Cases

ECG

Registrar Continuing Education

Updated February 2023

Quick reference

Uptodate

CASES

Quick reference

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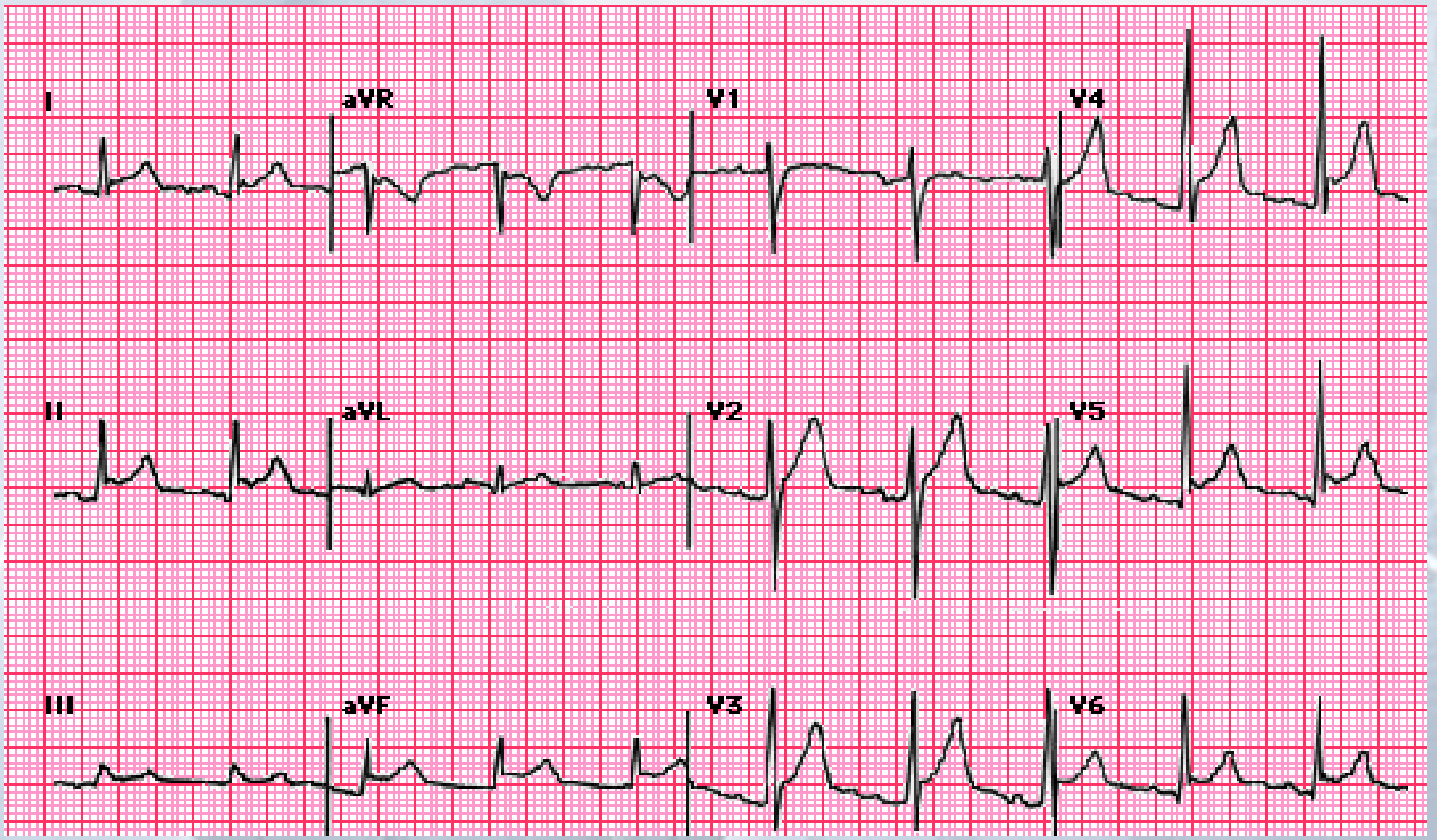
Quick reference

