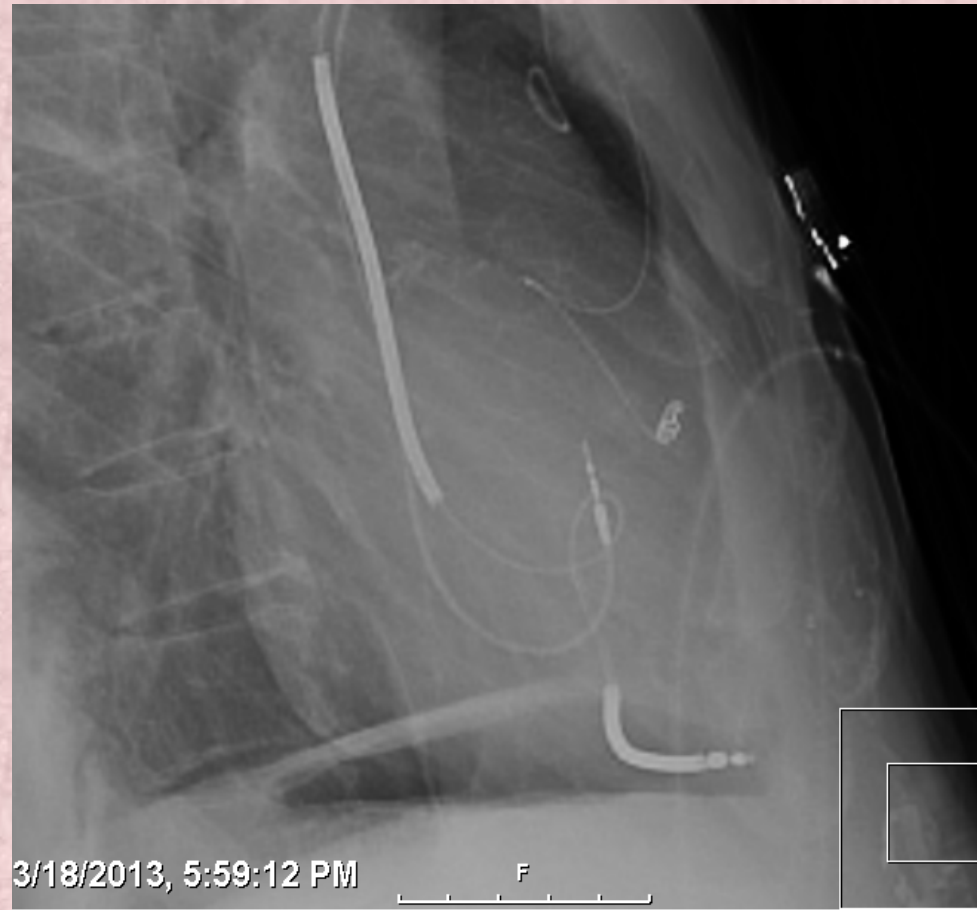


# What About Epicardial?

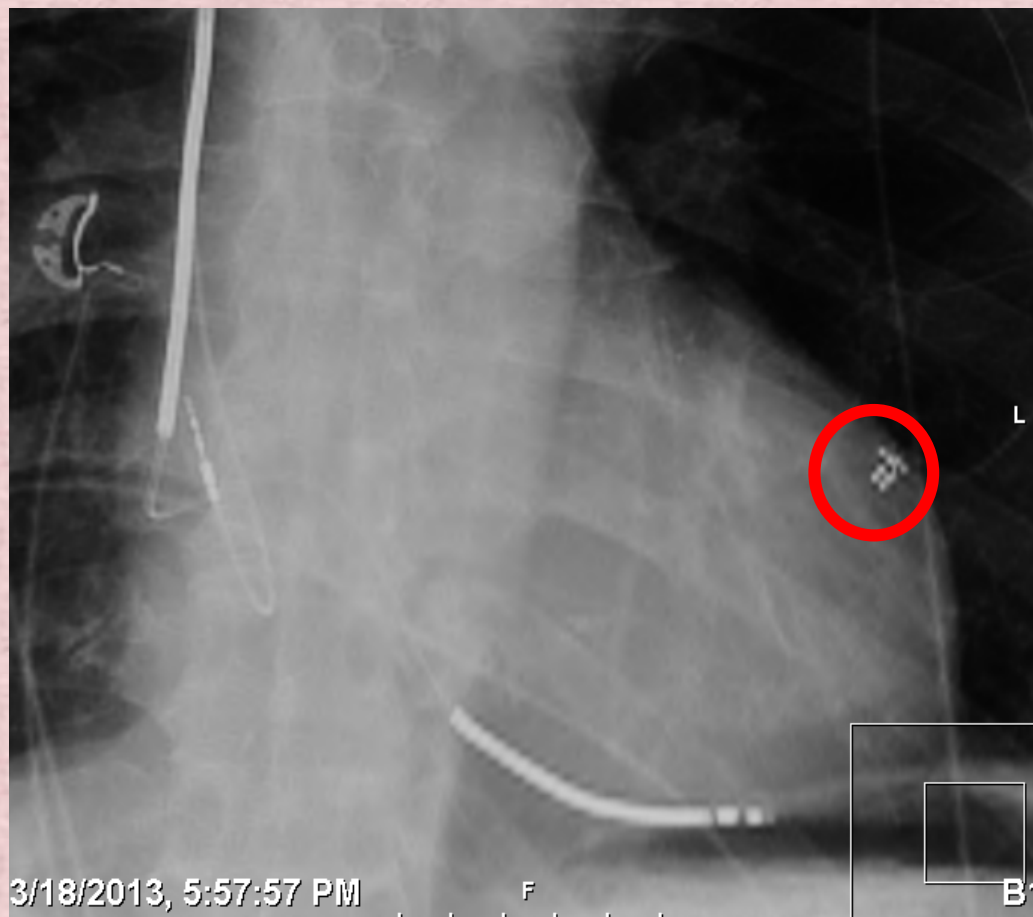
PA



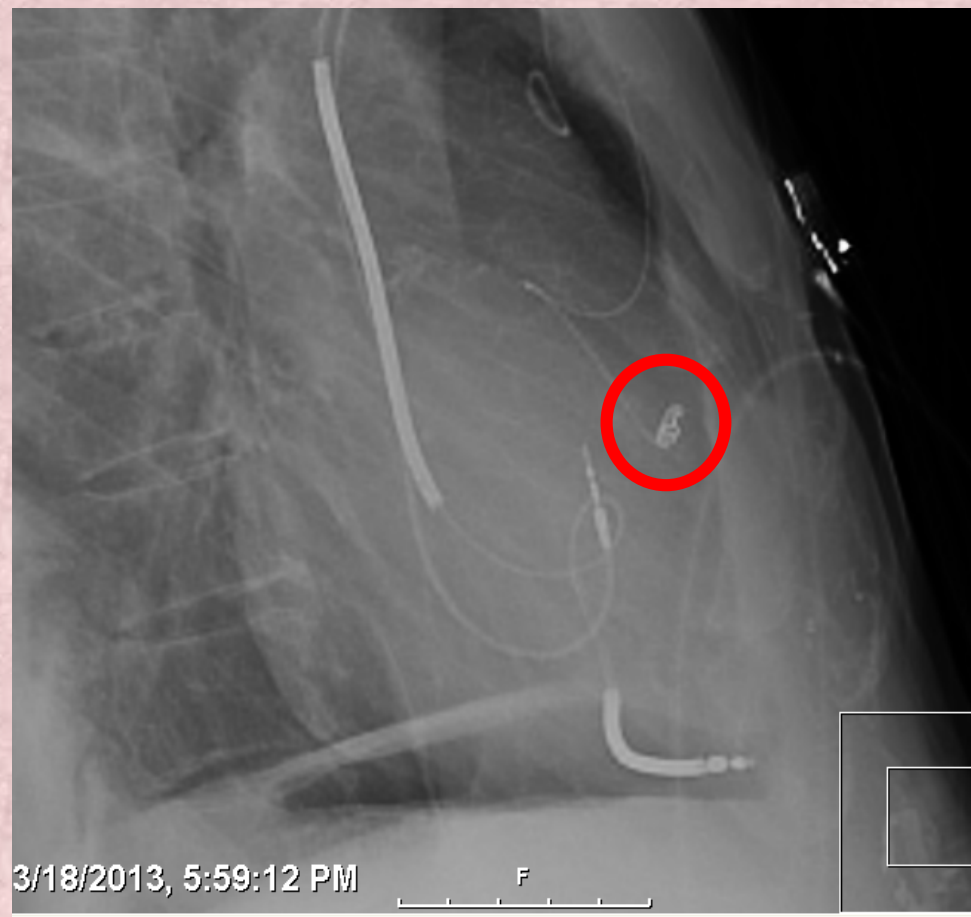
Lateral



PA

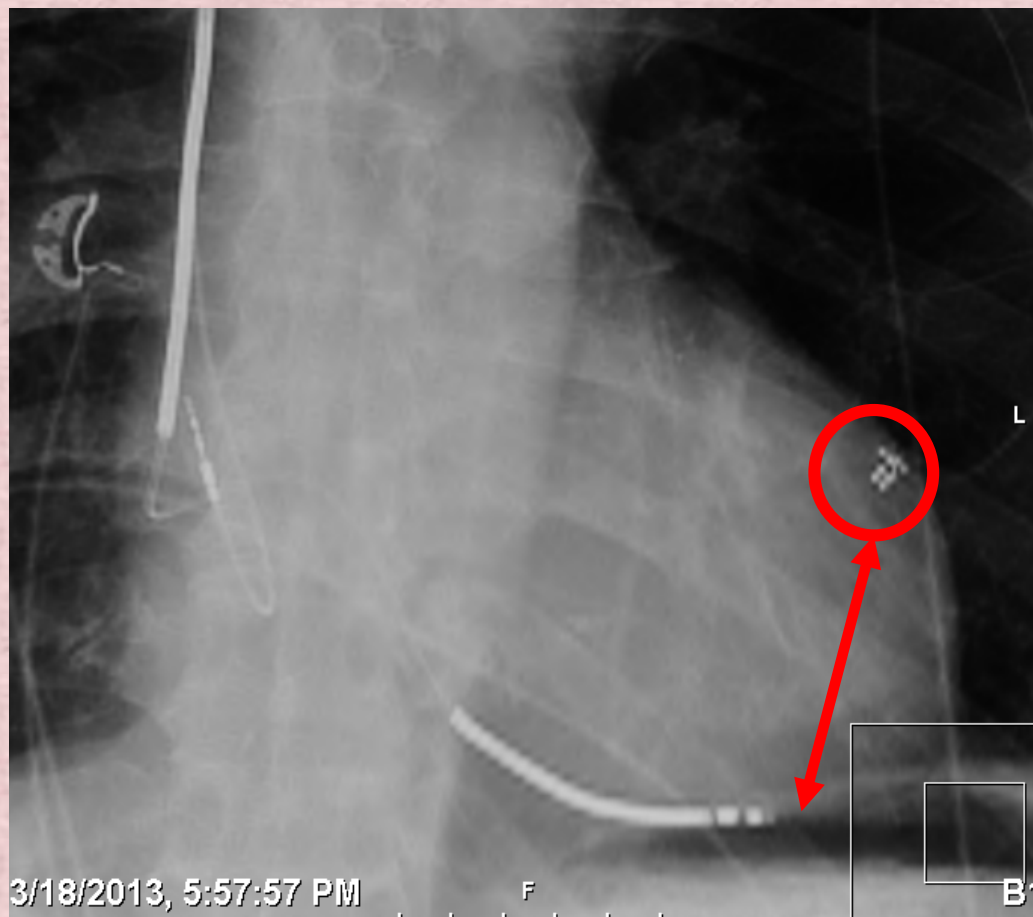


Lateral

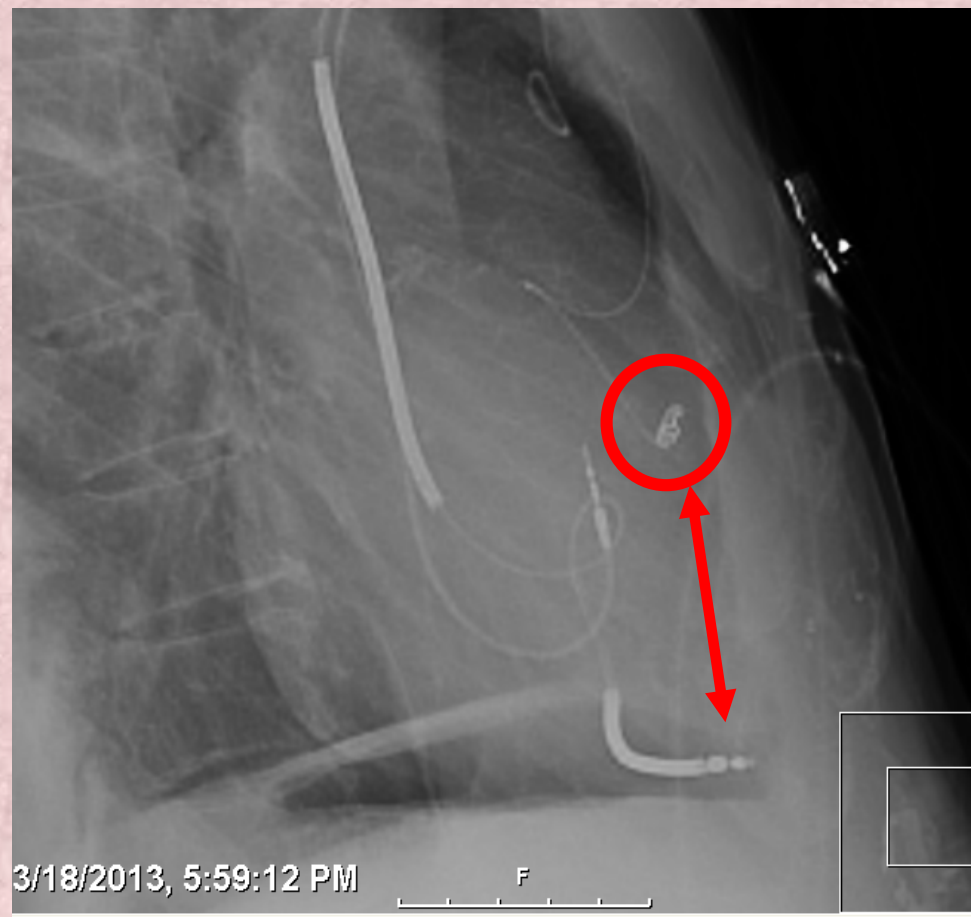




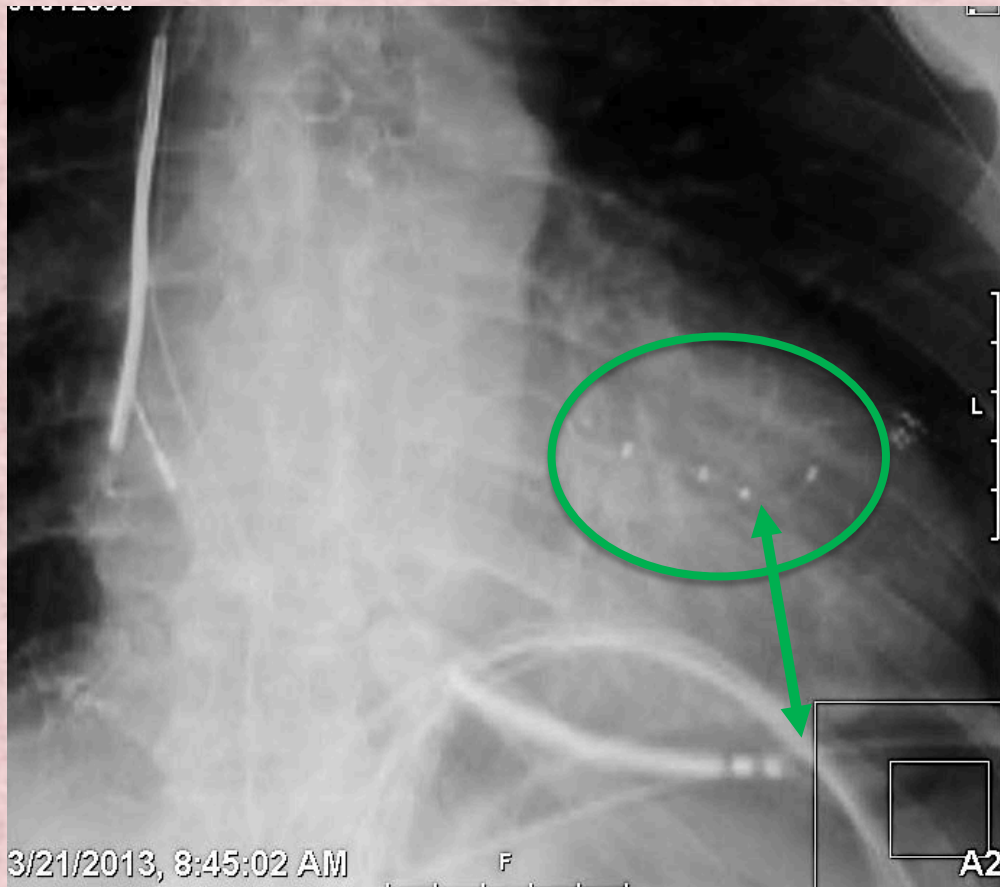
PA



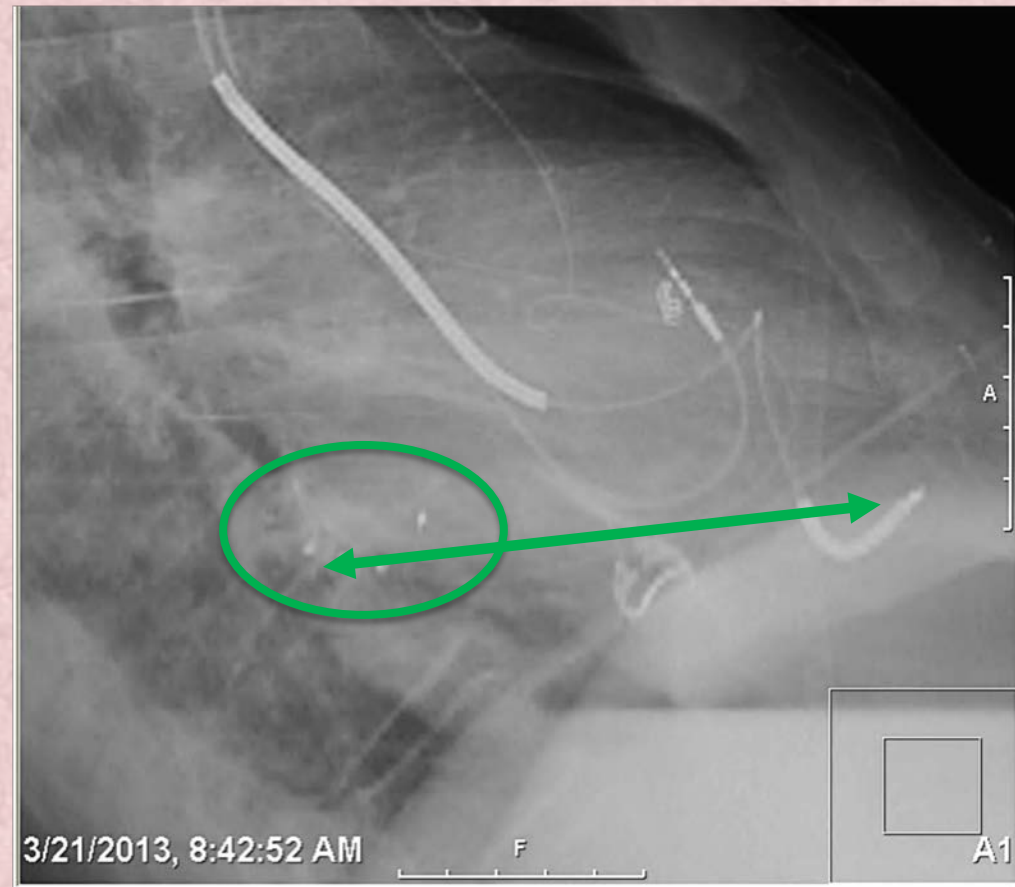
Lateral



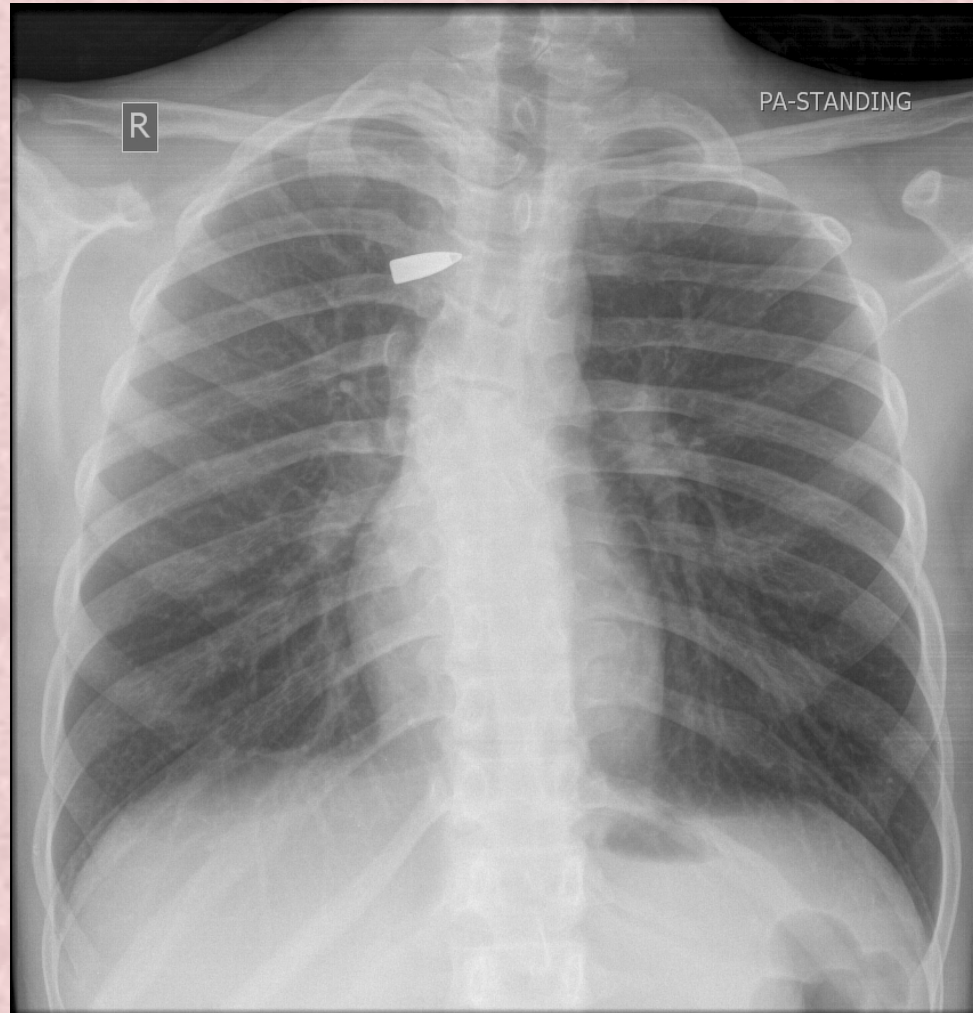
PA



Lateral



## X-Rated Image 6





## X-Rated Image 6

This is a...

1. Pacemaker
2. Bullet
3. Loop recorder
4. Heart failure diagnostic tool



## X-Rated Image 6

This is a...

