

# FOR EVERYDAY PRACTICE IN 90mins



Dr. Iseko Iseko

Consultant Physician/interventional Cardiologist



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MULTISPECIALTY HOSPITAL

Endocrinology & Diabetology • Neurology • Nephrology and Dialysis • Hepatology • Critical and Intensive Care • Internal Medicine

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• [frontdesk@cardiocare.ng](mailto:frontdesk@cardiocare.ng)



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# Basic Requirements to Learn ECG

1. Believe you can
2. Get a Pen and a Paper and Write
3. Practice, Practice, Practice some more
4. Some formulas must be memorized
5. Keep the understanding of the heart while interpreting the ECG

# Introduction

- Recording of electrical activity of the heart
- A relatively **cheap and widely available tool**
- Useful in **detection and diagnosis, assessment of response** to treatment of heart condition
- Also useful in non cardiac condition- electrolyte derangement, hypothermia



# WETIN THE LINES MEAN SEF?



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Since 1982

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**Serve**



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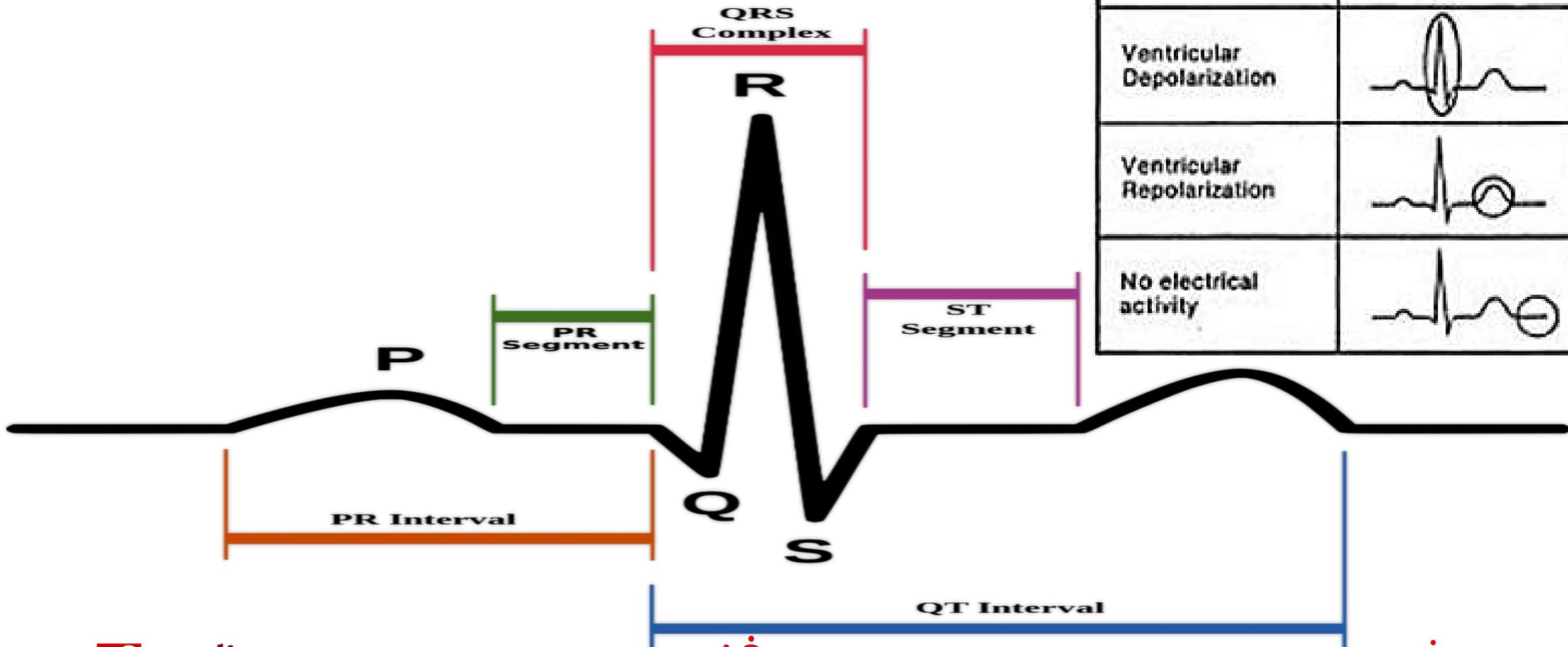
***Founded since 1982 to Support and***

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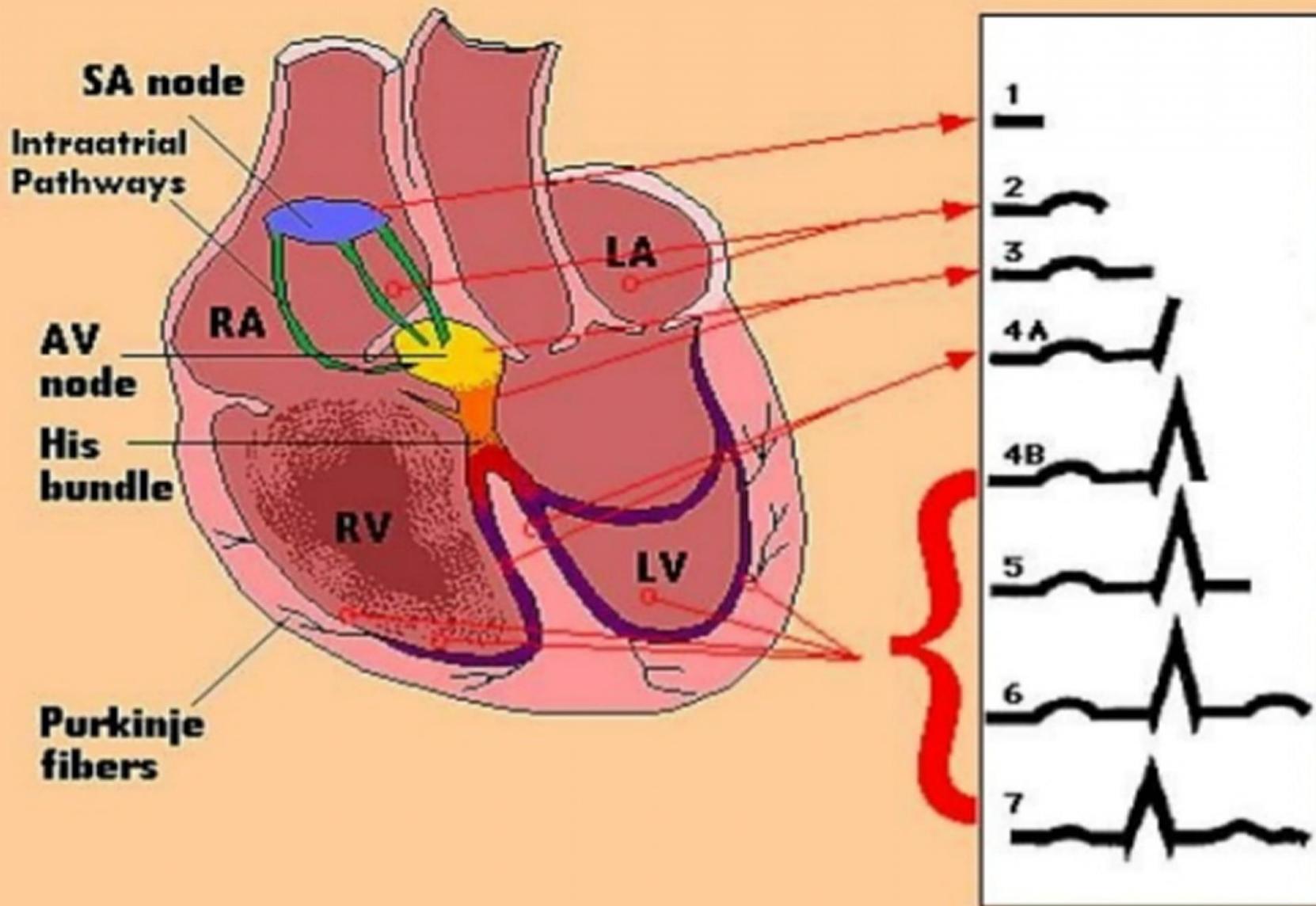
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# WHAT IT MEANS



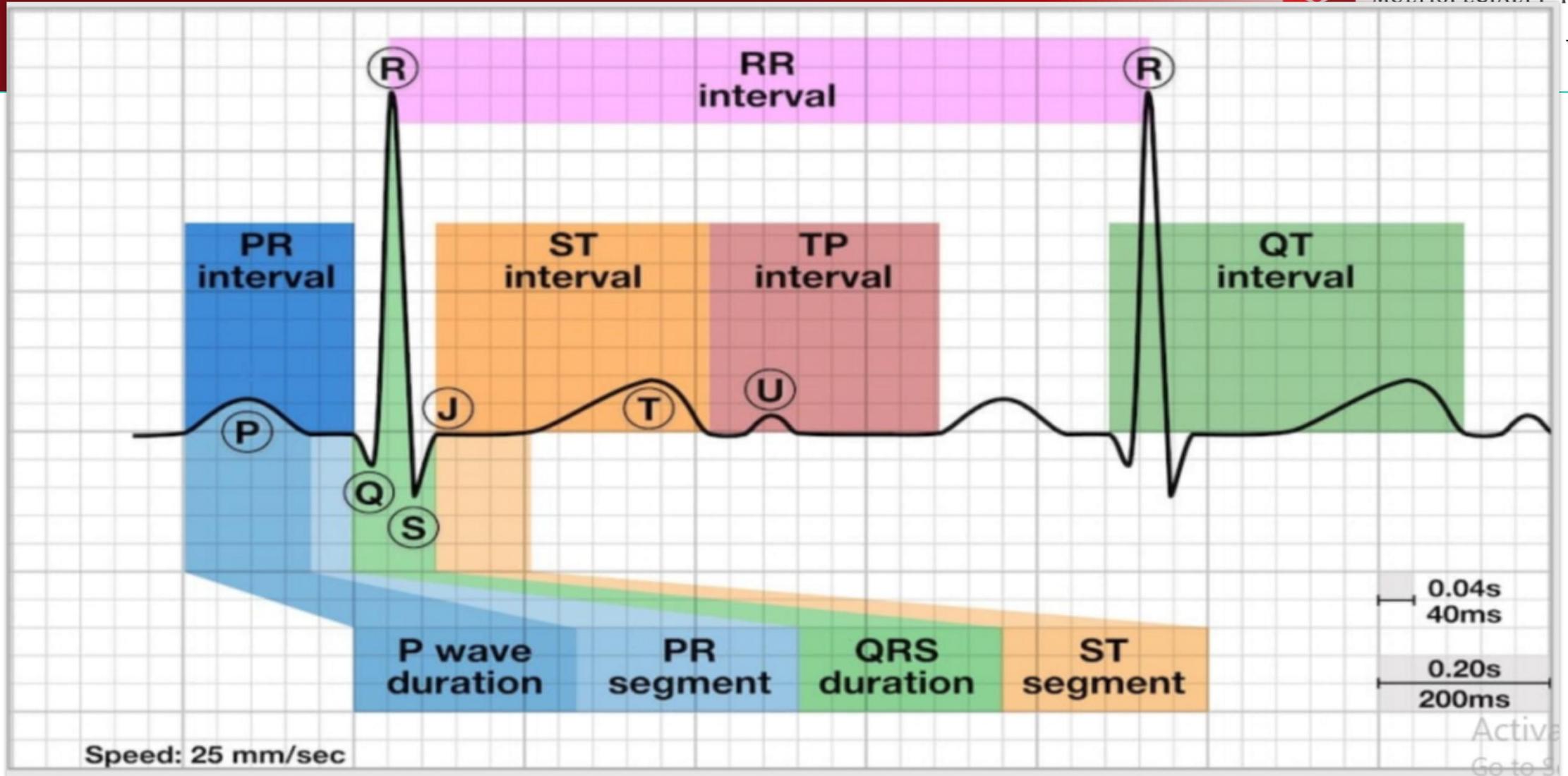
Electrical Activity	Graphic Depiction	Associated Pattern
Atrial Depolarization		P Wave
Delay at AV Node		PR Segment
Ventricular Depolarization		QRS Complex
Ventricular Repolarization		T Wave
No electrical activity		Isoelectric Line



1. SA node discharge  
no deflection
2. Right and left atrial  
activation: P wave
3. Activation of AV  
node and bundle of His:  
No deflection
- 4A. Septal activation:  
Onset of QRS complex,  
initial septal Q wave
- 4B. Left ventricular free  
wall activation:  
Inscription of QRS  
complex
5. Full ventricular  
activation: No deflection
6. Ventricular  
repolarization: His  
Purkinje T wave
7. Late ventricular  
repolarization: His  
Purkinje U wave

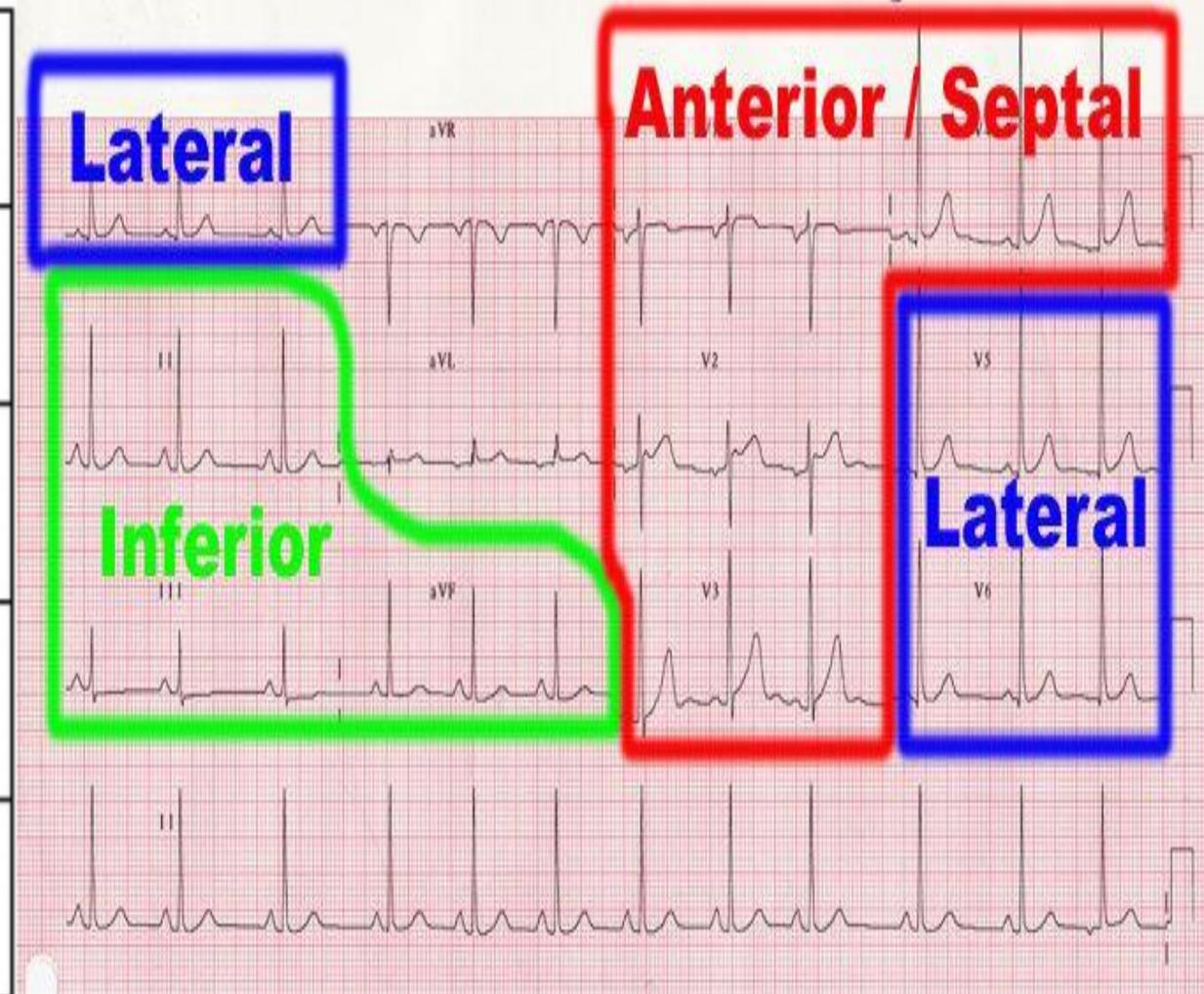
# Introduction

- Cardiac catheterization procedures in the dedicated catheterization laboratory (cathlab) are apparently at an infantile stage in Nigeria.
- The cardiac cathlab is invaluable in the practice of Cardiology as its use is the **gold standard** for diagnosis and treatment of many cardiovascular conditions.
- In Northern Nigeria, **two prior indigenous cathlab installations had been reported**, one public and one private which had become non-functional.
- However, since 2015 there has reportedly been **no functional indigenous cardiac cathlab in the entire Northern Nigeria**.



# EACH LINE REPRESENTS A VIEW OF THE HEART

View of heart	Leads
Inferior	II, III, aVF
Lateral	I, aVL, V5, V6
Anterior	V3, V4
Septal	V1, V2



# BASIC ECG TEMPLATE

1. IDENTIFY NAME AND CALIBRATION
2. RHYTHM AND P WAVES
3. QRS- WAVES
4. ST SEGMENT (& OTHER SEGMENTS)
5. Q WAVES
6. T WAVES

# Who is Cardiocare Multispecialty Hospital?



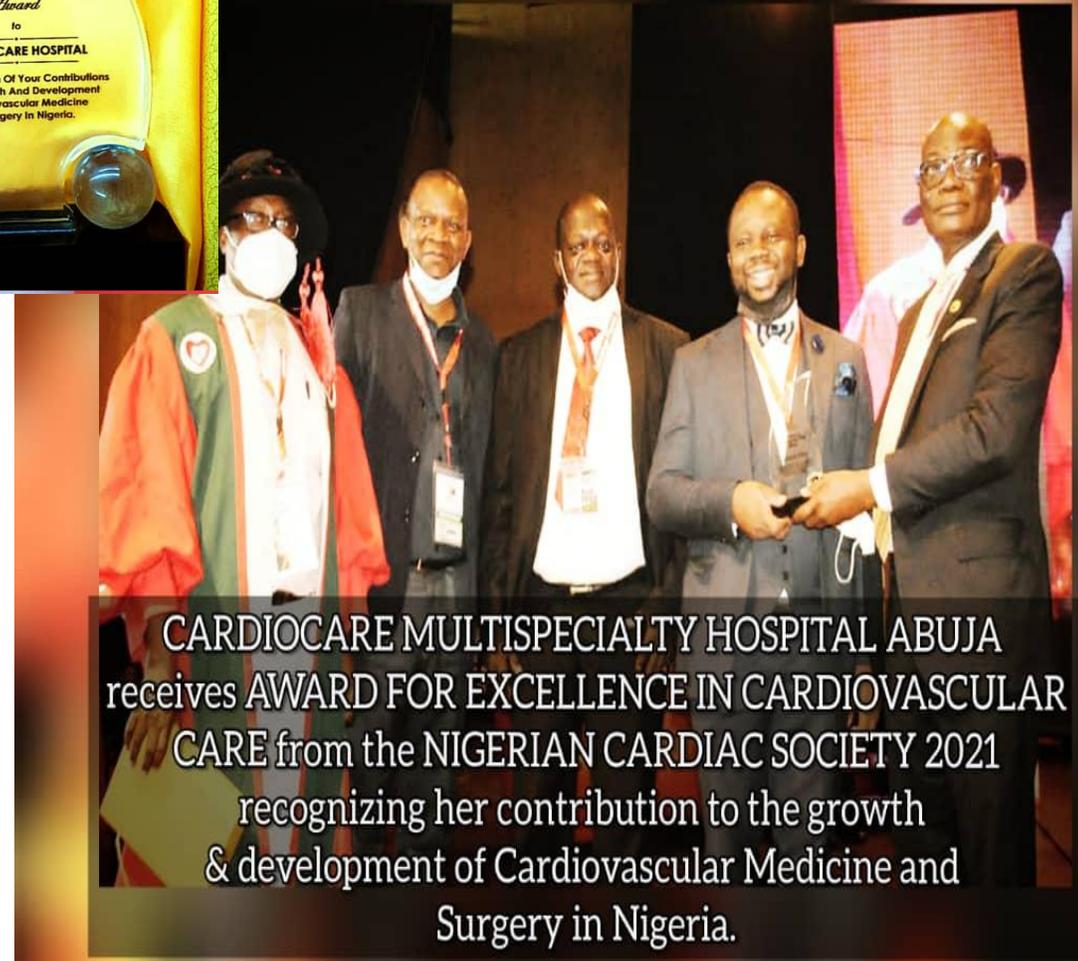
# Specialty



Northern Nigeria's **pioneer standalone Institution** wholly dedicated to comprehensive **Cardiovascular and Internal Medicine**.

Received Multiple **Awards for Excellence in Service**.

We are a **Support Hospital** for your practice in Nigeria through our **specialized services, training, and research in collaboration with**





# 1. Identify the ECG

# Identify the ECG

- Check correct name and ECG
- Check standard speed and calibration
  - 10mm = 1mV
  - 25mm/sec

# National Interventional Cardiology Symposium- One (1)

- 41 attendees from:
  - Lagos=3, Benin=1, Kano=3, Katsina=3, Sokoto=5
  - Enugu=3, Gombe= 5, Jos=5, Kebbi=4, FCT= 8



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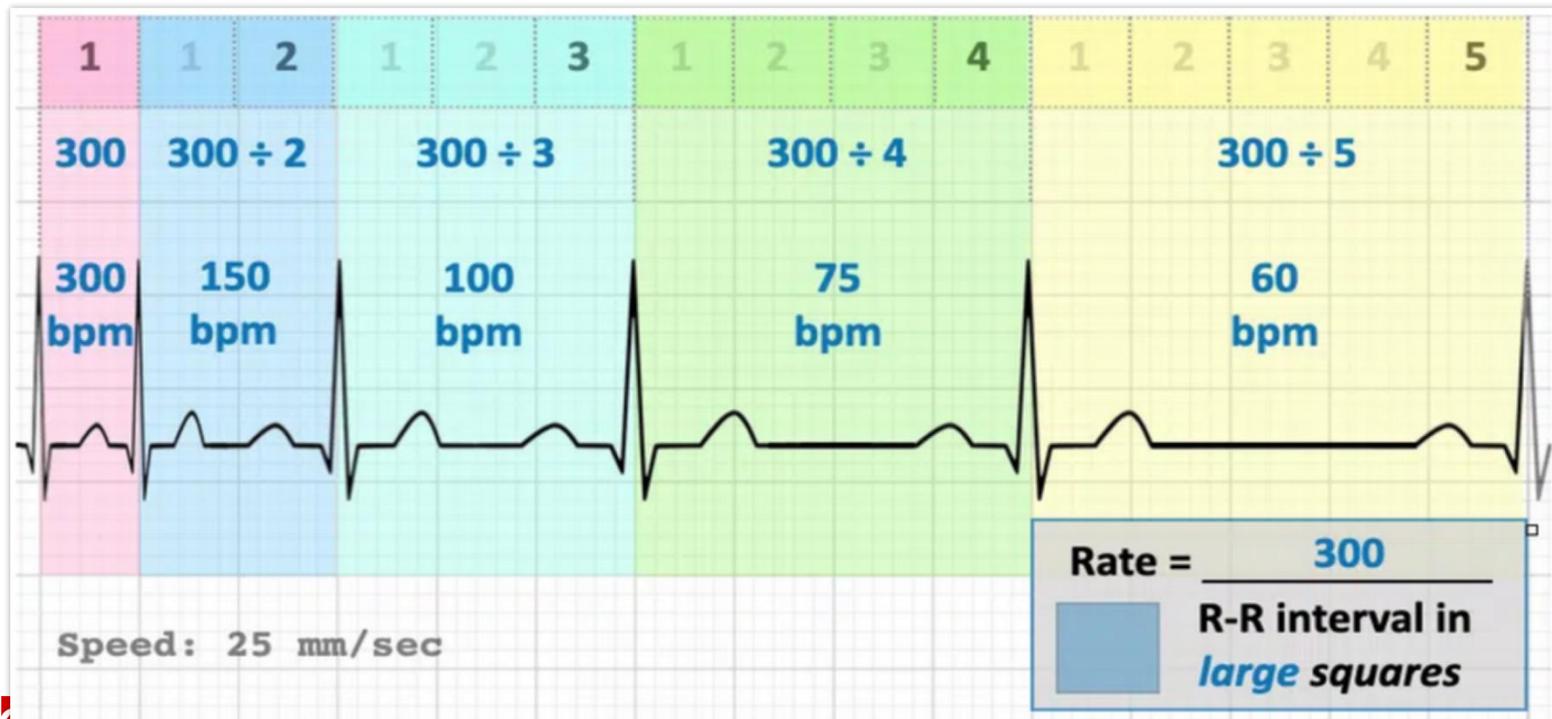
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## 2. Check the Rate

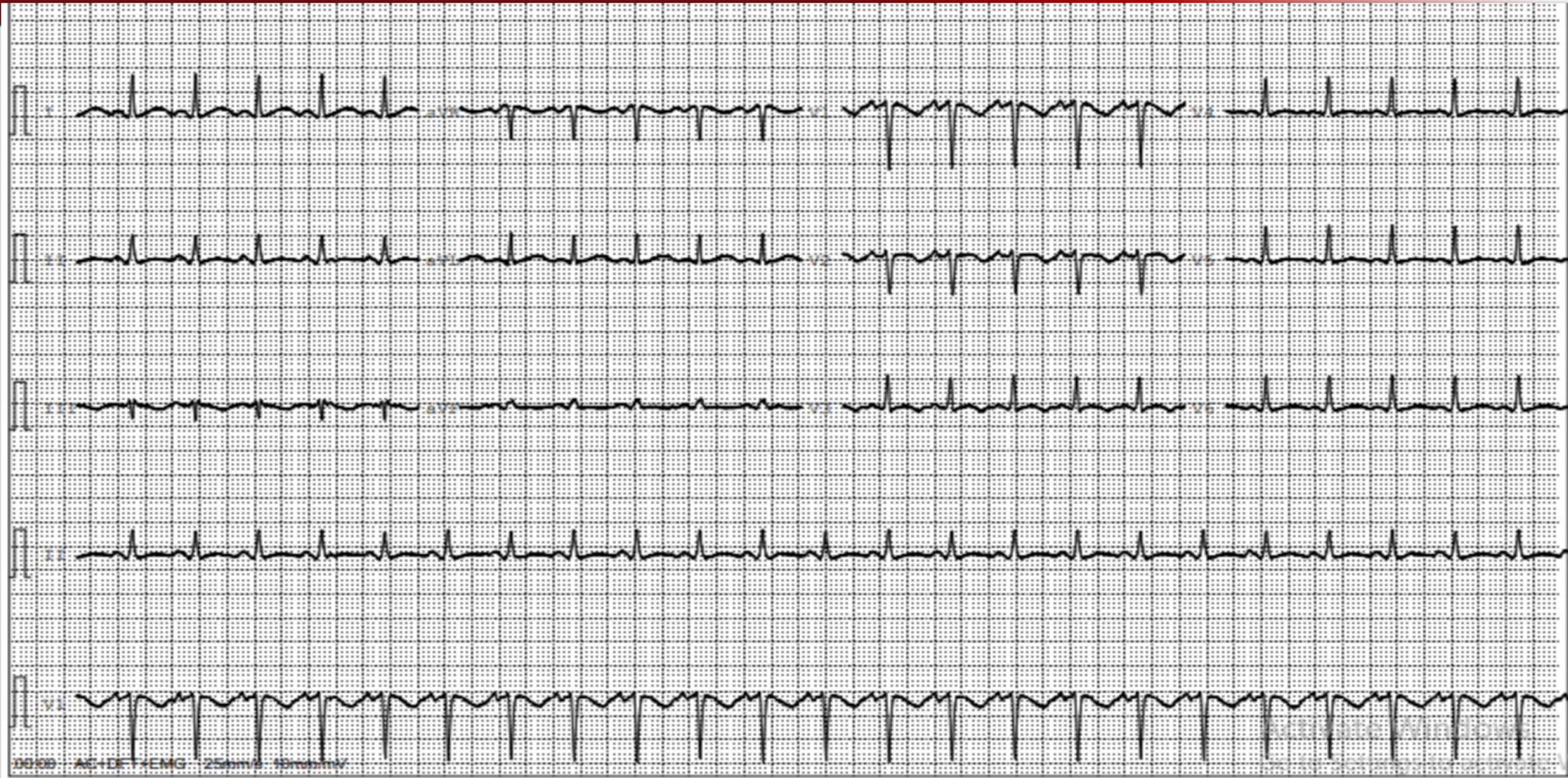
# 2. Check the Rate

- **Computer Generated Rate is usually ok in most cases**
- Check number of Big Boxes between R and R and divide by 4



**Large square method:** Divide 300 by the number of large squares between R-R interval. Useful for regular rhythms

# HR- TACHY





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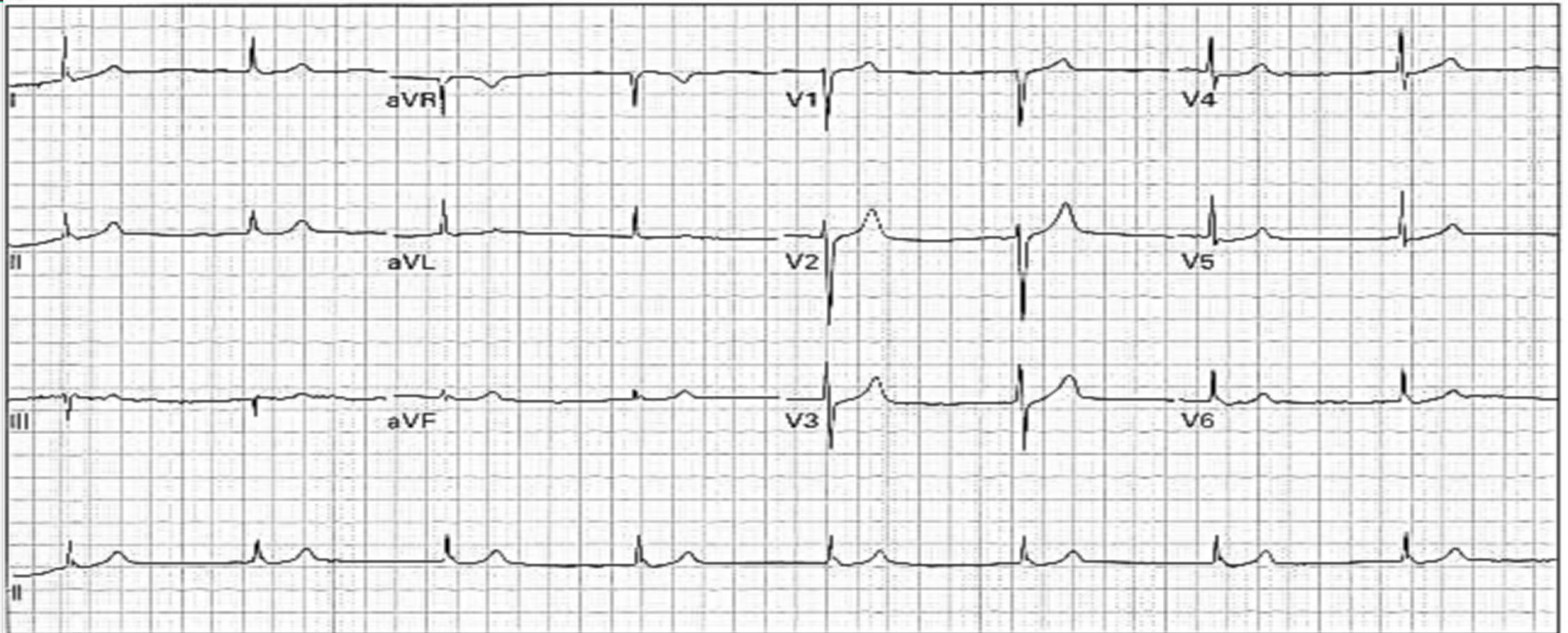
Fixing Heart Diseases without Open Surgery while awake.