- 1st degree block
- 2nd degree type I
- 2nd degree type II
- 3rd degree block
- A-fib
- A-flutter
- Hyperkalemia
- LBBB
- LVH
- Multifocal atrial tachycardia
- NSR
- Pericarditis
- RBBB
- Sinus brady
- Sinus tach
- STEMI
- V-fib
- V-tach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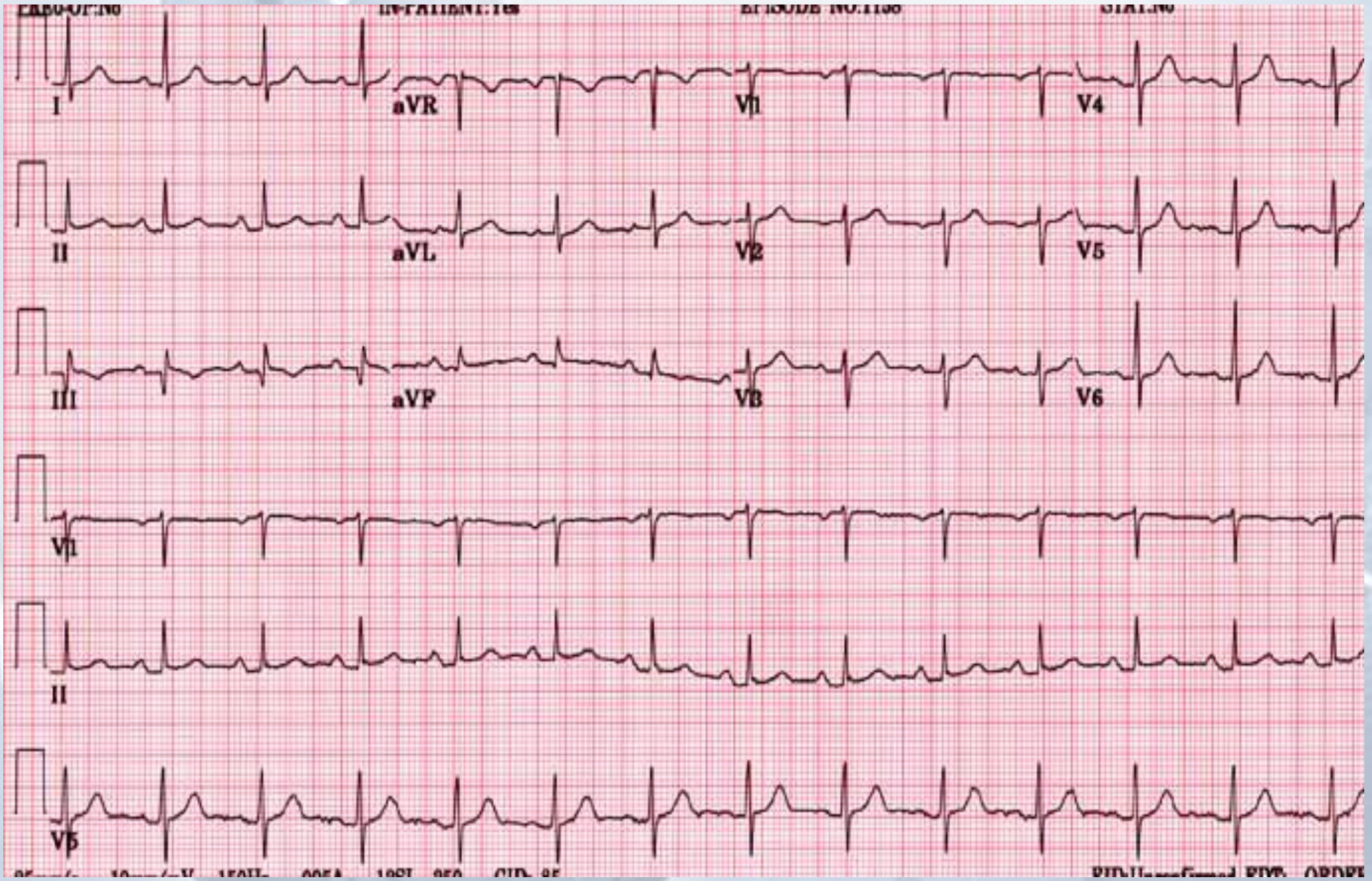