1. Pacemaker
2. Bullet
3. Loop recorder
4. Heart failure diagnostic tool



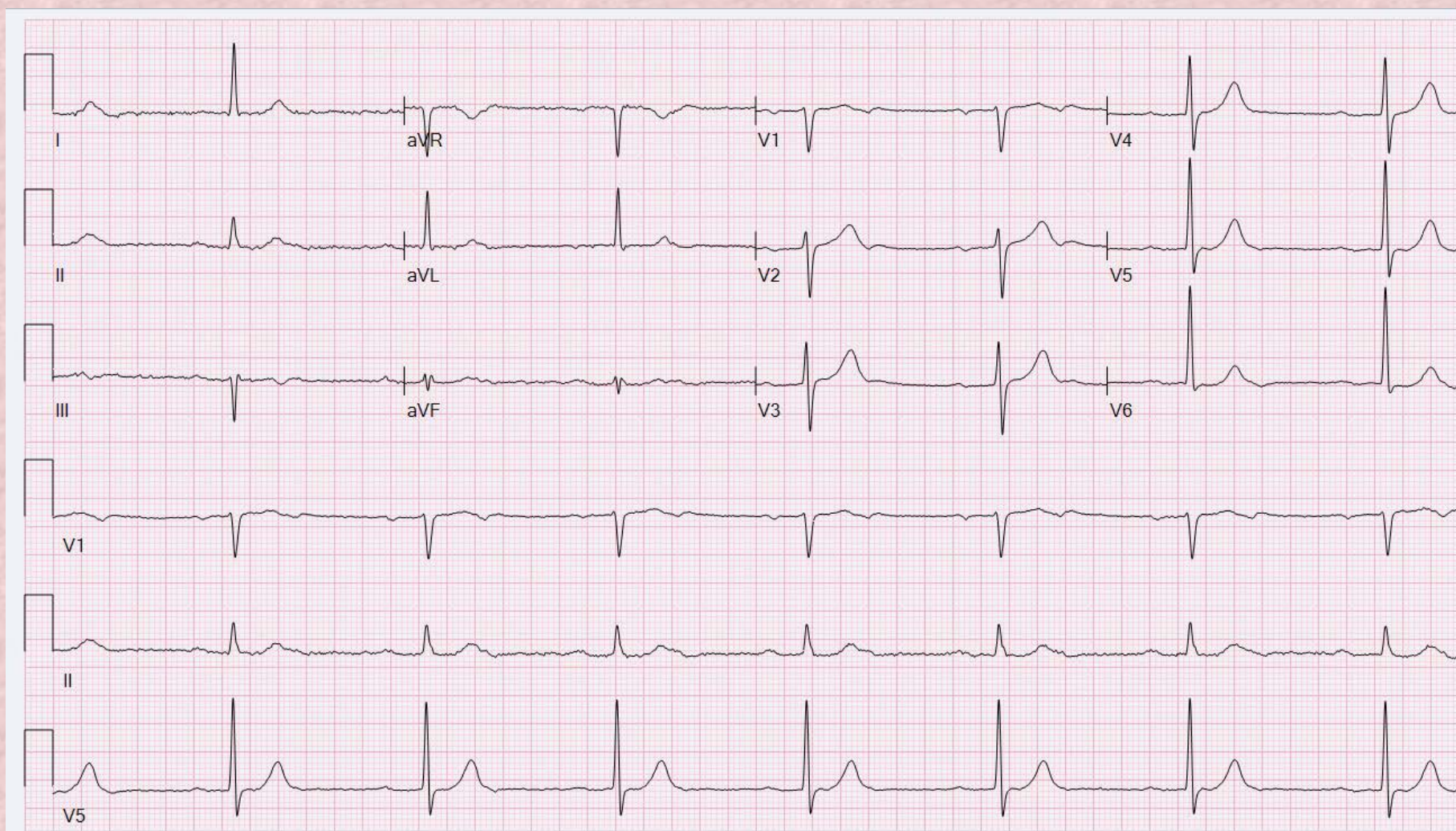
Extra stuff



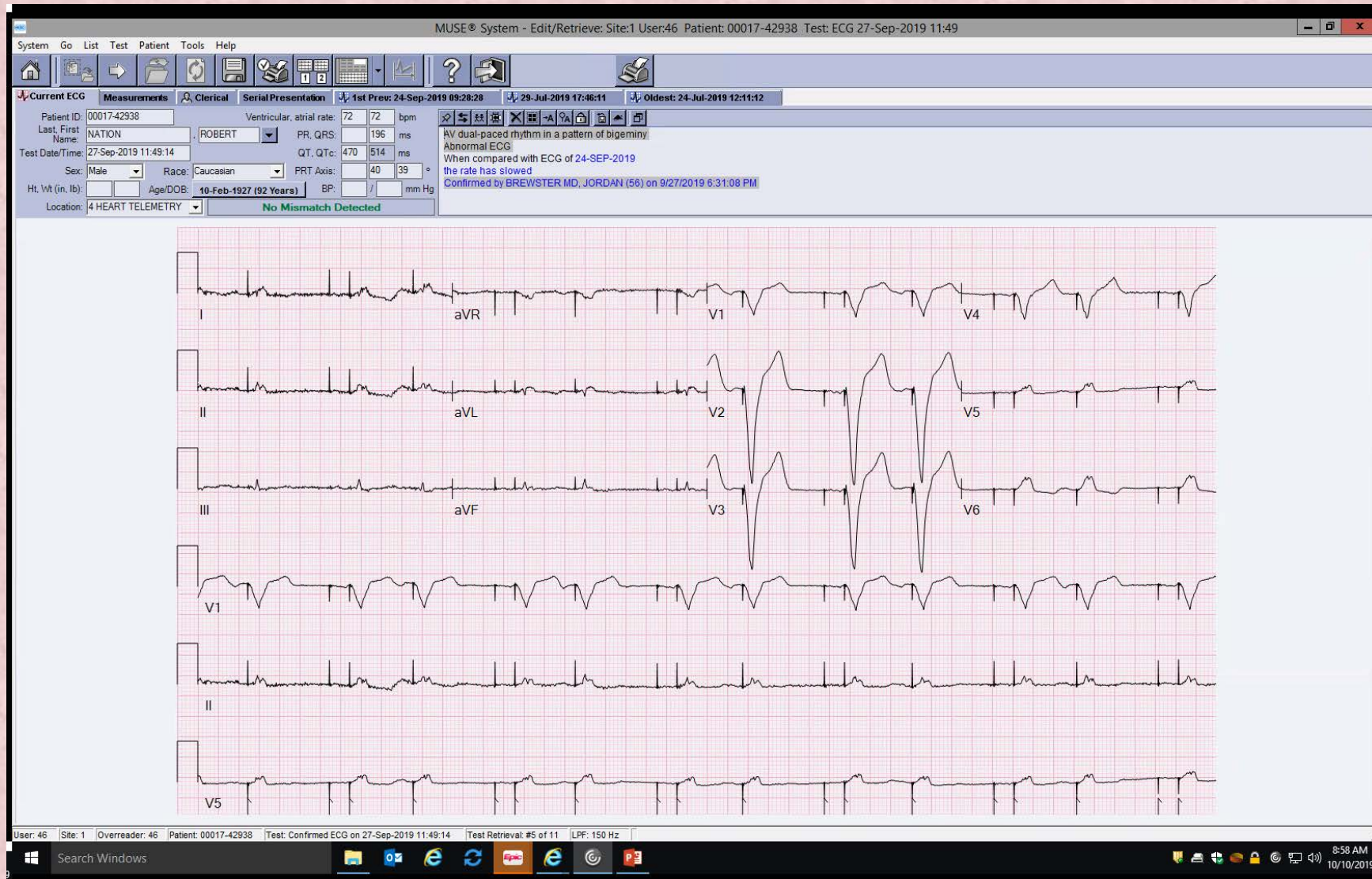


- 92 year old admitted with falls and hip fracture
- EF 50-55% by echo











- Readmitted with CHF
- EF 20-25%

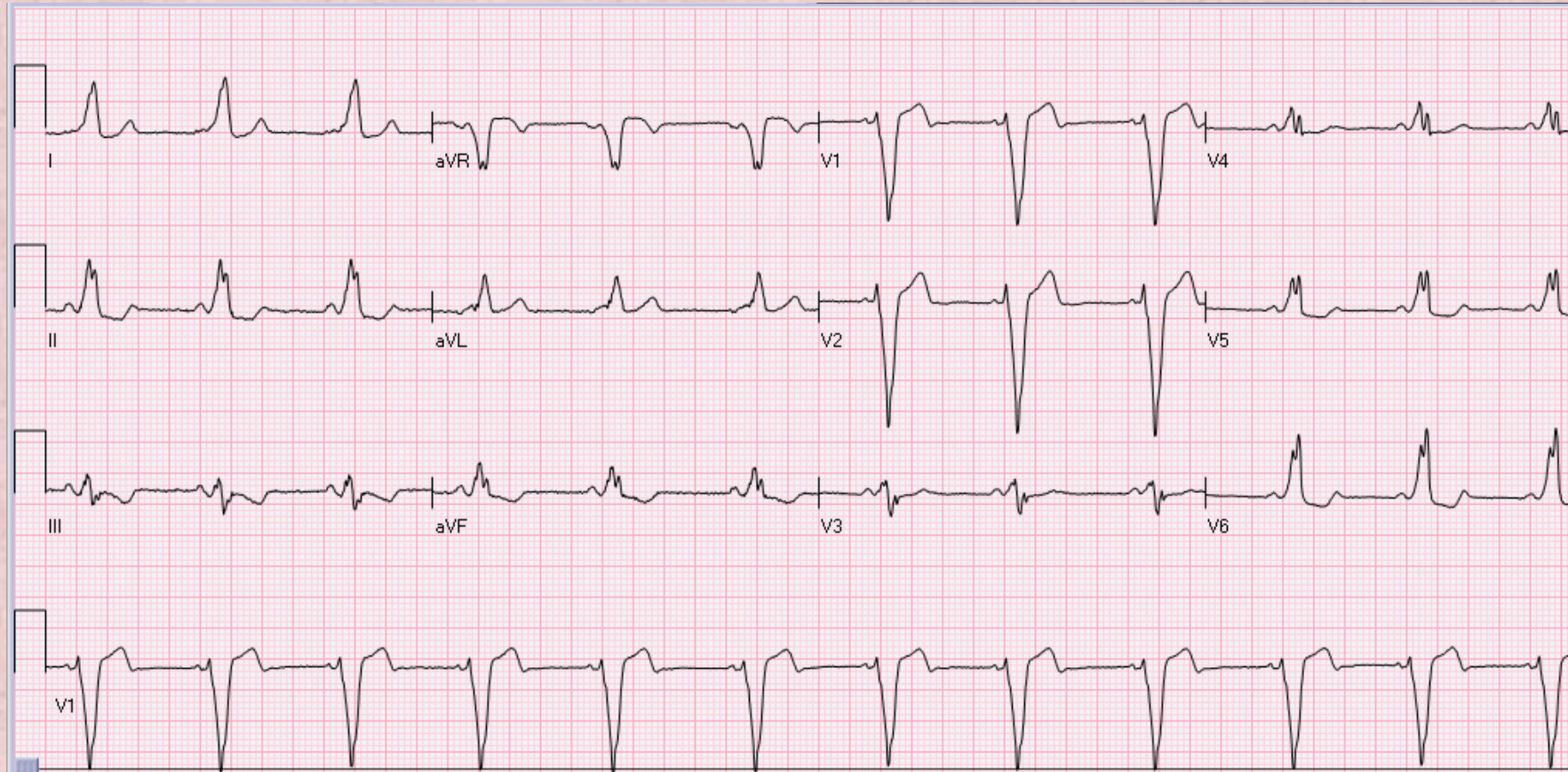


## Case 2

- 65 year old with palpitation and “drop spells”

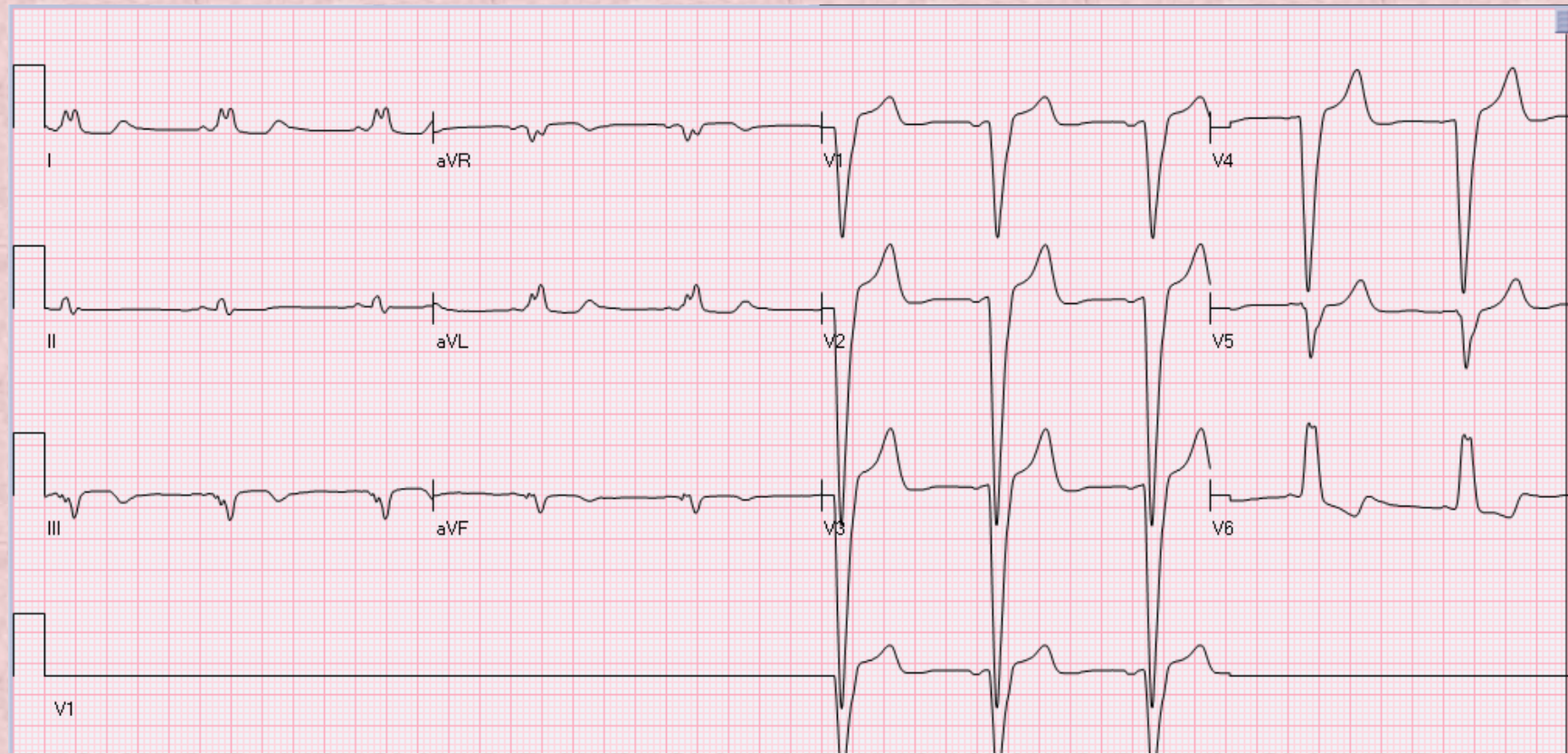


C.F.