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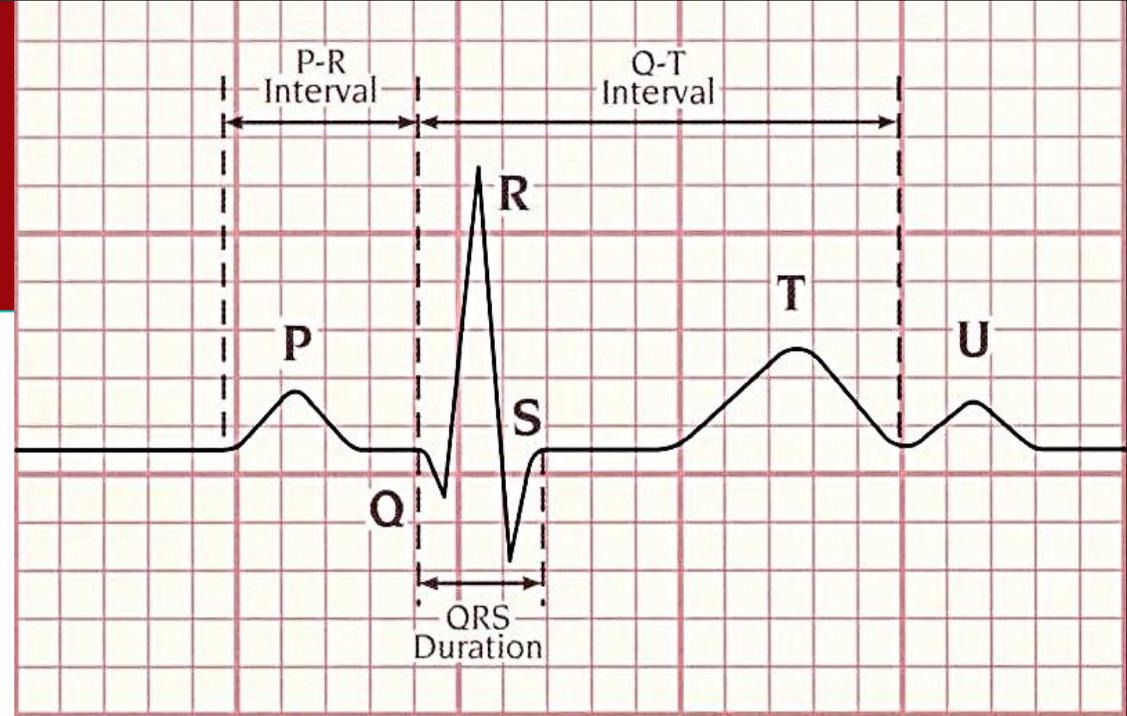
5. 48 year old woman reports severe lightheadedness with waking; she recently started a new medication for hypertension

# 3. Check the Rhythm & P-WAVE

# RHYTHM

## NORMAL SINUS RHYTHM?

- A. ARE THE R-R INTERVALS REGULAR?
- B. P WAVE IS UPRIGHT IN LEAD II AND INVERTED IN aVR?
- C. ALL QRS COMPLEXES ARE PRECEDED BY A P WAVE?
- D. ALL P WAVES HAVE A QRS COMPLEX AFTER IT?
- E. ALL P WAVES ARE SIMILAR AND NORMAL LOOKING?



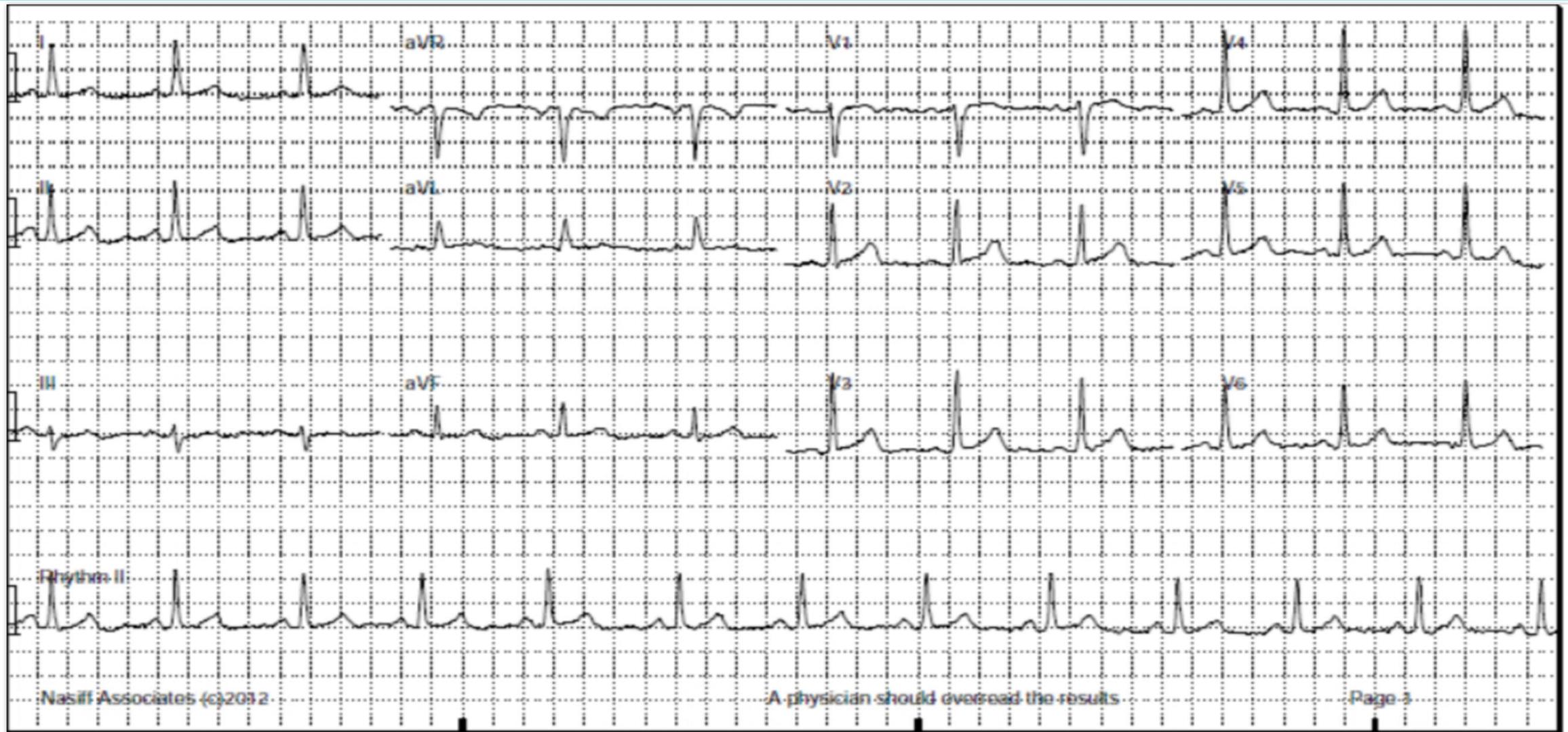


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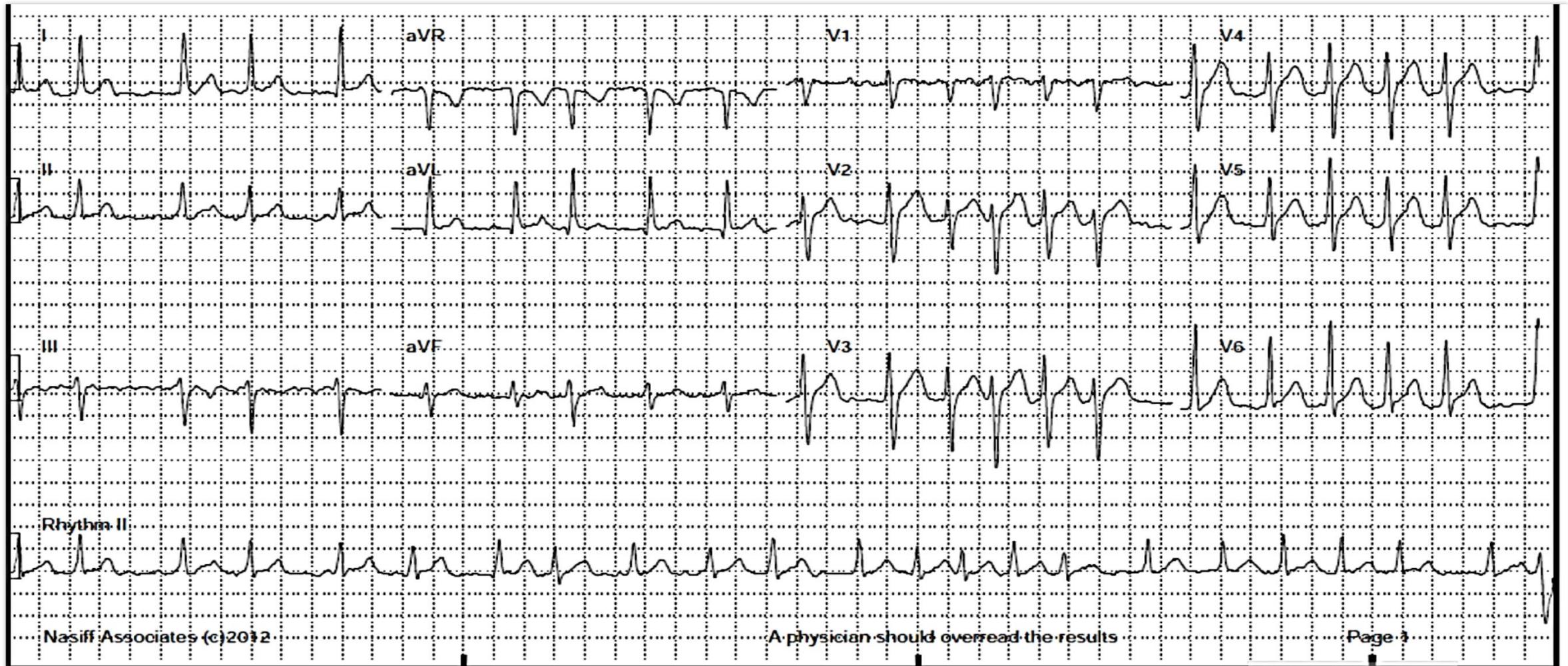
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# Coronary Angiography & Percutaneous Coronary Intervention

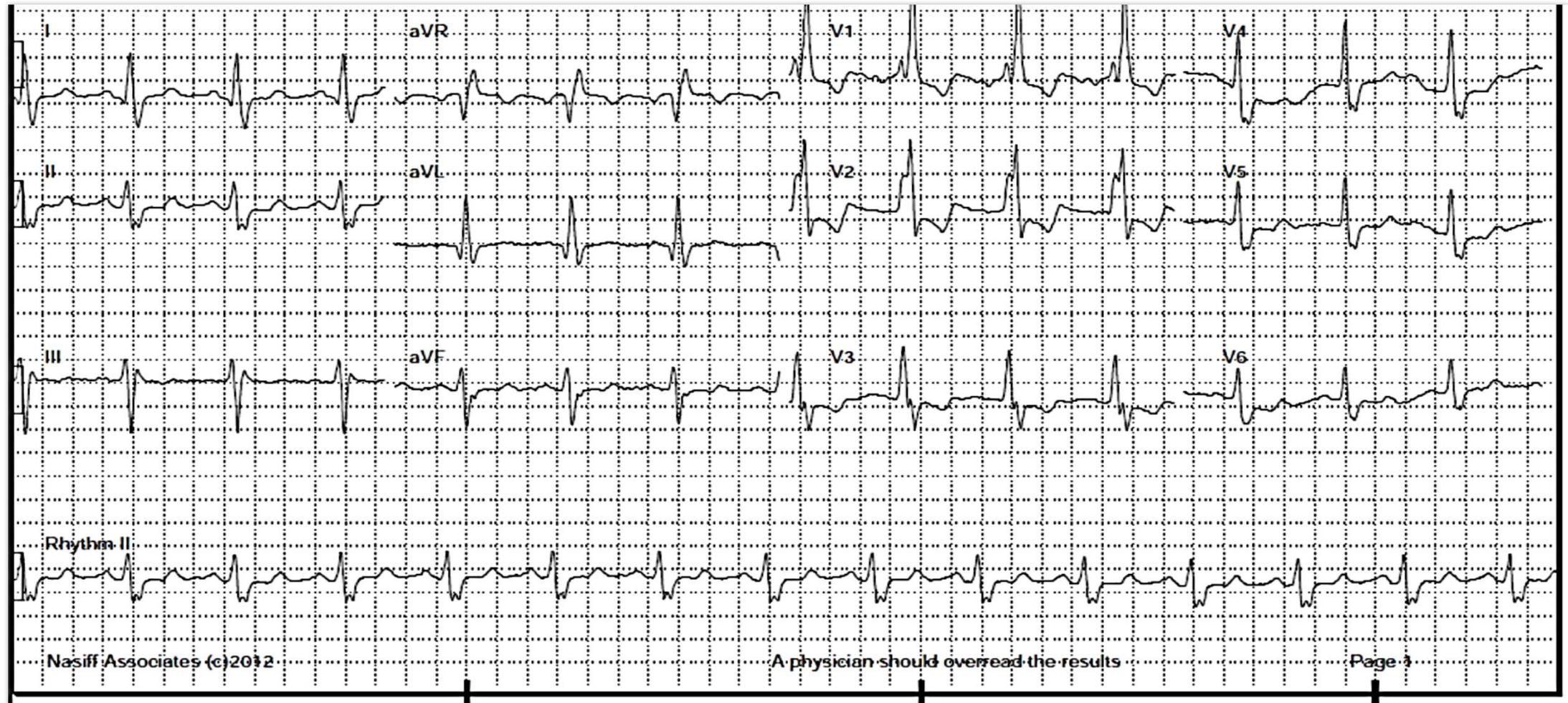
For Heart Attacks/Myocardial Infarction, Angina, Ischemic Heart Disease/Failure-  
Stents, Balloon Angioplasty, & Chronic Total Occlusions (CTO) of Heart Vessels



# Sinus Rhythm? or Not?



# Sinus Rhythm? or Not?

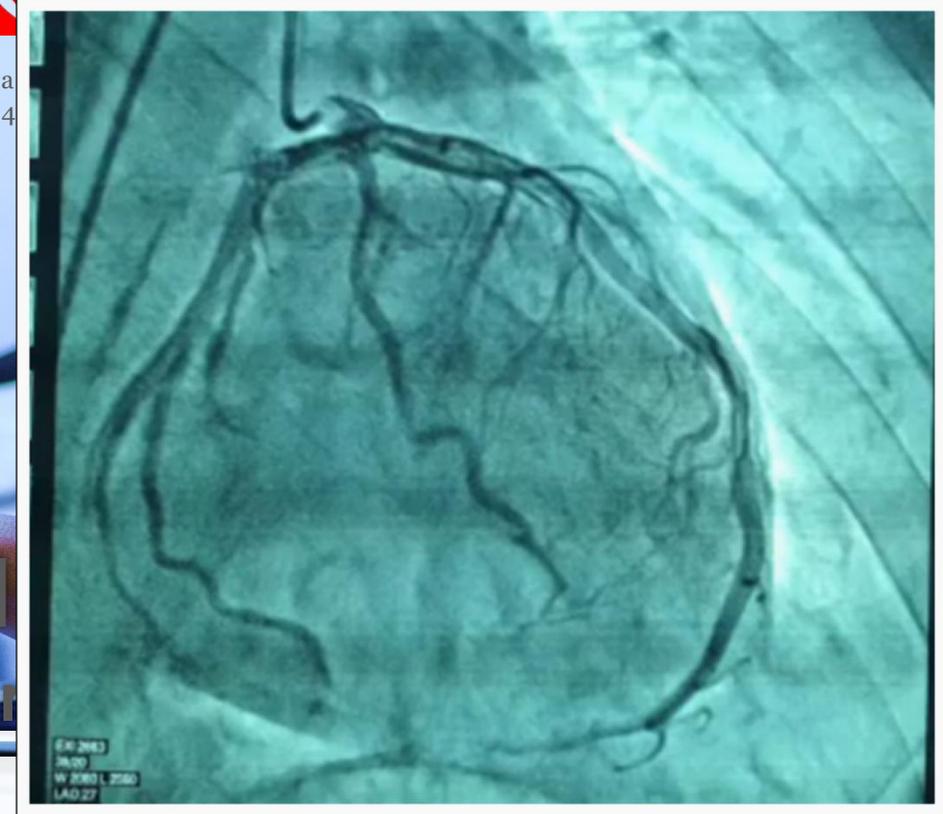


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A physician should overread the results

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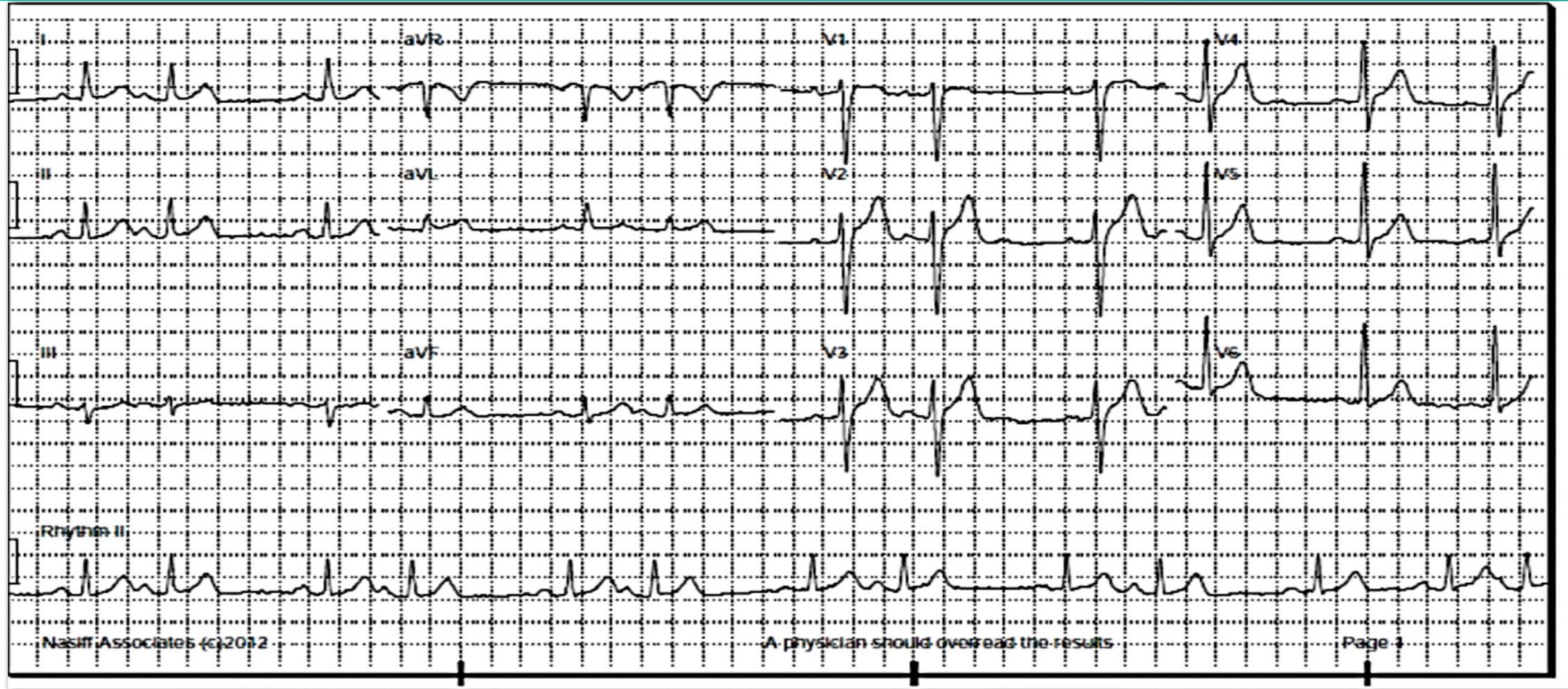
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For Heart Attacks/Myocardial Infarction, Angina, Ischemic Heart Disease/Failure-  
Stents, Balloon Angioplasty, & Chronic Total Occlusions (CTO) of Heart Vessels

# Sinus Rhythm? or Not?

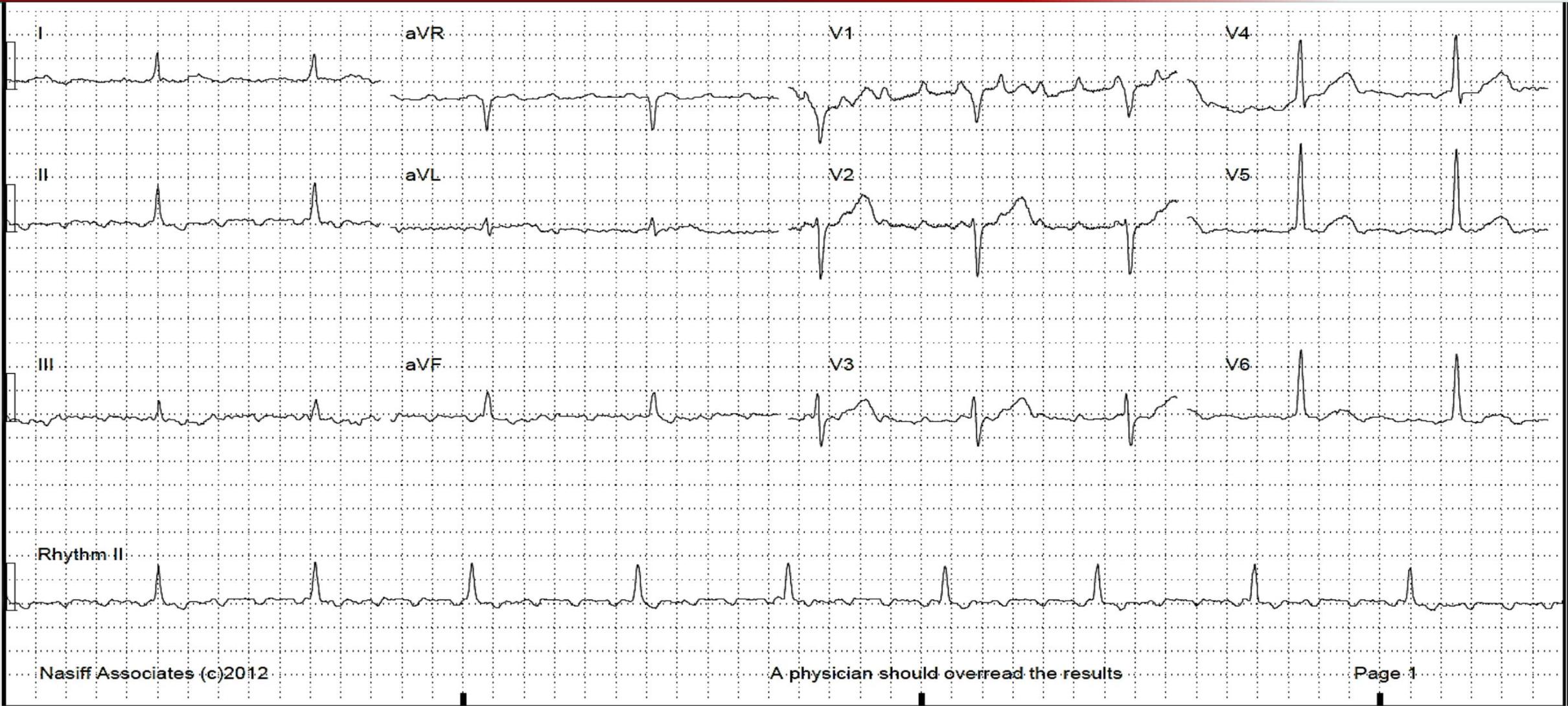


# RHYTHM RED FLAGS

	Regular?	Fast/Slow	P waves?	QRS appearance?	
Atrial Fibrillation	No	Either	No	Normal	URGENT.
Atrial Flutter	Yes/No	Either	Multiple P waves	Normal	URGENT.
Complete Heart Block	No	Slow	Yes, but not before QRS	Normal or Wide	<b>EMERGENCY!!</b>
Ventricular Tachycardia	Yes	Fast	No	Wide & Bizarre	<b>EMERGENCY!!</b>
Ventricular Fibrillation	No	Very Fast	no	Hardly detectable, Jaga-Jaga	<b>EMERGENCY!!</b>

**\*\*\* ALL RHYTHM PROBLEMS SHOULD BE REFERRED TO A SPECIALIST after initial care\*\*\***

# Atrial Flutter

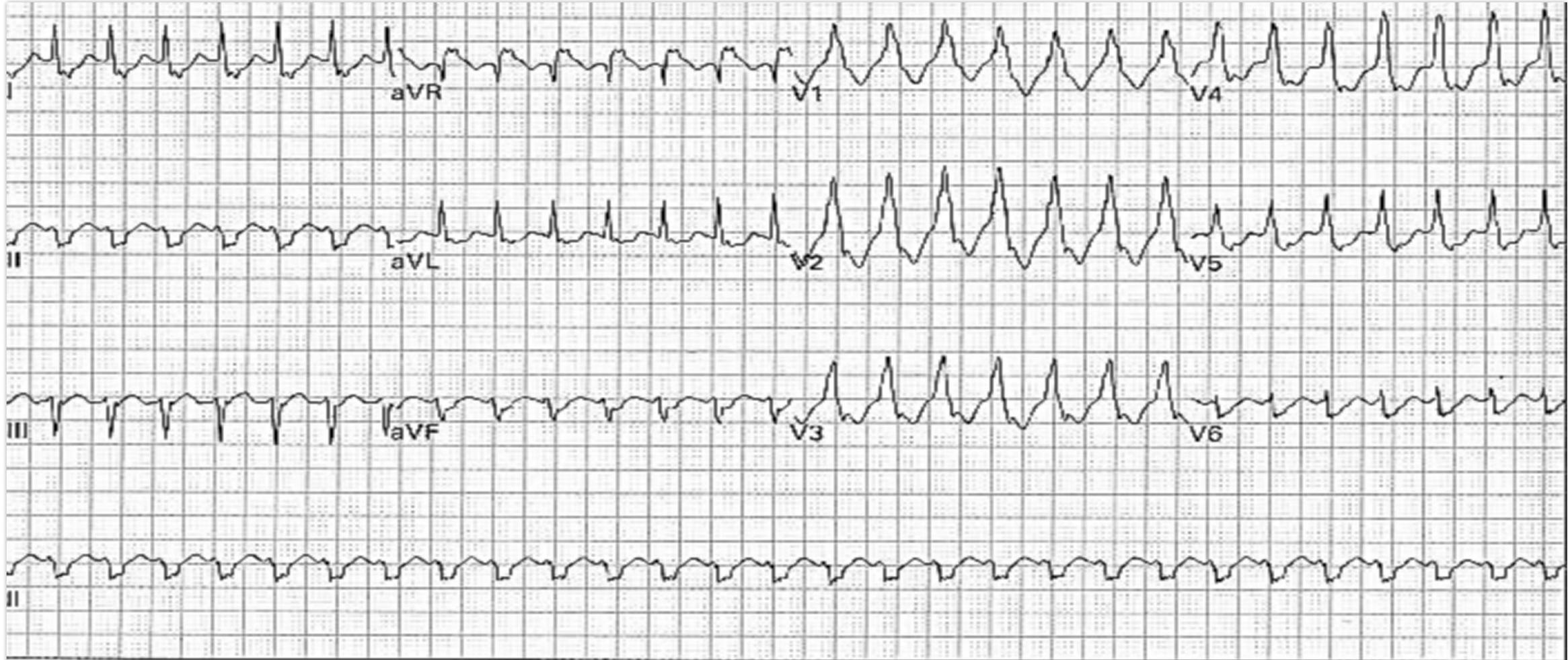


# Our Experience- Coronary

- The predominant procedures were
  - 233 (51.3%) diagnostic coronary angiography
  - 90 (19.8%) percutaneous interventions