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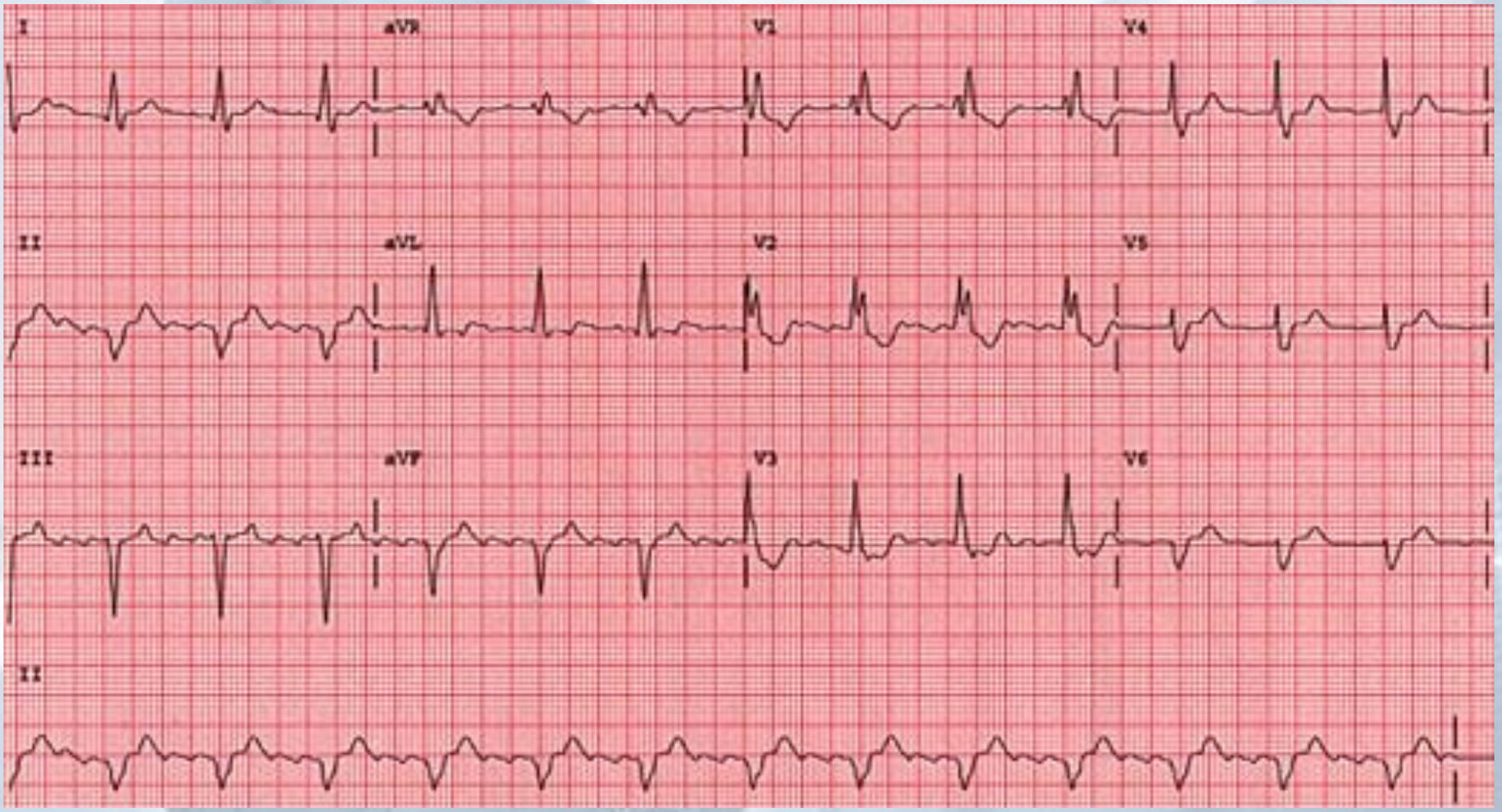
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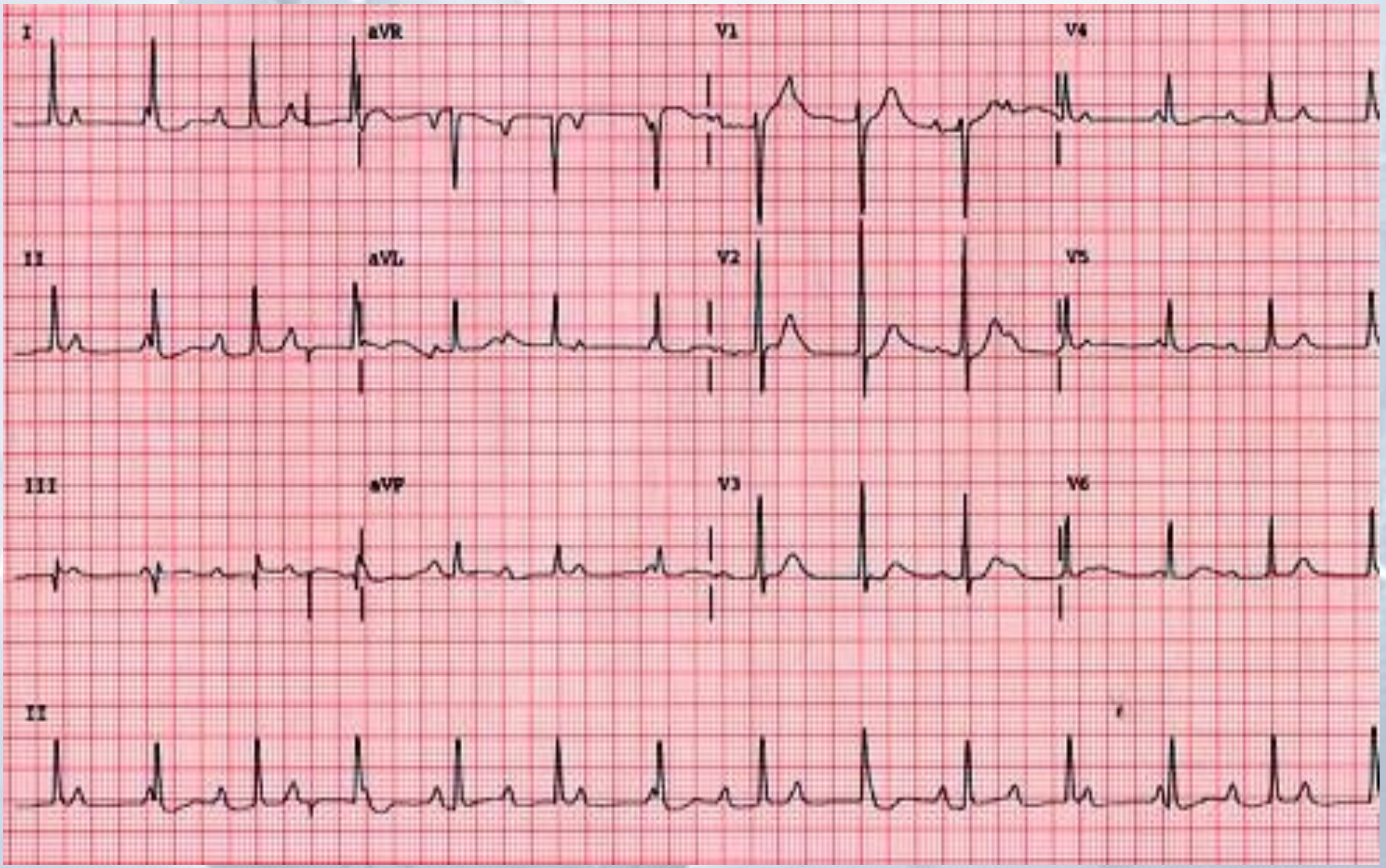
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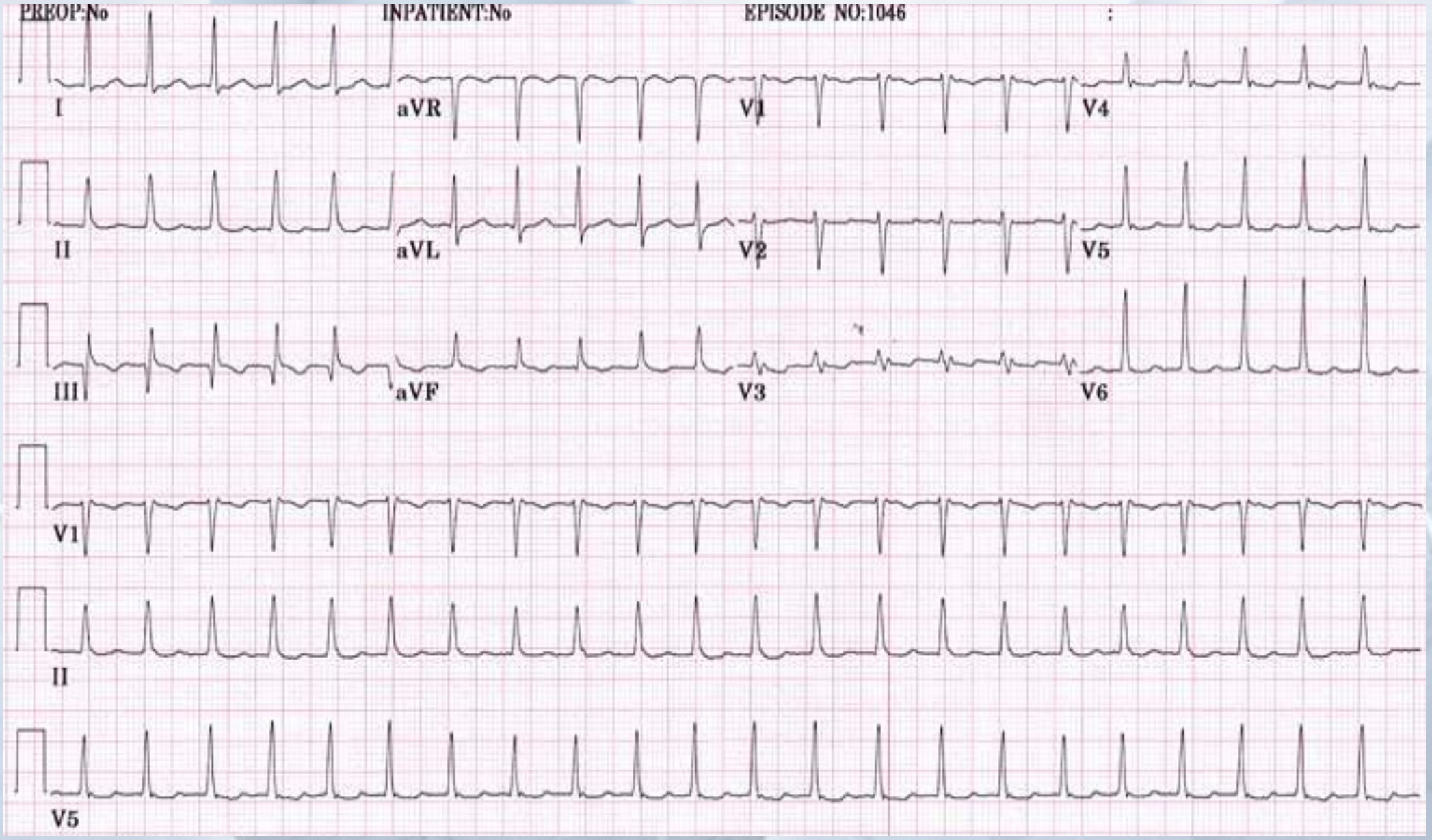
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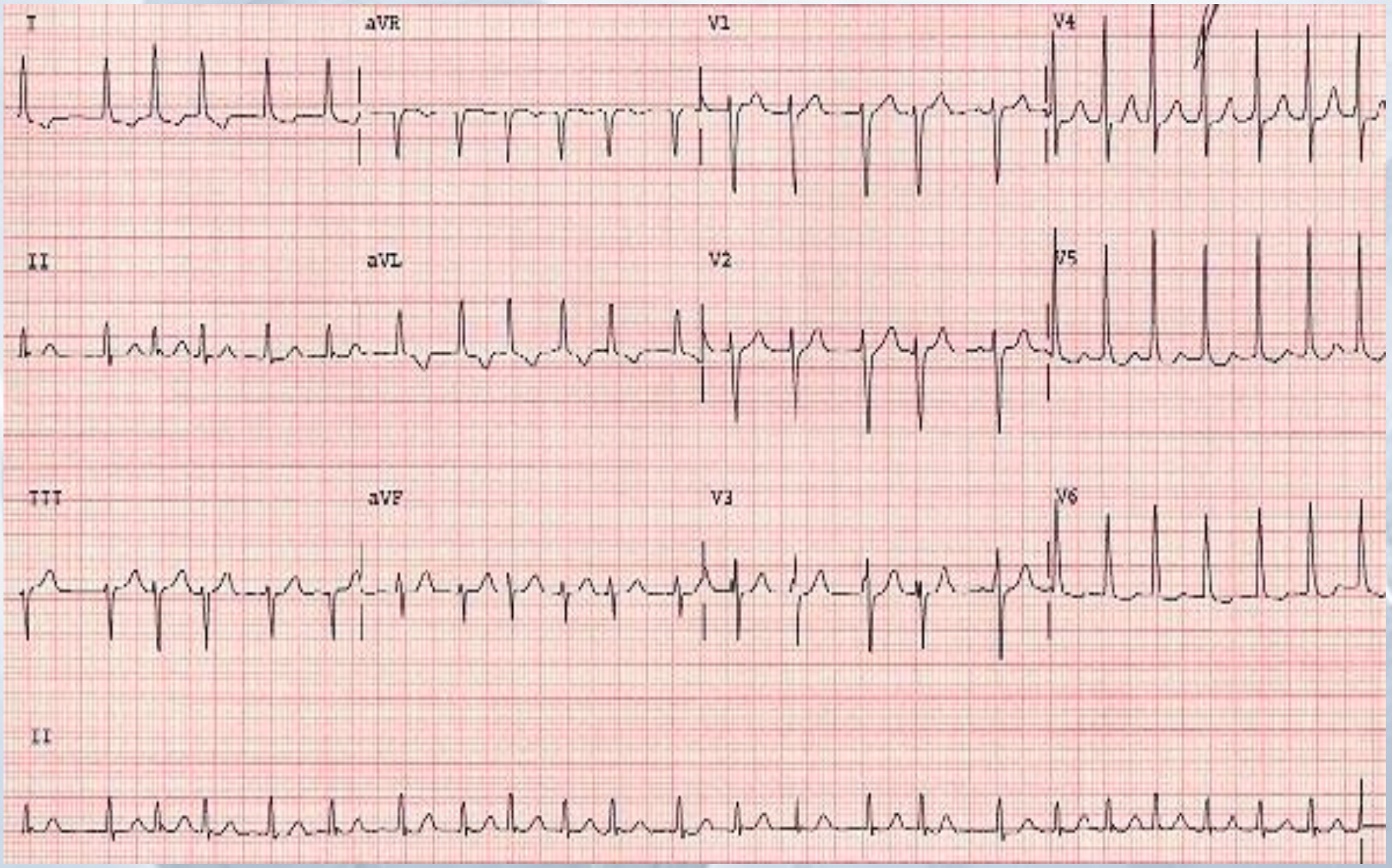