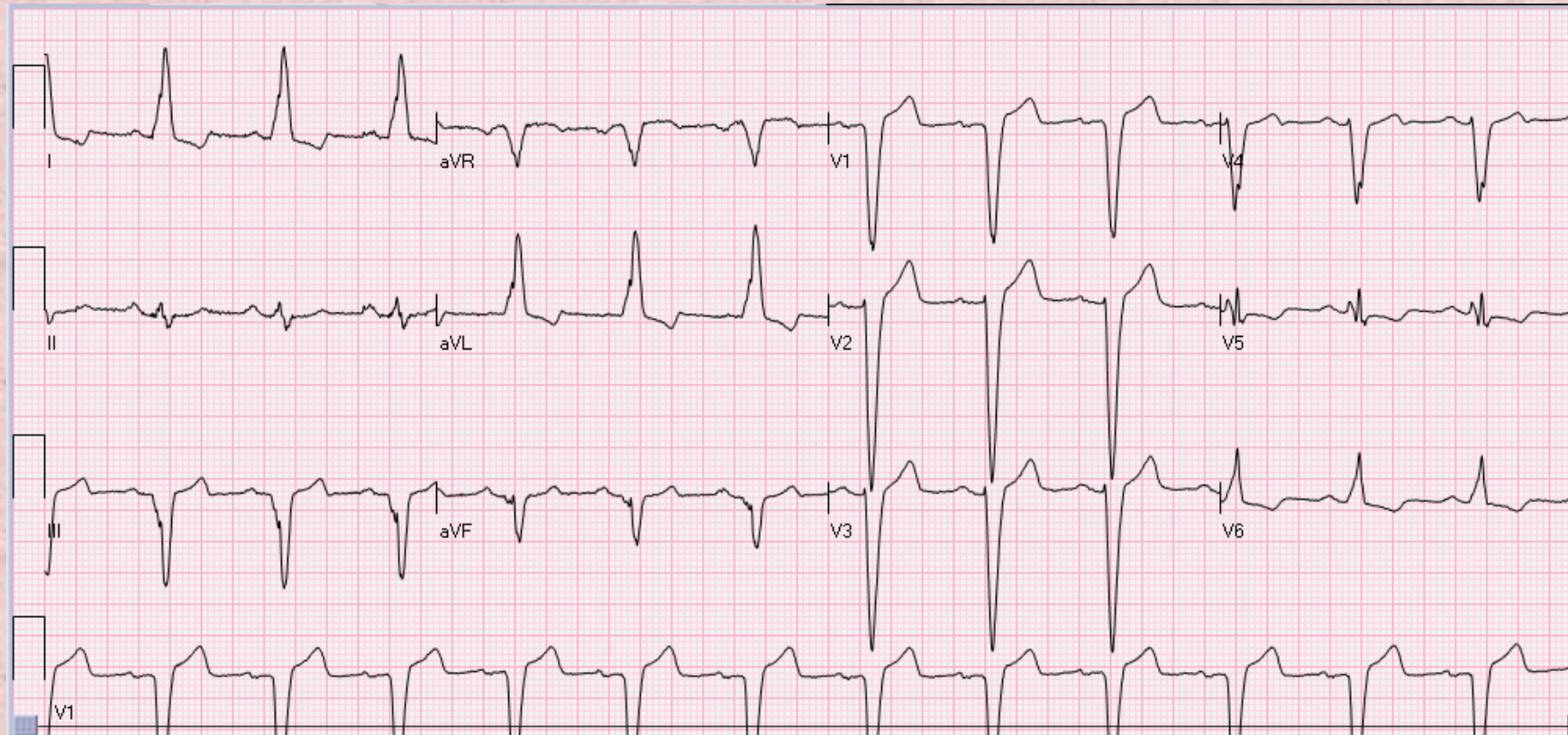


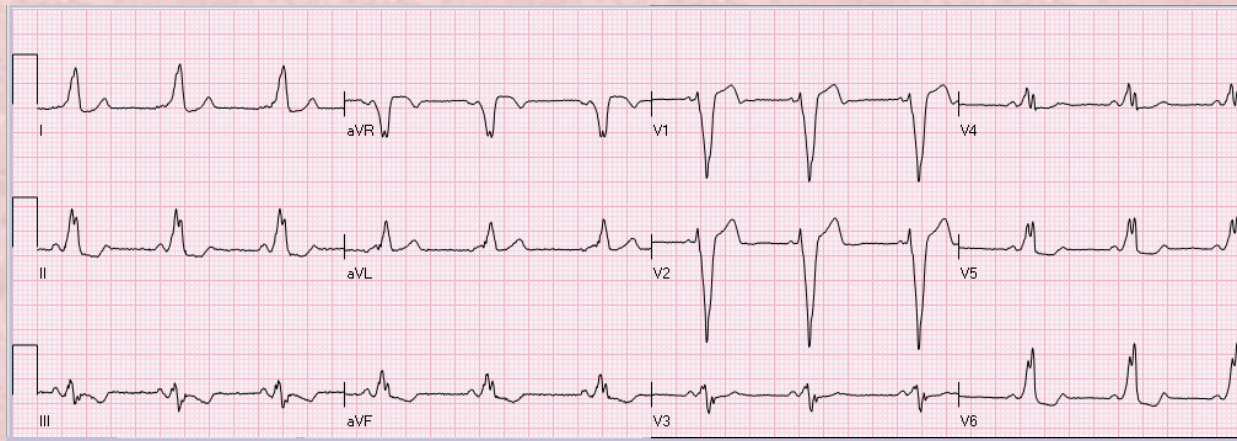


H.C.

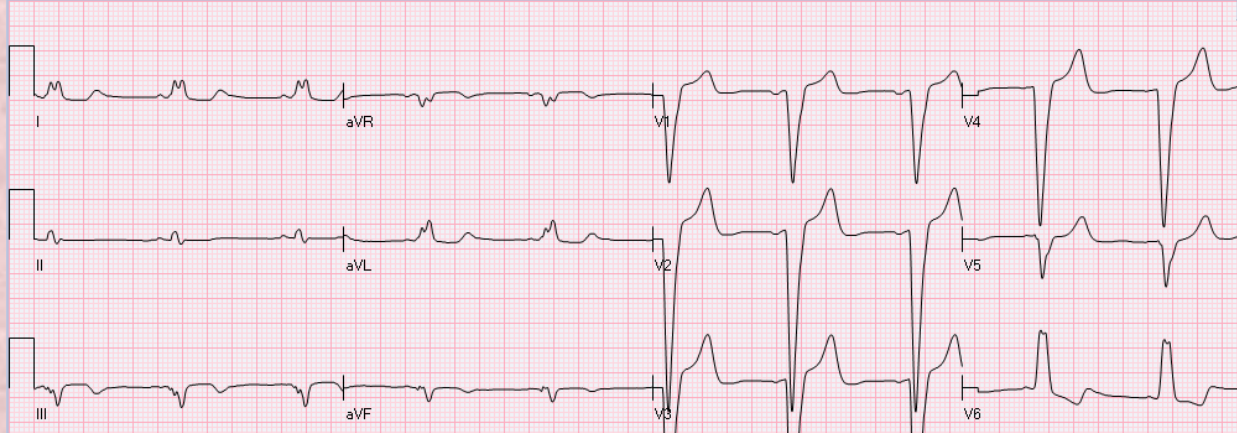


M.O.