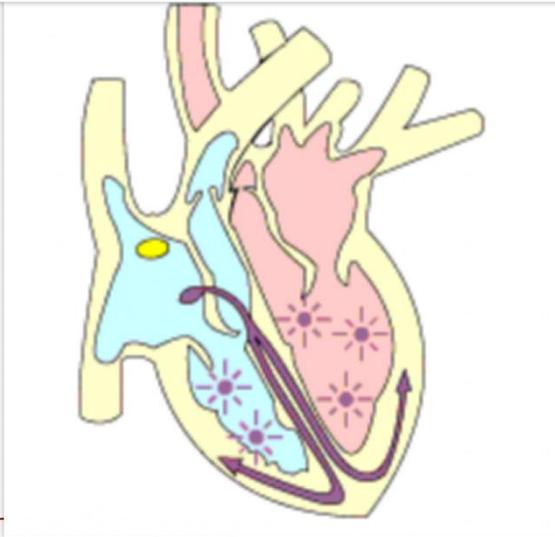
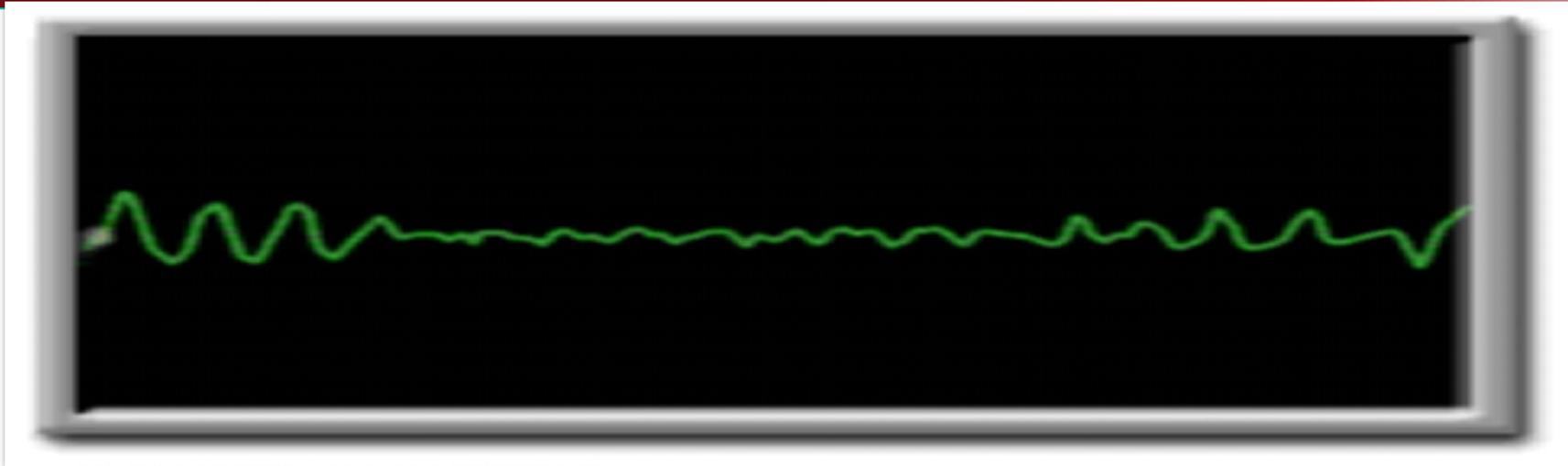


# Ventricular Tachycardia



9. 74 year old man with chest pain and palpitations

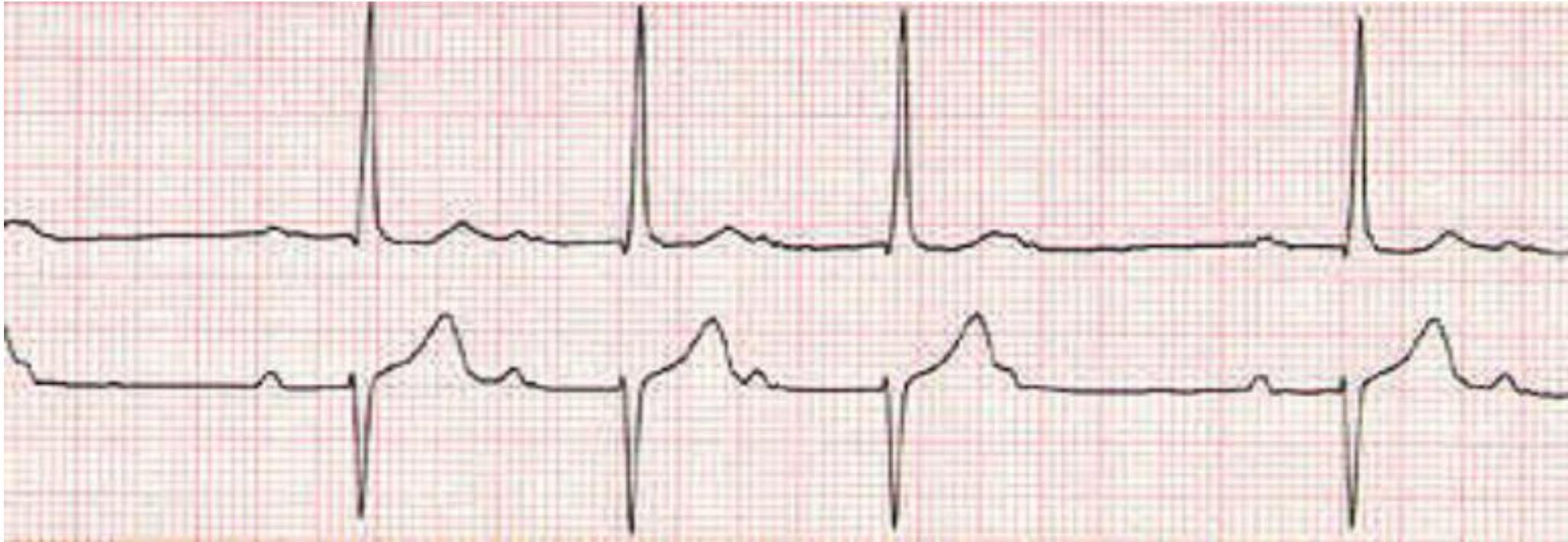
# Ventricular Fibrillation (VFib)



Rate	cannot be counted
Regularity	rapid, not detectable
P waves	none
QRS	none detectable

# What is this rhythm?

Type 1 second degree block (Wenckebach)





# Peripheral Artery **cardiocare** End Intervention

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For Peripheral Arterial Disease- **To reduce tissue loss and gangrene especially lower limb**

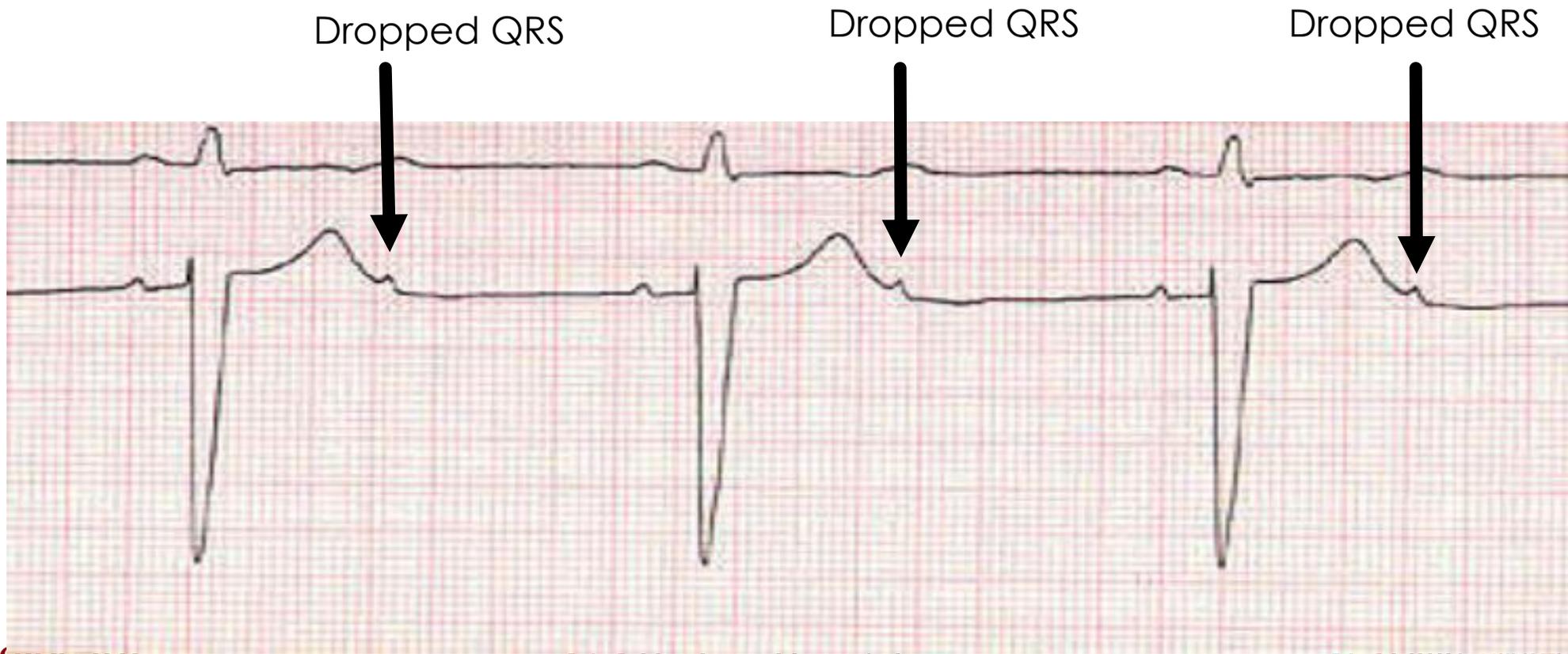
Stenting, Balloon Angioplasty, Thrombosuction, Catheter-Directed Thrombolytic Therapy (CDTT)

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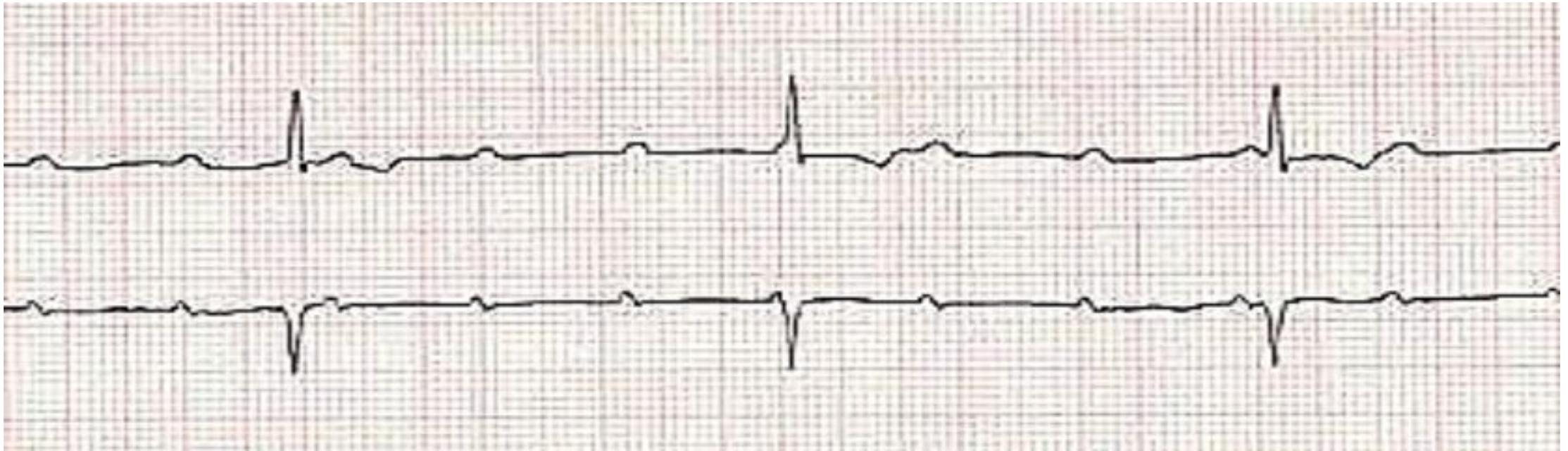
# What is this rhythm?

Type 2 second degree AV block

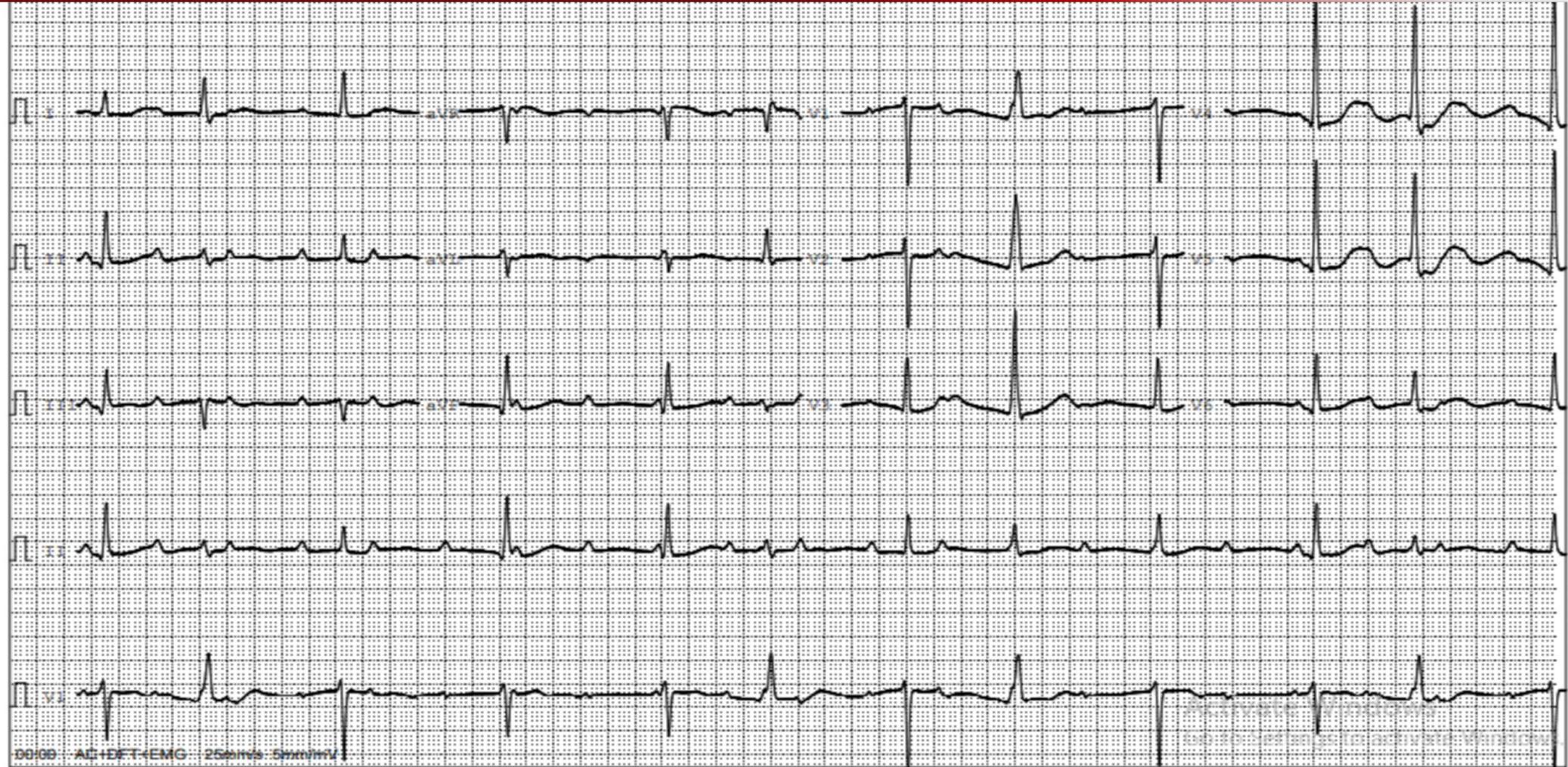


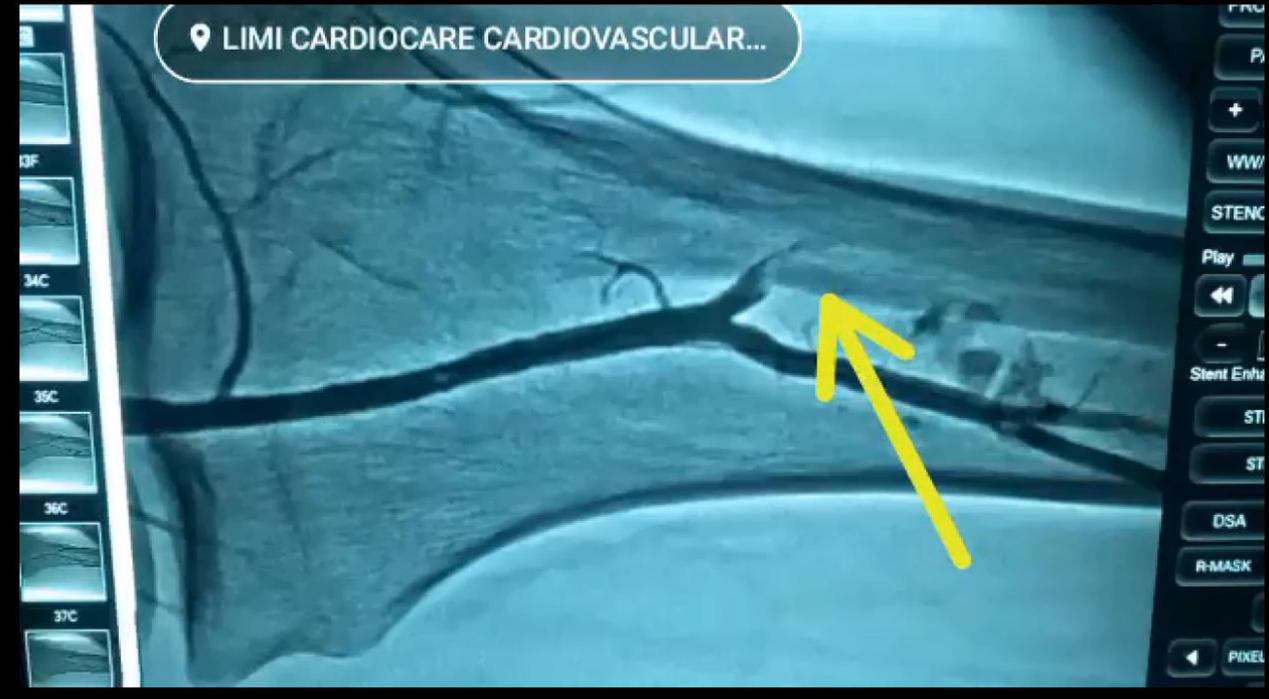
# What is this rhythm?

3<sup>rd</sup> degree heart block (complete)



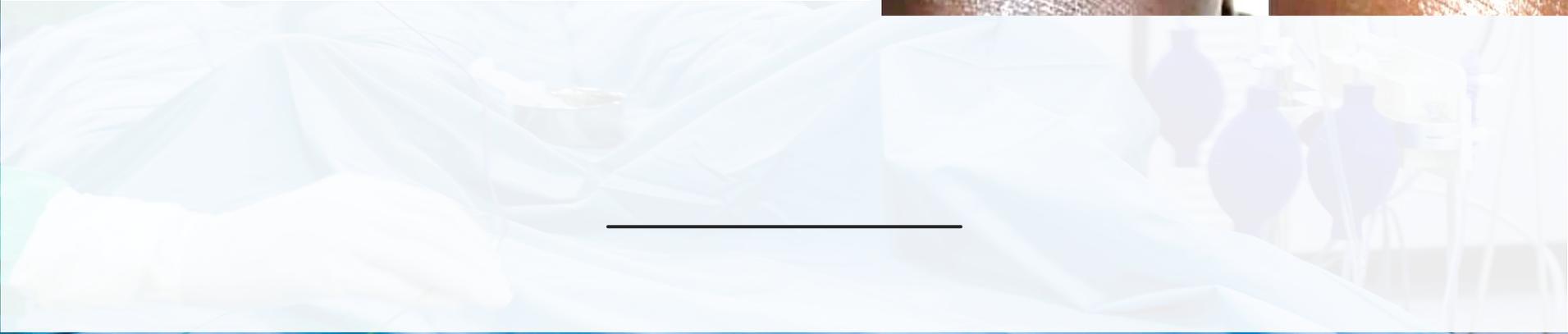
# CALIBRATION, 3<sup>RD</sup> DEGREE AV BLOCK





Before.

After.



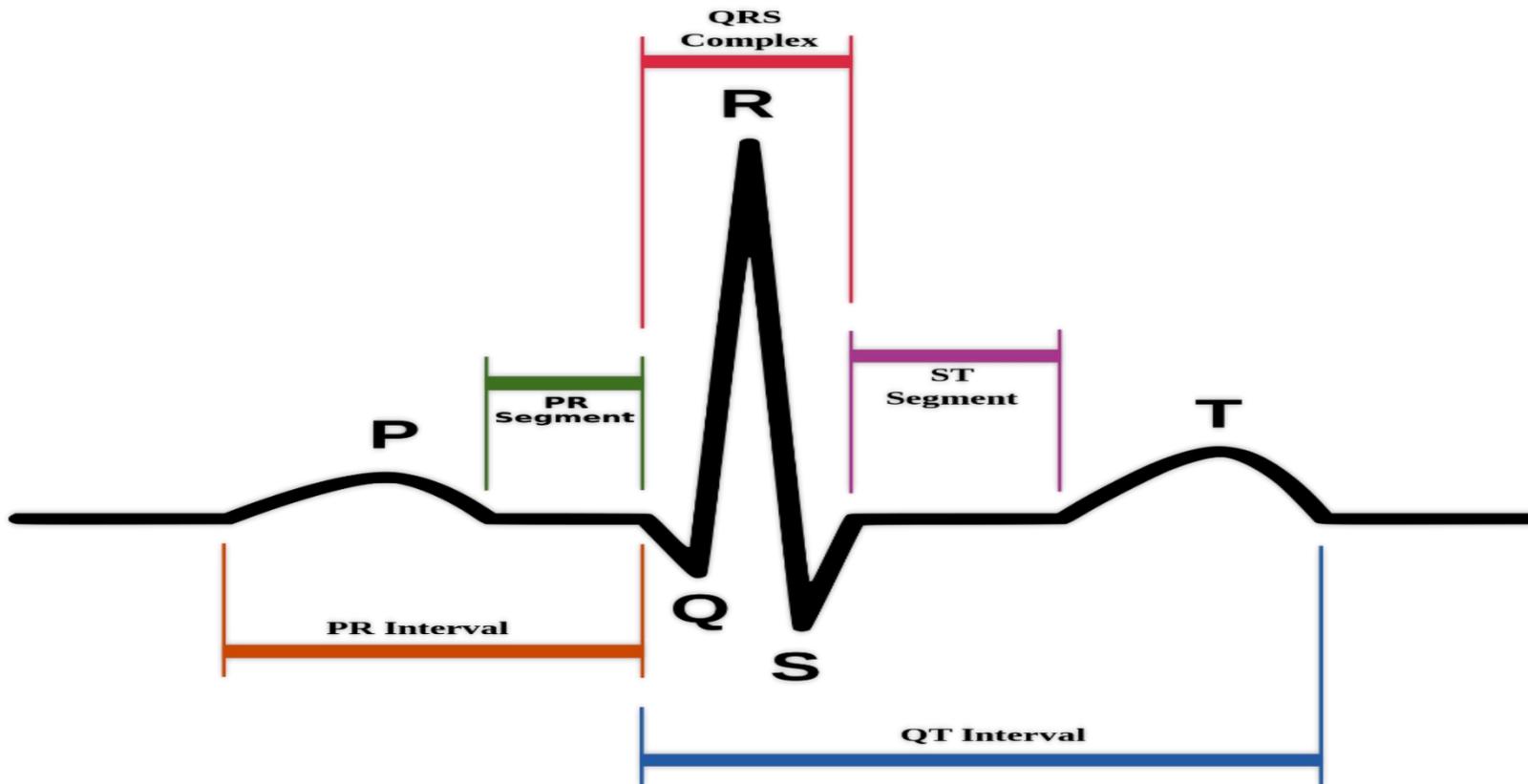


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# Step 4. QRS

# ECG WAVE – QRS?



Electrical Activity	Graphic Depiction	Associated Pattern
Atrial Depolarization		P Wave
Delay at AV Node		PR Segment
Ventricular Depolarization		QRS Complex
Ventricular Repolarization		T Wave
No electrical activity		Isoelectric Line

# Step 4- QRS Segment

- Width Less than 120ms (3 small boxes) *described as*
  - *Narrow (< 0.12 seconds) –normal conduction*
  - *Broad (> 0.12 seconds)– abnormal conduction through the ventricle*
- *Height*
  - *Small complexes (low voltage) are defined as < 5mm in the limb leads or < 10 mm in the chest leads.*
  - *Tall complexes imply ventricular hypertrophy*
    - *LVH [ $>25\text{mm}$  in any limb lead] or [ $S$  in  $V1$  or  $V2$  +  $R$  in  $V6$  =  $>35\text{mm}$ ]*
    - *RVH Positive deflection in  $V1$  or almost positive with T wave inversion in  $V1-3$*



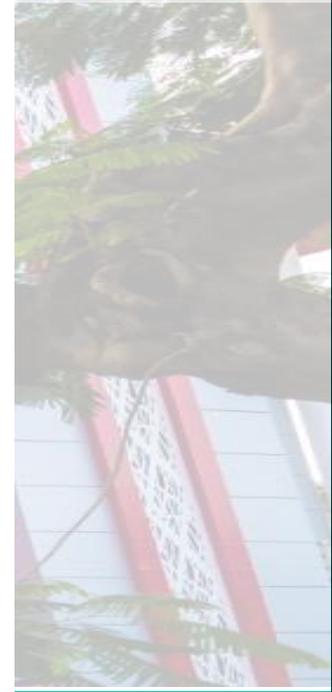
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# Cardiac Device Implantation, Programming & Replacement

Pacemakers, Implantable Defibrillators, Cardiac Resynchronization  
Devices

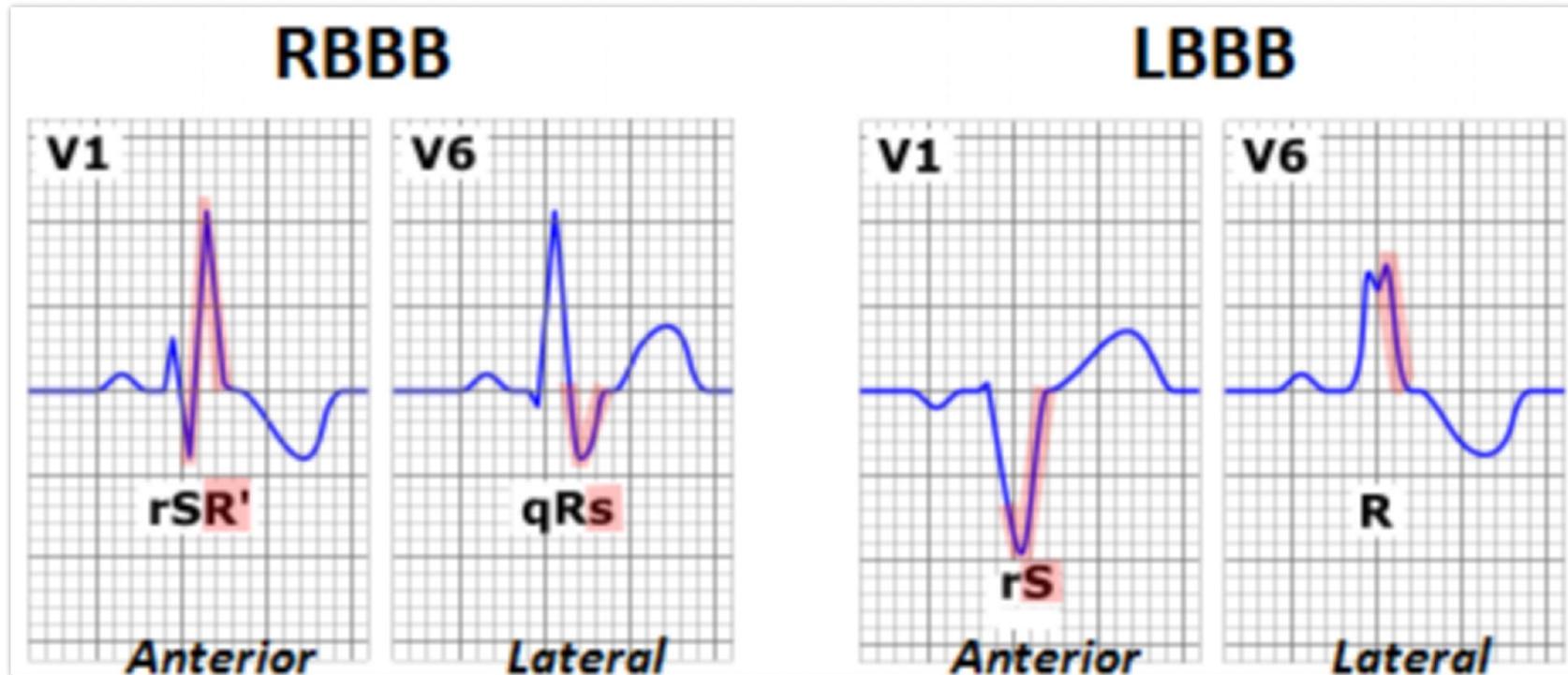
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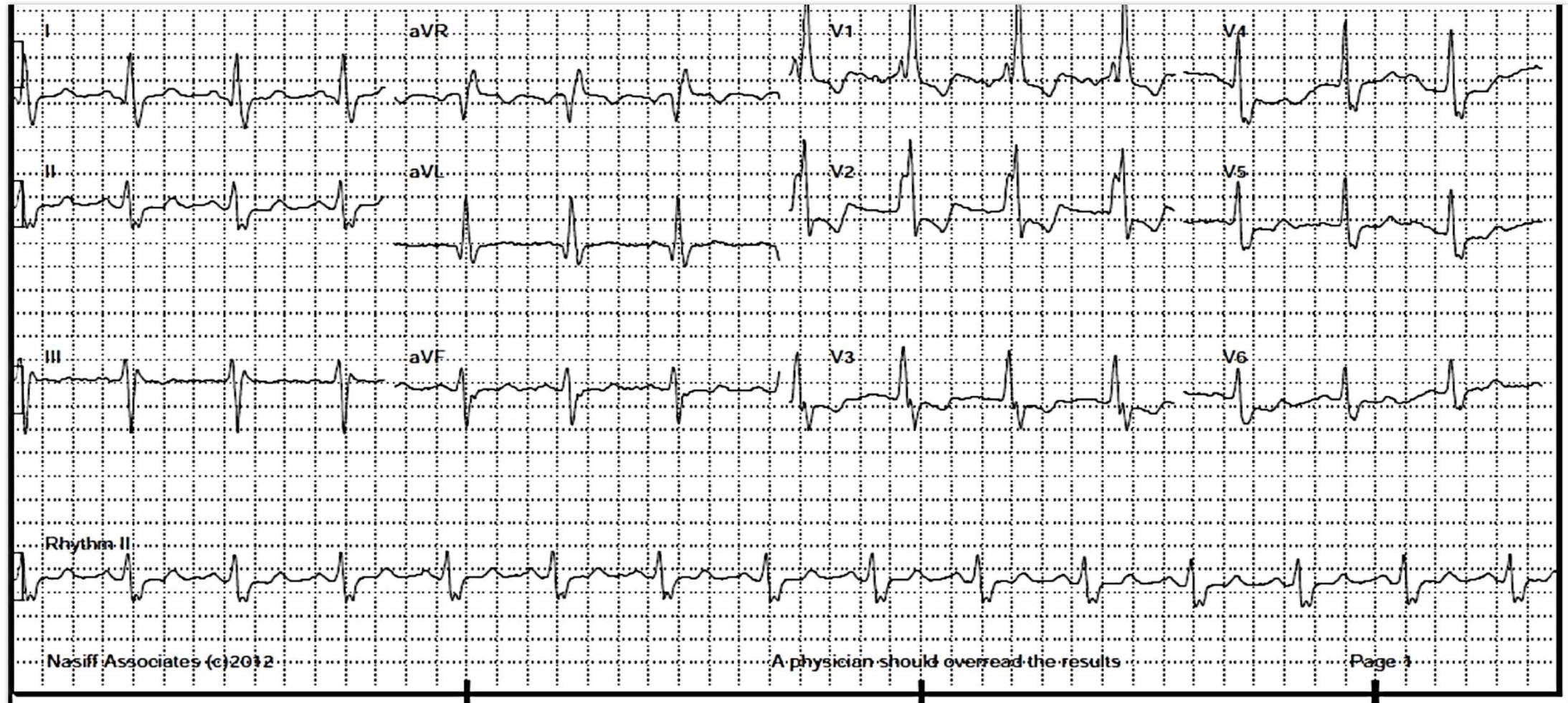
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# QRS MORPHOLOGY AND BUNDLE BRANCH BLOCKS