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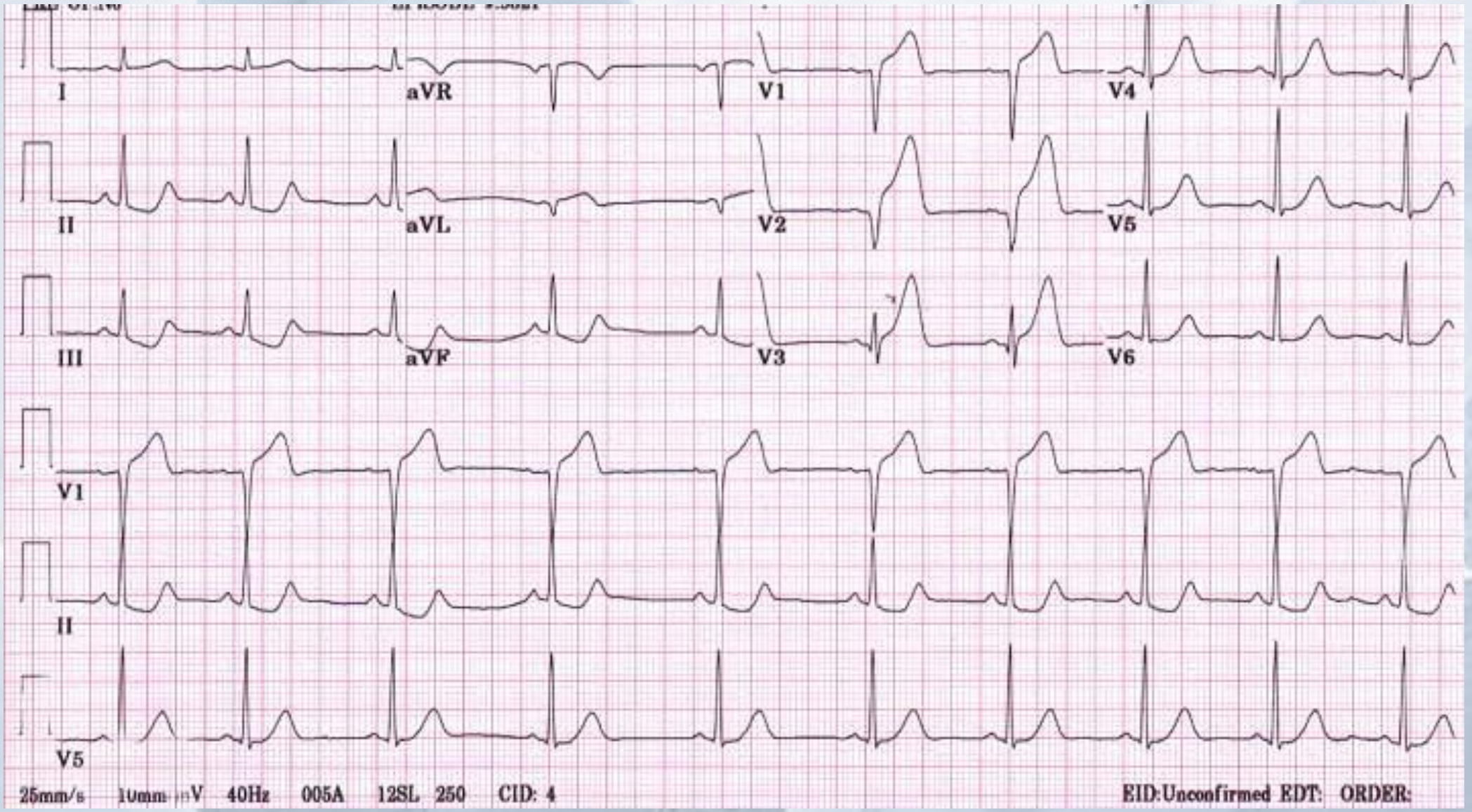
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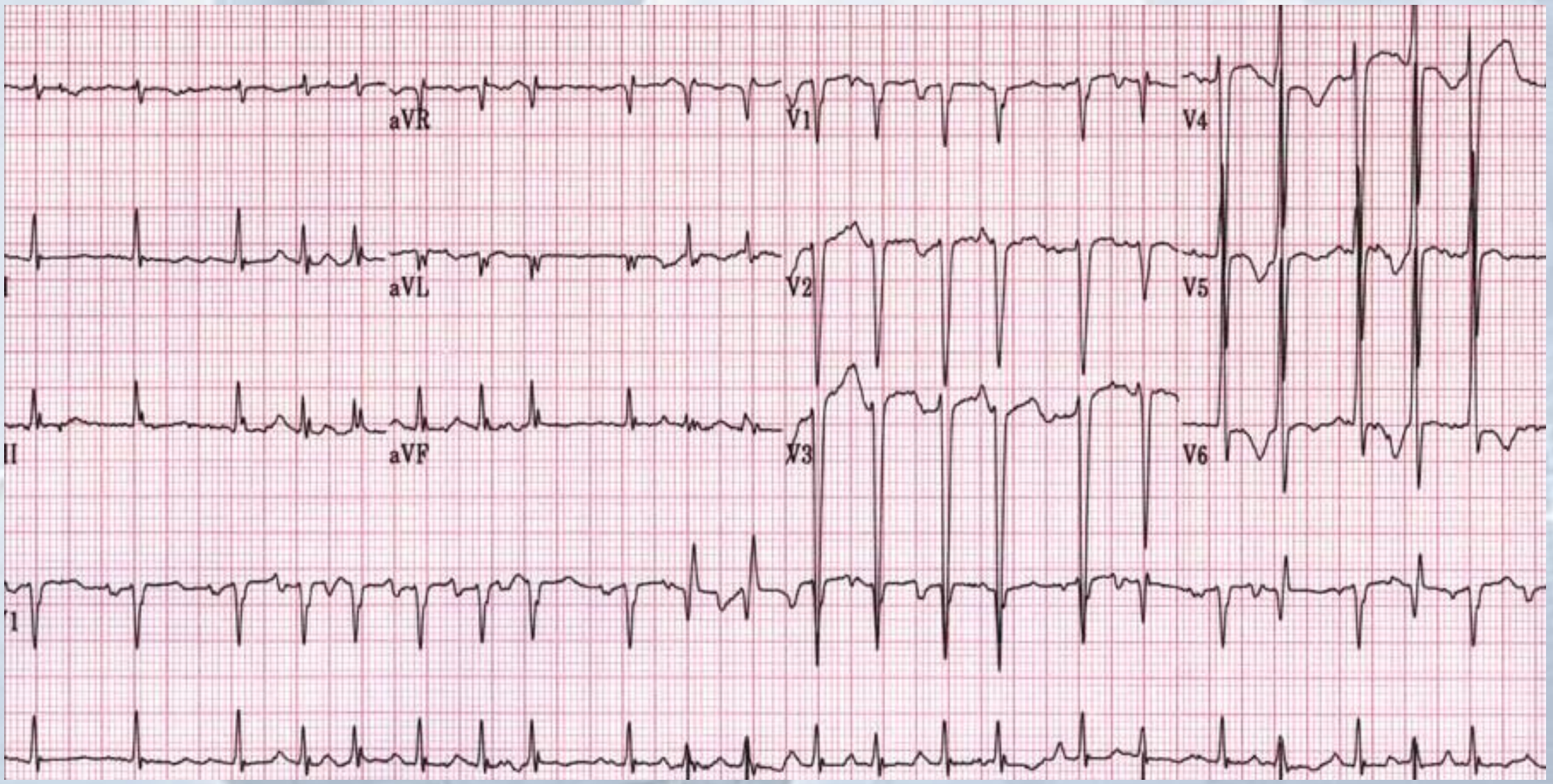
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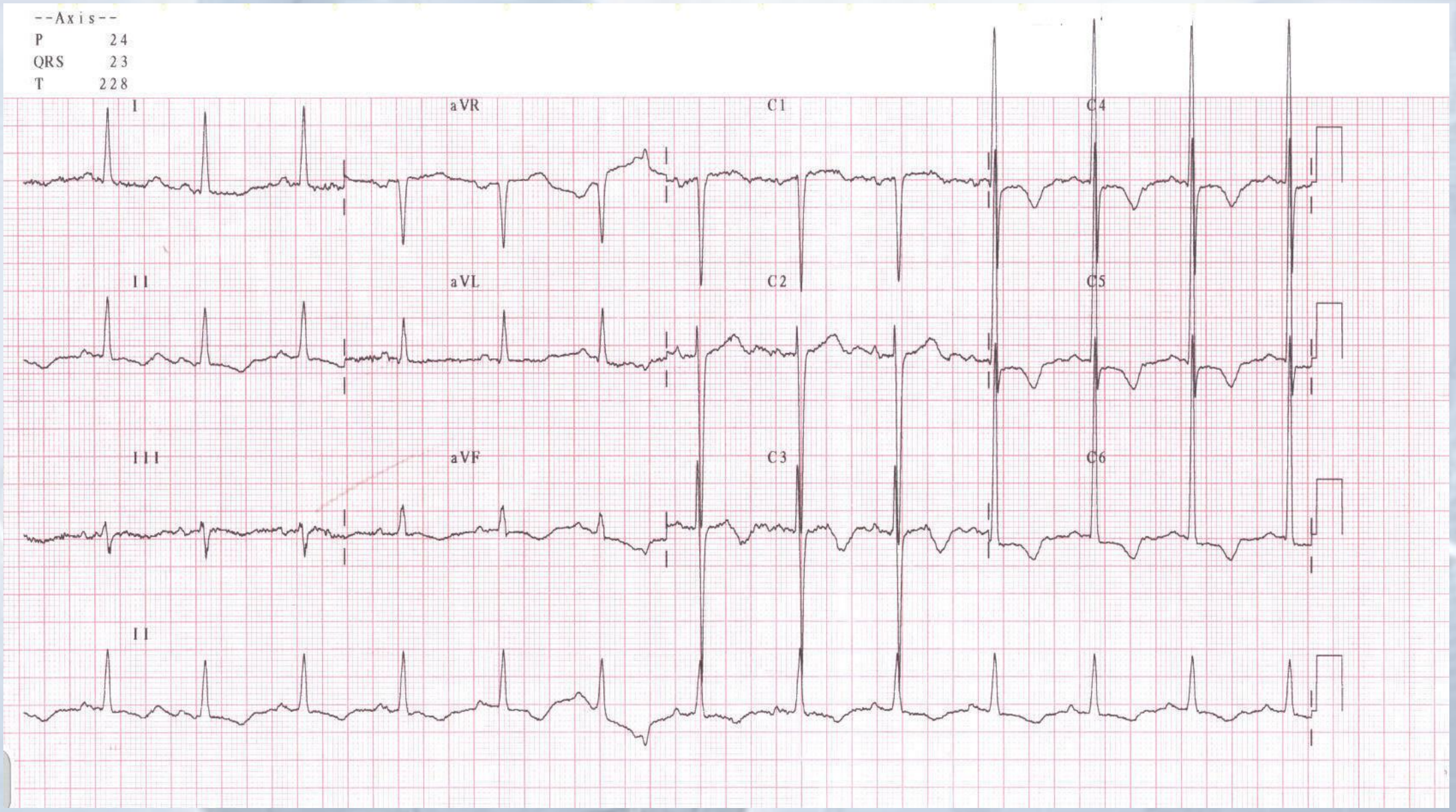
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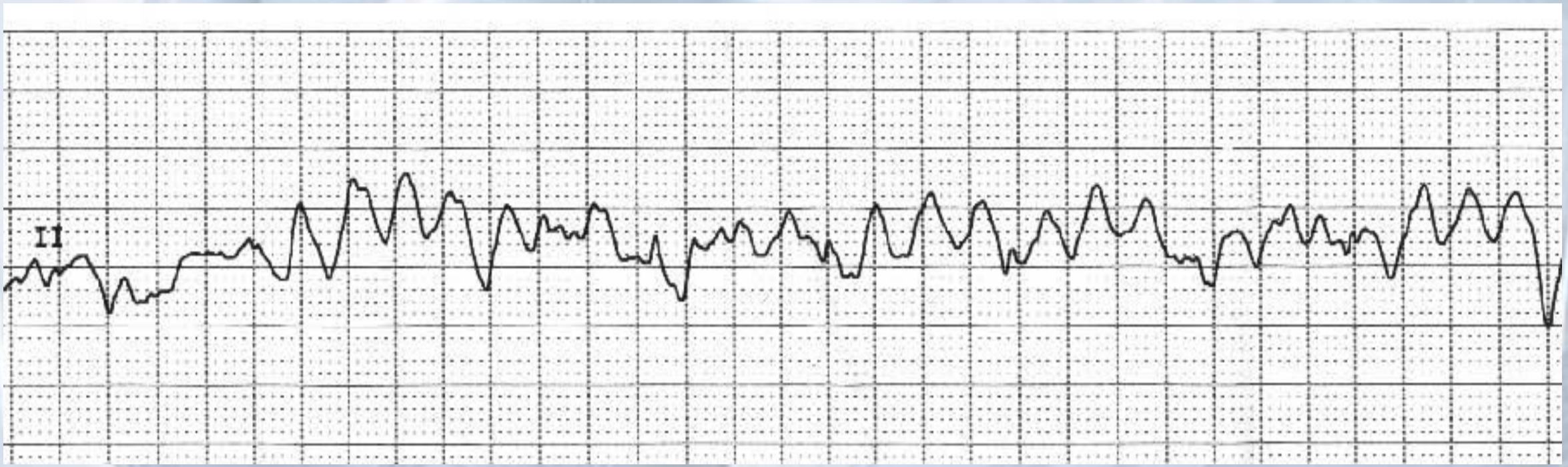