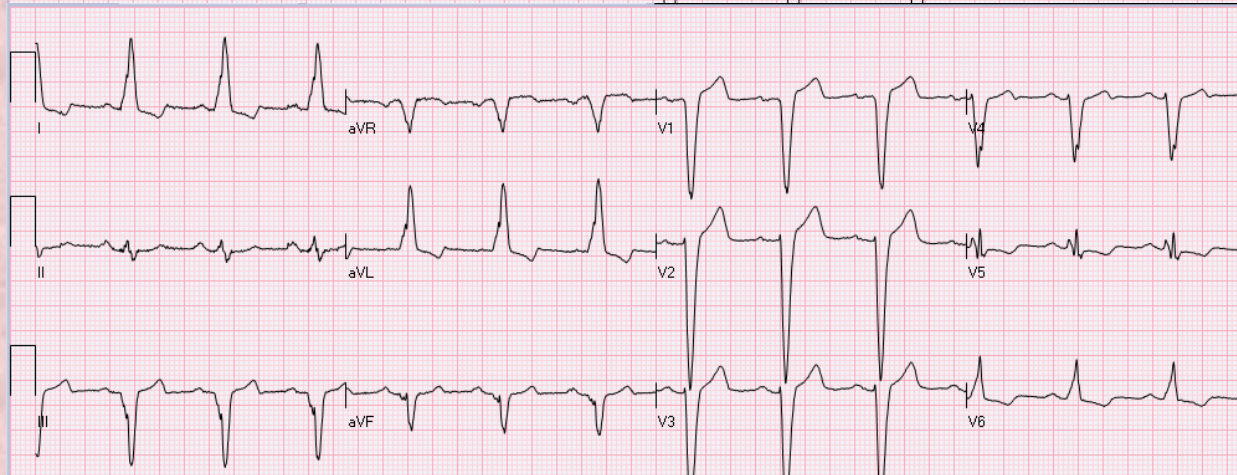




**AnteroSeptal  
WPW**



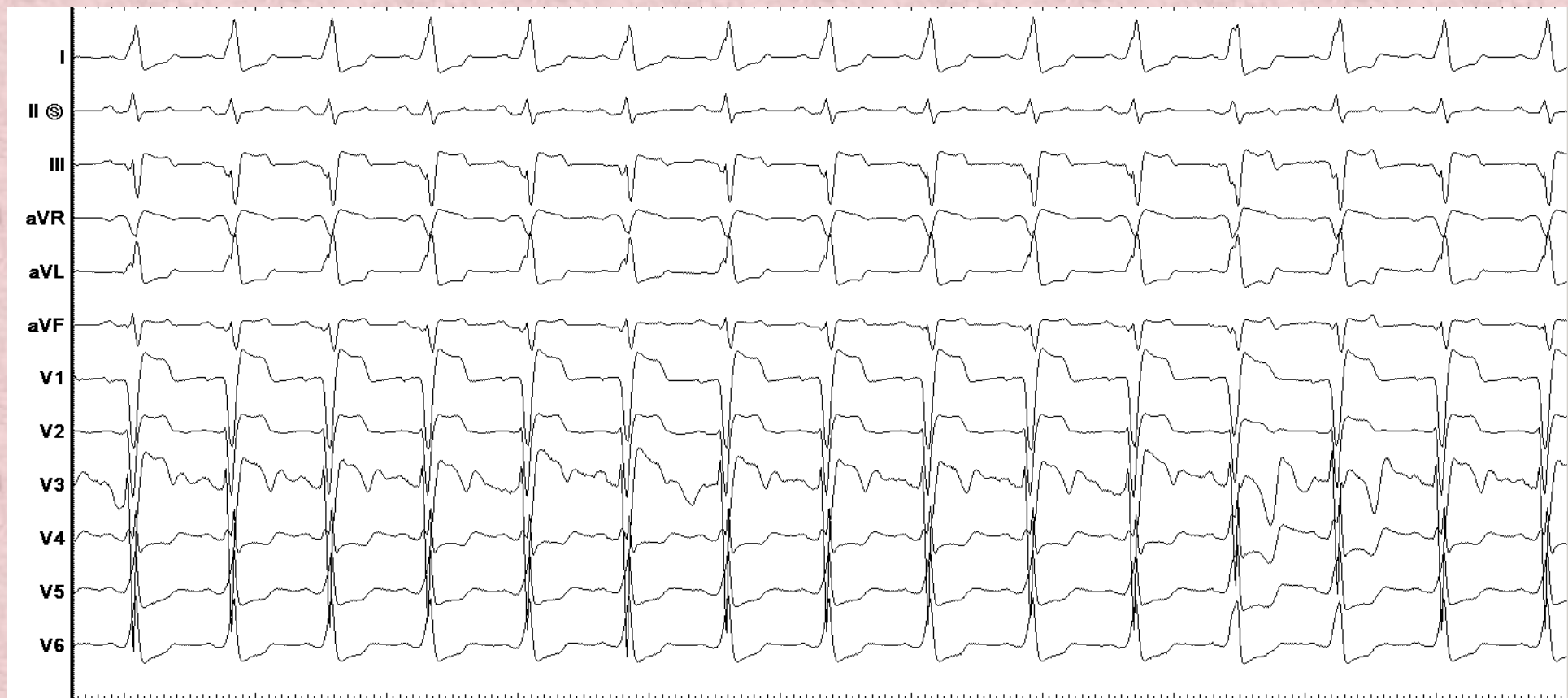
**LBBB**



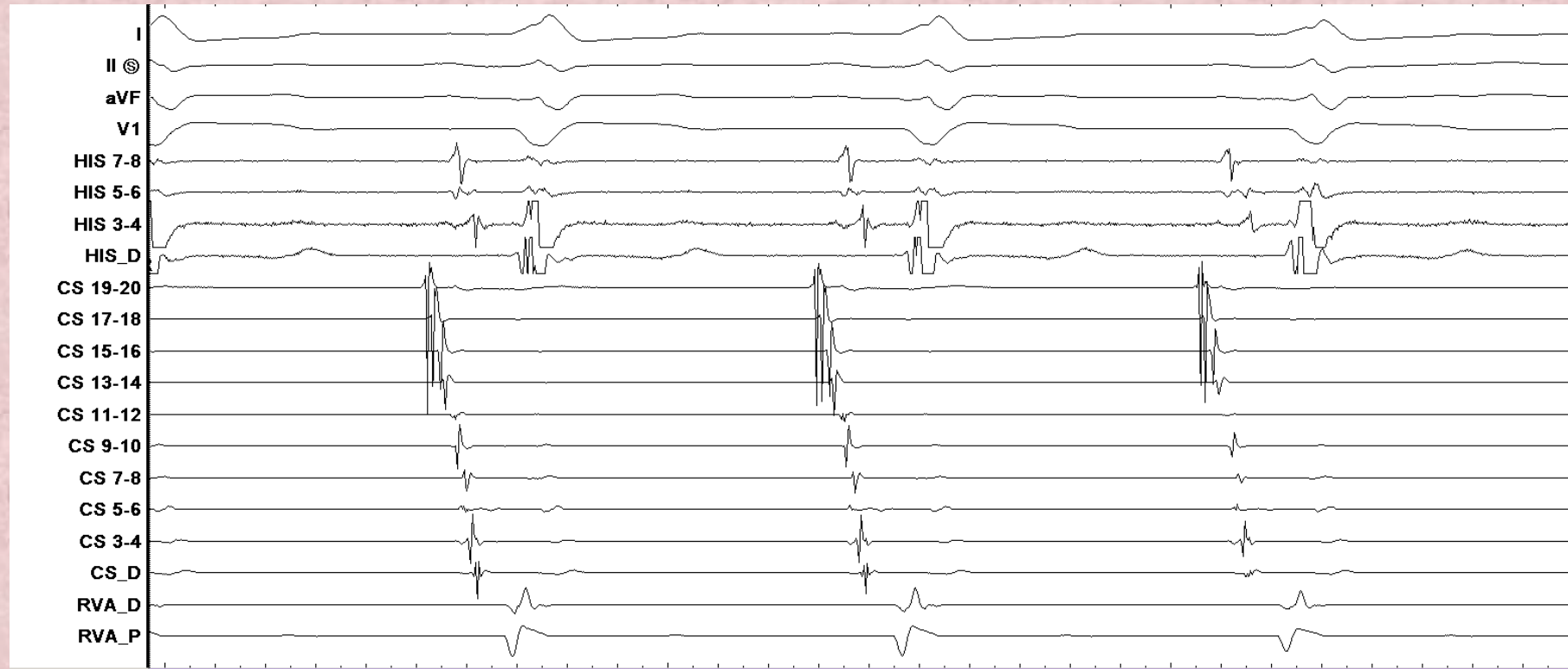
**???**







# Baseline

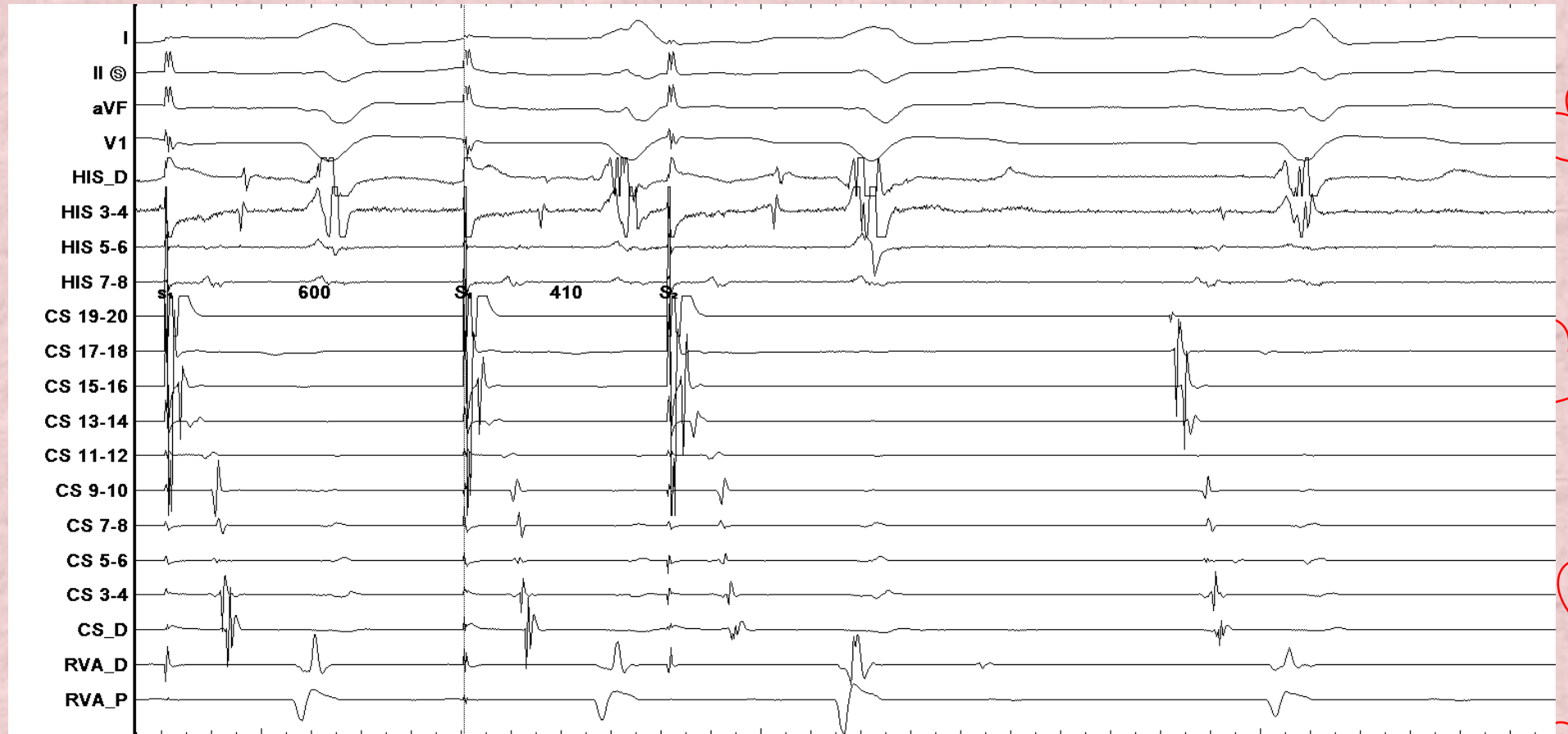


# Infra-nodal Block





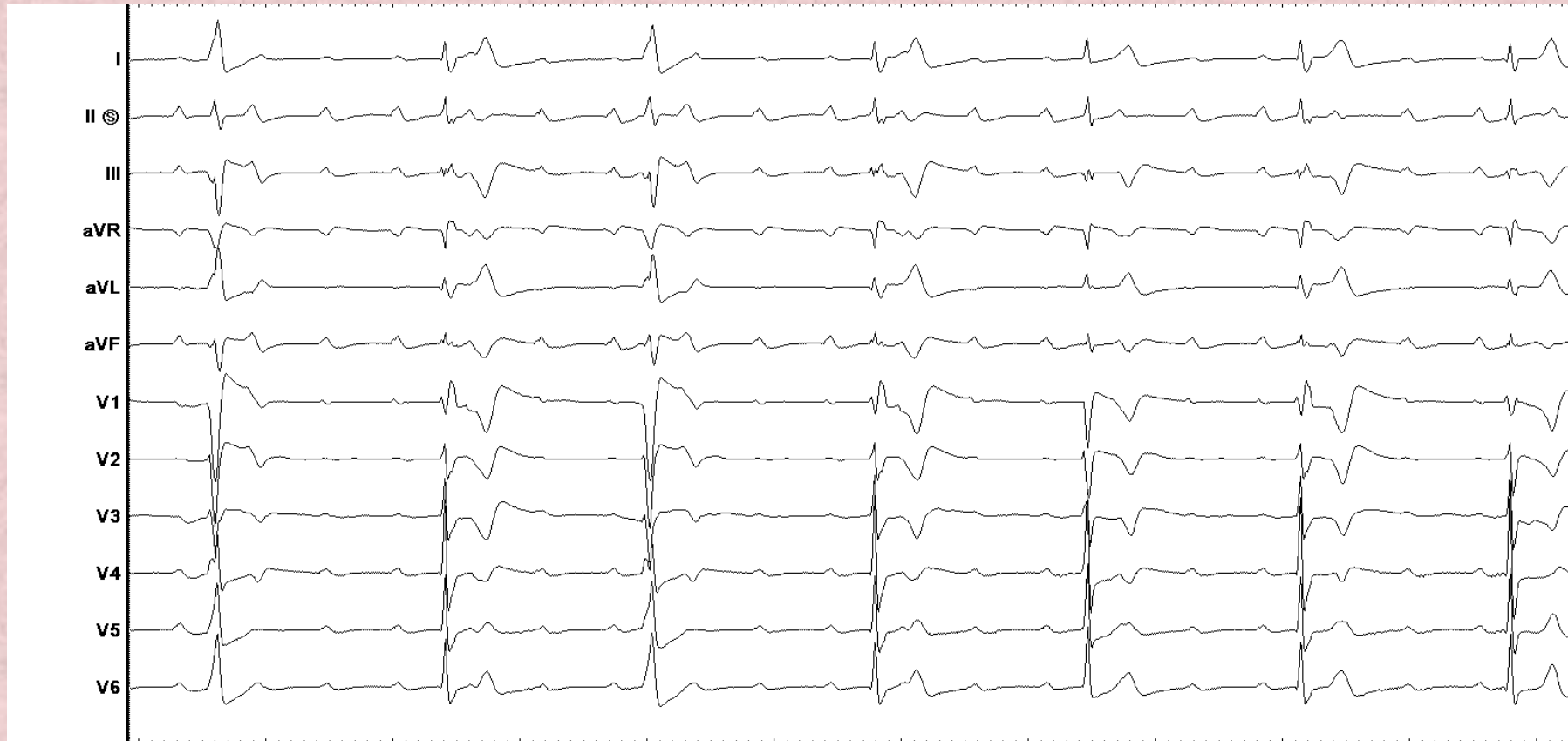
# Gap Phenomenon



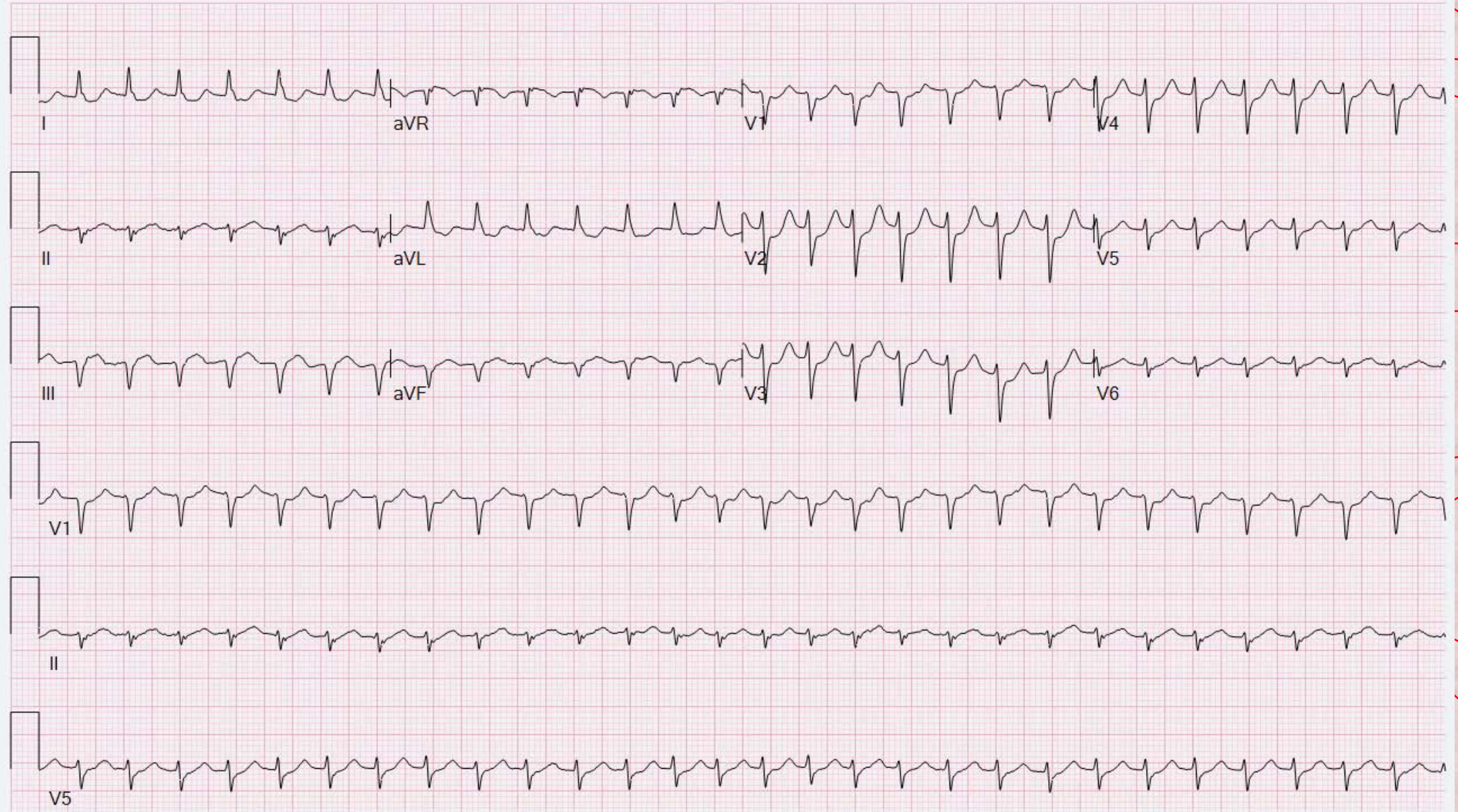
# Mobitz II block on isoproterenol



# AV block









# Case

- 72 year old with recurrent presyncope
- Symptoms consist of pain in the back of her neck into the back of her head
