

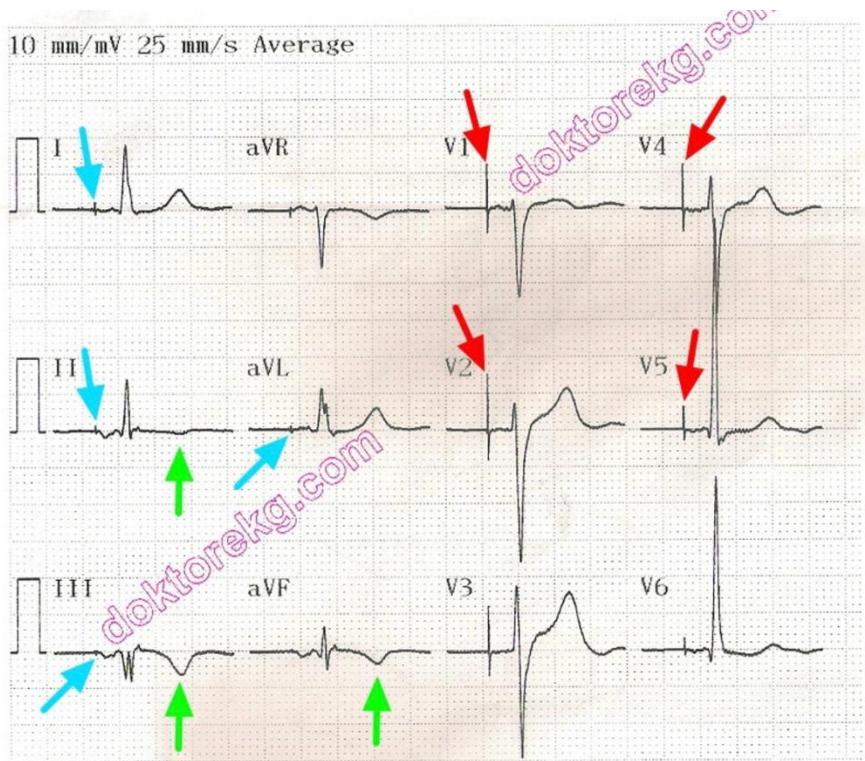
💡 What Is a Pacemaker Rhythm?

A pacemaker rhythm occurs when an artificial pacemaker initiates electrical impulses to control heart rate when the heart's natural conduction system fails or is too slow.

Pacemakers can pace:

- Atria
- Ventricles
- Both (dual-chamber)

The hallmark sign on ECG is the pacemaker spike (a thin vertical line).



- Appears as a sharp vertical line
- Represents electrical stimulus
- Seen before the chamber that is paced
- One spike = one paced chamber

◆ Types of Pacemaker Rhythms

1 Atrial Paced Rhythm (A-Paced)

ECG Characteristics

- Pacemaker spike before P wave
- Normal-looking QRS (narrow)
- Rhythm usually regular
- Ventricular conduction is intact

Interpretation

- Pacemaker is stimulating the atria
- The impulse travels normally through the AV node

Common Indications

- Sinus node dysfunction
- Sick sinus syndrome

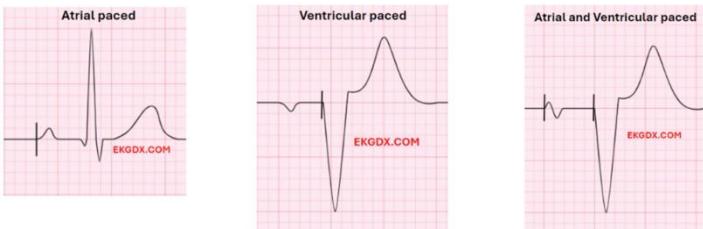
★ Key Tip:

If you see a spike → P wave → normal QRS → think atrial paced.

2 Ventricular Paced Rhythm (V-Paced)

Pacemaker Basics

Step 1: Identify the chamber(s) paced.