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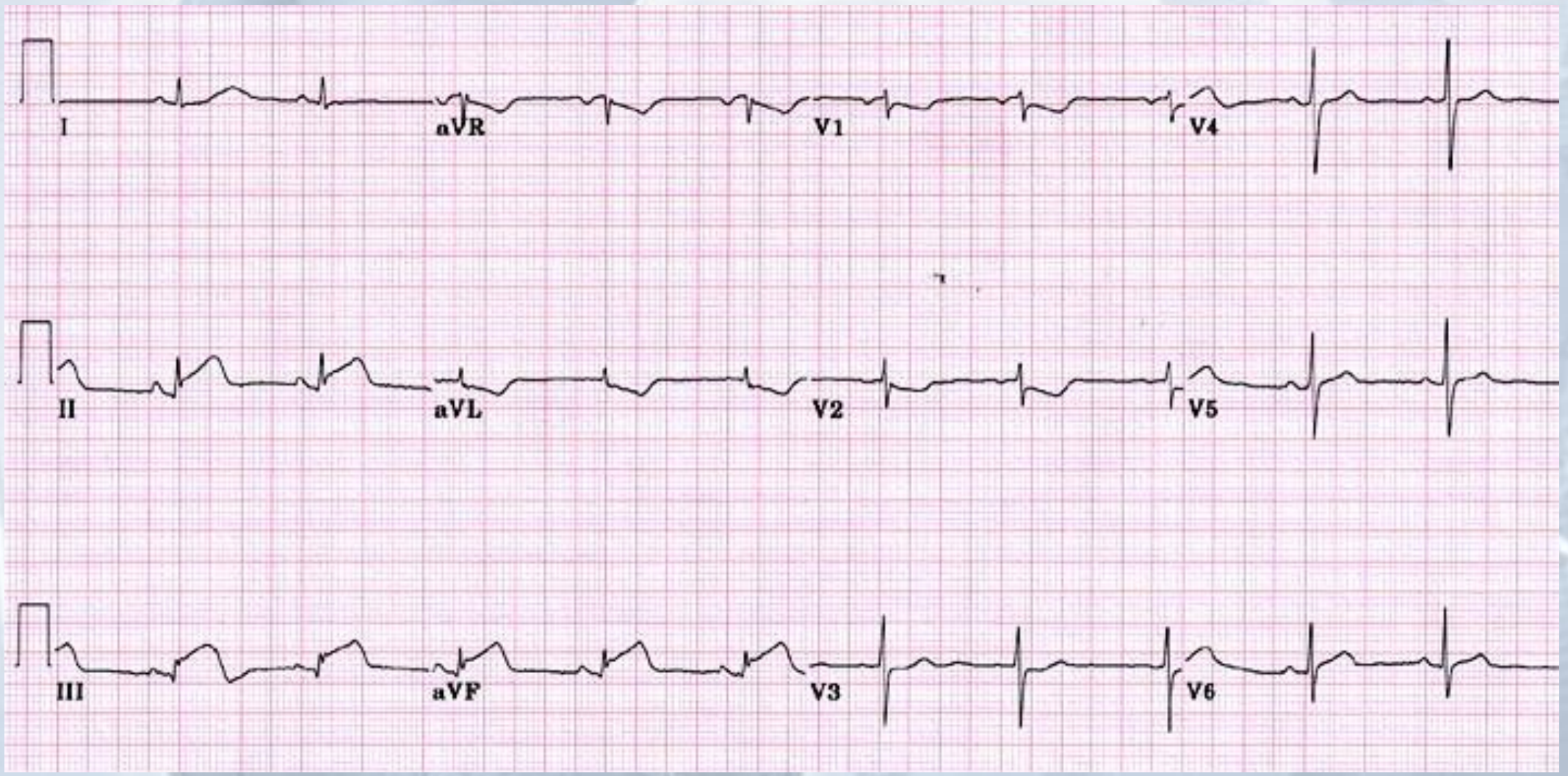
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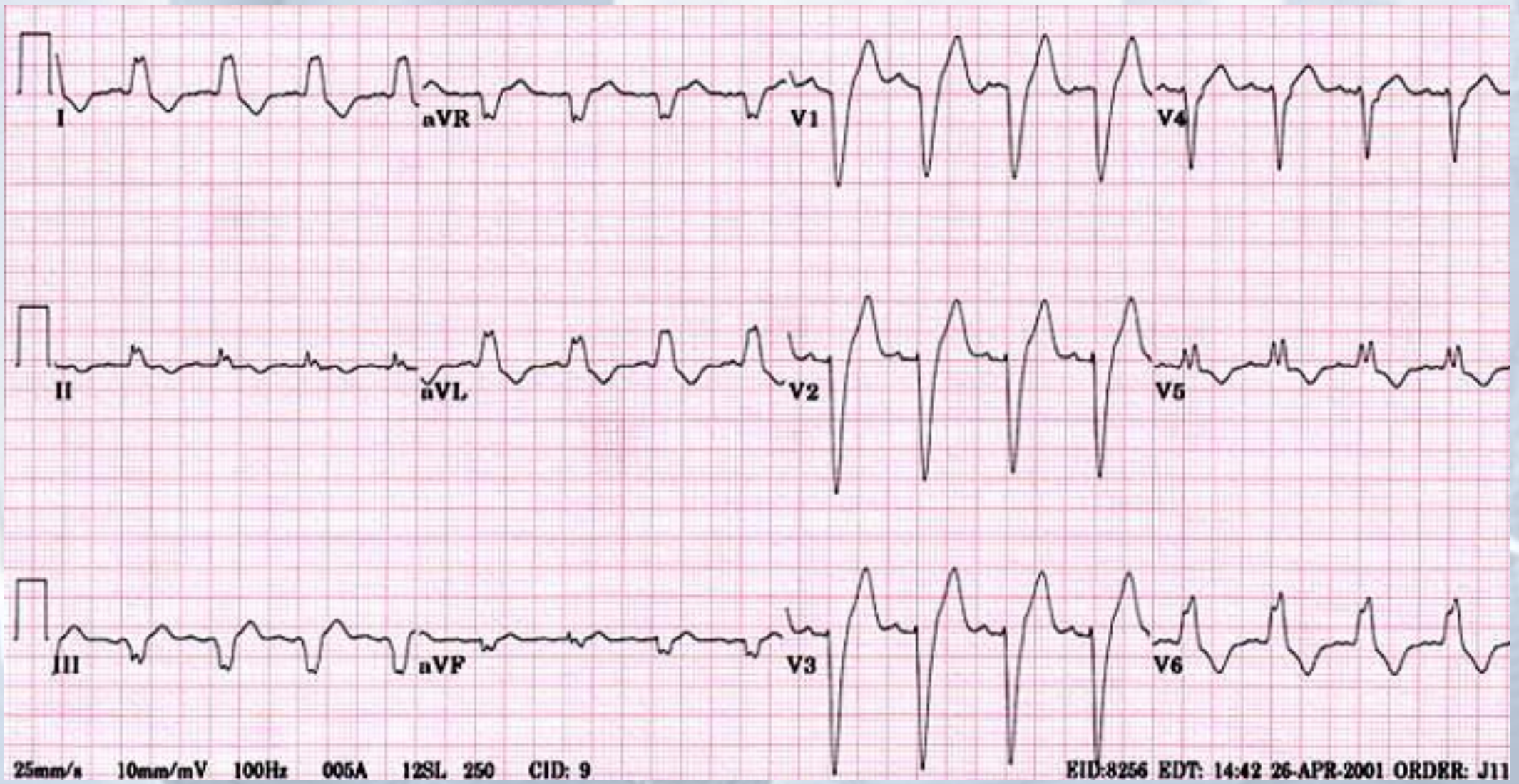
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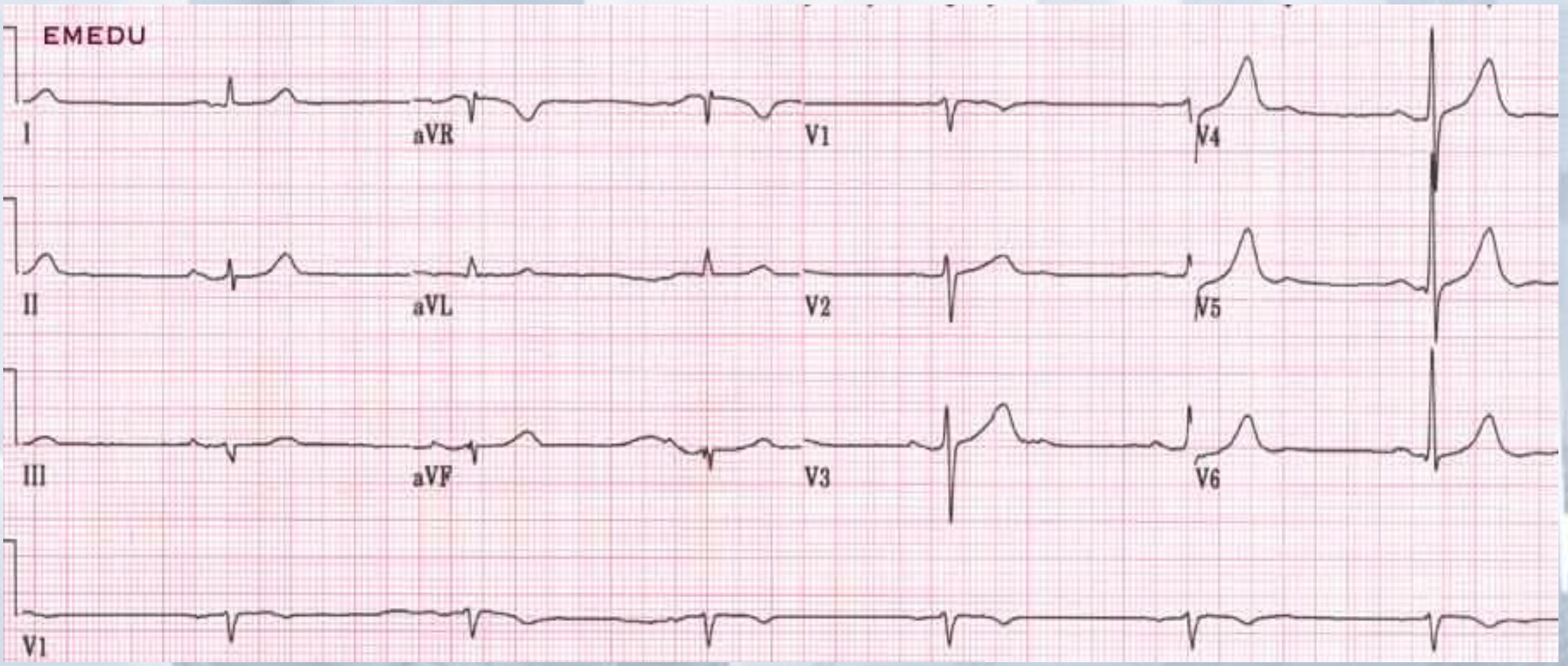