**WILLIAM**

**MARRROW**



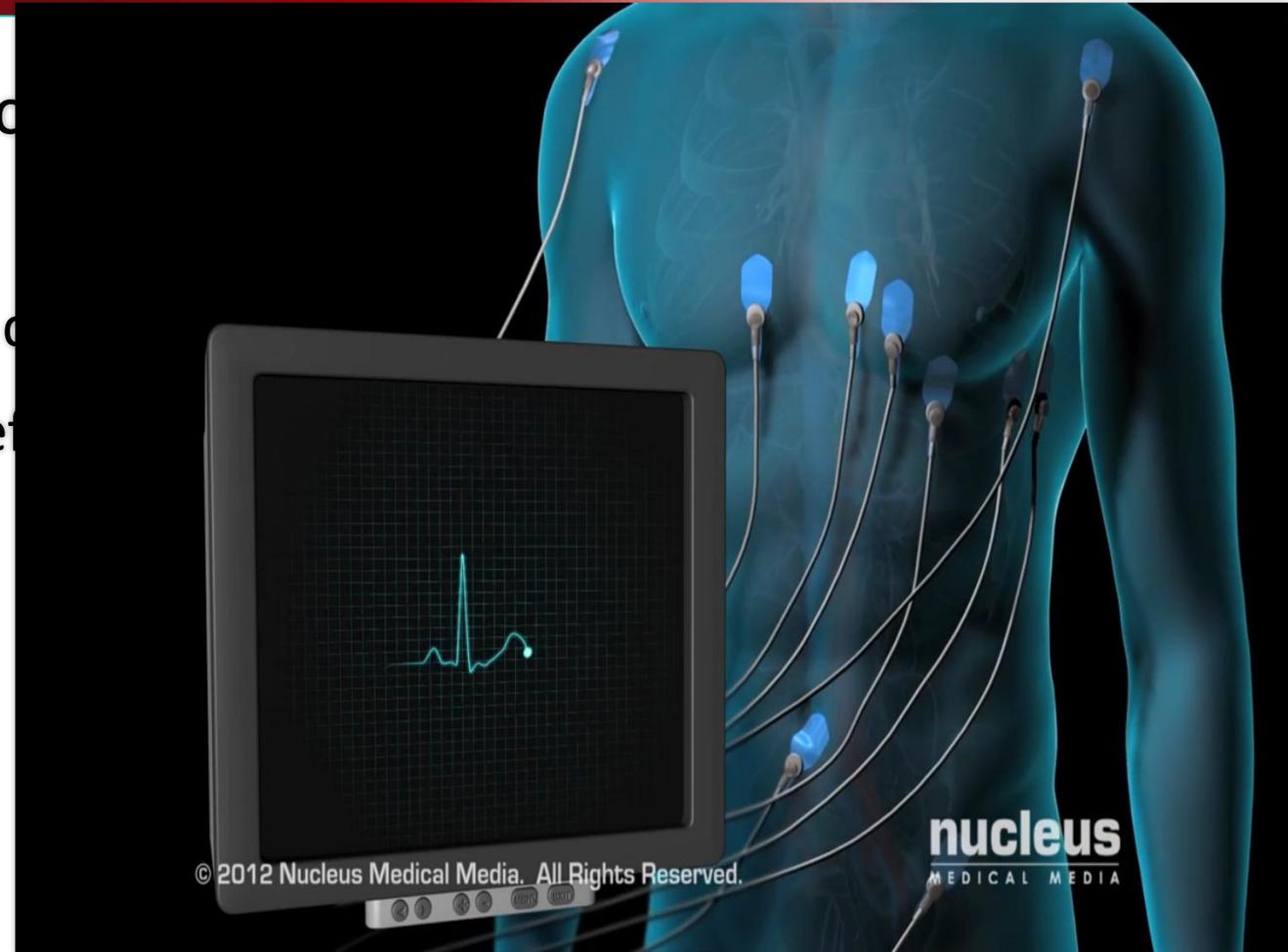
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A physician should overread the results

Page 3

# Our Experience- Cardiac Devices

- 43 (9.5%) permanent cardiac devices
  - 20 (4.4%) Pacemakers,
  - 14 (3.1%) Cardiac resynchronization devices
  - 9 (2.0%) implantable cardioverter defibrillators



# CHAMBERS

## HYPERTROPHY

- LVH
  - R wave in **V5** or **V6** >25mm
  - S wave in **V1** or **V2** >25mm
  - Sum of R wave in **V5** or **V6** + S wave in **V1** >35mm
- RVH
  - R wave > S wave in **V1**
- LEFT ATRIAL ENLARGEMENT (P mitrale)
  - P wave > 0.12s (3 small squares) and bifid in **lead II**
- RIGHT ATRIAL ENLARGEMENT (P pulmonale)
  - P wave > 0.25mV (2.5 small squares) in **lead II**



# STEP 5. ST SEGMENT



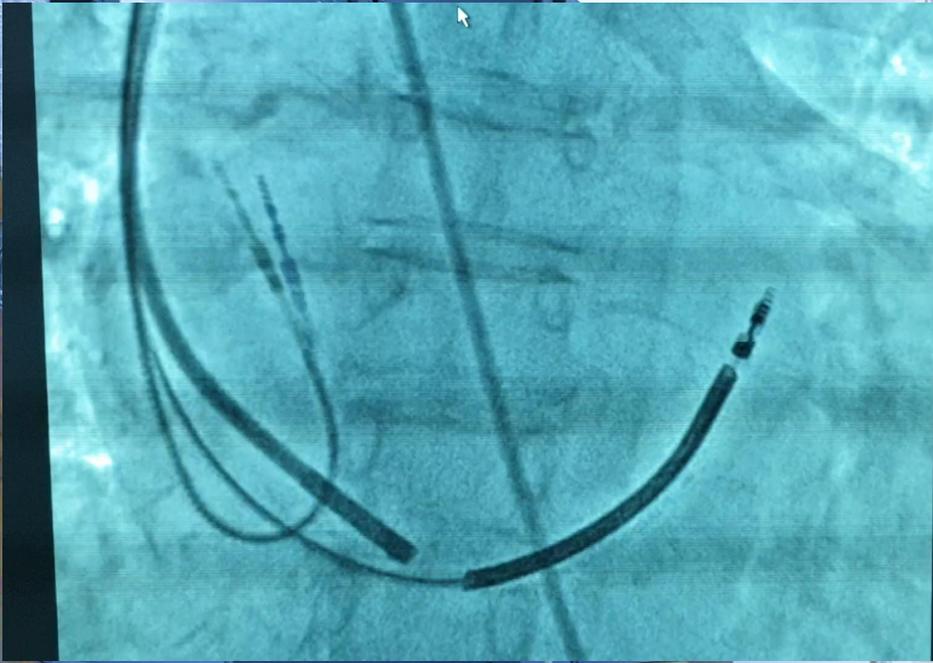
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# Programming &

Brillators, Cardiac Resynchronization

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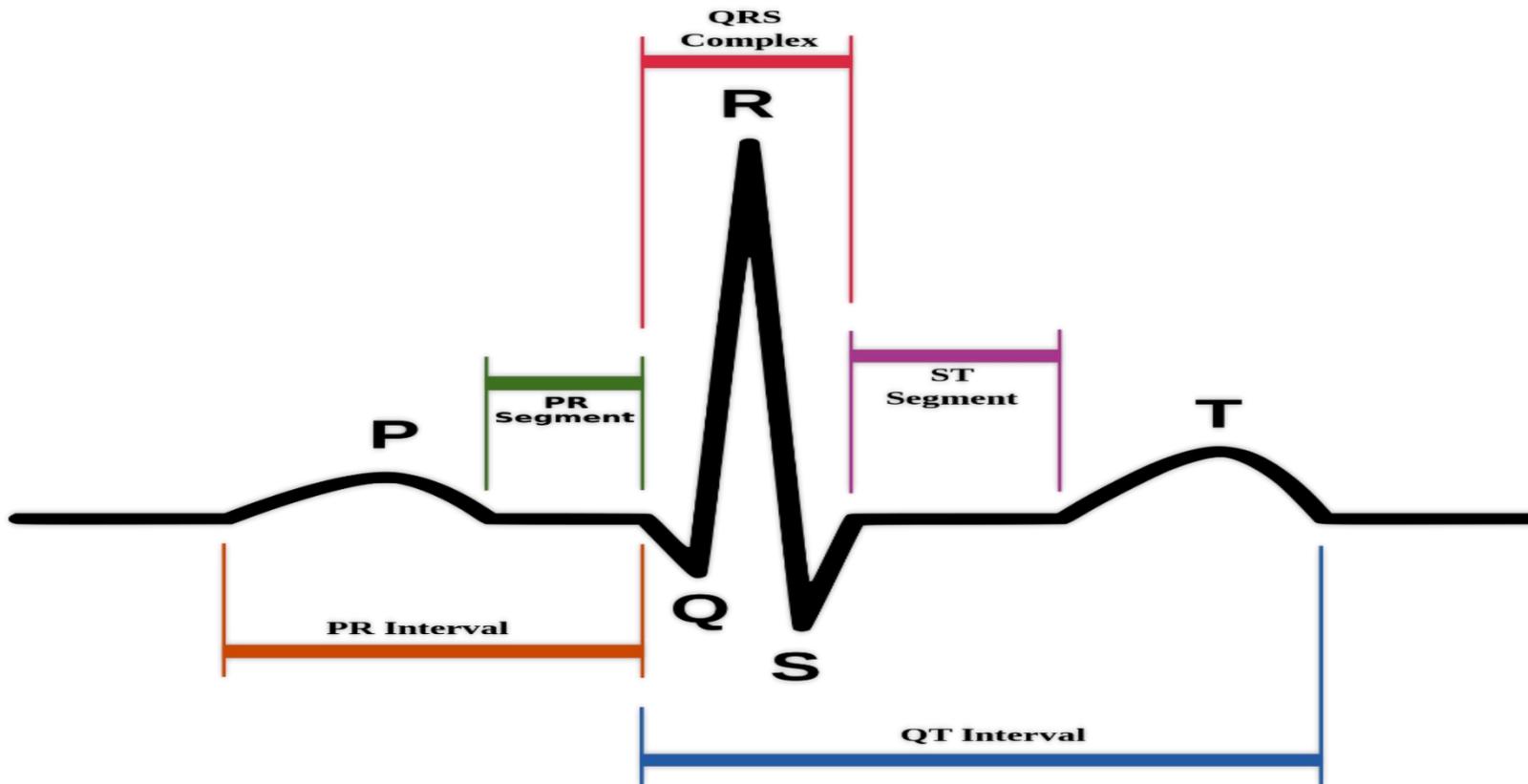


Co  
Im  
Rep

Pacema  
Devices



# ECG WAVE – ST?



Electrical Activity	Graphic Depiction	Associated Pattern
Atrial Depolarization		P Wave
Delay at AV Node		PR Segment
Ventricular Depolarization		QRS Complex
Ventricular Repolarization		T Wave
No electrical activity		Isoelectric Line

# Step 5 – ST segment

- The ST segment is the part of the ECG between the end of the S wave and the start of the T wave.
- ST-elevation is significant when it is:
  - Greater than 1 mm (1 small square) in 2 or more contiguous limb leads or
  - Greater than 2mm in 2 or more chest leads.



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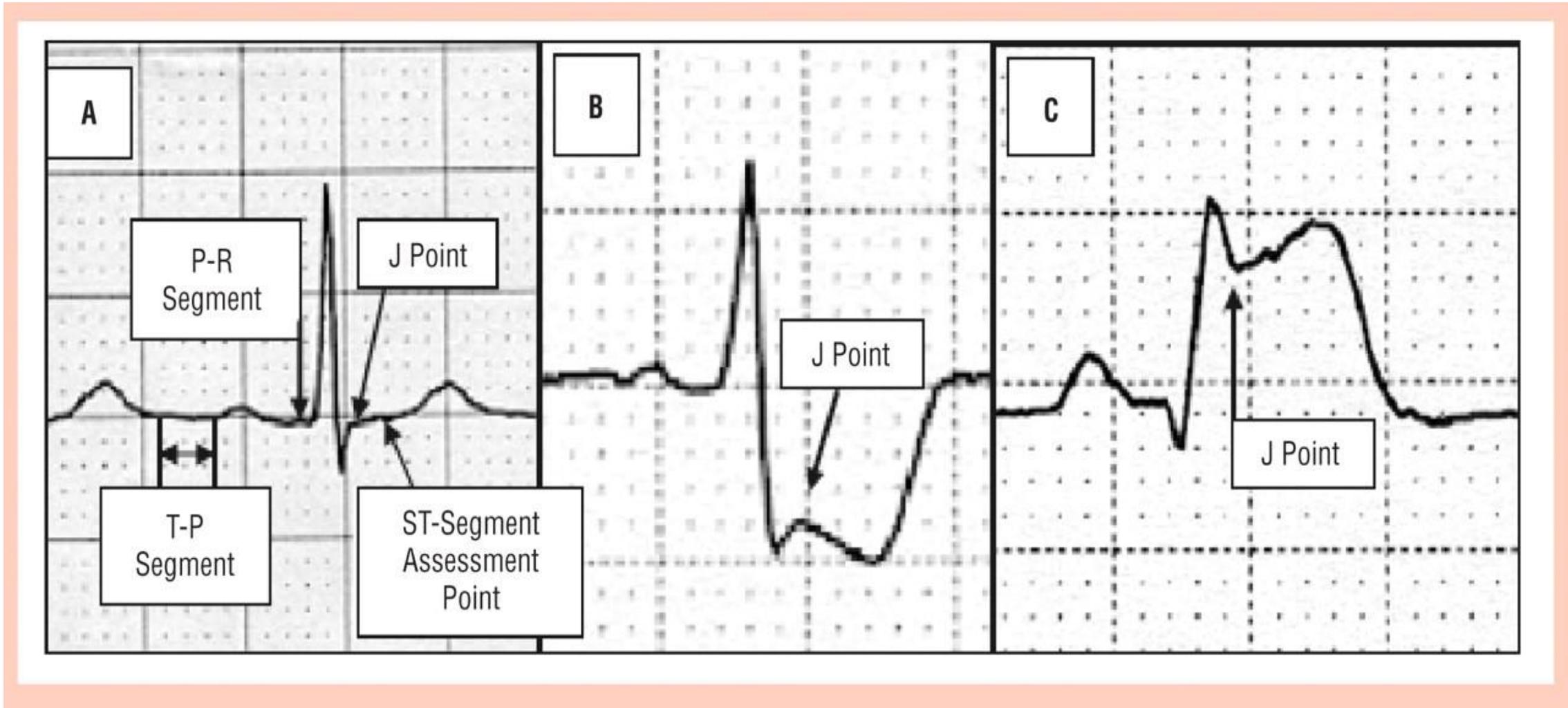
# Right Heart (Cardiac) Catheterization and IVC Filters

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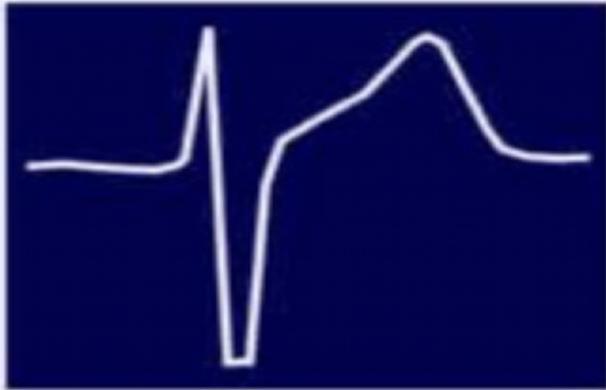


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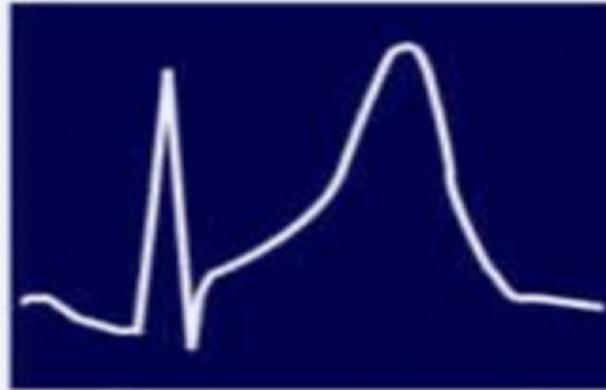
# ST SEGMENT



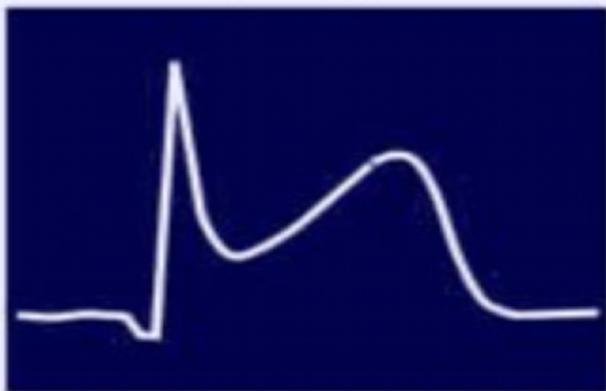
# ST SEGMENT



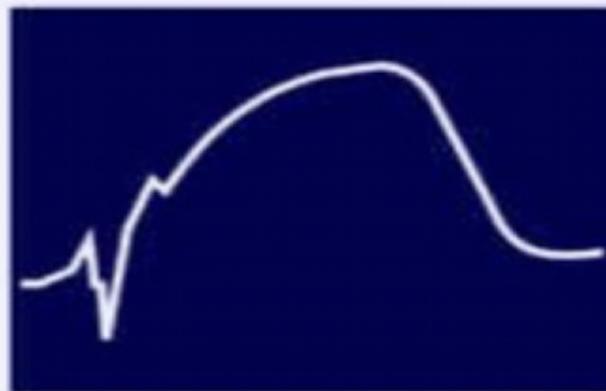
Concave upward  
(BER)



Concave upward  
(pericarditis)



Oblique straightening  
(AMI)



Convex upward  
(AMI)

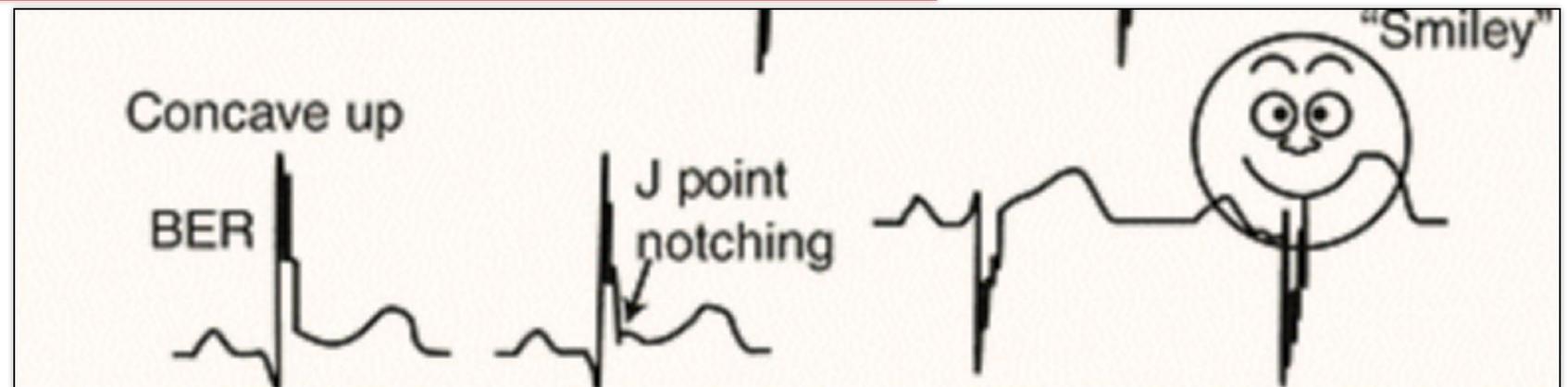
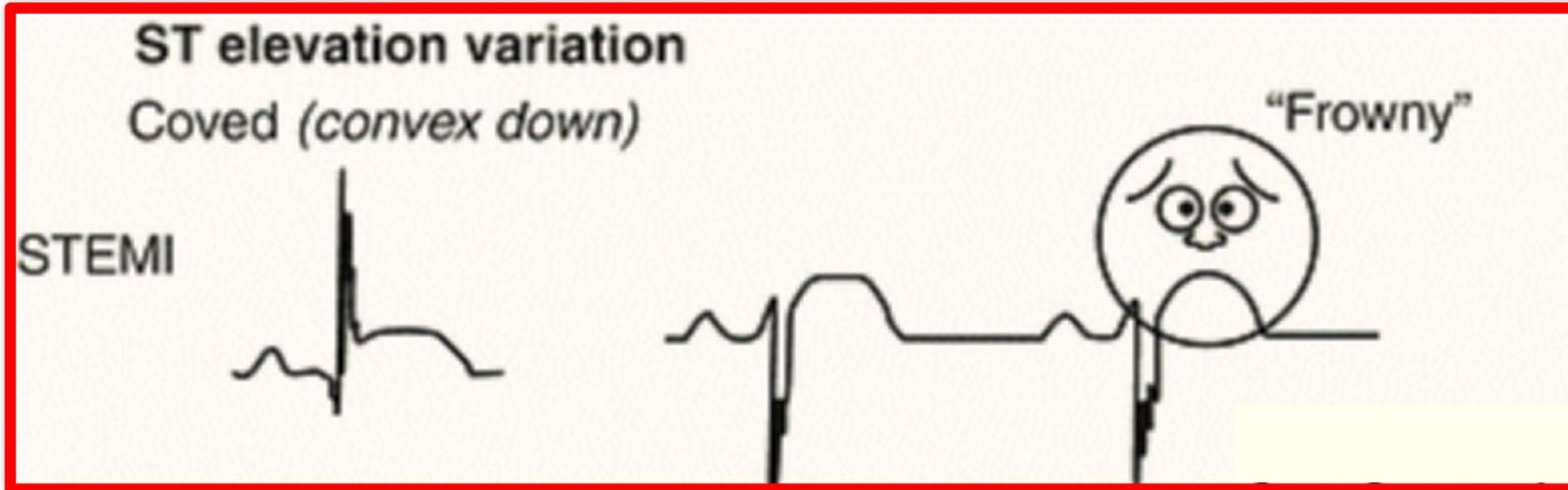
**ST SEGMENT ELEVATED?**  
Benign Early Repolarization -  
Concave upwards, usually with J  
point notching mostly in v2-v3  
only

Pericarditis - Concave "saddleback"  
ST elevation in I, II, III, aVF, V5-6  
with depressed PR segments

Acute MI - elevated typically in  
related leads mostly with ST  
depression in some other leads

**CAVEAT:** Must be interpreted in  
light of the patient's cardiovascular  
risk

# Never Miss a STEMI- even if it looks like PUD!!!



# Indications for permanent pacing

- In bradycardia caused by reversible etiologies, permanent pacing is not warranted.
- The **indication for pacing is based on the severity of bradycardia** rather than its etiology.
- Symptomatic sinus bradycardia as a result of medical therapy is an indication for permanent pacing if there are no alternative treatment options.
- Typically from:
  1. Sinus Node Dysfunction
  2. AV Block