- No true syncopal episode
- Scheduled to see neurosurgery to discuss her neck issues
- Extensive workup including:
  - ECG
  - Carotid ultrasound
  - CT of the head
  - Echocardiogram

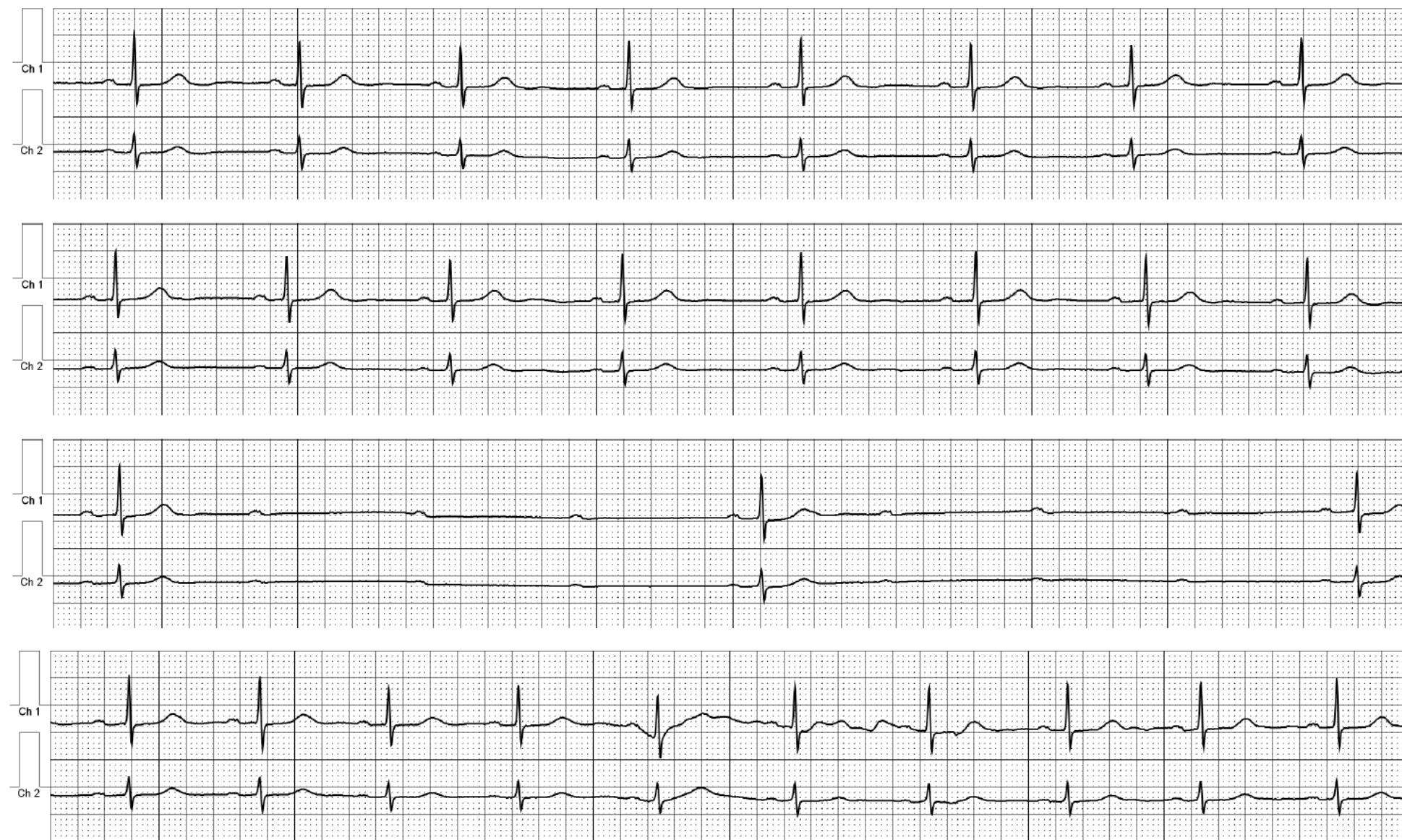


**Date:** 11/09/2018 03:31:02 CST

**HR:** 48

Automatic Event

**Findings:** Urgent - Advanced Heart Block with Multiple Pauses noted, Longest Pause is 4.7 seconds  
**Activities:** None Indicated  
Glenda (Holter Tech) notified on 11/09/2018 at 11:34 EDT