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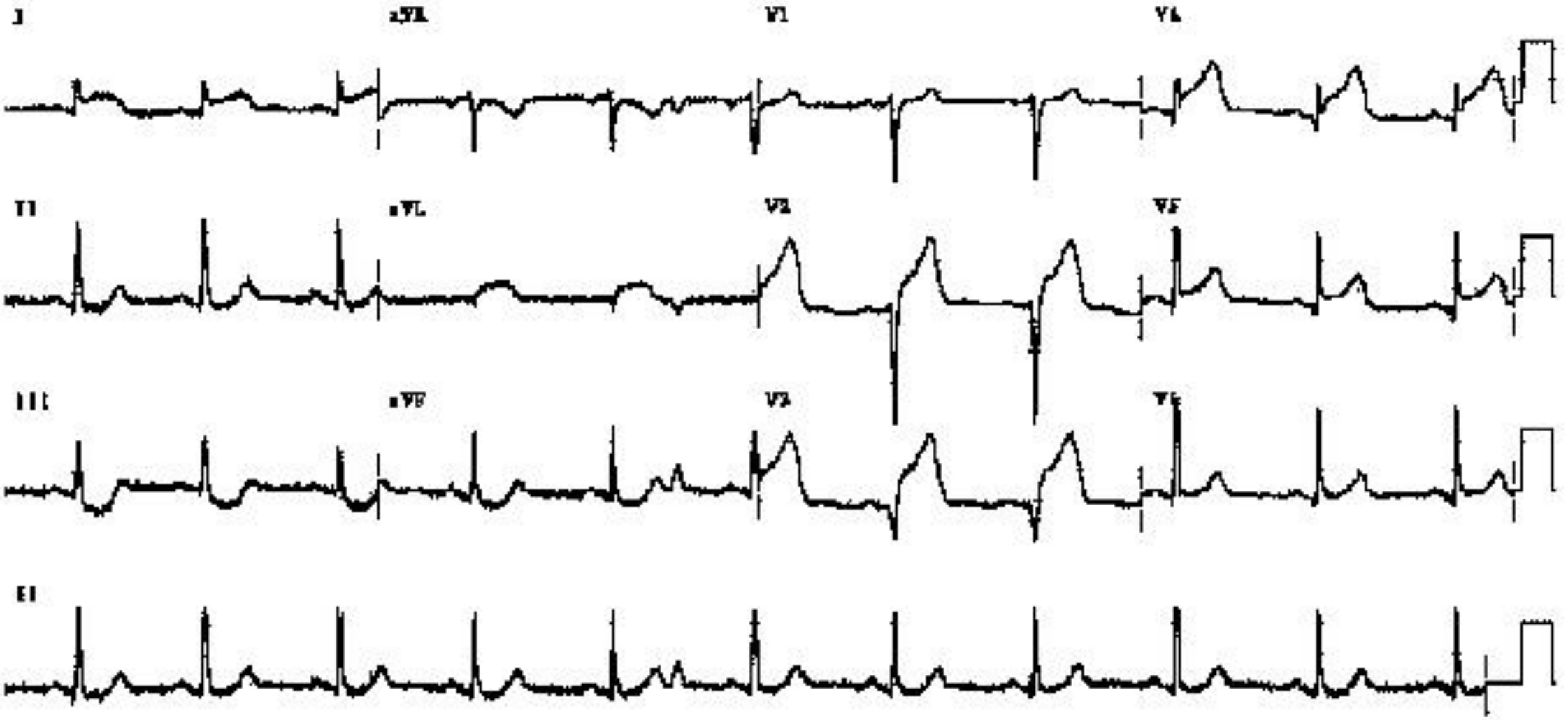
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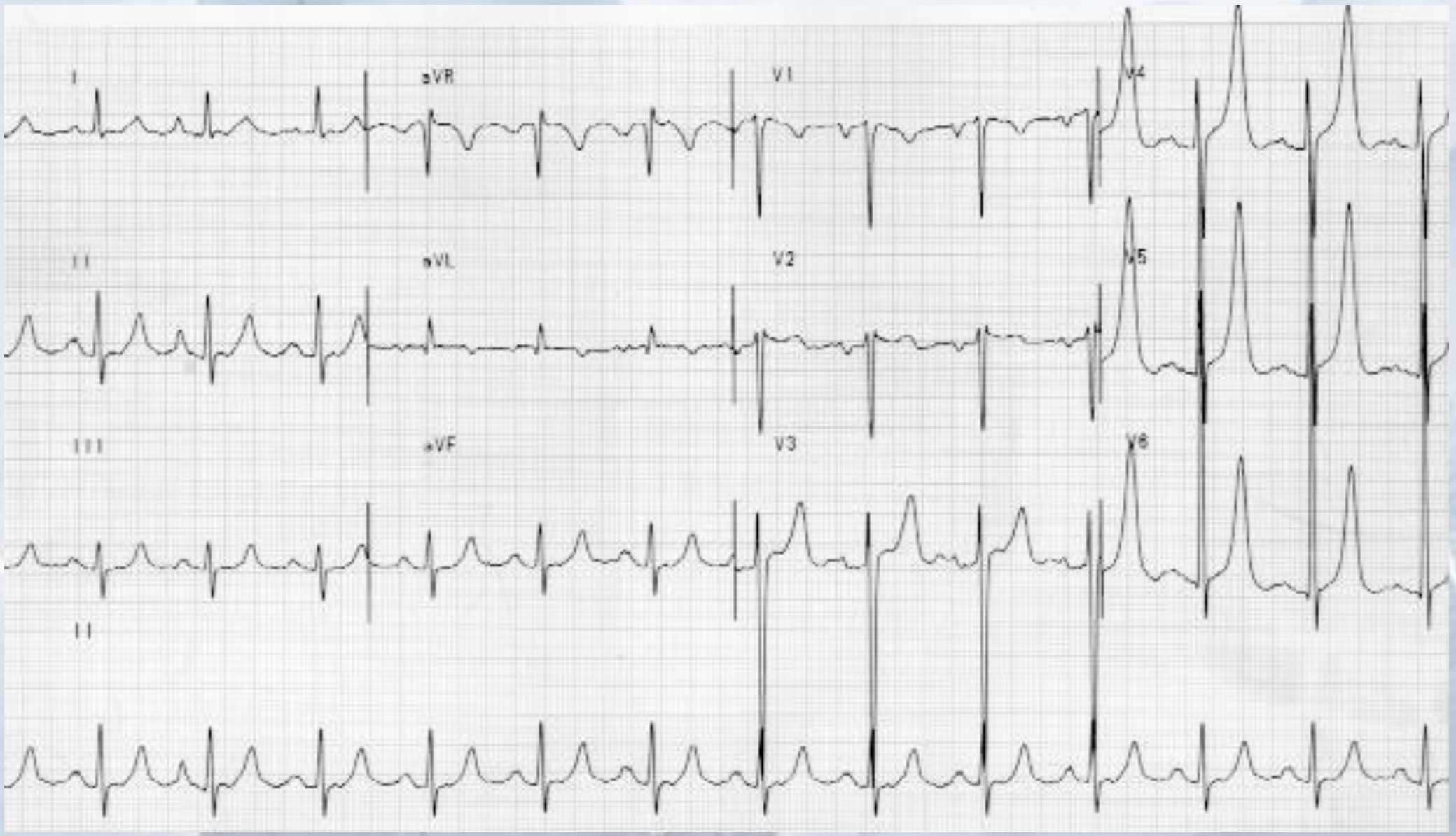
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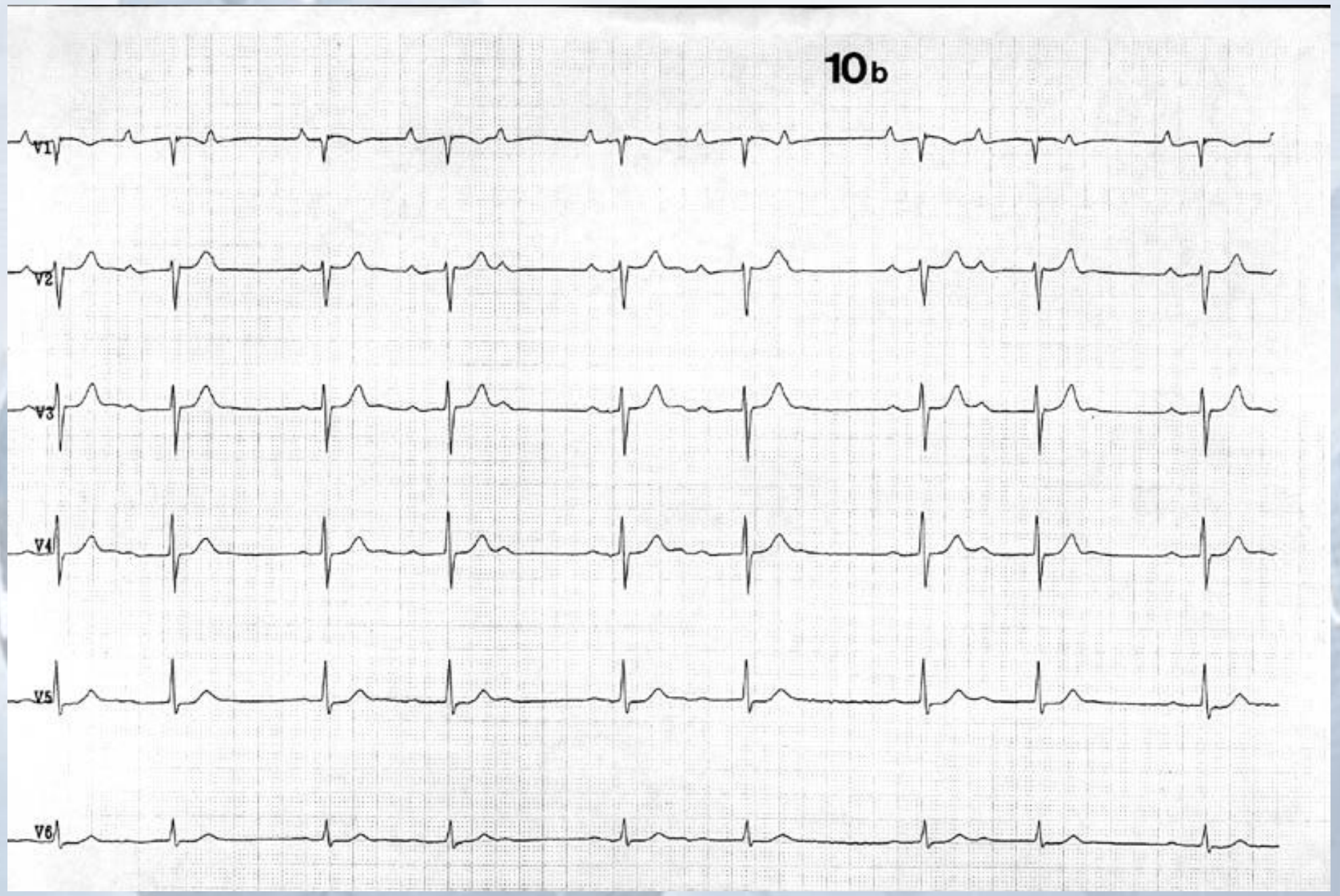
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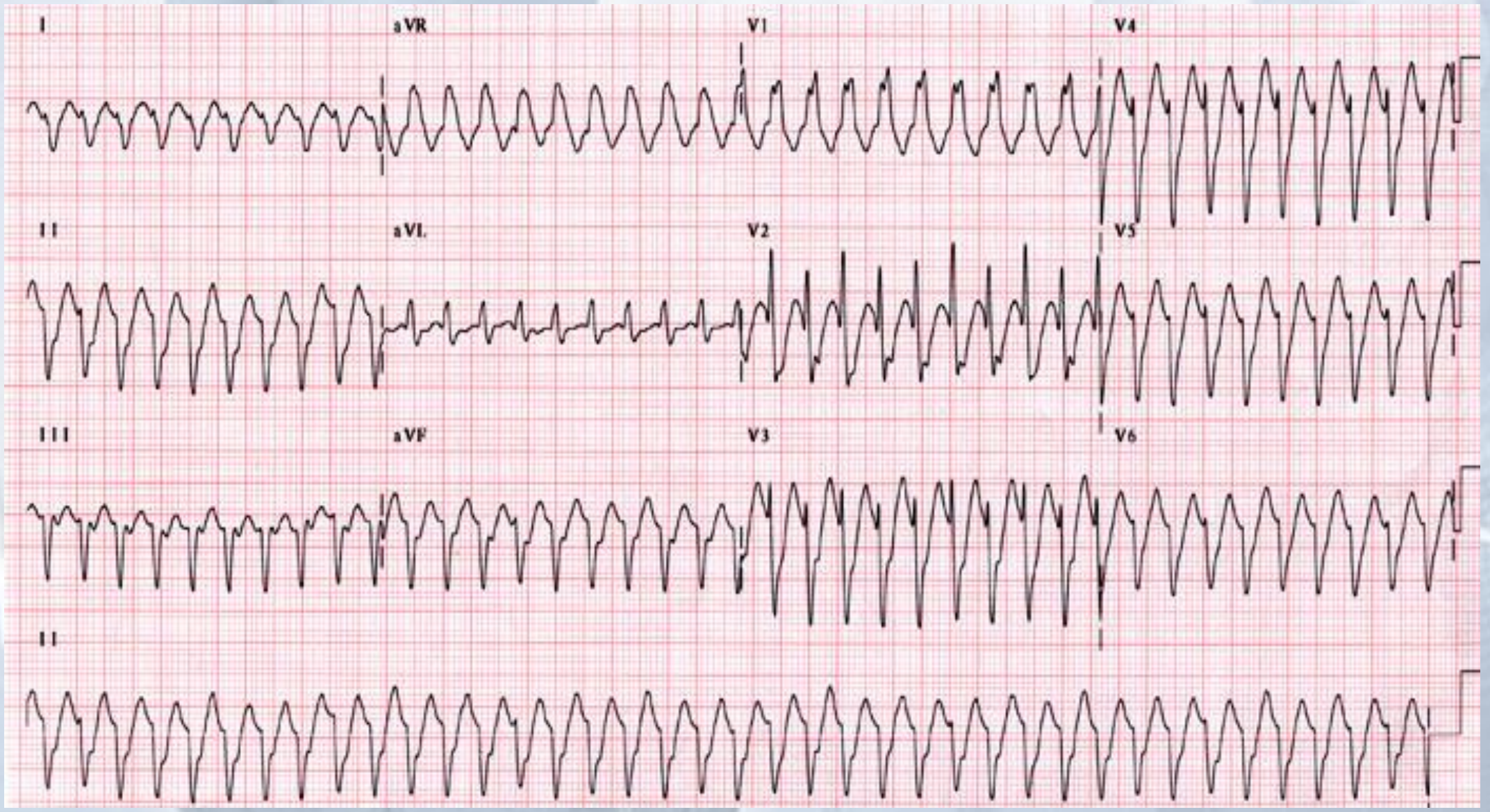