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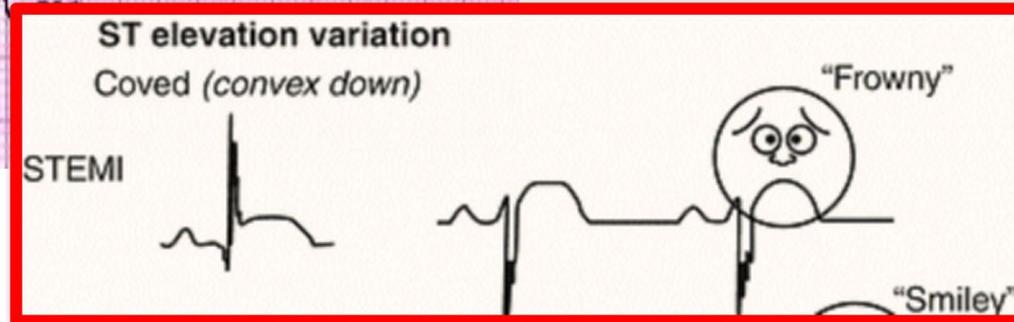
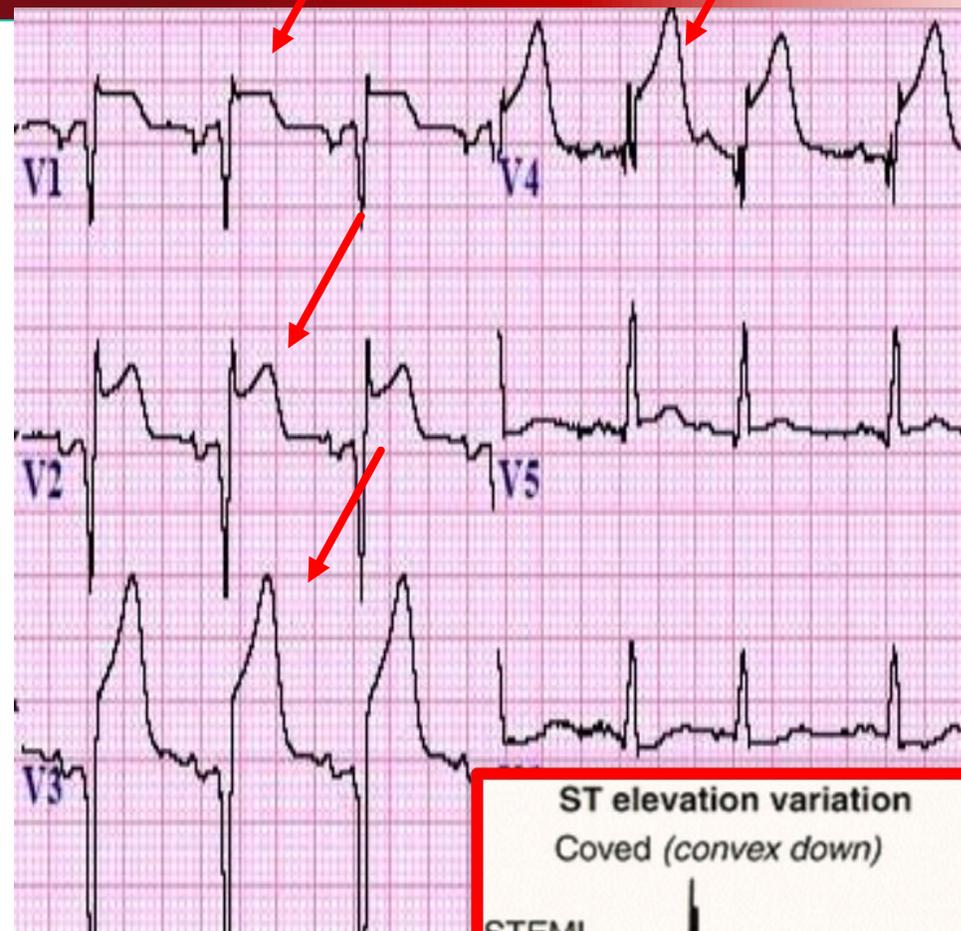
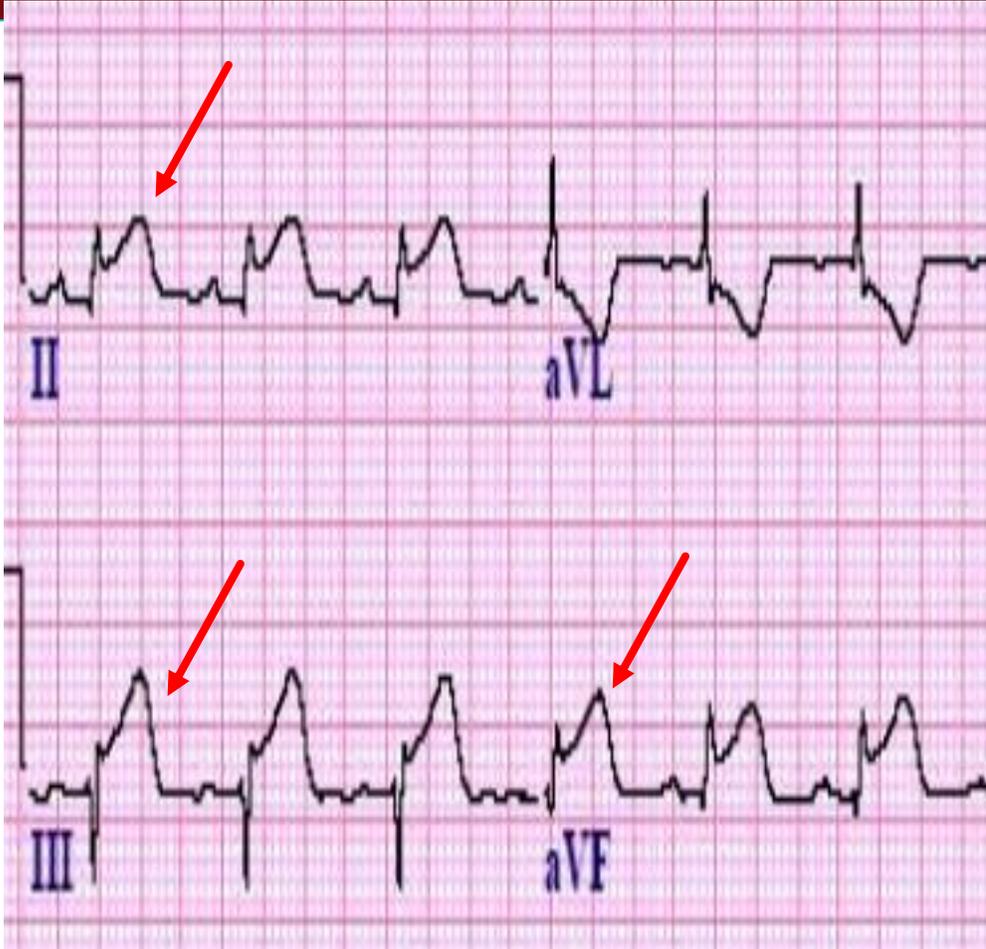
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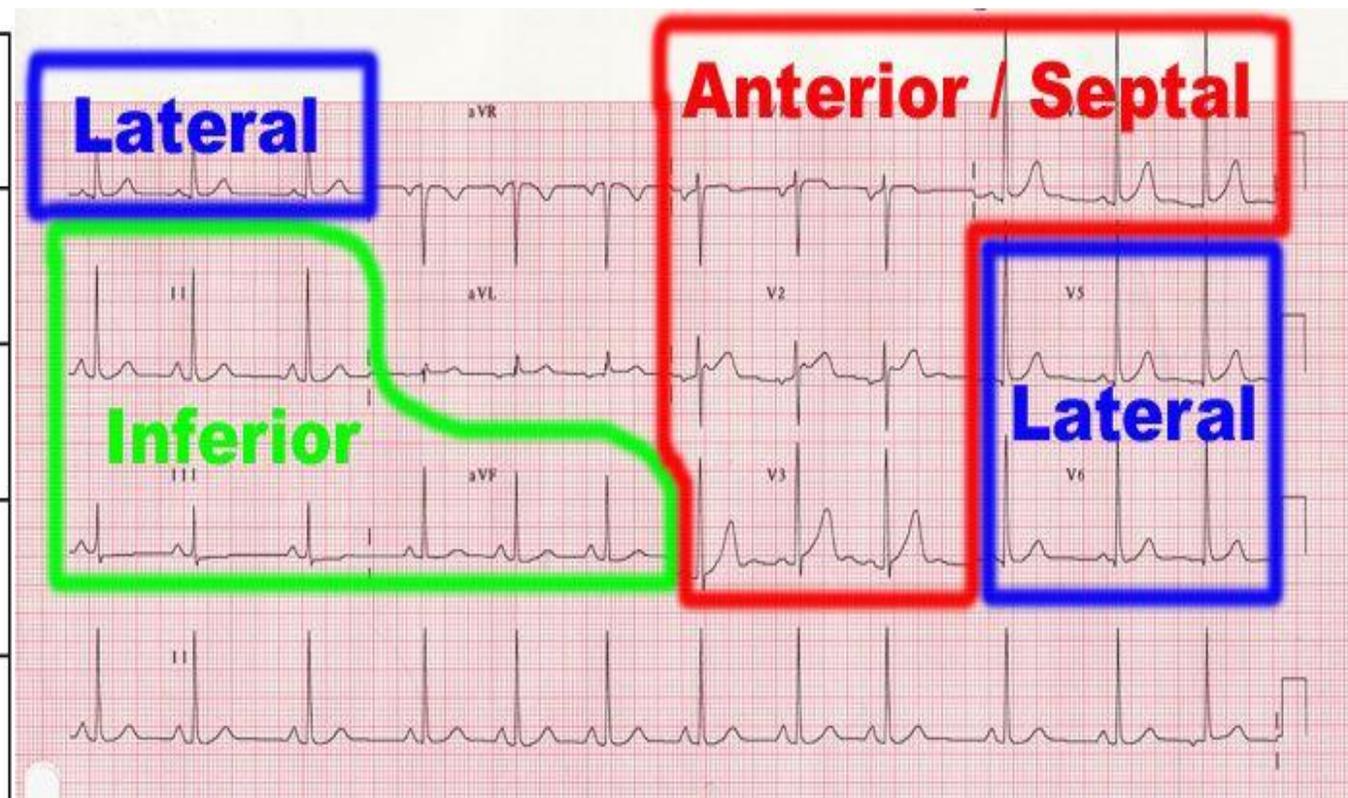
# Never Miss a STEMI- even if it looks like PUD!!!



# Contiguous Leads

- II, III, and aVF- Inferior
- V1, V2 – Septal
- V3, V4- Anterior
- I, aVL, V5, V6- Lateral

View of heart	Leads
Inferior	II, III, aVF
Lateral	I, aVL, V5, V6
Anterior	V3, V4
Septal	V1, V2

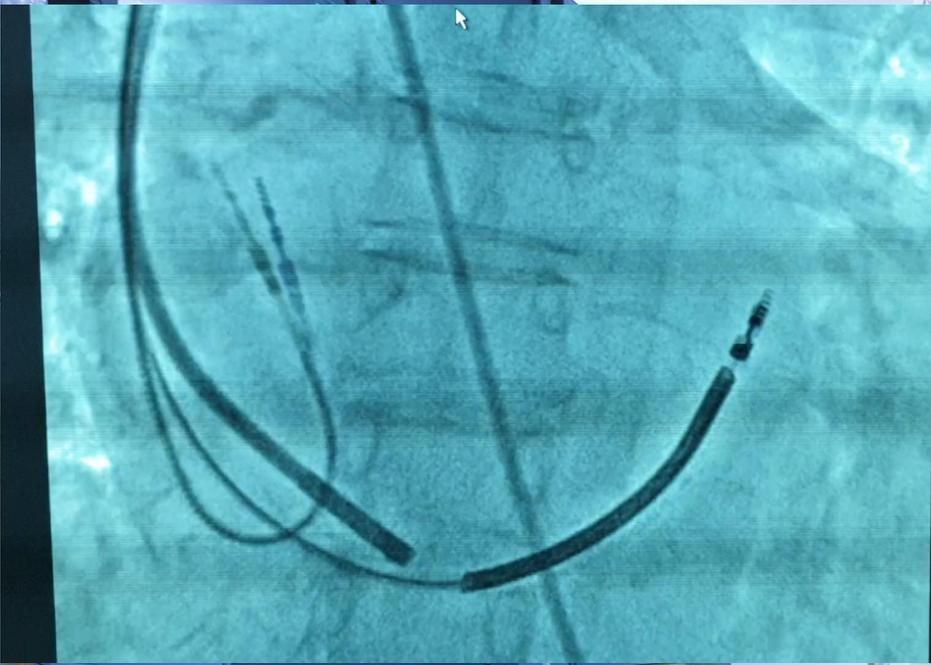




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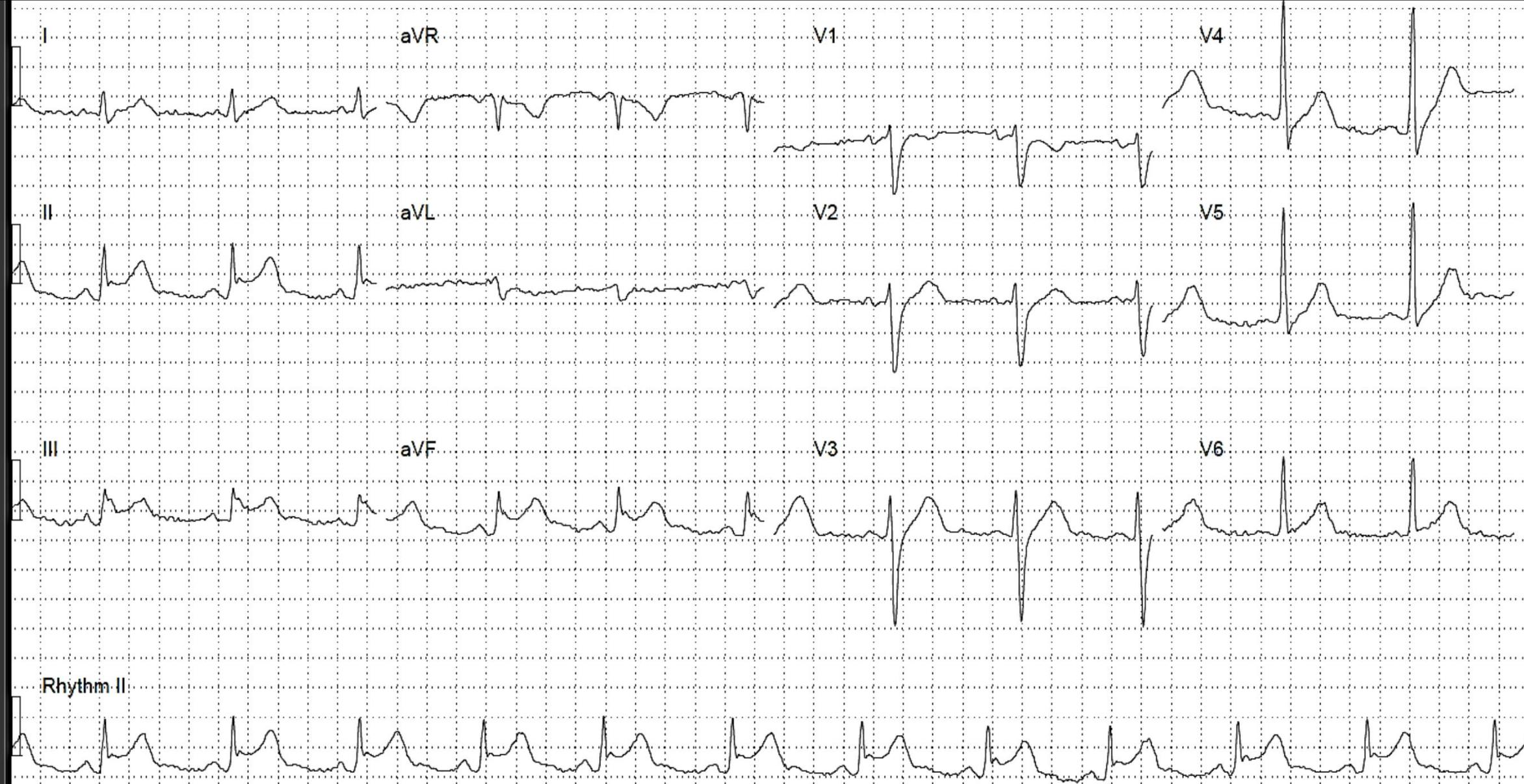
# Programming &



Defibrillators, Cardiac Resynchronization

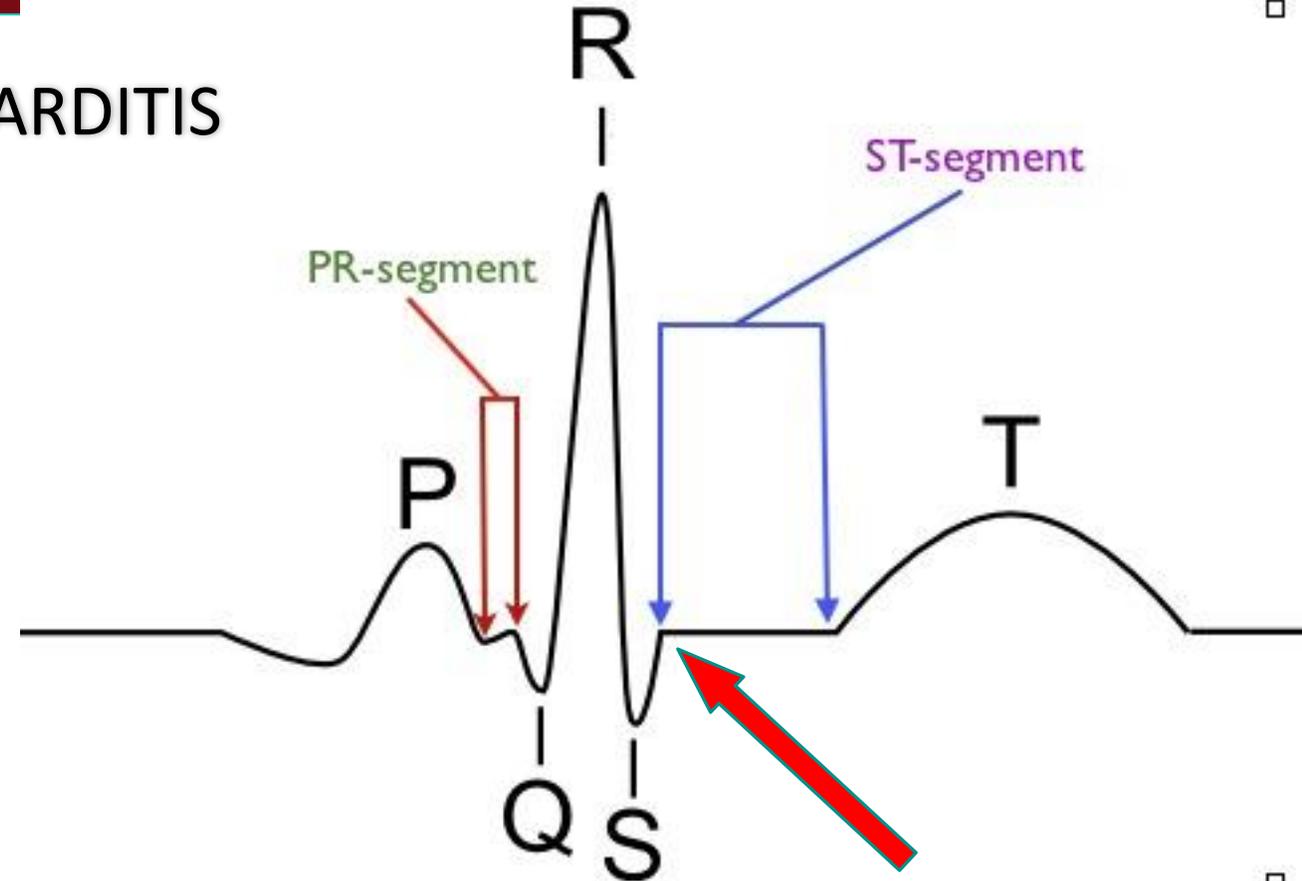
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# OTHER SEGMENTS

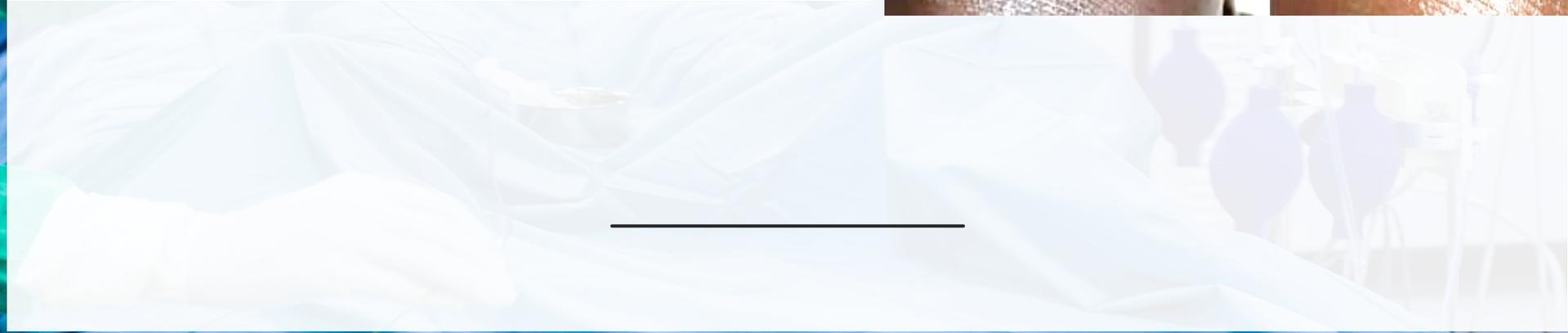
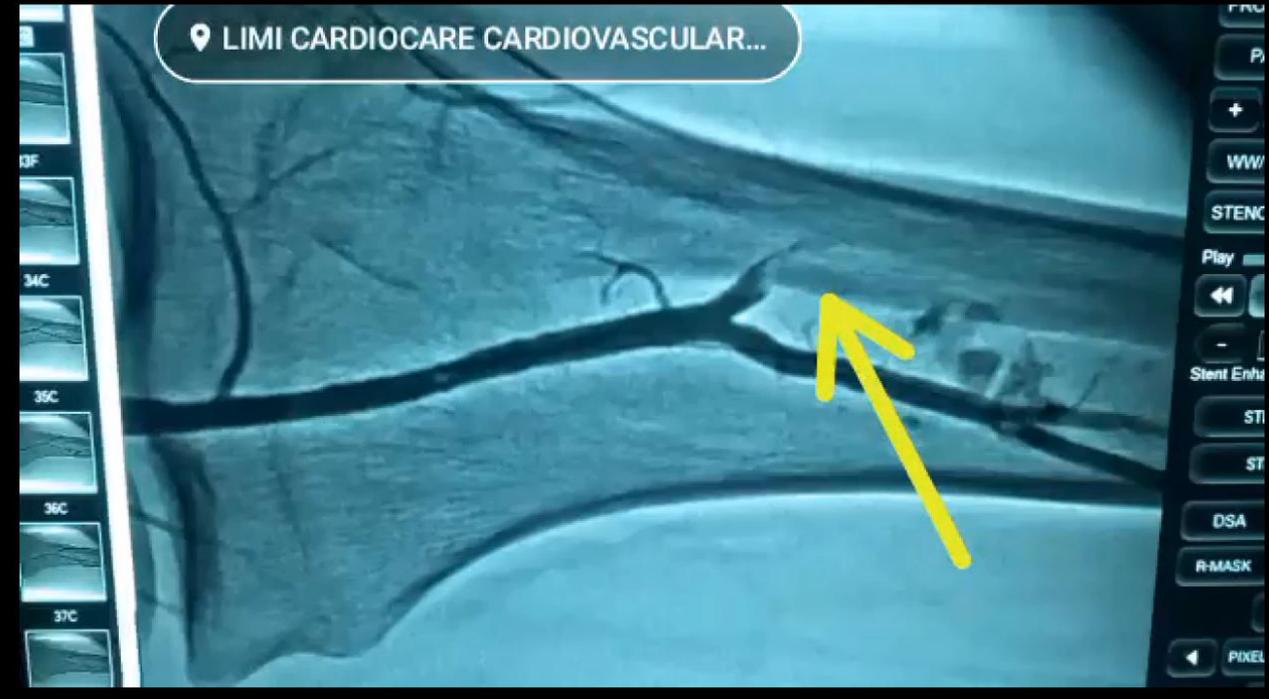
- PR SEGMENT- DEPRESSED IN PERICARDITIS
- TP SEGMENT- ISOELECTRIC LINE



- *EXCEPTION IN BBB FOR ST SEGMENTS*

# 5. Q-WAVE

ABSENT OR PRESENT



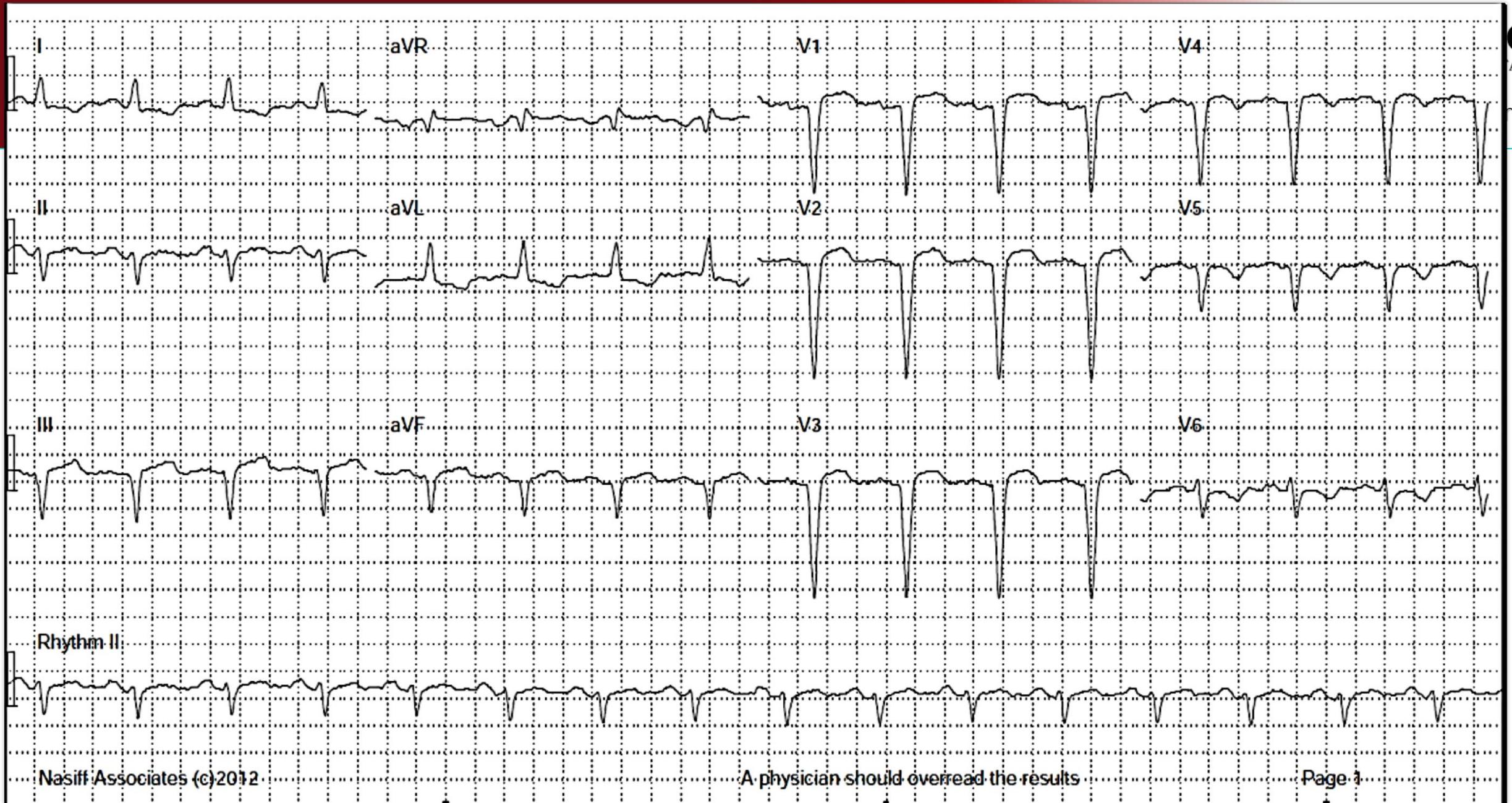
# Q WAVE

- A Q wave is any negative deflection that precedes an R wave or first negative deflection after P wave
- Represents the normal left-to-right depolarization of the interventricular septum
- Small 'septal' Q waves are typically seen in the left-sided leads (I, aVL, V5 and V6)

# Q WAVE

## ■ Pathologic Q waves

1. The depth of the Q wave is at least 25% of the depth of the associated R wave
2. > 40 ms (1 mm) wide
3. They should appear in *at least 2* contiguous leads (An isolated Q wave to lead III/aVR is a very common normal variant)
4. Any Q wave in leads V1- V3 with a duration of >0.04seconds is likely to be pathological.





# Peripheral Artery **cardiocare** End Intervention

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# 6. T-WAVE

UP OR DOWN

# T WAVE

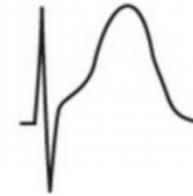
- Positive in all leads except aVR and V1/V2
- Not more than 5mm in limb leads and 10mm in precordial leads
- Highest between V2/V3
- Should be concordant with the QRS complex

# T WAVE ABNORMALITY

## Large T-waves

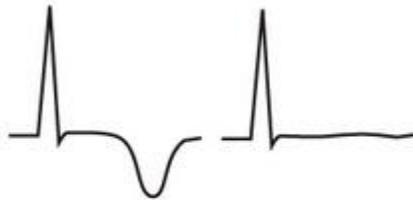


**Hyperkalemia**  
Large, symmetric, pointed with short base.

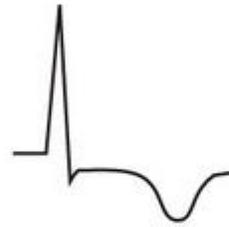


**Hyperacute T wave**  
can be seen in transmural ischemia. High, broad based, symmetric, not pointed. Almost always seen in conjunction with ST-segment elevation.

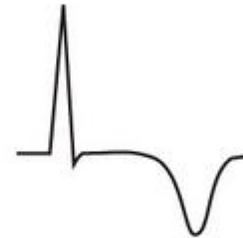
## Negative (inverted) T-waves



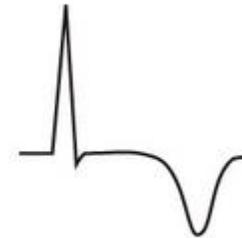
**Post-ischemic**  
Symmetric T wave, with varying depth. Ranges from flat T wave to very deep T wave inversion. Inverted T waves do not equate acute (ongoing) ischemia, but rather appear after an episode of ischemia!



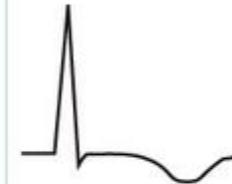
**Acute (ongoing) ischemia**  
T wave inversion with simultaneous ST-segment deviation (most commonly ST-depression). Note that it is the ST-segment deviation that represents the acute ischemia!



**Cerebrovascular insult pattern**  
Very deep (gigantic) T wave inversions in the chest leads. Some studies report this finding in up to 30% of patients with intracerebral hemorrhage.



**Hypertrophic cardiomyopathy**  
Symmetric T wave inversions, most commonly in V1-V3. Often very deep and accompanied by large R waves. Occasionally accompanied by ST-segment depression.

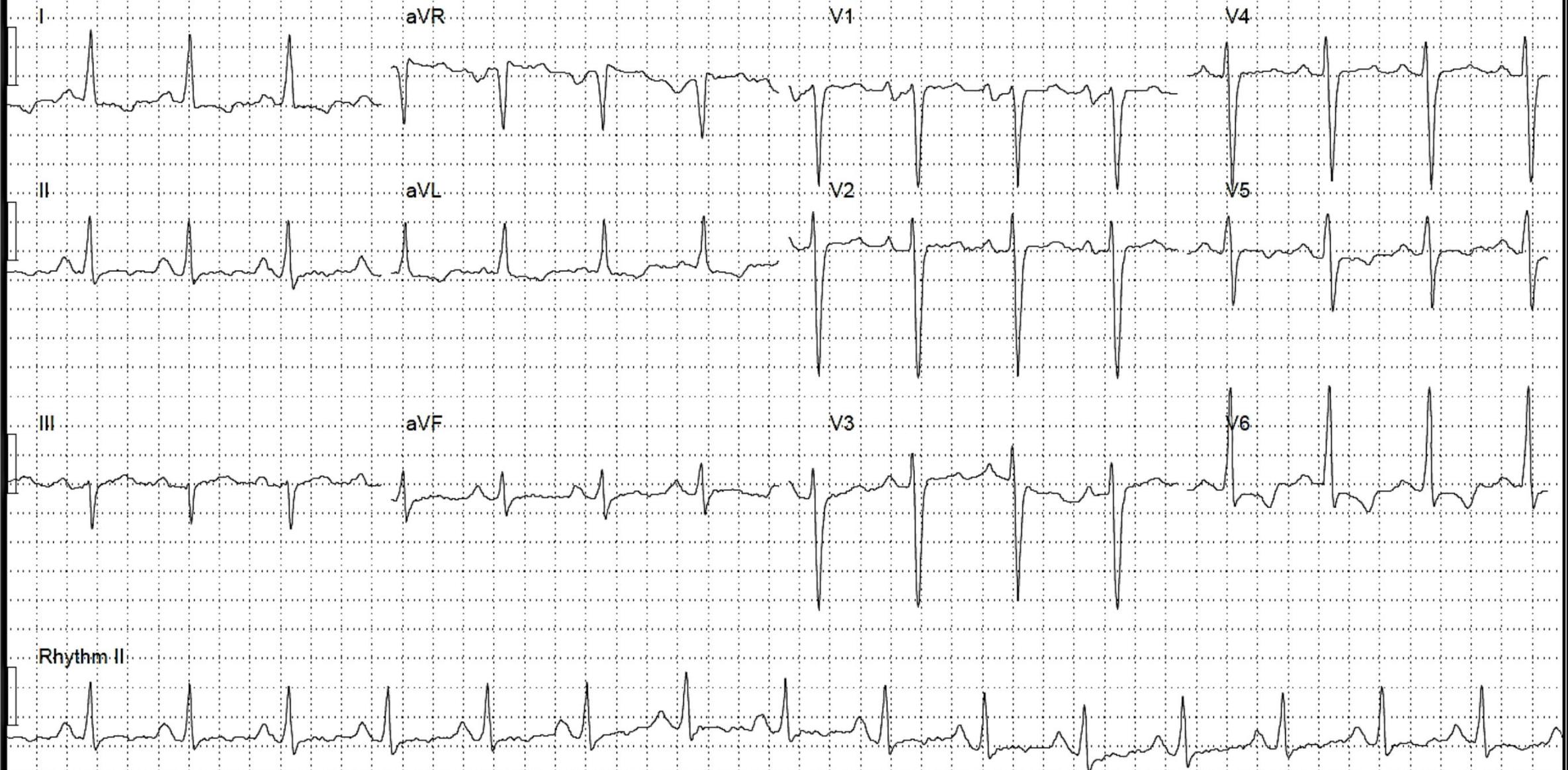


**PERIMYOKARDITIS**  
T wave inversions occur after normalization of ST-segment elevations in perimyocarditis. T wave inversions often seen in most leads.