# AV Block

## First Degree

Long PR no dropped beats

## Second Degree

Mobitz I (AKA Wenckebach)

PR interval lengthens

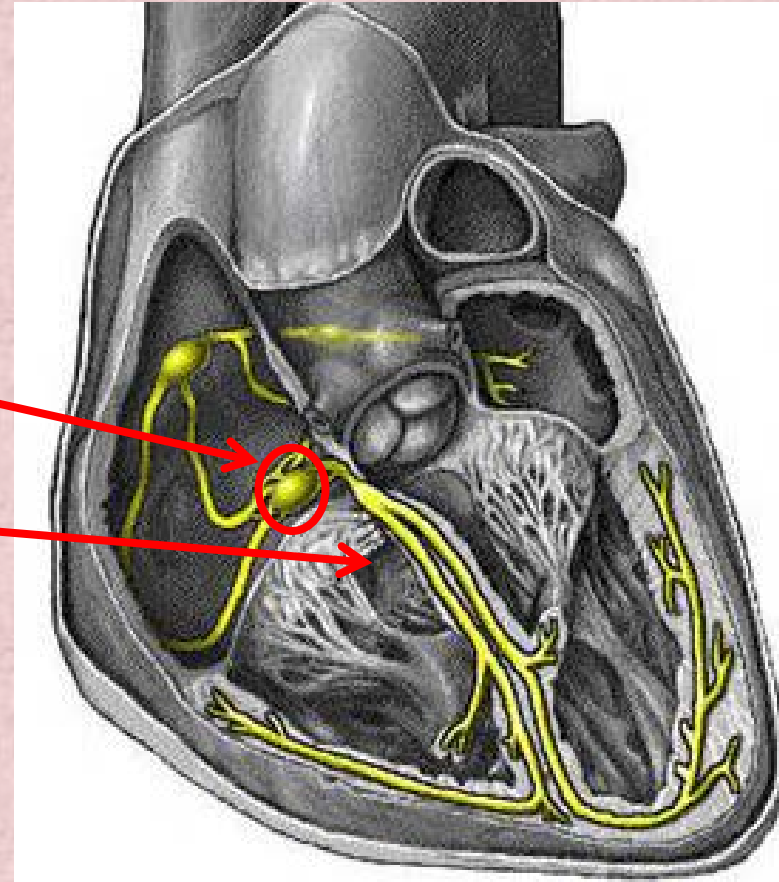
Mobitz II

Fixed PR, dropped QRS

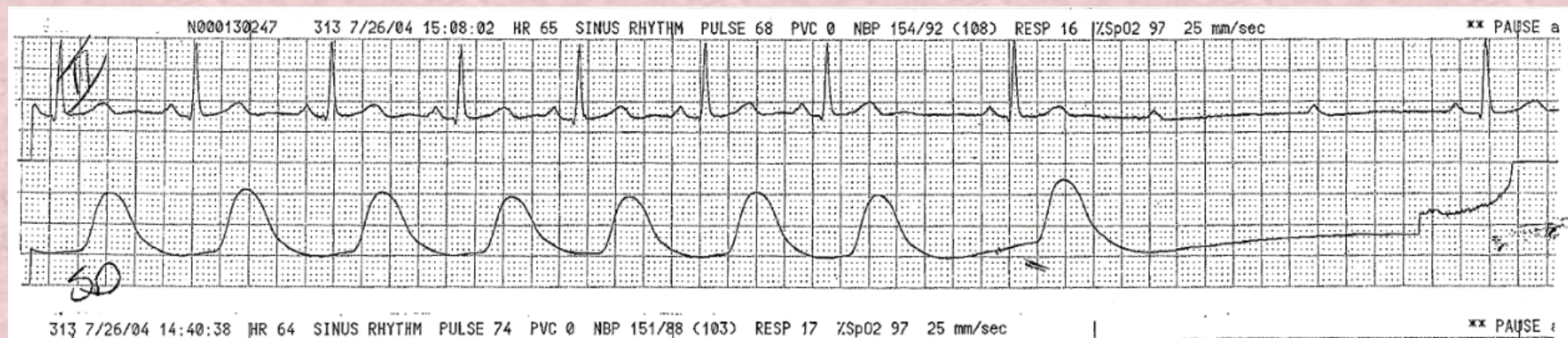
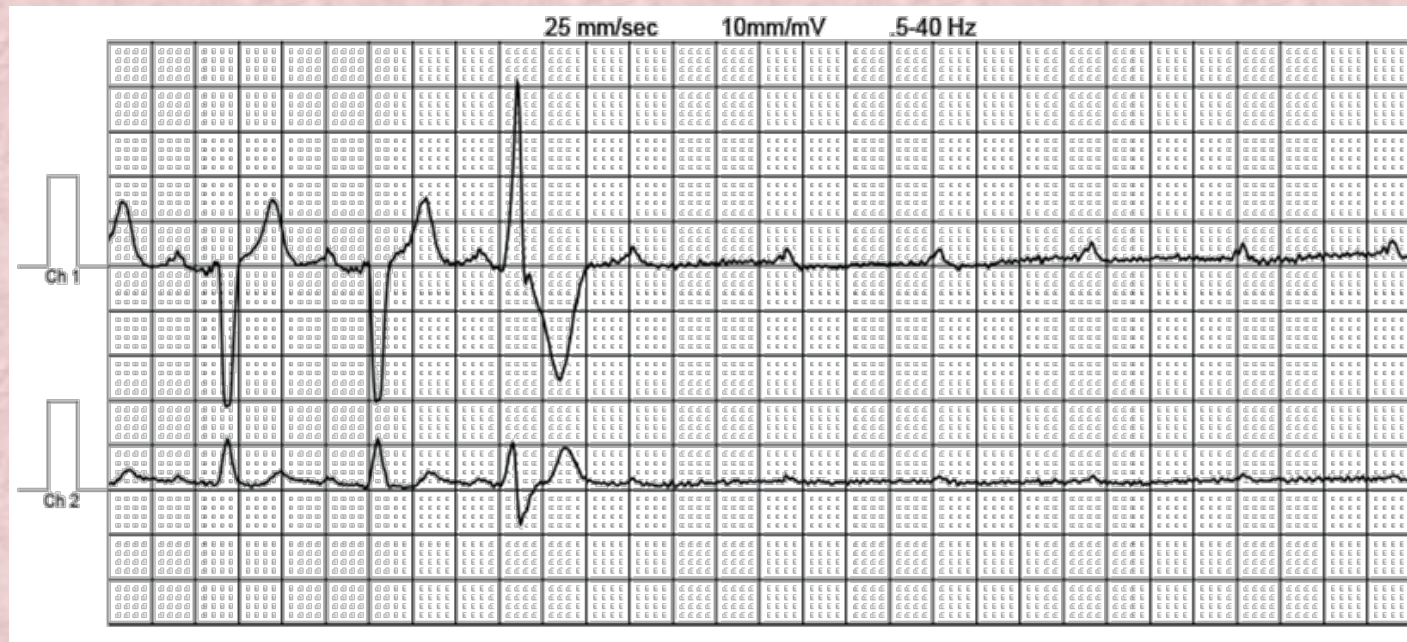
2:1 Block

## Third Degree

Complete AV Block



# Vagal vs Paroxysmal AV Block





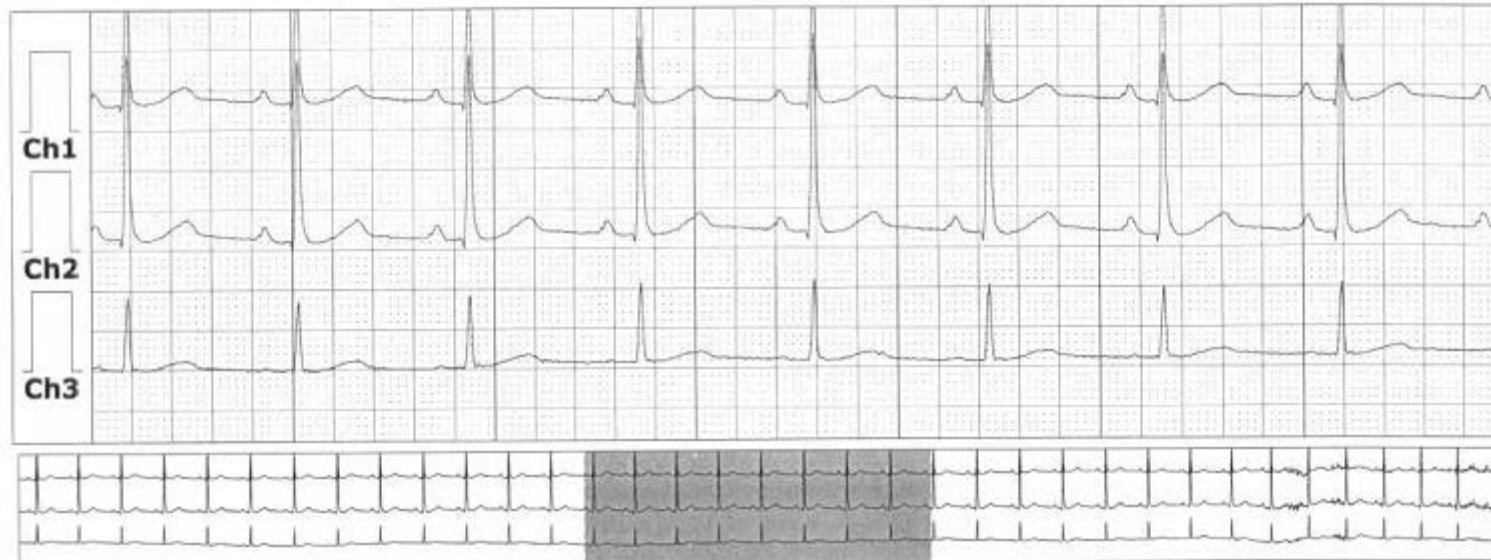
REASON FOR ADMISSION: Syncope with complete heart block.

HISTORY OF PRESENT ILLNESS: The patient is a very pleasant 48-year-old woman with hypertension who has had recurrent syncope for the past 3 weeks. The \_\_\_\_\_ event occurred 3 weeks ago when she was getting ready for work. She reports that while brushing her hair she "all of a sudden" felt her ears ringing and began to black out. She then awoke looking up at the ceiling noticing that she had bit her tongue. She cleaned up the blood and proceeded to go to work. She reports that, that day she experienced a severe headache. The next day, she had episodes of near syncope every 30 minutes. She was brought to St. John's Emergency Room where an EKG was "normal." The patient continued to have occasional episodes of near syncope both sitting and while standing. She denies prior cardiac workup. She has not undergone echocardiography or stress testing. She denies exertional chest pain or dyspnea on exertion. A Holter monitor was placed, which was interpreted earlier today. There were 2 episodes of high-degree AV block with numerous non-conducted P waves with ventricular standstill of over 5 seconds.