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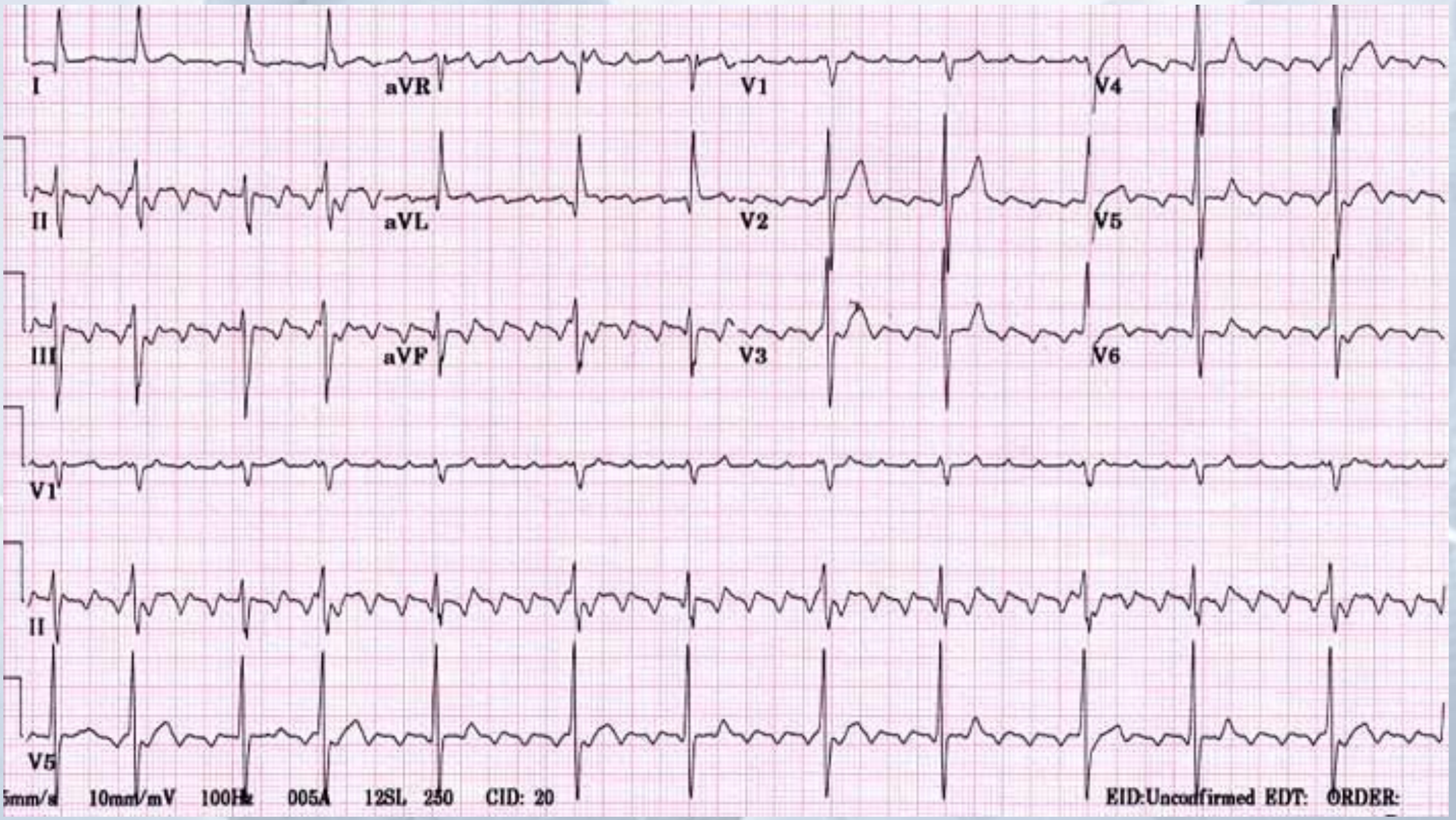
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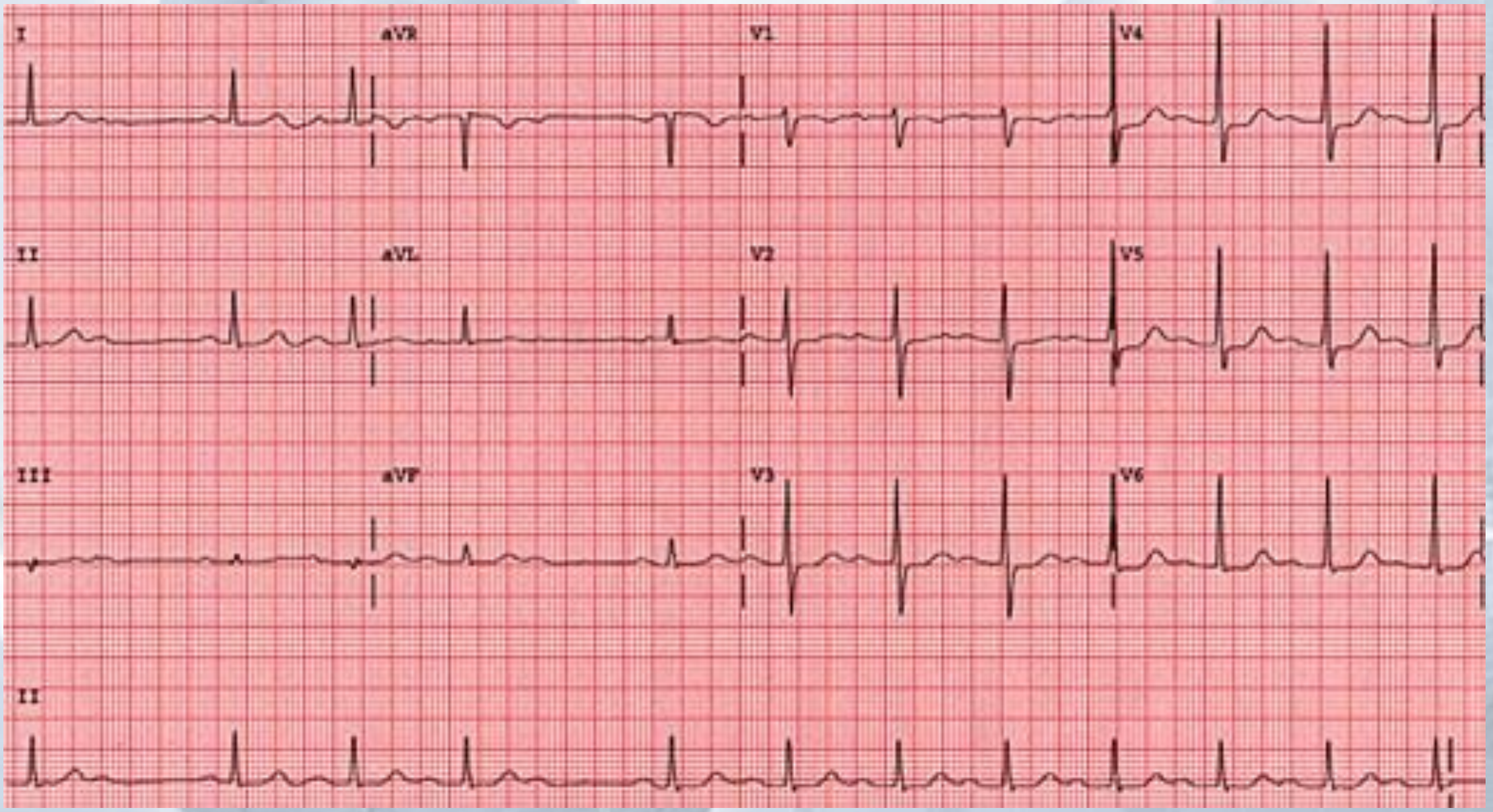
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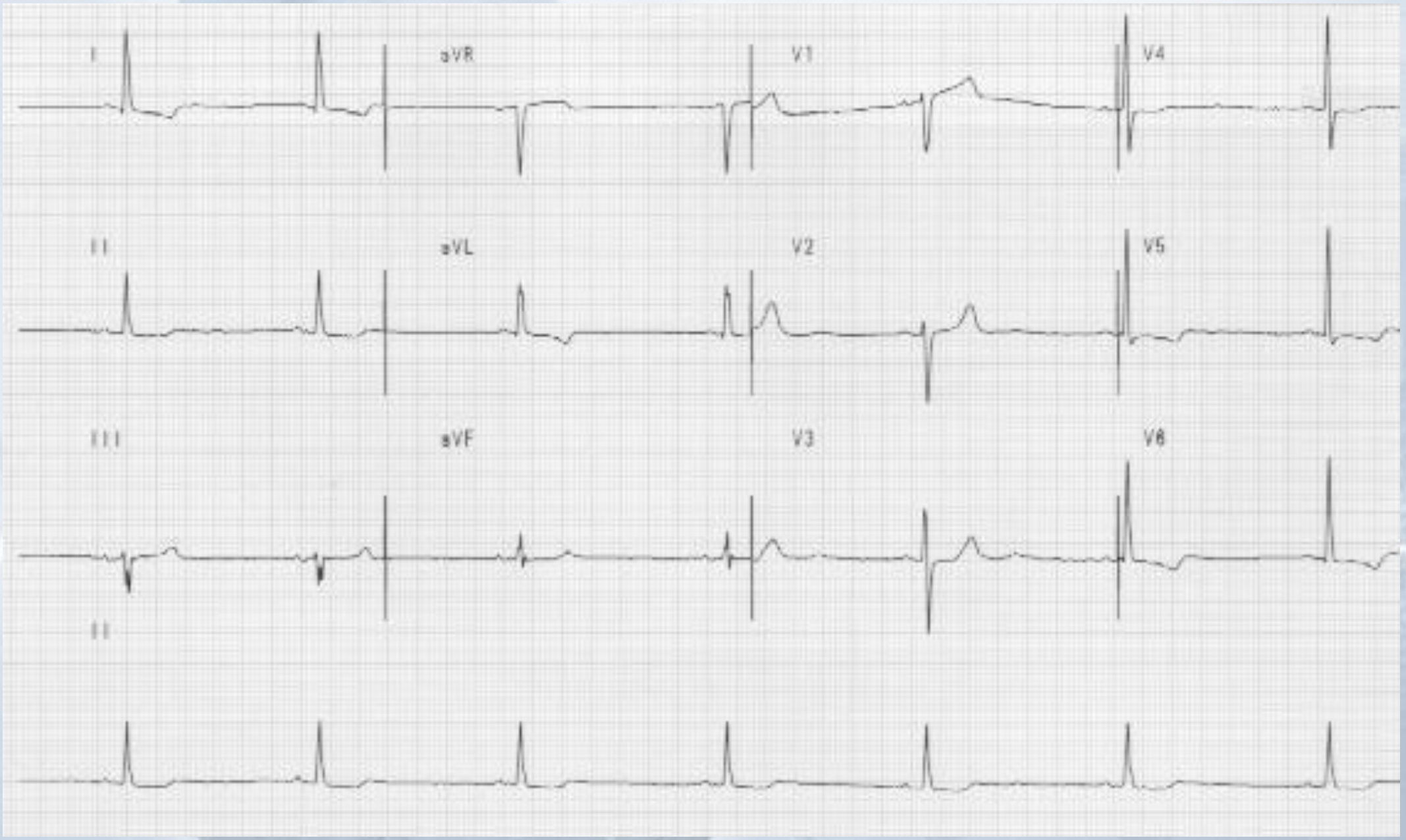
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A-fib with RVR