# Our Experience- Coronary

- The predominant procedures were
  - 233 (51.3%) diagnostic coronary angiography
  - 90 (19.8%) percutaneous interventions

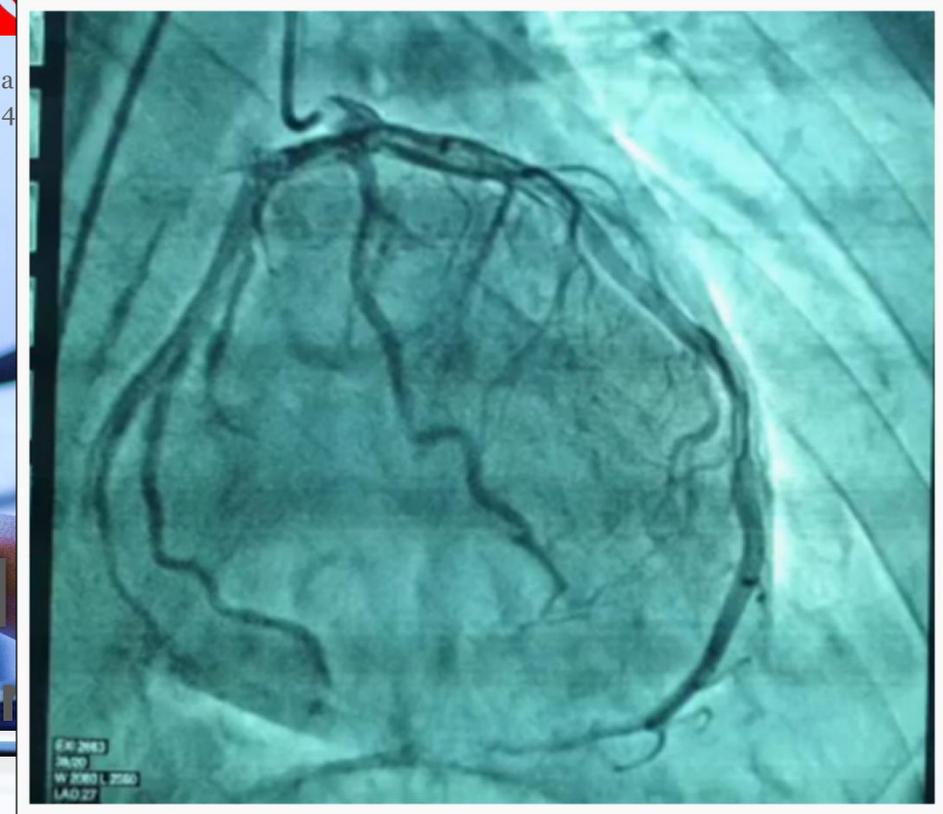
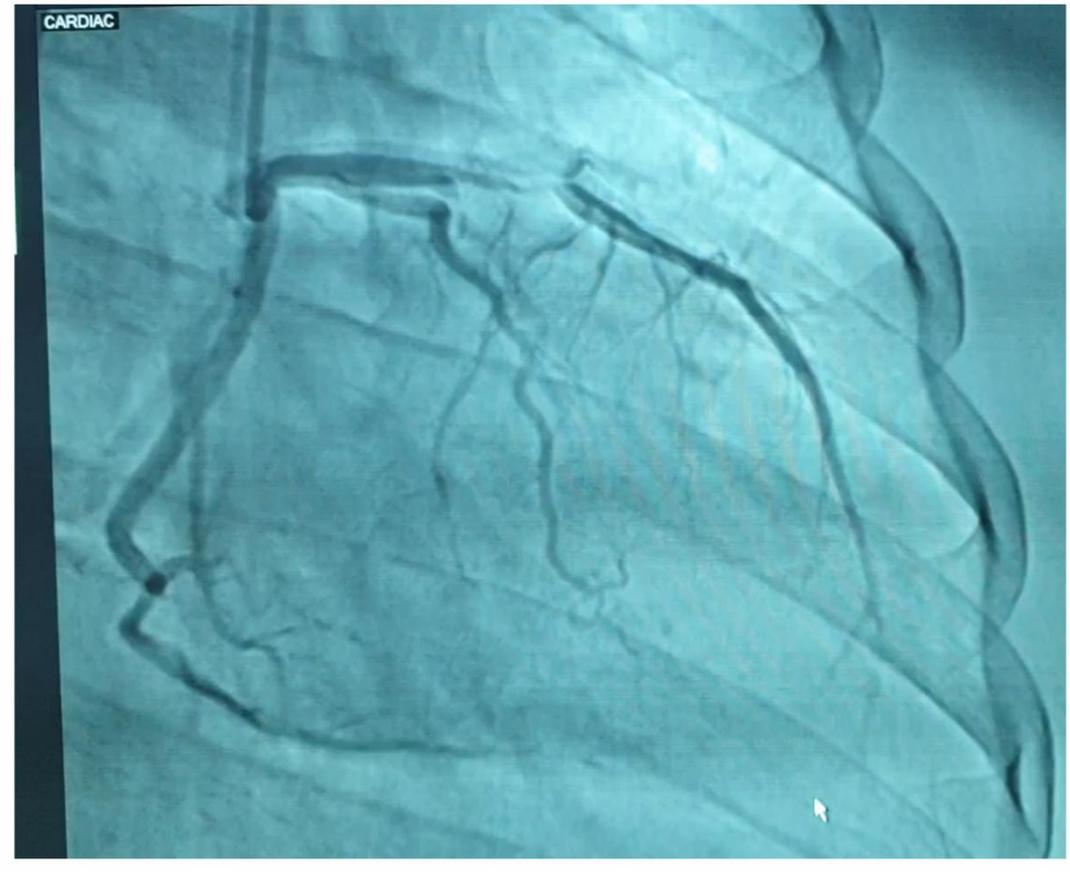




# BASIC ECG TEMPLATE

1. IDENTIFY NAME AND CALIBRATION
2. RHYTHM AND P WAVES
3. QRS- WAVES
4. ST SEGMENT (& OTHER SEGMENTS)
5. Q WAVES
6. T WAVES

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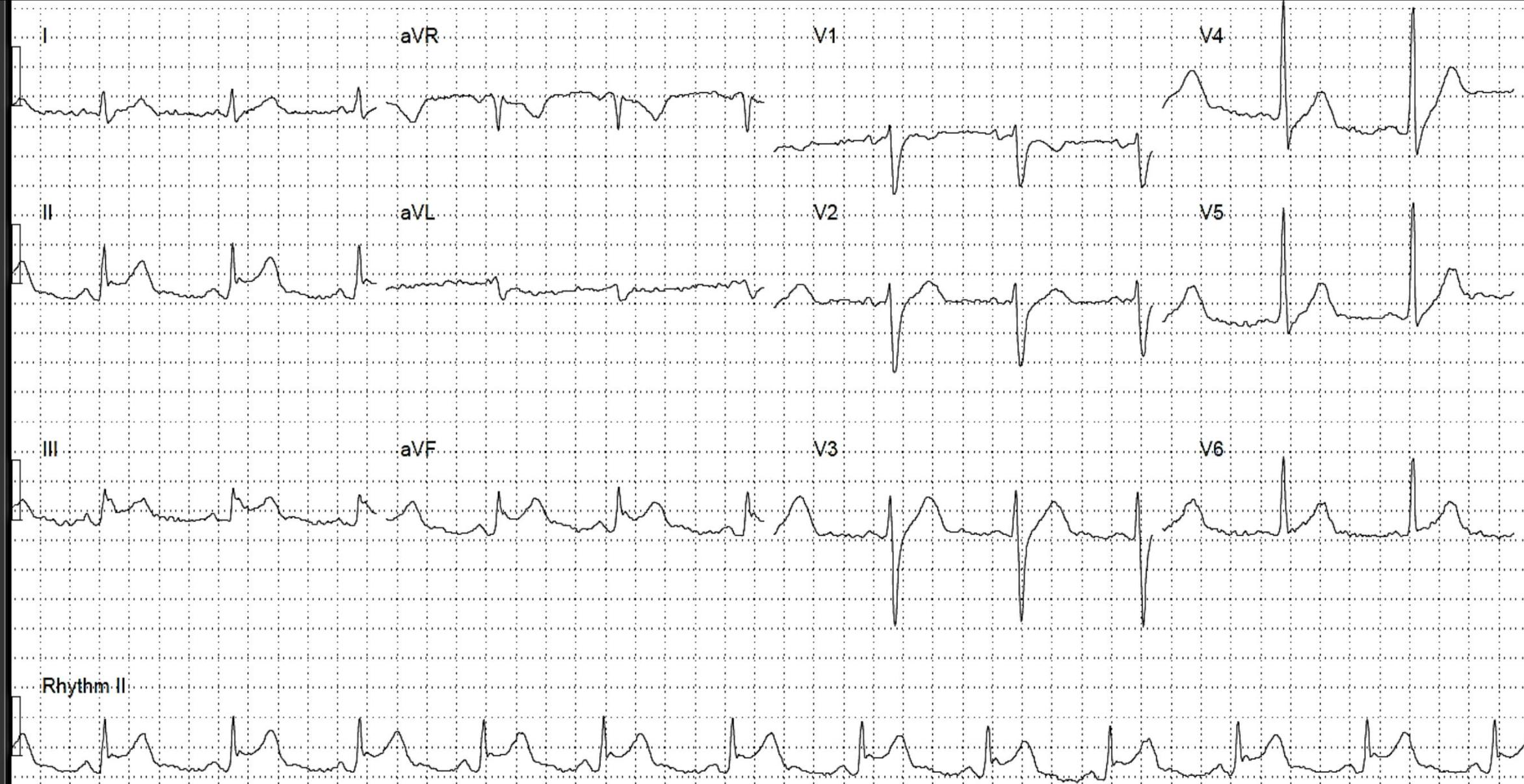
For Heart Attacks/Myocardial Infarction, Angina, Ischemic Heart Disease/Failure-  
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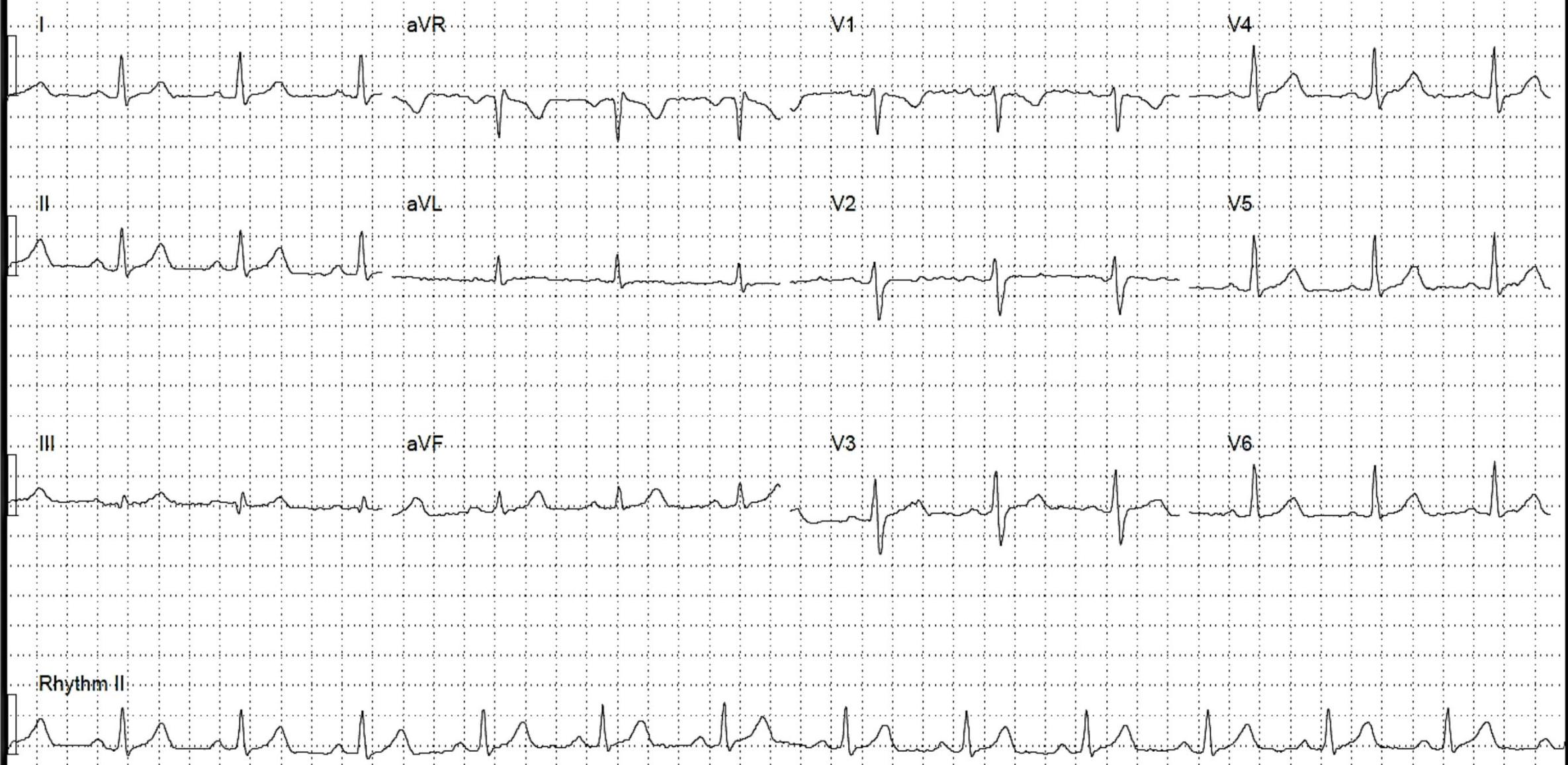


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# OTHER ECGs





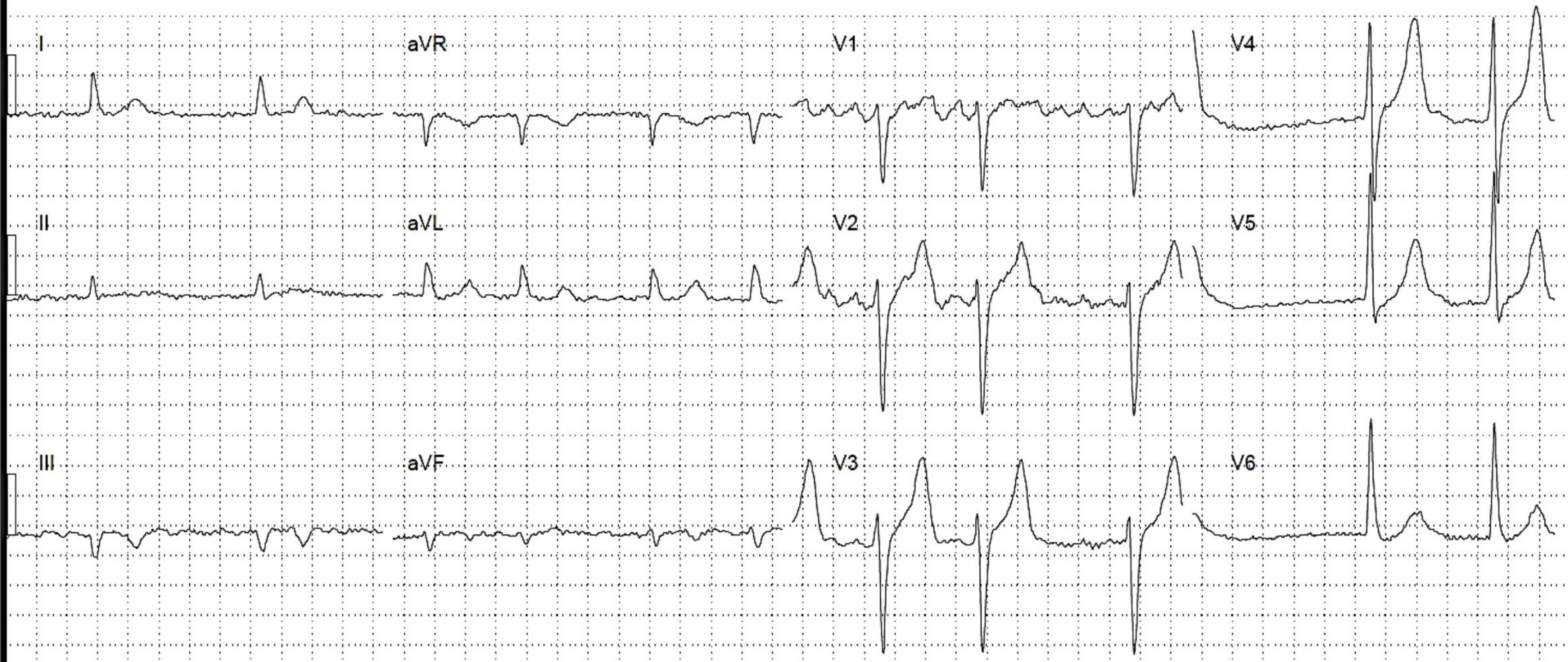


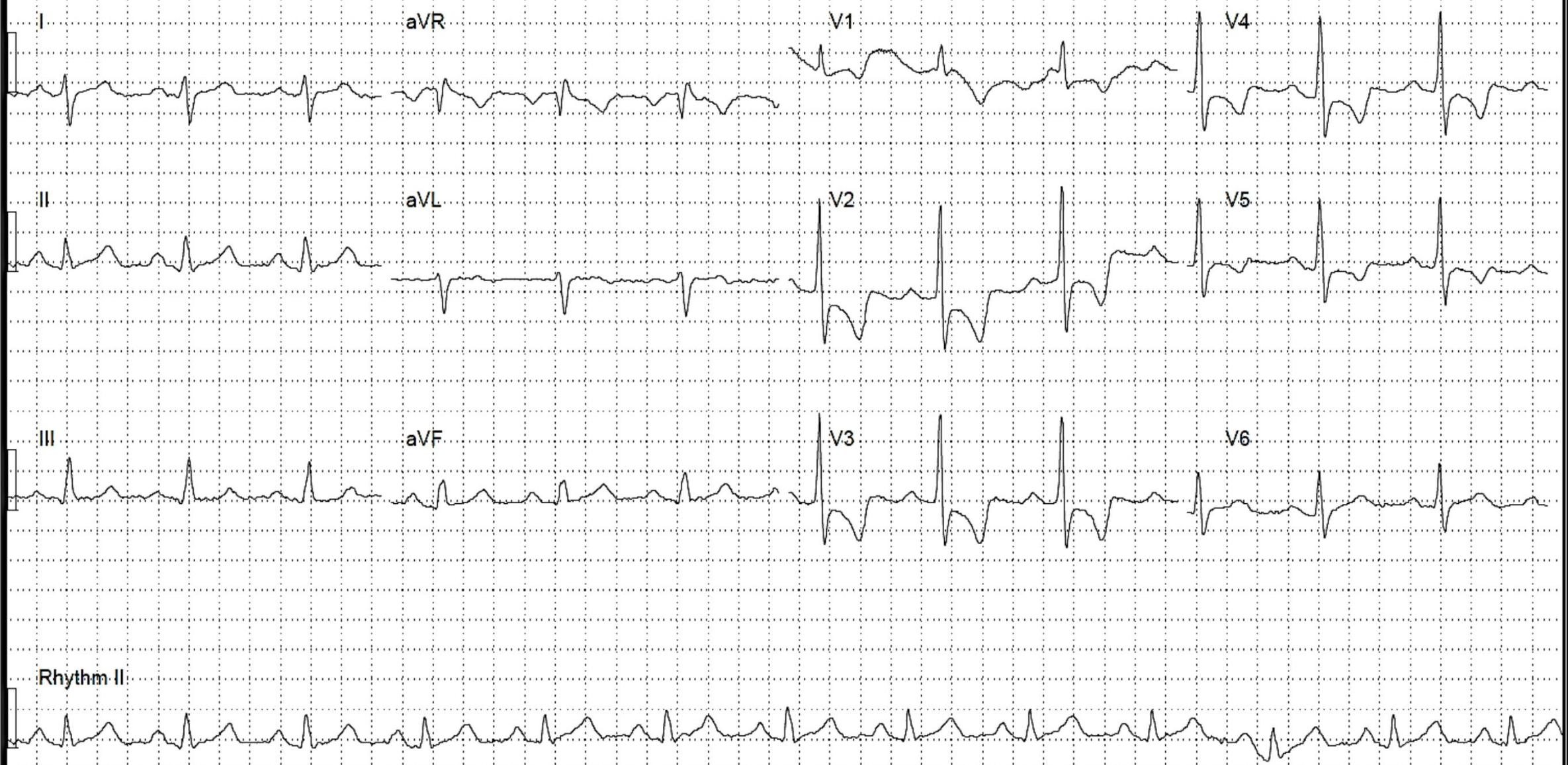
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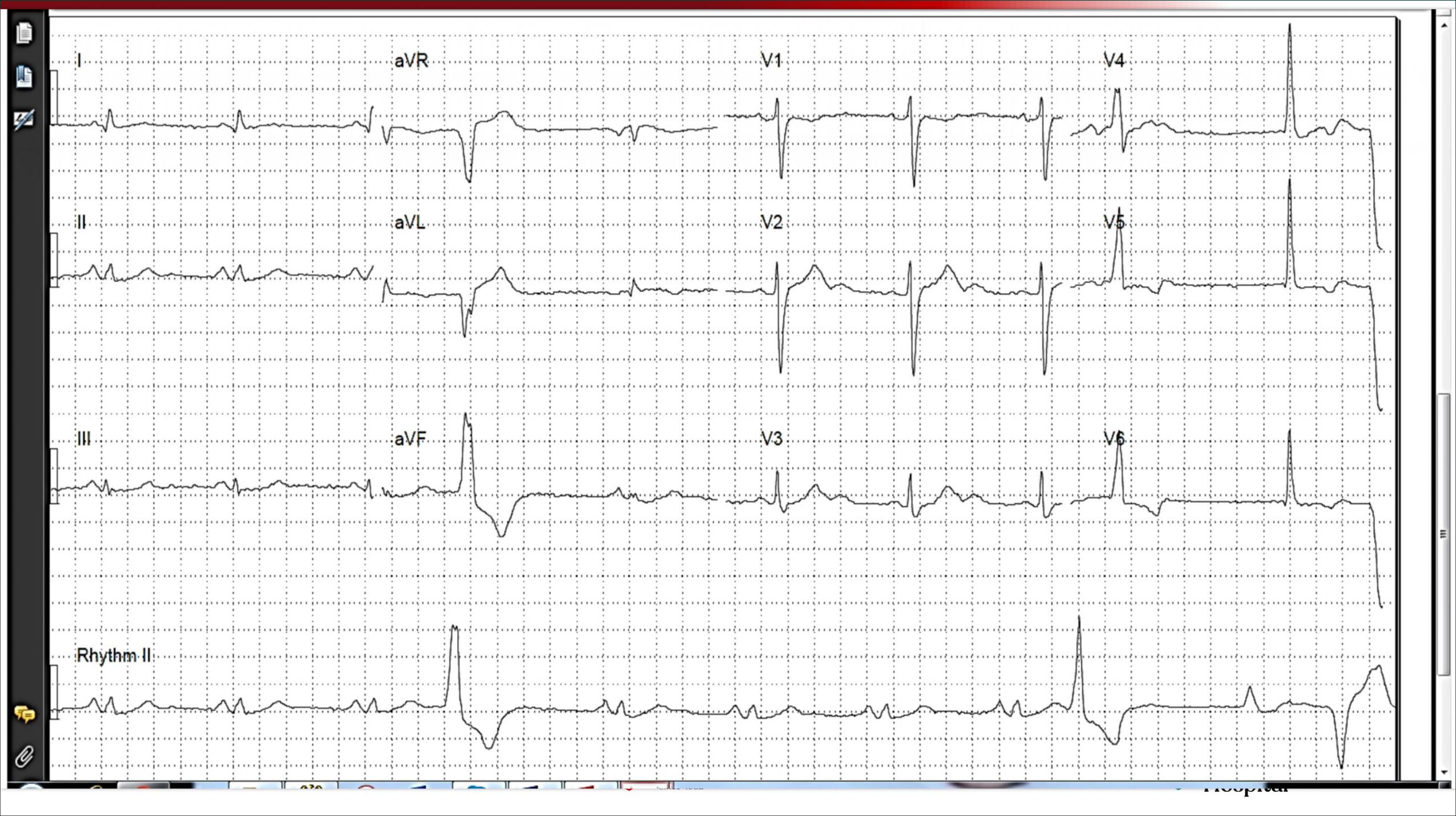
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# Coronary Angiography & Percutaneous Coronary Intervention

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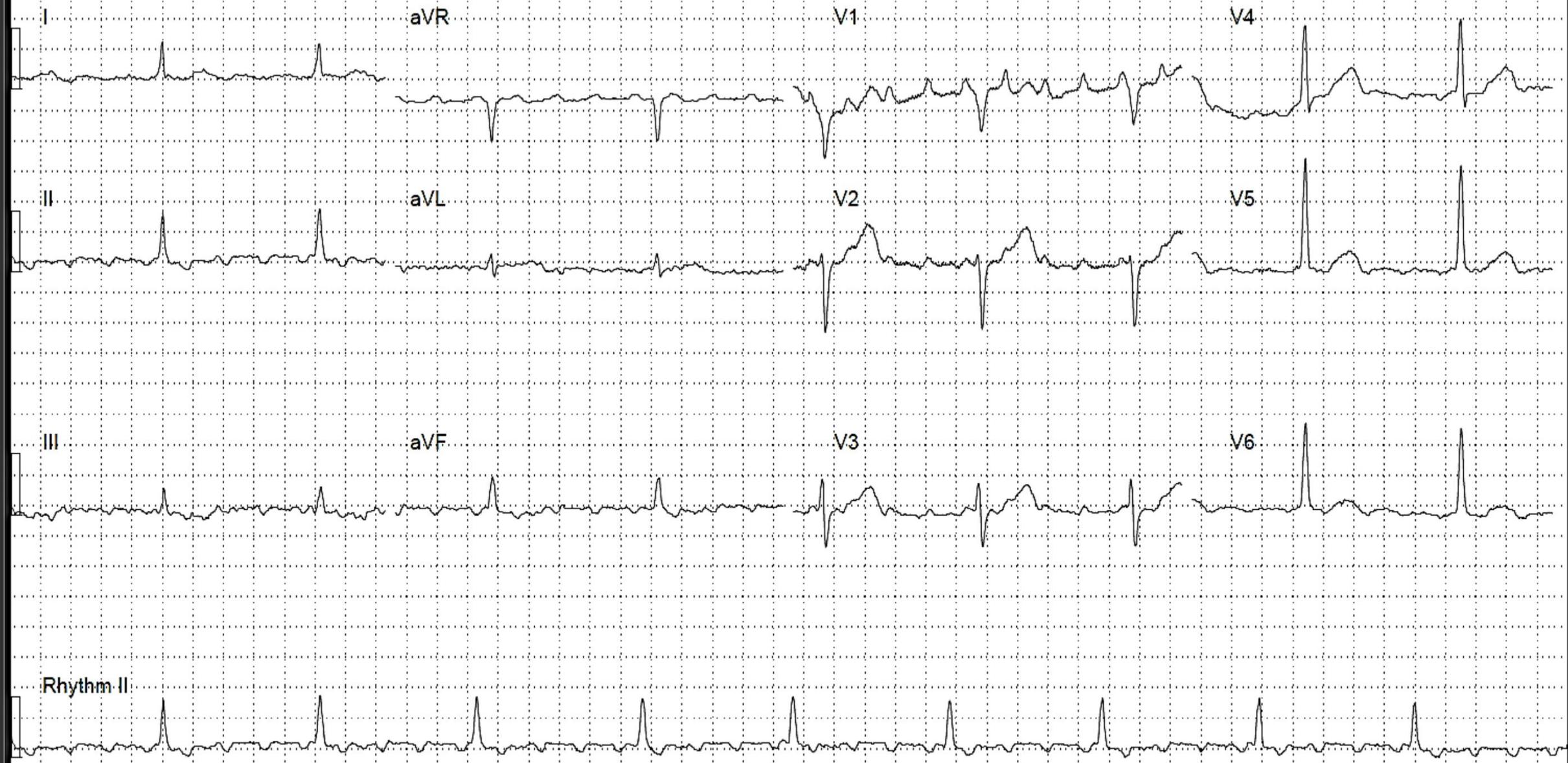