ECG Characteristics

- Pacemaker spike before QRS
- Wide, bizarre-looking QRS
- No normal P-QRS relationship
- Rhythm usually regular

Interpretation

- Pacemaker stimulates the ventricles
- Depolarization bypasses normal conduction pathways

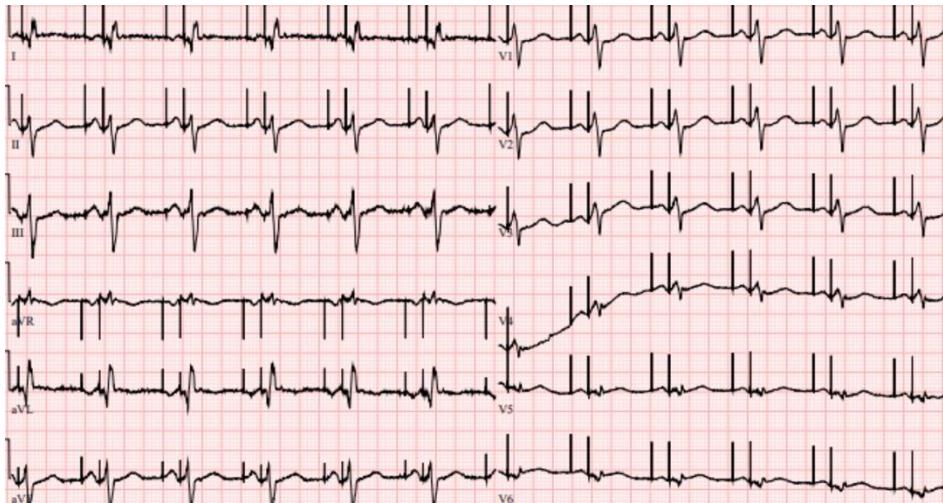
Common Indications

- Complete heart block
- Severe bradycardia
- Ventricular standstill

Exam Pearl:

Wide QRS + spike right before it = ventricular pacing.

3 Dual-Chamber Paced Rhythm (AV Sequential)



ECG Characteristics

- Two pacemaker spikes
 - First → P wave (atrial pacing)
 - Second → QRS (ventricular pacing)
- Wide QRS
- Regular rhythm

Interpretation

- Pacemaker coordinates atrial then ventricular contraction
- Mimics normal cardiac timing

Indications

- AV block with atrial involvement
- Advanced conduction disease

★ Mnemonic:

Spike–P–Spike–QRS

◆ **Pacemaker Capture**

Capture = Pacemaker stimulus causes depolarization

Type	What You See
Atrial capture	Spike followed by P wave
Ventricular capture	Spike followed by wide QRS
Failure to capture	Spike with no P wave or QRS

⚠ Failure to capture is abnormal and urgent.

◆ **Pacemaker Sensing**

Normal Sensing

- Pacemaker detects intrinsic beats
- Does NOT fire unnecessarily

Oversensing

- Pacemaker incorrectly senses signals
- Results in too few spikes

Undersensing

- Pacemaker misses intrinsic beats
- Fires randomly or inappropriately

⚠ Look for spikes appearing inside or after QRS/T waves → undersensing.

◆ **Pacemaker Malfunctions (Common Test Questions)**

Malfunction	ECG Clue
Failure to pace	No spikes
Failure to capture	Spike but no beat
Failure to sense	Spikes at wrong times
Runaway pacemaker	Very fast paced rhythm

◆ **Key Comparison Table**

Rhythm	Spike Location	QRS
Atrial paced	Before P	Narrow
Ventricular paced	Before QRS	Wide
Dual chamber	Before P & QRS	Wide

 **Quick Memory Tips**

- Wide QRS = ventricular involvement
- Two spikes = dual chamber
- **Spike with no beat = capture problem
- Paced rhythms are usually regular