Unstable

- Cardioversion immediately with sedation
- No heart failure
  - metoprolol tartrate 2.5-5 mg IV bolus over 2 minutes, up to 3 doses
  - propranolol 1 mg IV over 1 minute, up to 3 doses at 2-minute intervals
  - diltiazem 0.25 mg/kg IV bolus over 2 minutes, then 5-15 mg/hour IV infusion
  - verapamil 0.075-0.15 mg/kg IV bolus over 2 minutes; may give an additional 10 mg after 30 minutes if no response, then 0.005 mg/kg/minute infusion
  - caution in patients with significant hypotension or heart failure

Stable

- metoprolol tartrate 25-100 mg orally twice daily
- metoprolol succinate (extended release) 50-400 mg orally once daily
- propranolol 10-40 mg orally 3-4 times daily
- diltiazem 120-360 mg orally once daily for extended release
- verapamil 180-480 mg orally once daily for extended release
- atenolol 25-100 mg orally once daily
- carvedilol 3.125-25 mg orally twice daily

Calculate $\underline{CHA_2DS_2VASc}$ score to determine anticoagulation need

Sinus tachycardia

Treat underlying etiology

- ACS: betablocker
- Dehydration: fluids
- Infection: treat infection, supportive care
- Panic/anxiety: gabapentin, propranolol, hydroxyzine, benzodiazepine
- Exercise: catch a breath
- etc

Ventricular tachycardia (V-tach)

Unstable

- Cardioversion/defibrillation
  - synchronized (if possible) 120 to 200 joule shock from a biphasic defibrillator or a 360 joule shock from a monophasic defibrillator

Stable

- Vagal maneuvers
- Antiarrhythmics, i.e. amiodarone
- AVOID: Intravenous calcium channel blockers, and digoxin
  - Relative contraindication IV beta blocker

A-flutter

Radiofrequency catheter ablation

Cardioversion with synchronized internal or external direct current

Rate control (may need IV CCB or BB prior to transitioning to PO, see MAT)

- metoprolol tartrate 25-100 mg orally twice daily
- metoprolol succinate (extended release) 50-400 mg orally once daily
- propranolol 10-40 mg orally 3-4 times daily
- diltiazem 120-360 mg orally once daily for extended release
- verapamil 180-480 mg orally once daily for extended release
- atenolol 25-100 mg orally once daily
- carvedilol 3.125-25 mg orally twice daily

Calculate *CHA_2DS_2VASc* for anticoagulation

- May or may not be discontinued 4 weeks after successful ablation

Multifocal atrial tachycardia

Treat underlying etiology

Verapamil: 5-10mg IV over 2 minutes (onset 1-2 minutes). Followed by 10mg IV bolus 15-30 minutes after initial dose, maintenance dose of 120-480mg daily

Metoprolol: 2.5-5mg IV over 2-5 minutes (onset 2-5 minutes). Followed by 2.5-5mg IV over 2-5 minutes at 10 minute intervals up to a maximum of 15mg IV. Maintenance with long-acting 50mg daily or short acting 25mg bid

Transition to PO meds (see A-flutter)

Ventricular fibrillation

Defibrillation

200 joules with biphasic waveforms

Normal sinus rhythm

Investigate non-cardiac causes for chief concern

If intermittent arrythmia is on the differential can consider holter monitor

3rd degree AV block

Unstable

- Atropine 1mg IV, repeated every 3-5 minutes
- If LOW BP: Dopamine IV 5mcg/kg/min titrated to max of 20/mcg/kg/min
- If HF: Dobutamine IV 2-5mcg/kg/min titrated to max of 20/mcg/kg/min
- Transcutaneous pacing

Stable: monitor, work up for reversible cause, permanent implantable pacemaker

Symptomatic sinus bradycardia

Hemodynamic instability atropine 1.0mg IV repeated every 3-5 minutes if needed to a max total dose of 3mg

- If no improvement
  - Temporary cardiac pacing
  - IV dopamine or epinephrine
- Glucagon for beta blocker or calcium channel blocker overdose
  - 3-10mg IV bolus given over 3-5 minutes repeated once if no response
  - If response give a 3-5mg/hr infusion

Hemodynamically stable

- Treat underlying cause, i.e. ACS, thyroid, medication
- If no underlying causing is identified work up for sinus node dysfunction
- If heart rate < 40 bpm will need pacer

Mobitz type II 2nd degree AV block

Unstable

- Isoproterenol, dopamine, dobutamine or epinephrine
- Temporary cardiac pacing
- Avoid atropine

Stable

- Investigate for reversible causes
- Permanent pace maker

Complete left bundle branch block

Asymptomatic

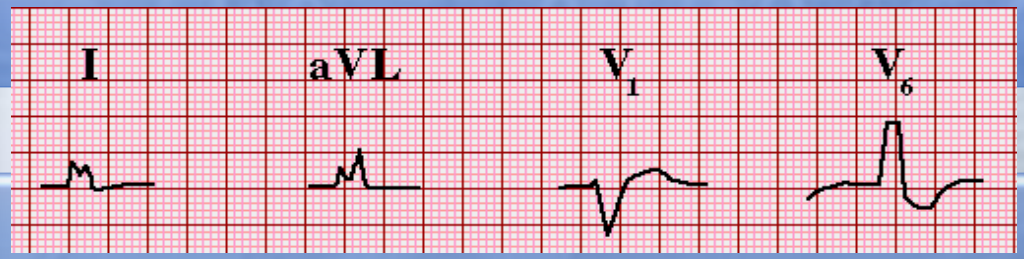
- No treatment

Evaluate

- ACS, valve disease, cardiomyopathies
  - If ACS suspected by chest pain or symptoms start STEMI work up/protocol

Syncope

- Permanent pacemaker



HFrEF

- Cardiac resynchronization therapy

Complete right bundle branch block

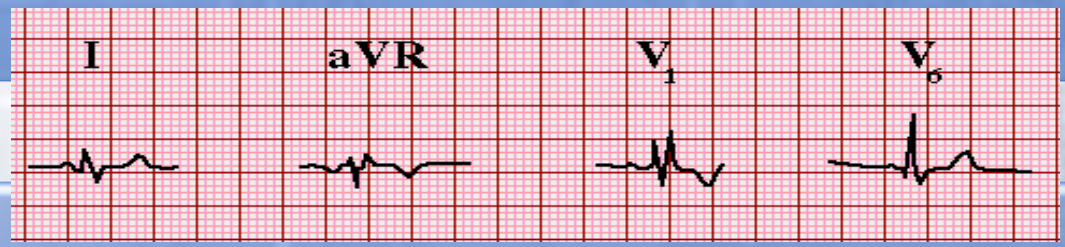
Typically asymptomatic

Investigate and treat underlying cause

- OSA, PE, pulmonary hypertension

Syncope

- Permanent pacemaker



HFrEF

- May benefit from cardiac resynchronization therapy

2nd degree Mobitz Type I block

Symptomatic

- Hemodynamically unstable give atropine 0.5mg IV repeated every 3-5 minutes to a total dose of 3mg
- Ventricular pacing
- if LOW BP: Dopamine IV 5mcg/kg/min titrated to max of 20/mcg/kg/min
- if HF: Dobutamine IV 2-5mcg/kg/min titrated to max of 20/mcg/kg/min

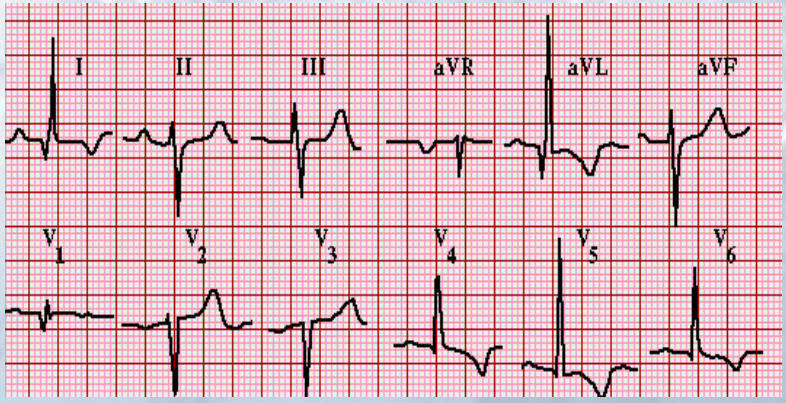
Asymptomatic

- Evaluate for reversible causes
  - No cause identified, no treatment is needed

Left ventricular hypertrophy

Treat underlying etiology

- Hypertension
- Valve disease
- Cardiomyopathy
- Infiltrative disease



1st degree AV block

Asymptomatic

- No treatment is needed

Symptomatic

- Treat underlying cause
  - Ischemia
  - medications

Posterioinferior STEMI in RCA territory

Revascularization within 90 minutes

- Can be performed as late as 12-24 hours

Fibrinolytics

Aspirin

Clopidogrel

Low molecular weight heparin

ACEI/ARB

Atorvastatin

Betablocker if hemodynamically stable

O2 if oxygen sats <90%

As needed for pain

- Nitro 0.4mg sublingual every 5 minutes
- Morphine 4 - 8mg IV every 5 - 15 minutes

Anterioseptal STEMI in LAD territory

Revascularization within 90 minutes

- Can be performed as late as 12-24 hours

Fibrinolytics

Aspirin

Clopidogrel

Low molecular weight heparin

ACEI/ARB

Atorvastatin

Betablocker if hemodynamically stable

O2 if oxygen sats <90%

As needed for pain

- Nitro 0.4mg sublingual every 5 minutes
- Morphine 4 - 8mg IV every 5 - 15 minutes

Hyperkalemia with peaked T waves

Stabilize myocardiocytes

- Calcium gluconate 1000mg over 2-3 minutes

Intracellular shift

- Insulin 10u regular with 50mL of 50% dextrose
- Beta-2-adrenergic agonists Albuterol 10-20mg nebulizer over 10 min

Excretion

- Furosemide 40mg IV every 12 hours (with fluids if euvolemic)
- Kayexalate 15gm PO qd-qid OR 30-50gm PR q6 hours
- Dialysis

Anteriolateral STEMI in left main territory

Revascularization within 90 minutes

- Can be performed as late as 12-24 hours

Fibrinolytics

Aspirin

Clopidogrel

Low molecular weight heparin

ACEI/ARB

Atorvastatin

Betablocker if hemodynamically stable

O2 if oxygen sats <90%

As needed for pain

- Nitro 0.4mg sublingual every 5 minutes
- Morphine 4 - 8mg IV every 5 - 15 minutes

Pericarditis

Restrict activity + NSAIDS + Cholchcine

NSAIDS

- Ibuprofen 600-800mg tid
- aspirin 650-1000mg daily
- Indomethacin 25-50mg tid
  - Taper dose weekly once pain free for 24 hours

Colchicine 0.5mg – 1mg (or 1.6-1.2mg) bid on day one

- Maintenance 0.5-0.6 bid if ≥ 70kg
- Maintenance 0.5-0.6 daily if < 70kg

If there is a contradiction to NSAIDS

- Glucocorticoid at the lowest effective dose (start at 0.2-0.5mg/day) with slow taper to avoid rebound pericarditis