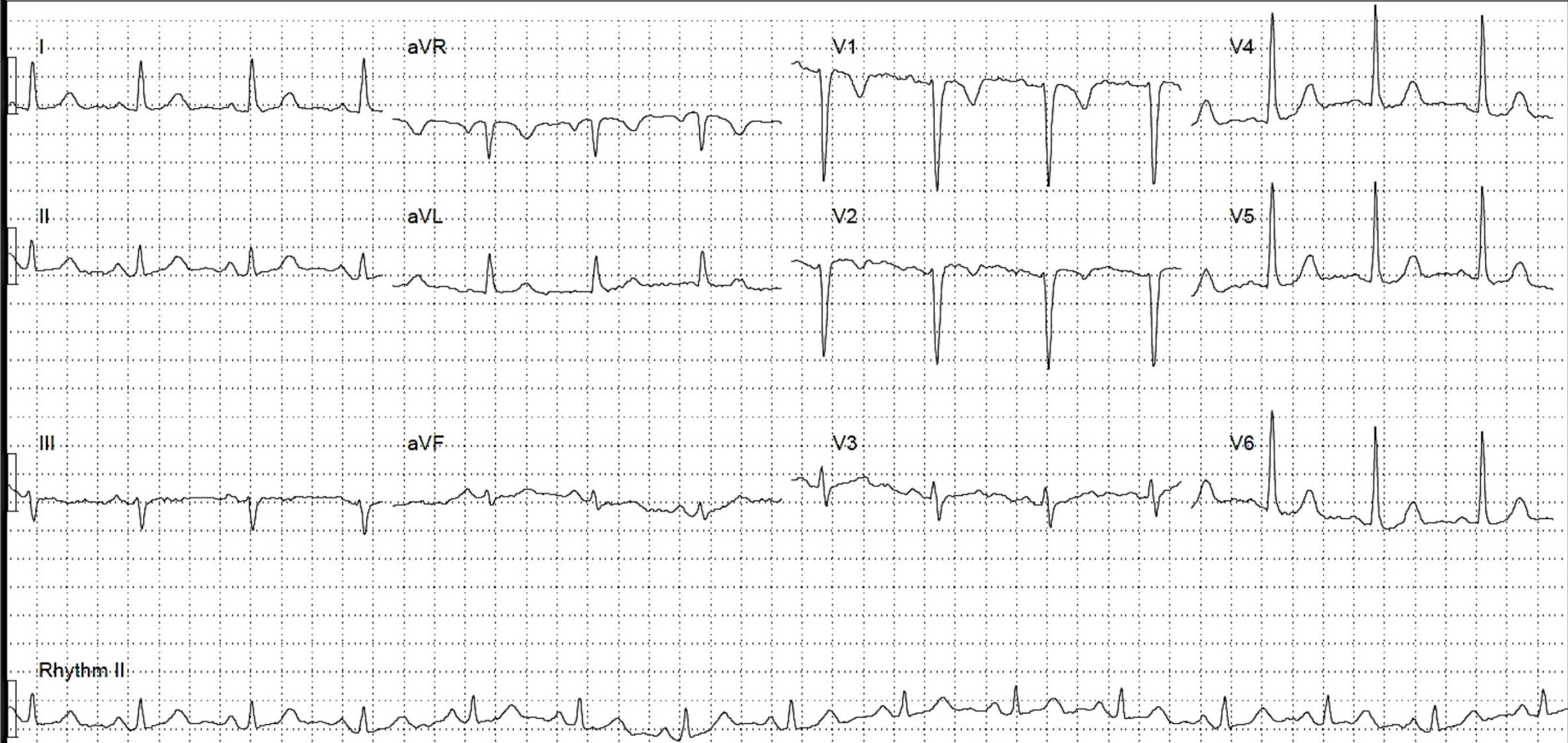
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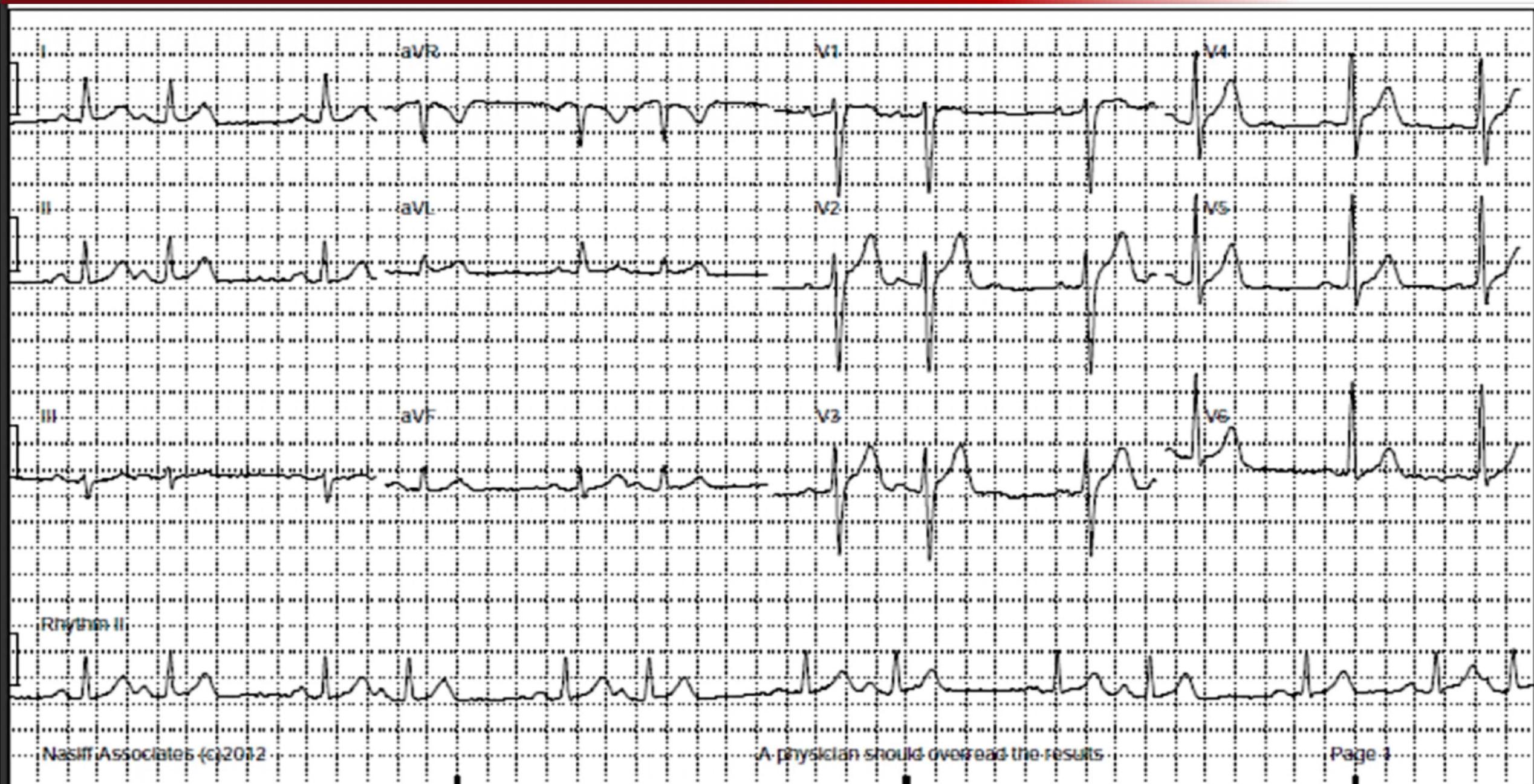
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# Peripheral Artery **cardiocare** End Intervention

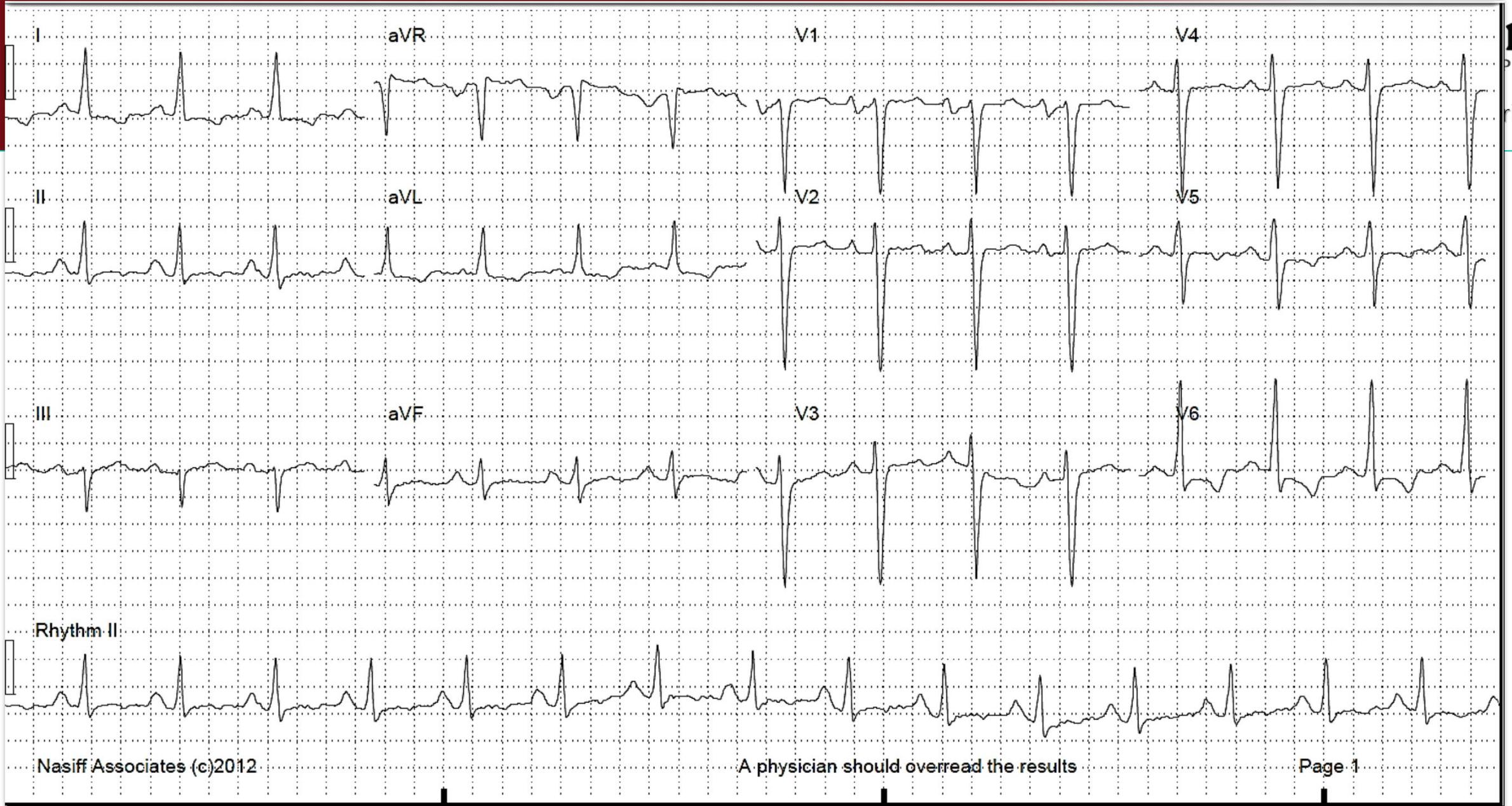
MULTISPECIALTY HOSPITAL

For Peripheral Arterial Disease- **To reduce tissue loss and gangrene especially lower limb**

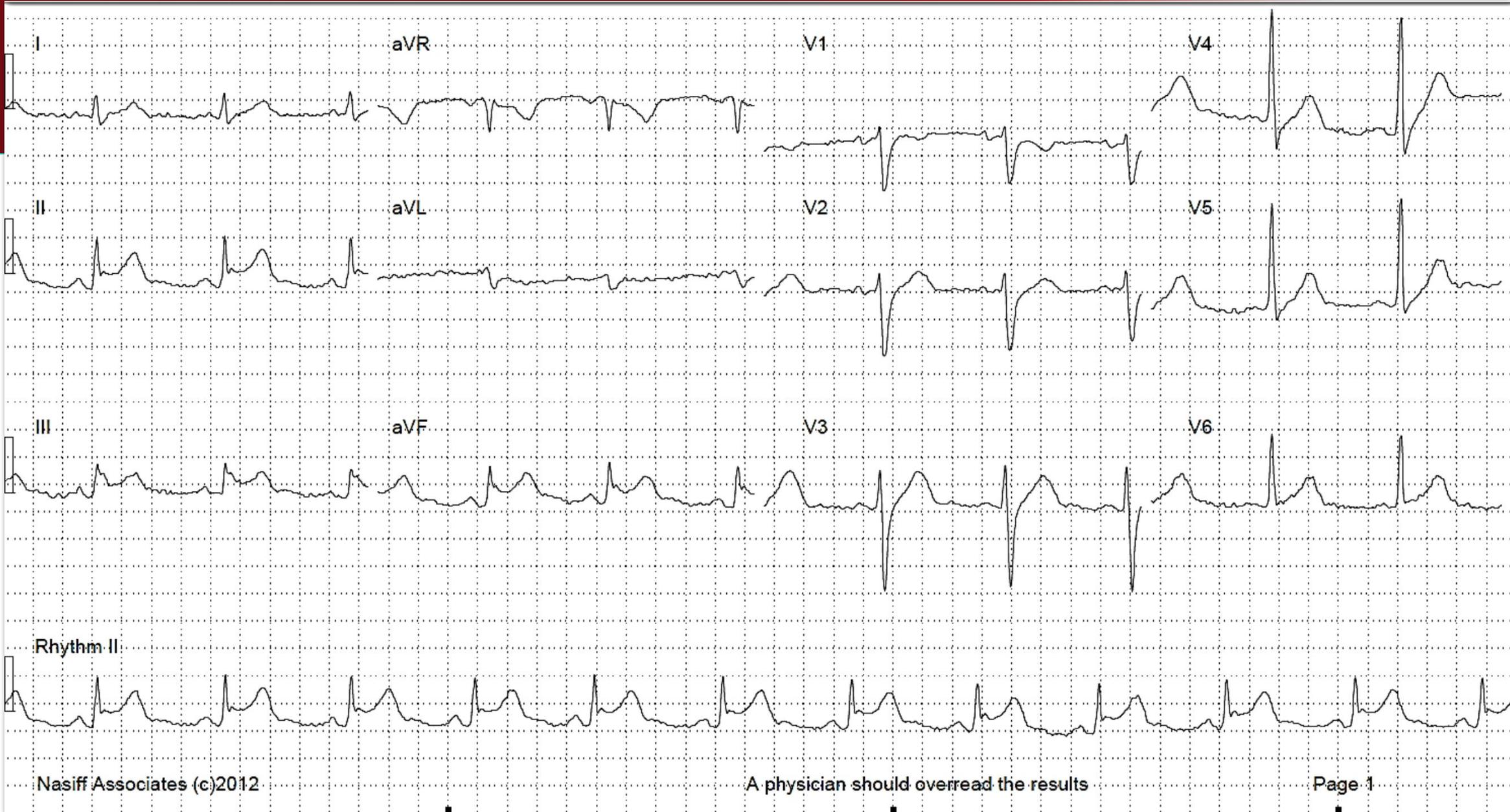
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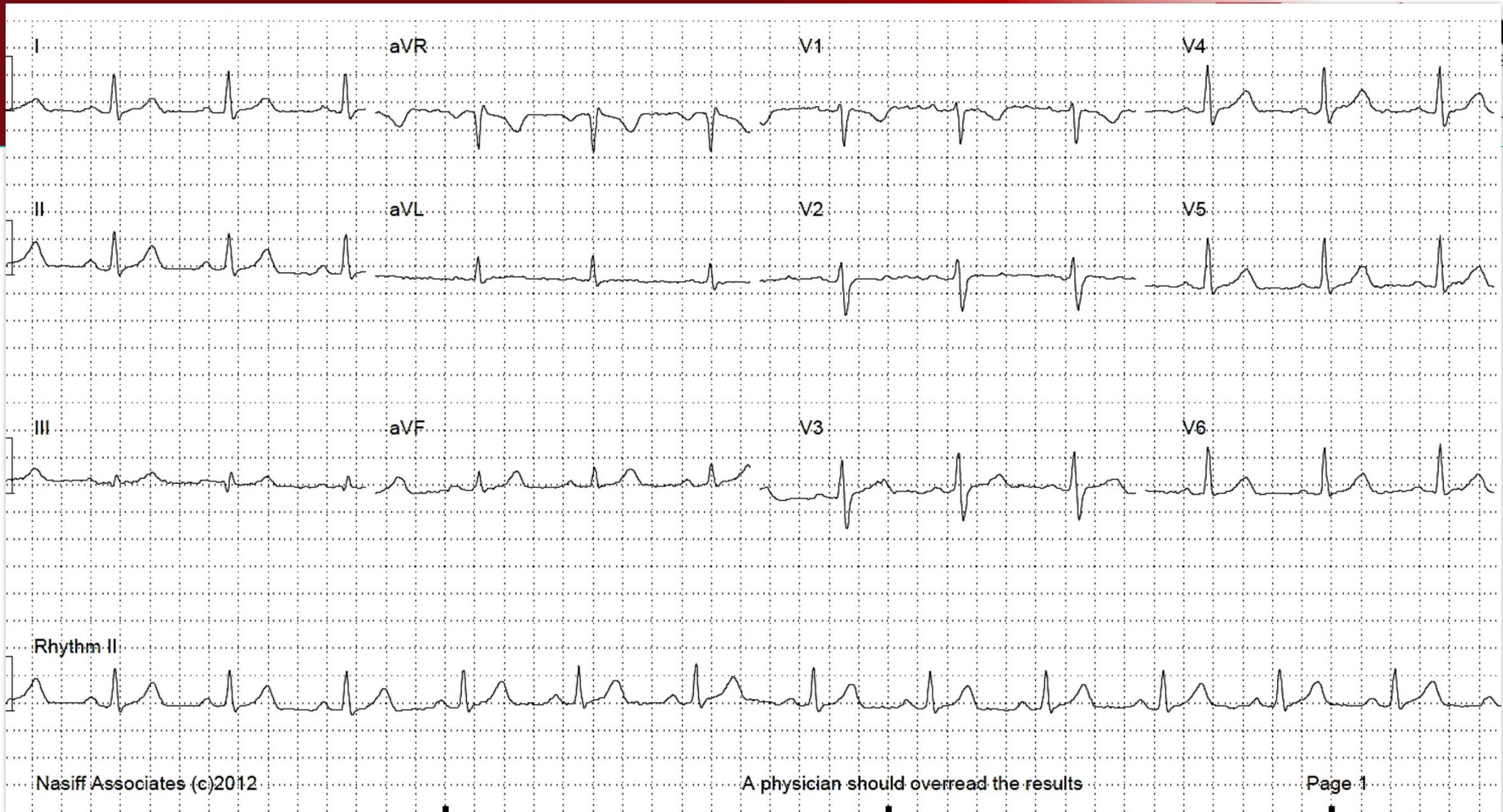




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# Peripheral Artery and Intervention



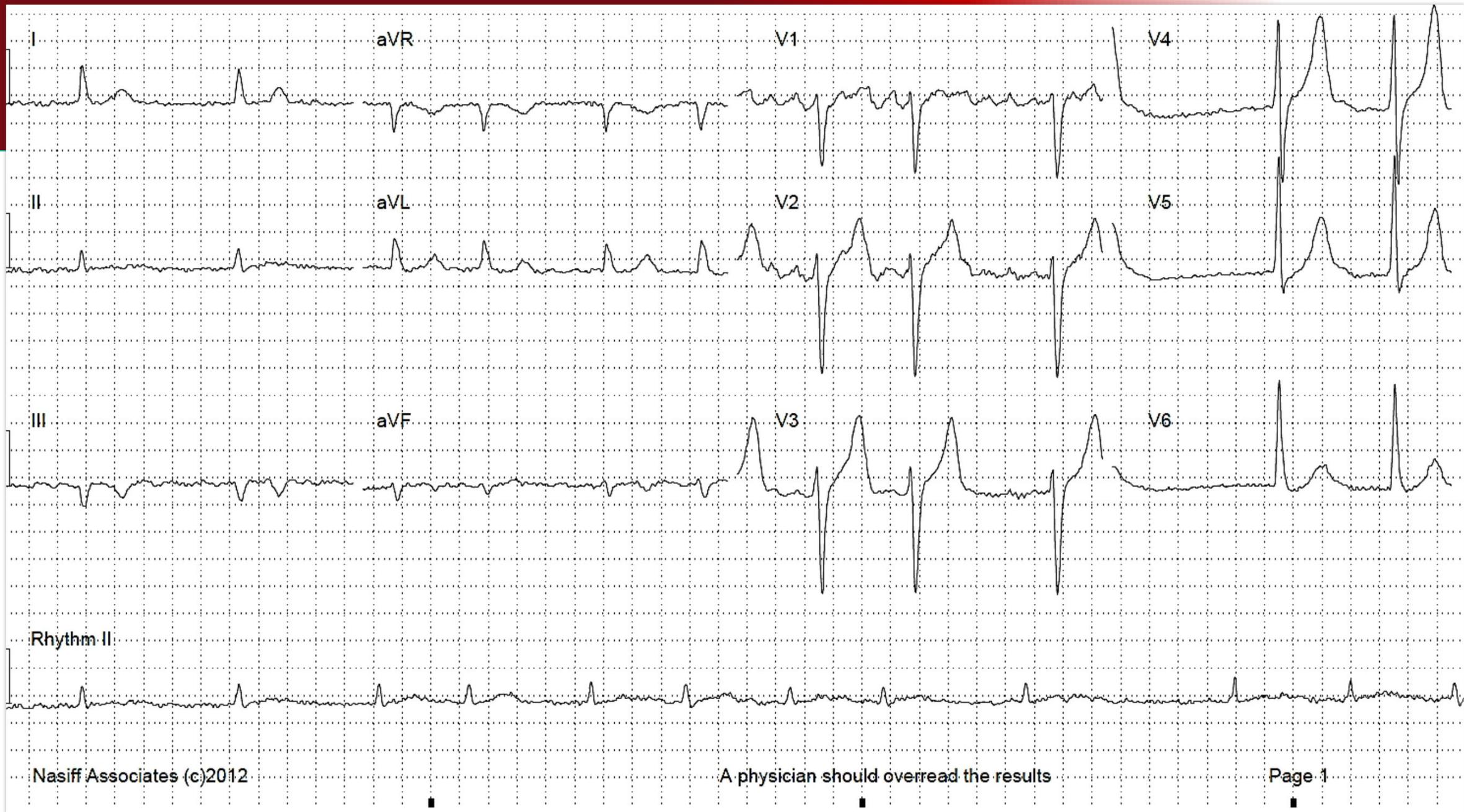
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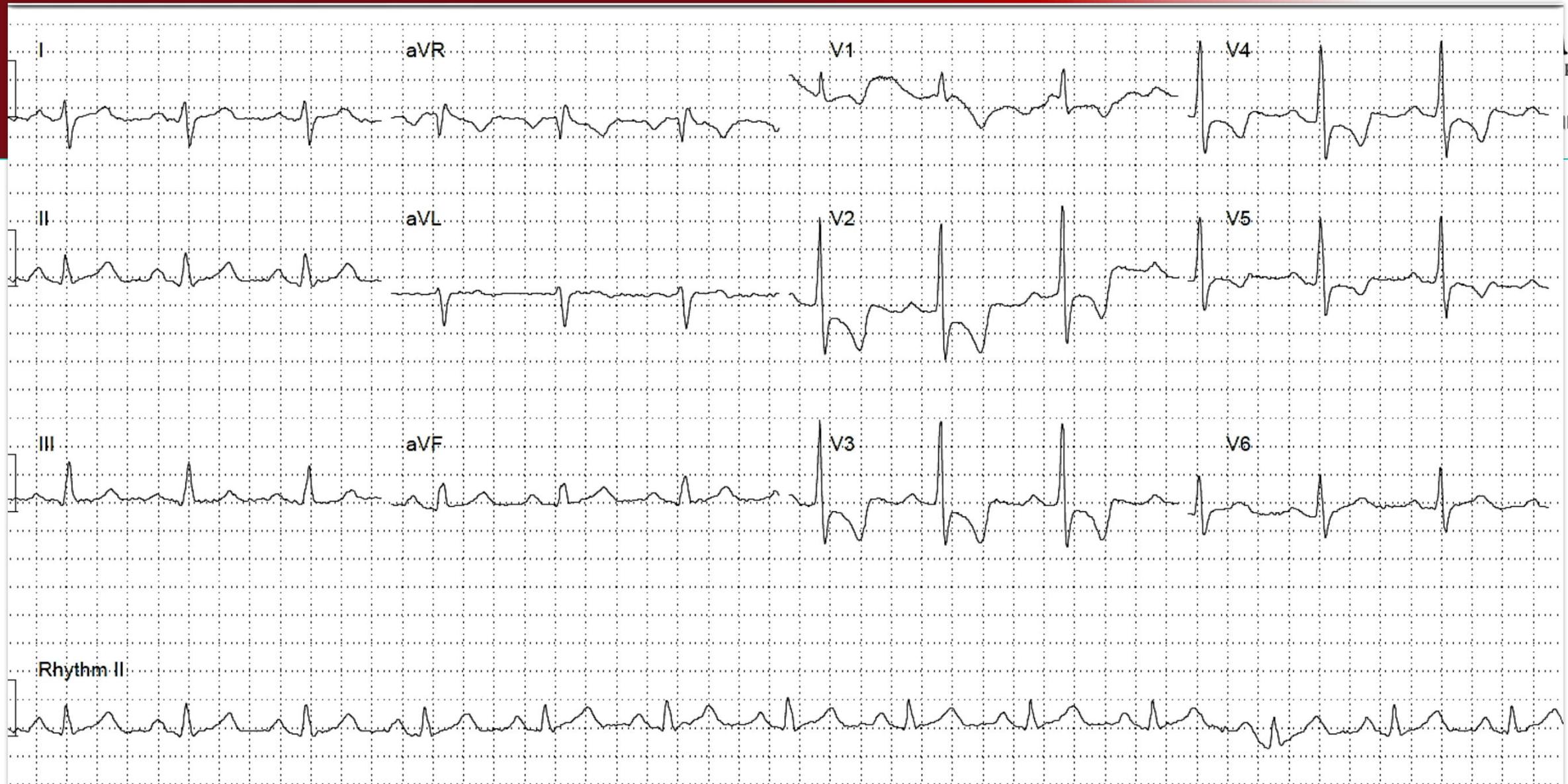
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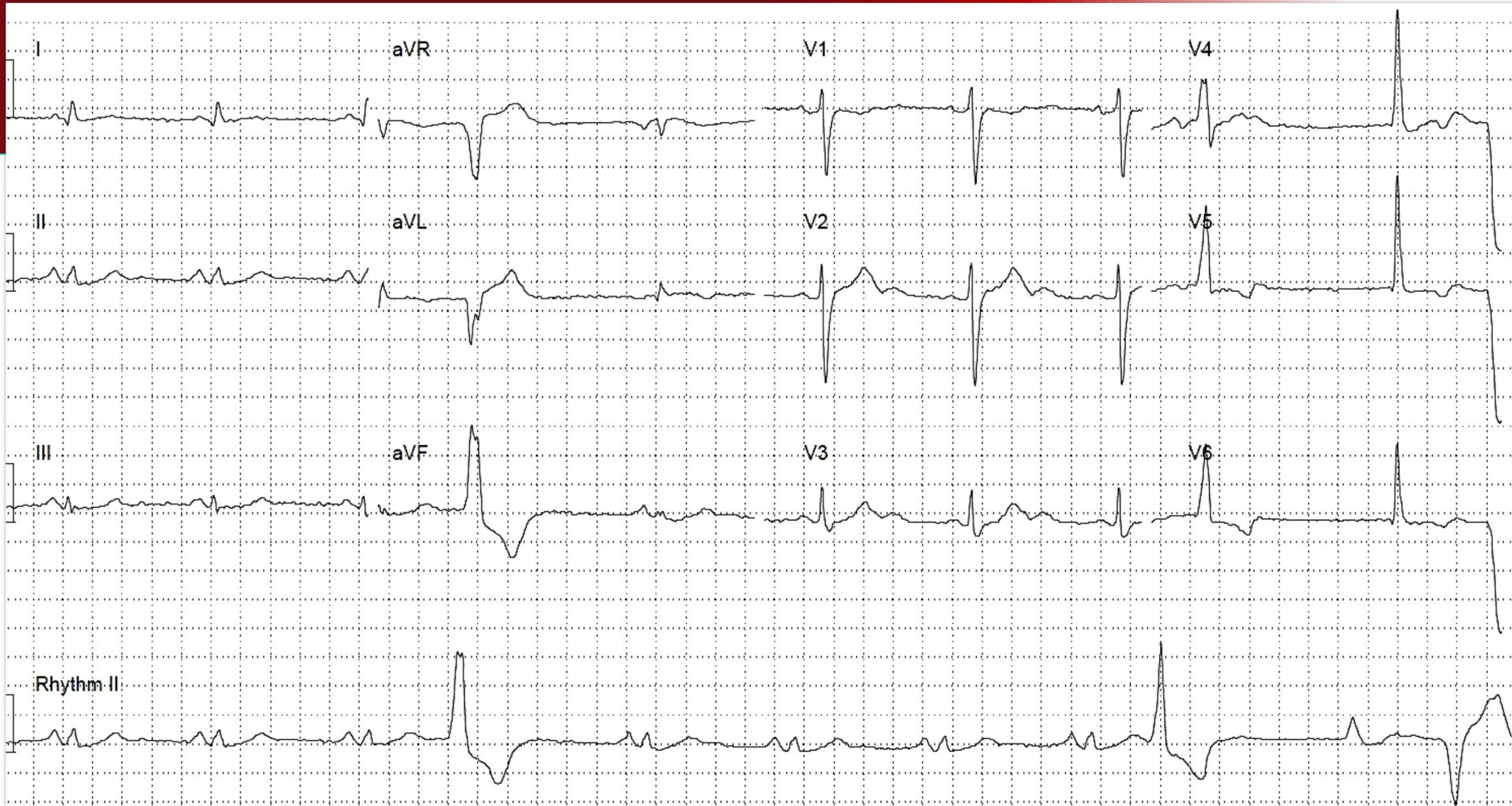
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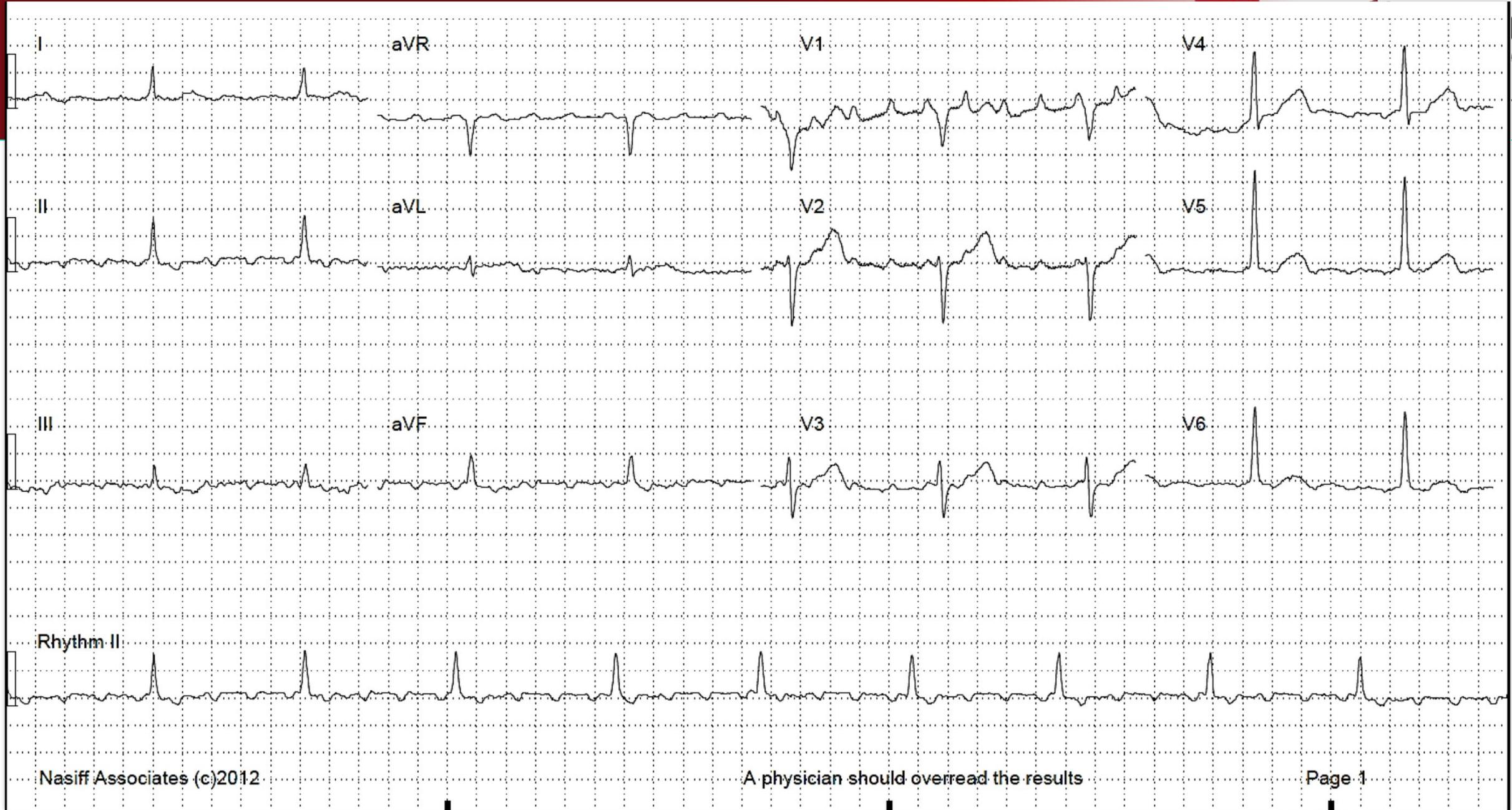
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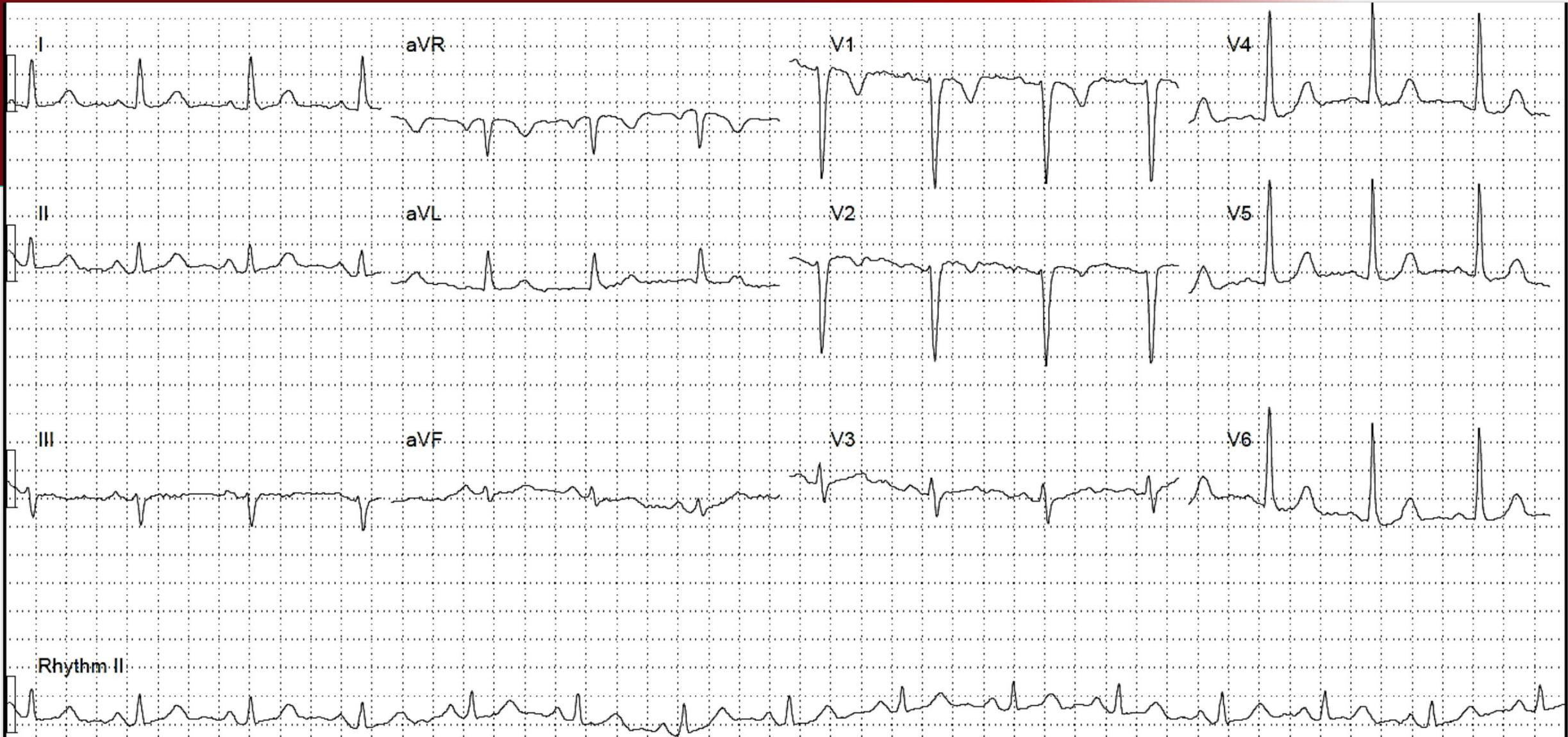
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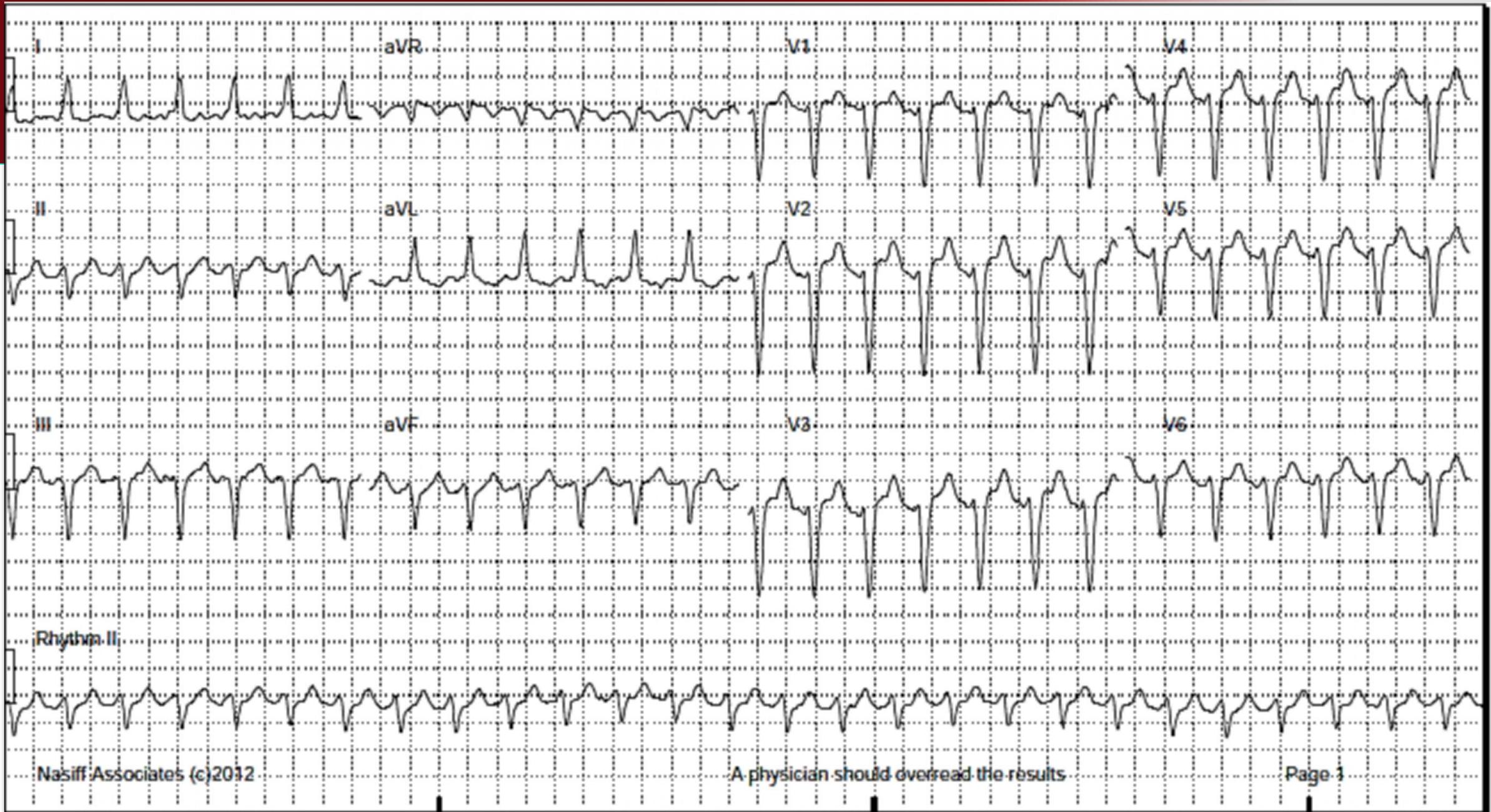