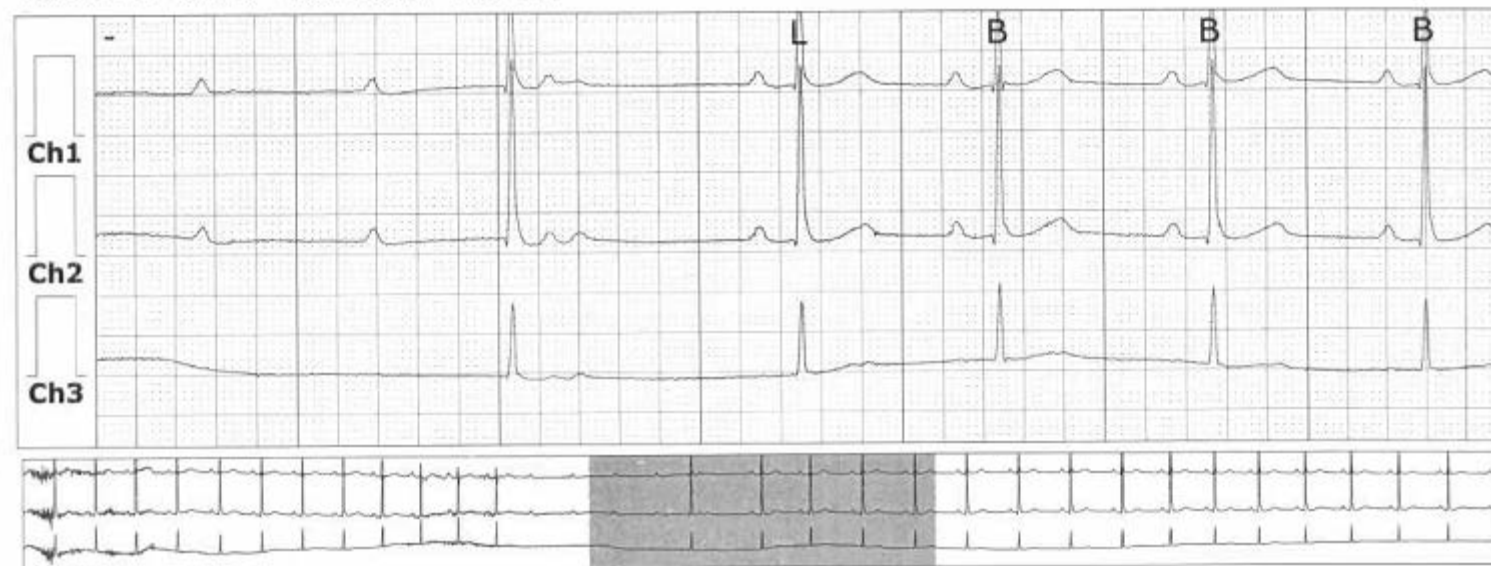
8:44:56 PM 70 BPM Size x1,x1,x1 Dizzy

Strip 7 of 20



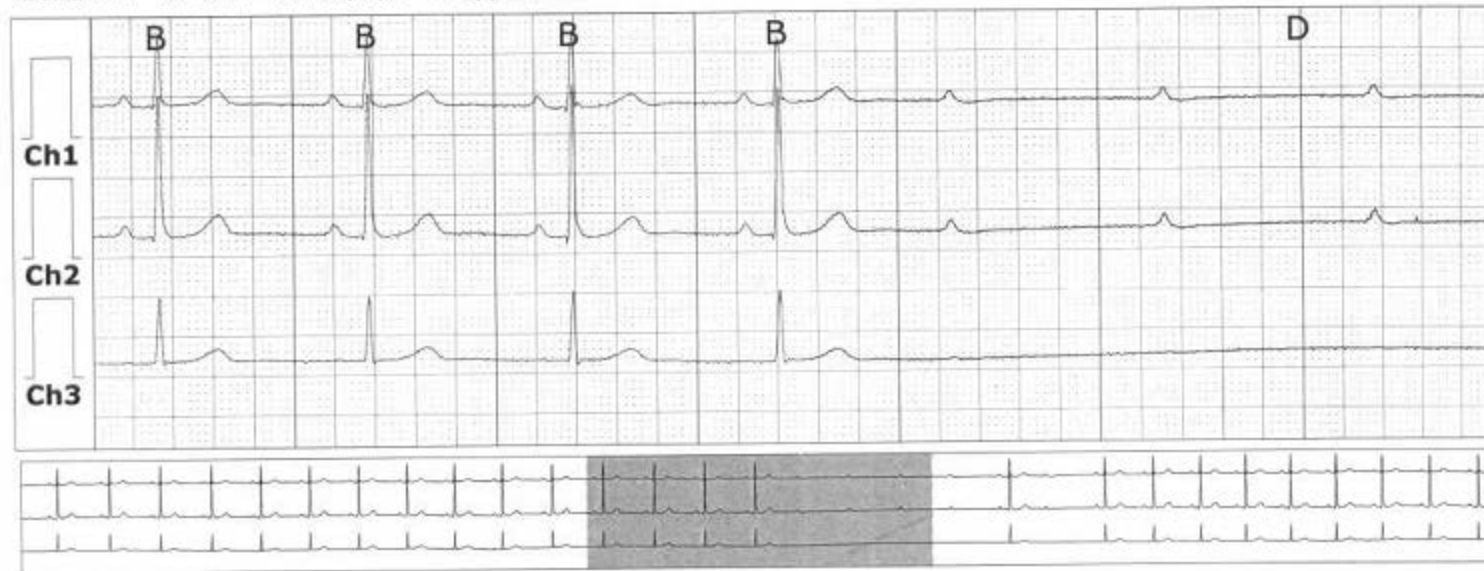
10:10:49 PM 53 BPM Size x1,x1,x1 Late Beat

Strip 8 of 20



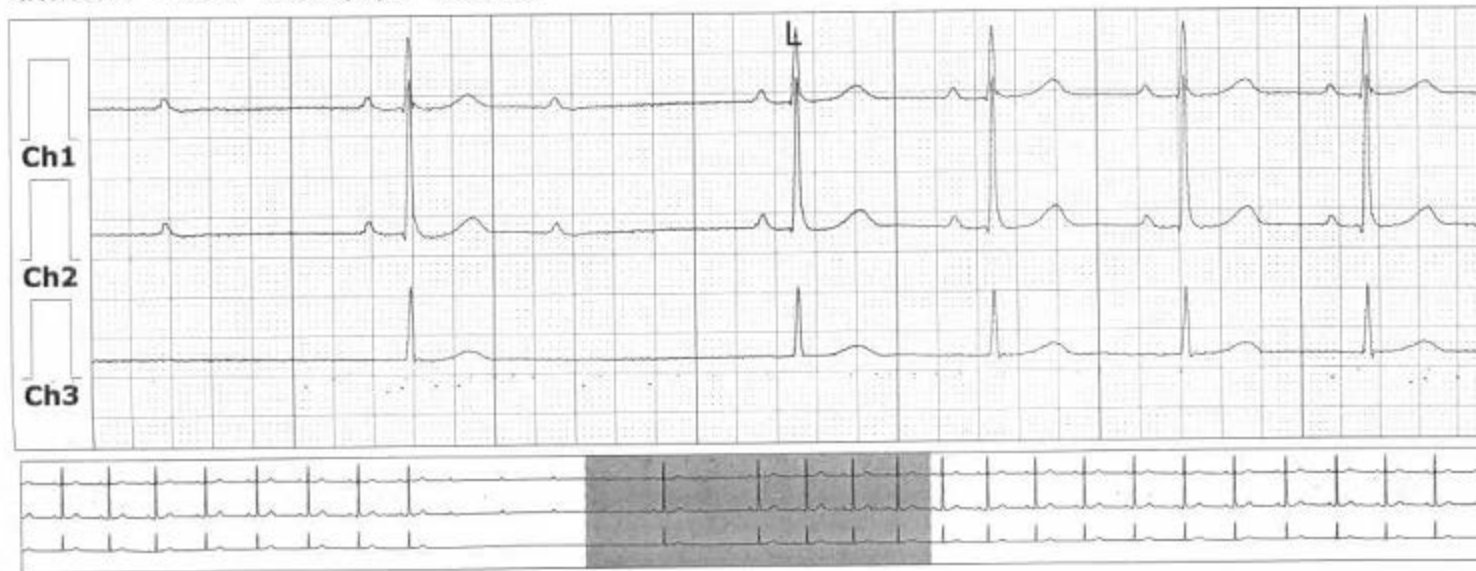
4:41:37 AM 59 BPM Size x1,x1,x1 Dropped Beat