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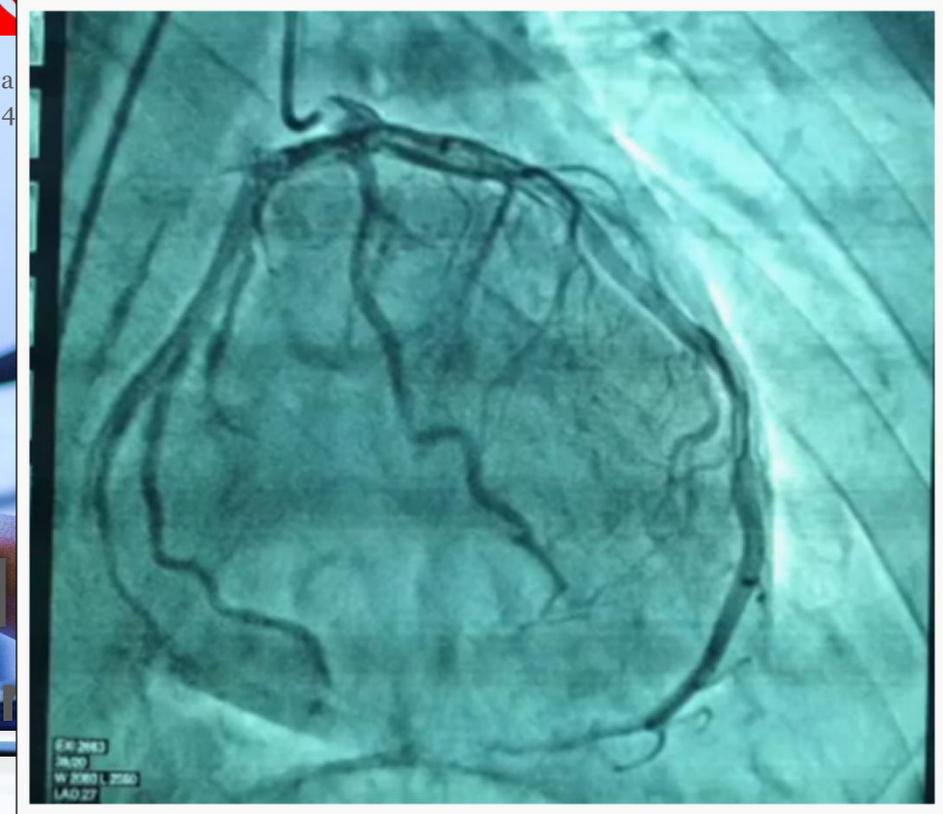
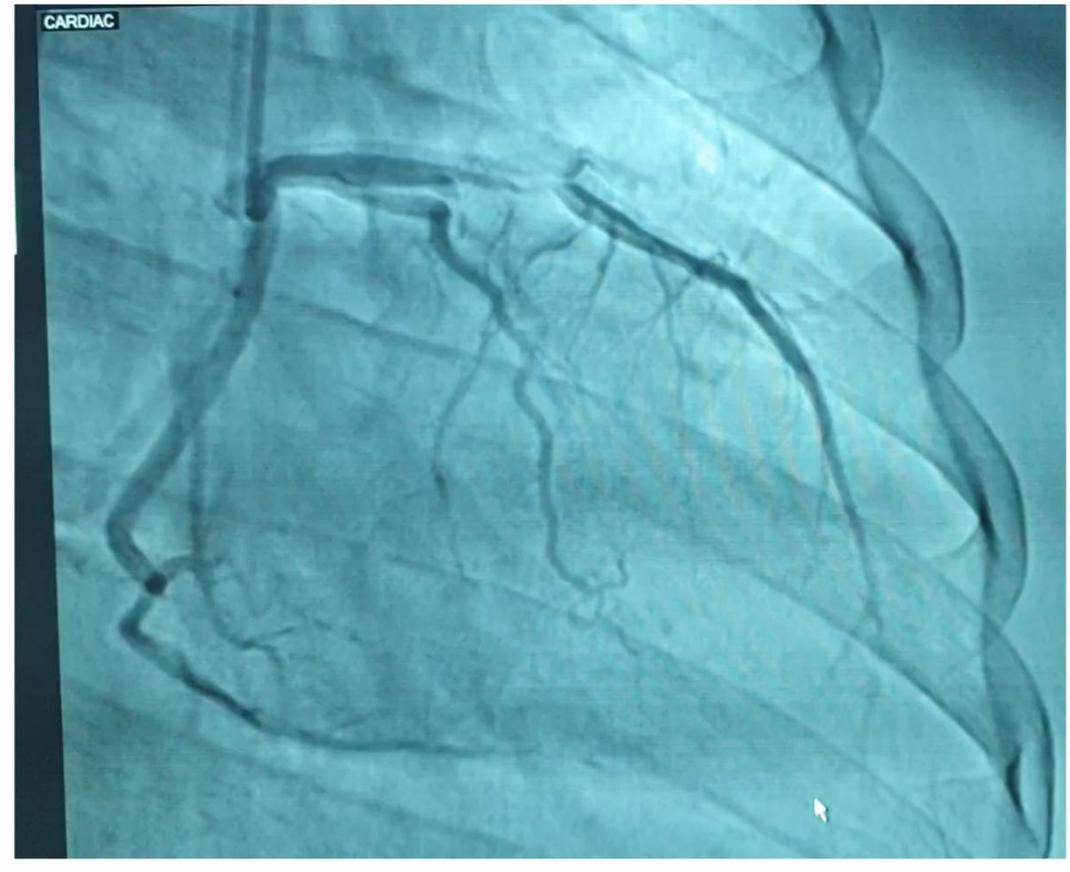
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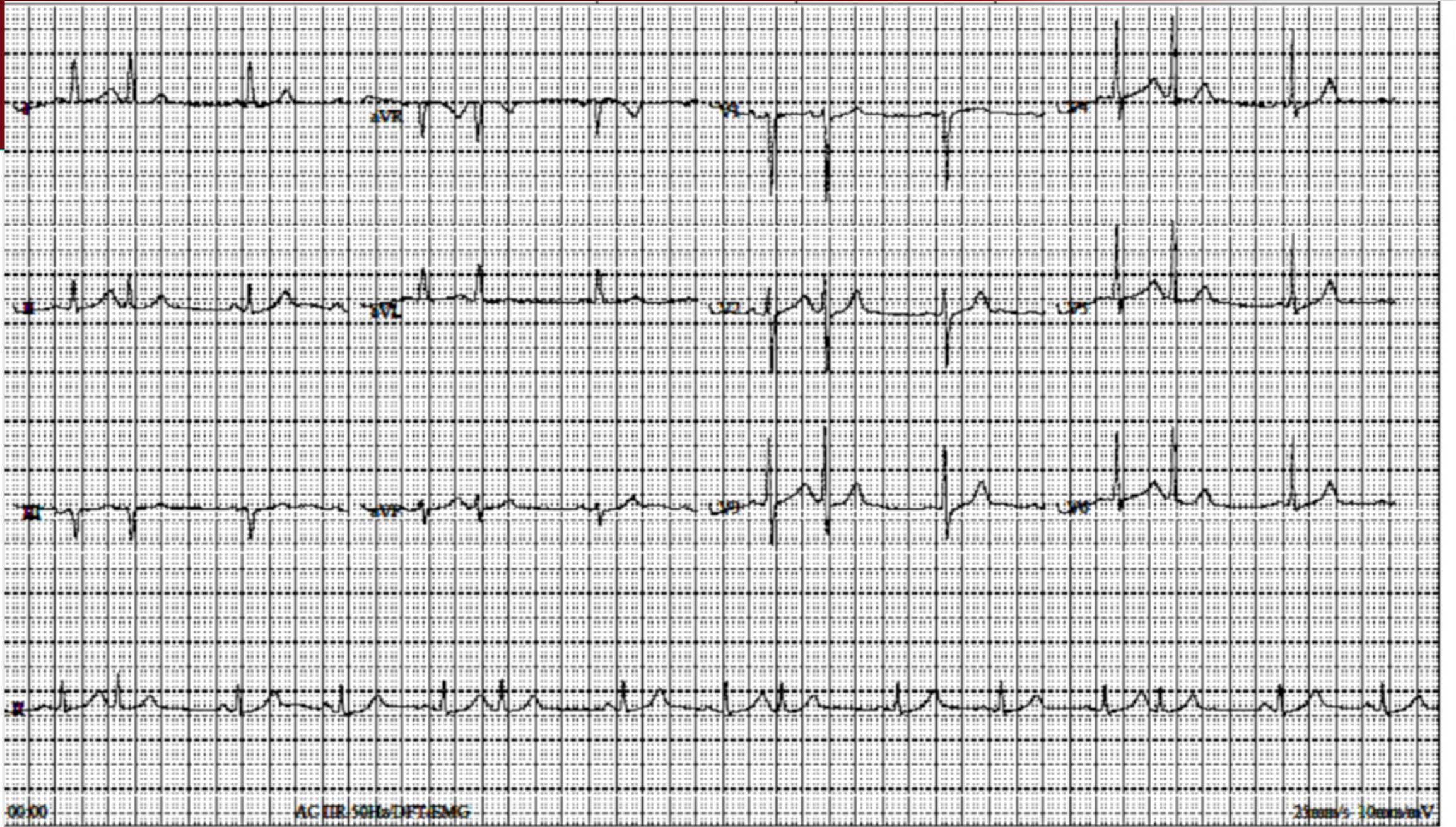


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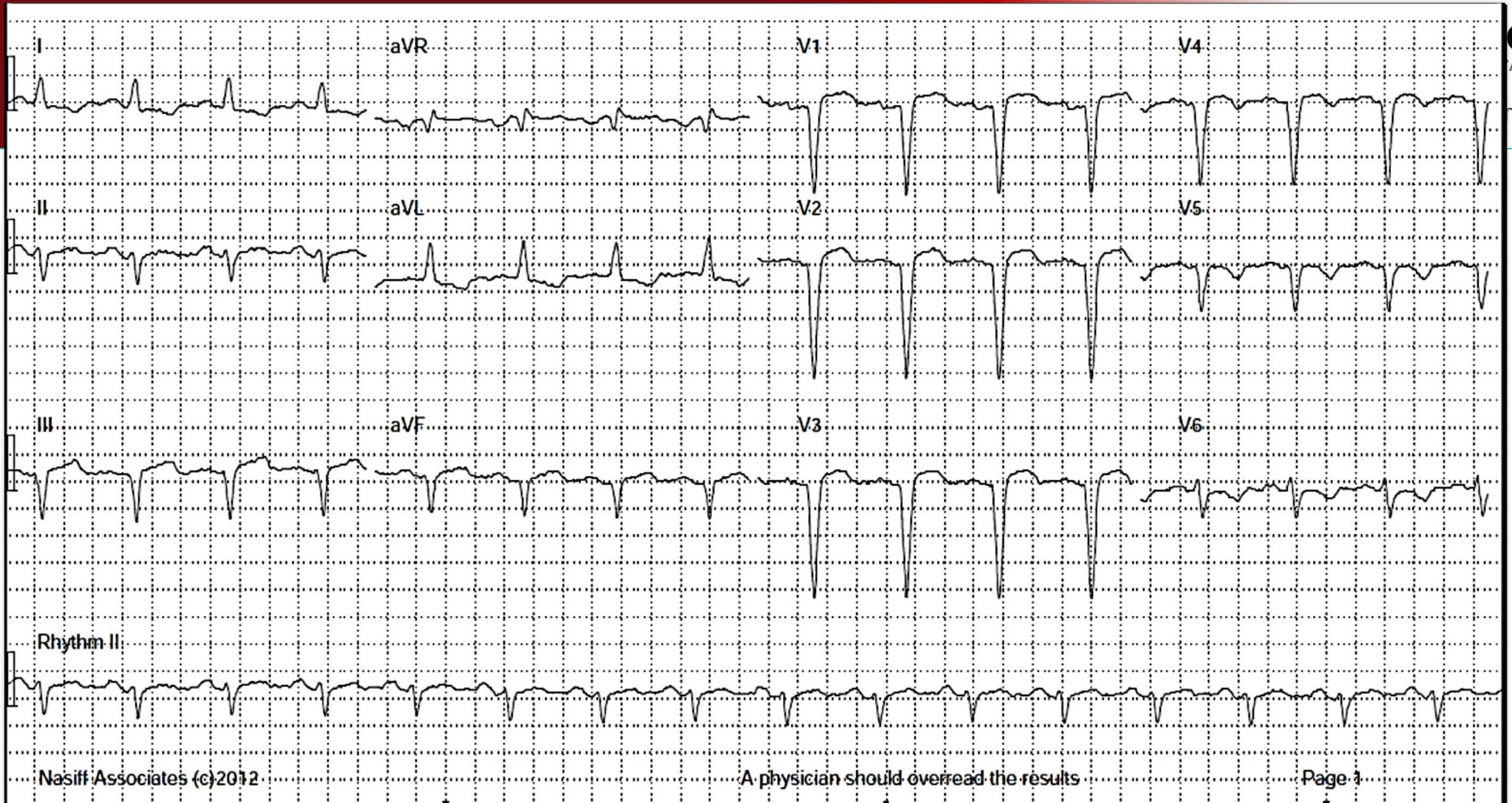


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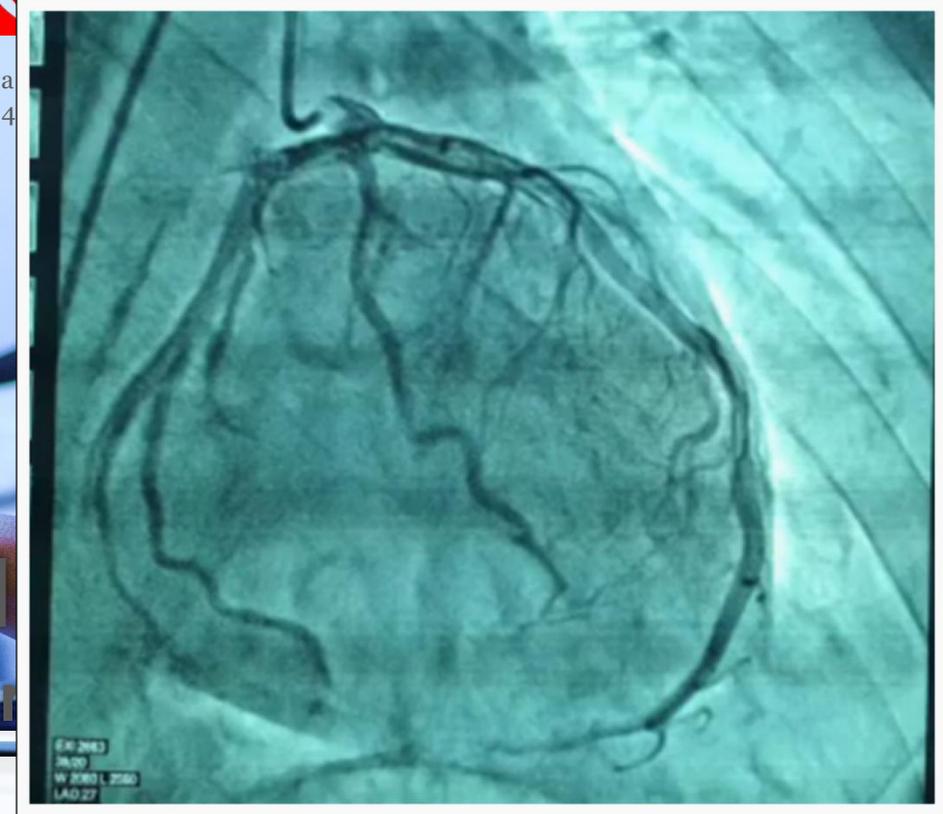
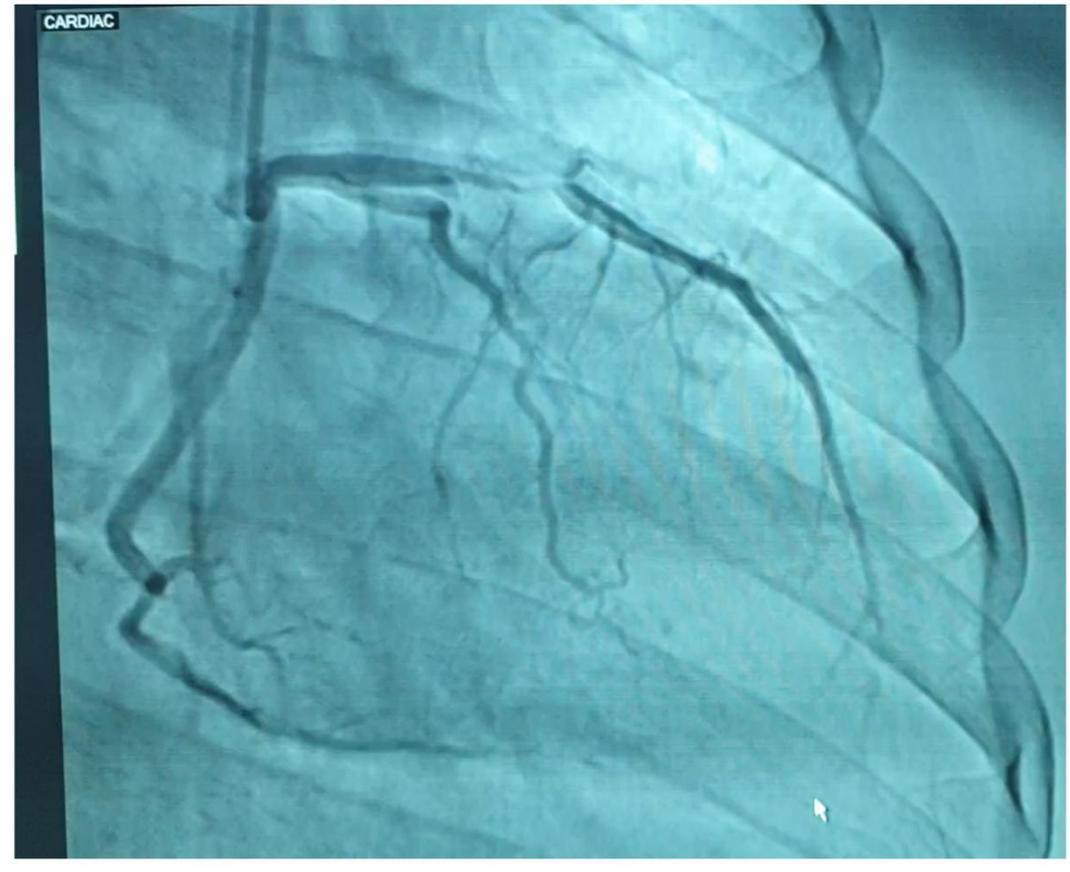
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For Heart Attacks/Myocardial Infarction, Angina, Ischemic Heart Disease/Failure-  
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# Few Alarm Signs On ECG: Call for help!

- Heart Rate <50 or >130
- Significant ST elevation in 2 or more contiguous leads
- Rhythms that are not Sinus
- Multiple Ventricular Ectopic beats especially when they occur together (Ventricular Tachycardia)
- Ventricular Fibrillation
- New Left Bundle Branch Block
- New ST depression/T wave inversion in V1-V3
- Q Waves

# Why Consider Cardiocare Multispecialty Hospital?



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1. Team of consultants & residents
2. **Detailed back-referral medical reports** when indicated/requested
3. Opportunity to **discuss & collaborate** with team on referred cases
4. **24/7 emergencies** and **same-day/next-day appointments**
5. Over **400 successful cathlab cases** for:
  - Pacemakers, CRTs, Coronary & Peripheral revascularization with stents, IVC filters, etc. while awake with no scars for vascular interventions.
6. **Ultramodern world-class equipment & fully computerized**



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The Limi Hospital  
Since 1982

Hospital

# What are the Cardiocare Multispecialty Hospital's

## services?

We provide **24/7 world-class healthcare solutions** for patients, hospitals, and their doctors in:

- ✓ **Interventional Cardiology (Cathlab)**
- ✓ **Endocrinology, Diabetology & Metabolic Medicine**
- ✓ **Cardiology**
- ✓ **Nephrology, Transplant & Dialysis**
- ✓ **Neurology**
- ✓ **Rheumatology**
- ✓ **Pulmonology**
- ✓ **Critical Care**
- ✓ **Cardiothoracic Surgery**
- ✓ **General Internal Medicine**
- ✓ **Comprehensive Medical Checkups**



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# How to refer patients to Consider Cardiocare



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1. Give a standard referral letter & preferably attach any available results
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3. **WhatsApp:** 0908-331-7777
4. **Email:** [frontdesk@cardiocare.ng](mailto:frontdesk@cardiocare.ng)
5. **Visit:** 5, Giza Close Area 11, Garki (off Dunukofia Street- near FCDA) Abuja-FCT.
6. Kindly indicate Doctor's name, & email/phone number especially if you wish to receive a medical report afterwards.