Strip 14 of 20

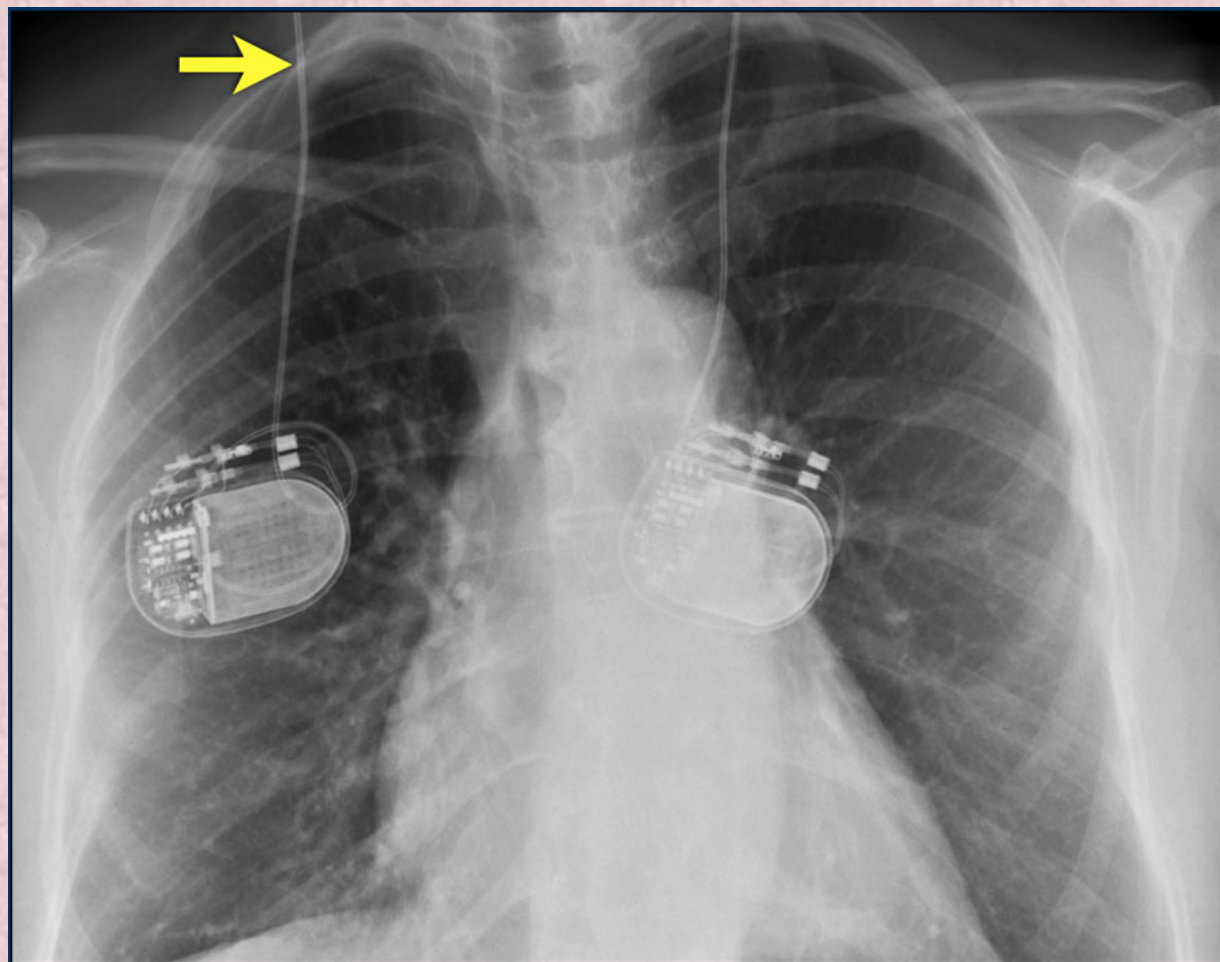


4:41:44 AM 50 BPM Size x1,x1,x1 Late Beat

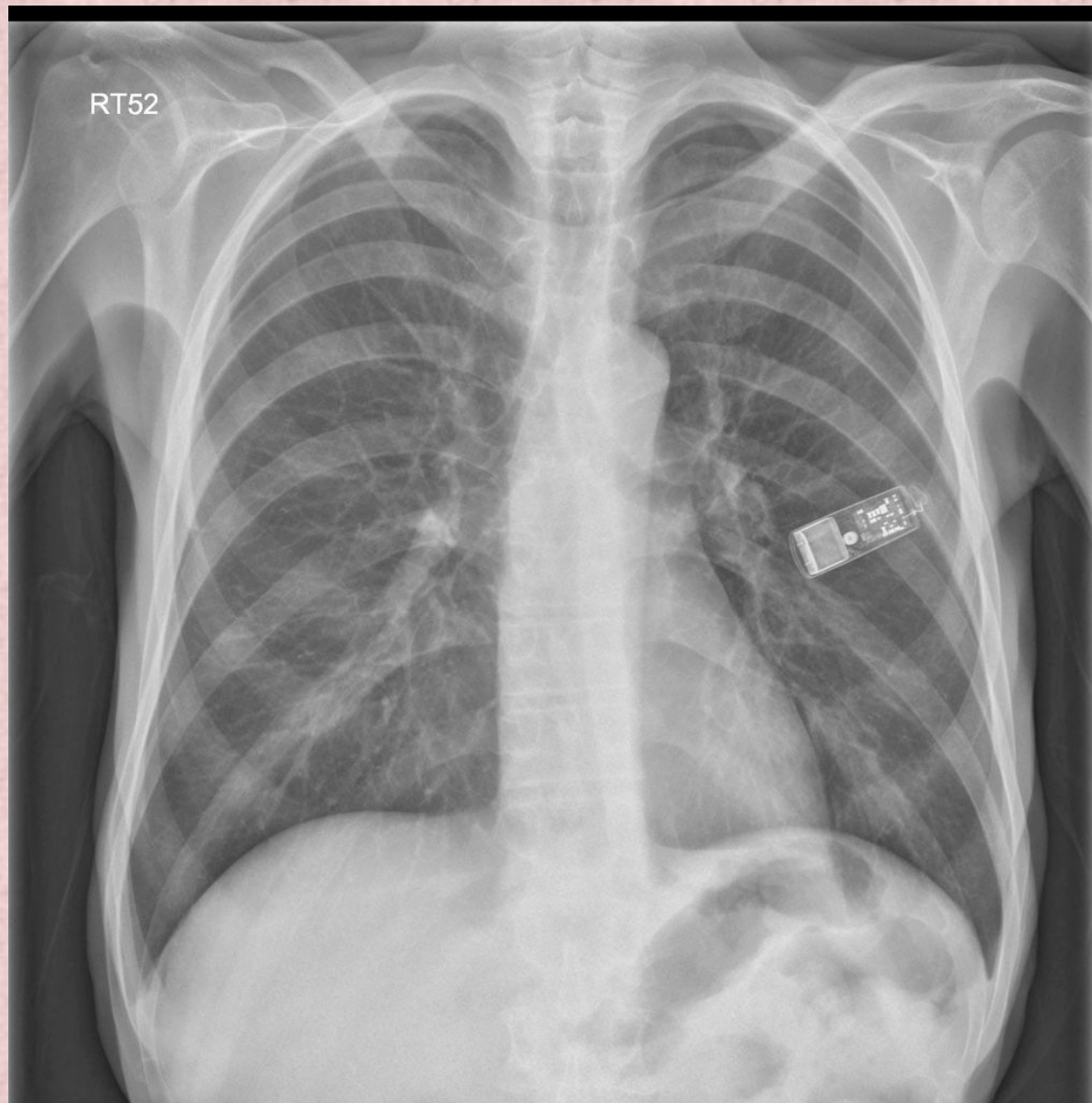
Strip 15 of 20

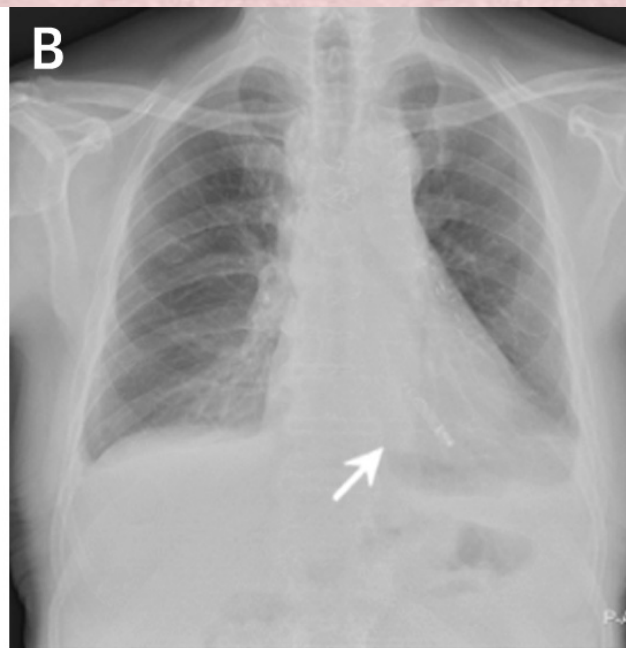
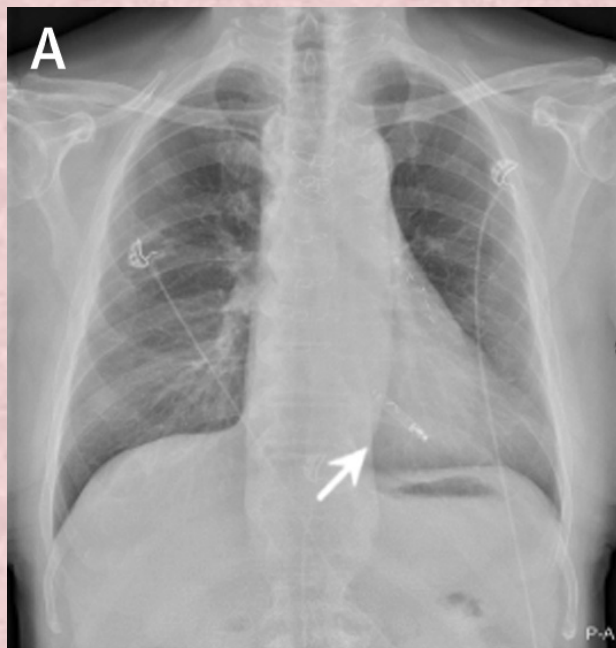




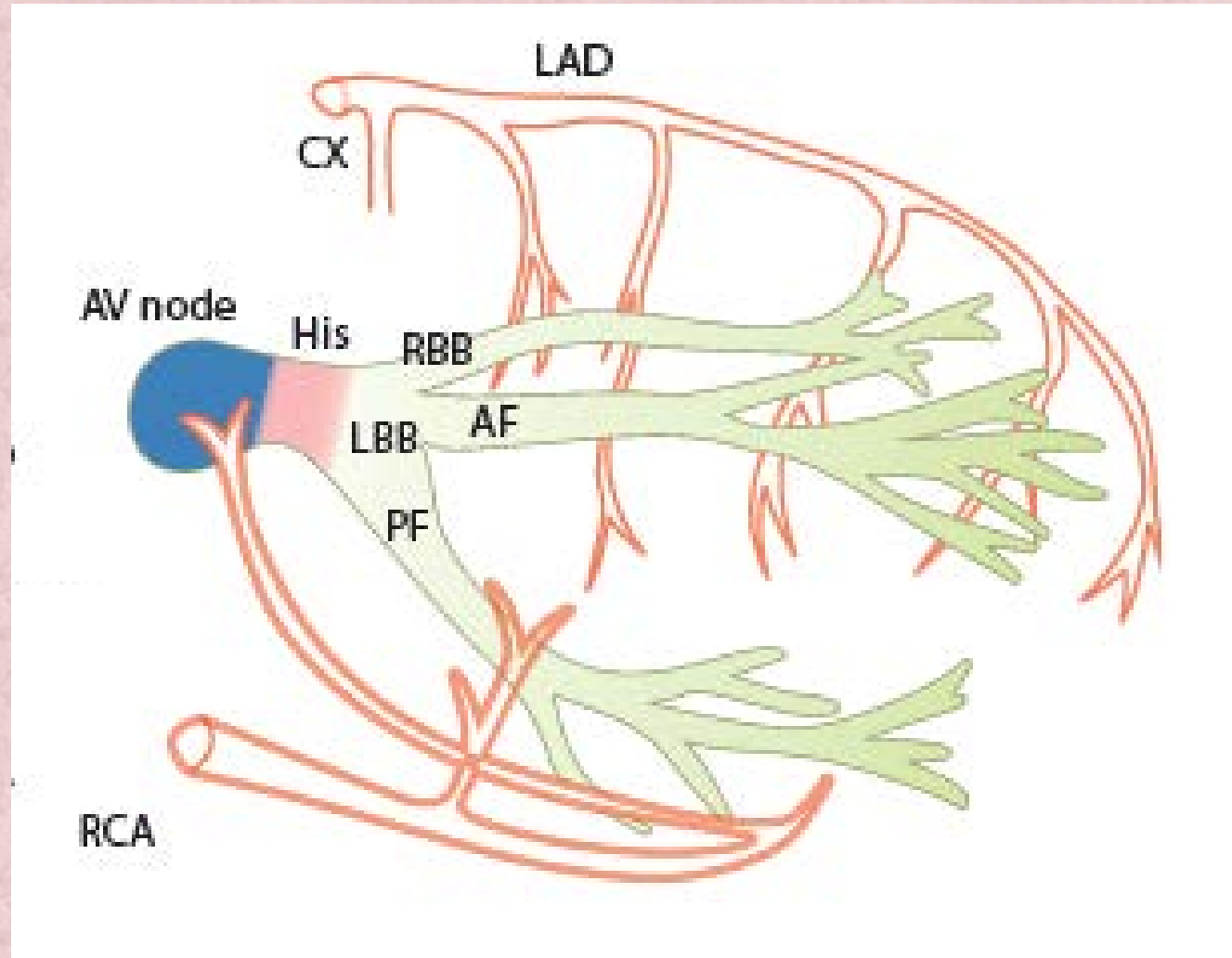






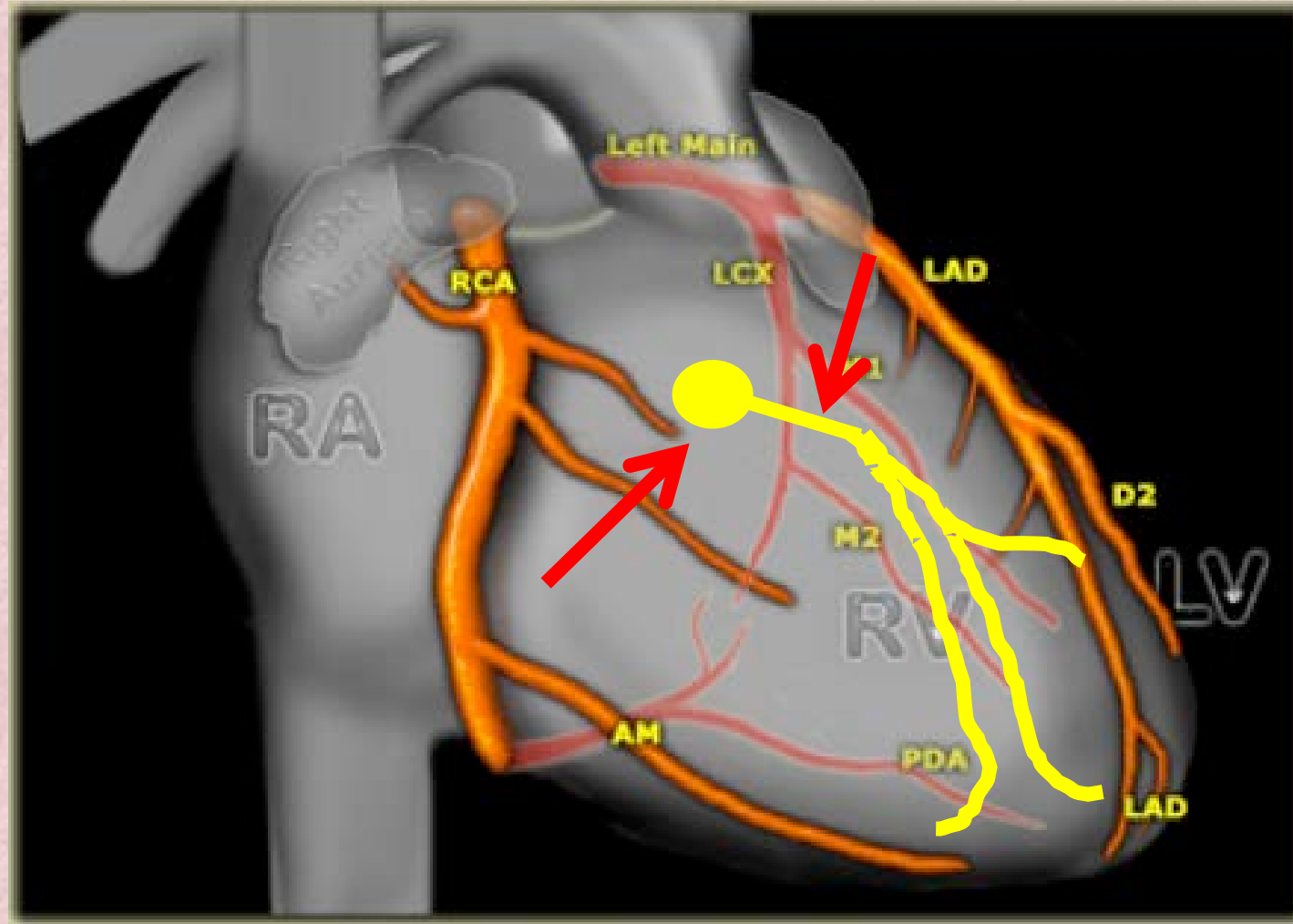


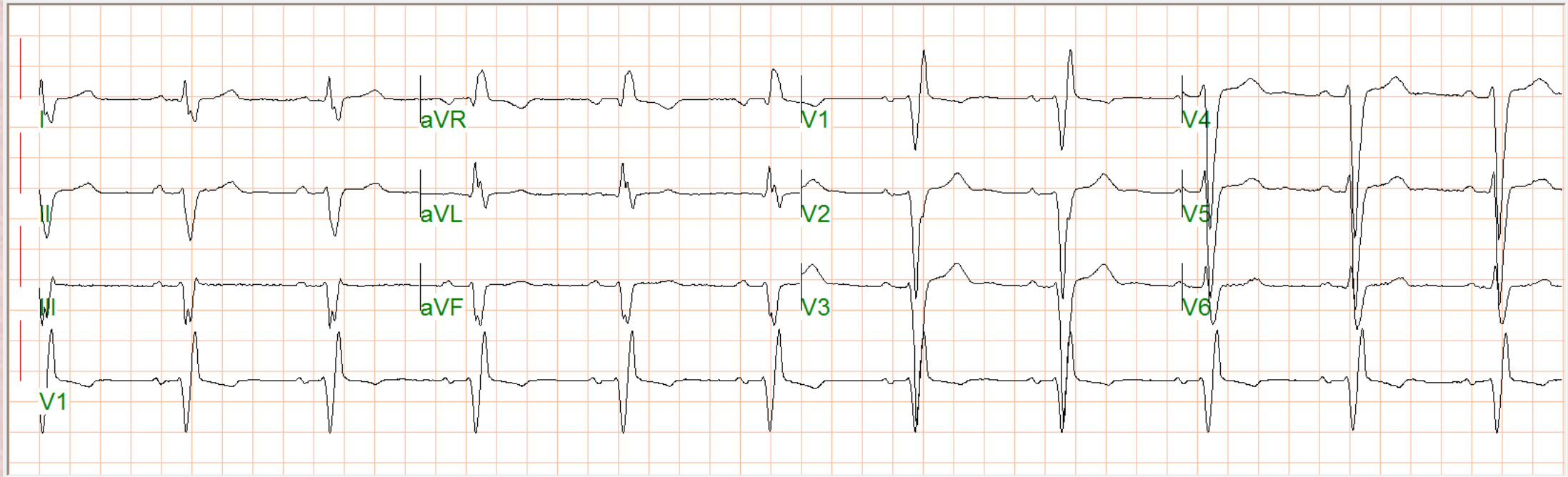
# Blood Supply of the Conduction System





## A vertical strip of light pink textured paper, decorated with ten red heart outlines. The hearts are scattered along the strip, with some appearing larger than others. The background of the strip has a subtle, repeating pattern of the word 'LOVE' in a light, textured font.





# Loves to Workout:

Office Visit 8/15/19

- The patient is a very pleasant 57-year-old avid exerciser who reports recurrent syncope for the last 15 months. His first episode occurred while performing pec exercises on a butterfly machine. He reports that he passed out 3 separate times that day. On one occasion his face hit the machine resulting in facial trauma. His most recent episode occurred 2 months ago while using a seated lat bar. He again passed out while seated and had his head hit the bar in front of him.
- He denies exertional chest pain. He is undergone echocardiography and nuclear stress testing (shown below) there is been no significant structural abnormalities.





**AV Node**



**His Bundle**

