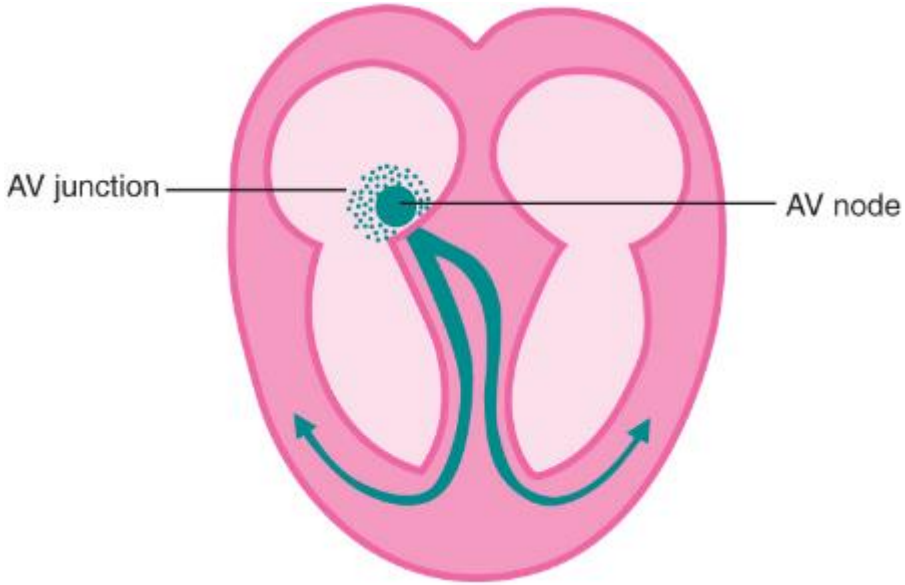
Junctional Dysrhythmias

Overview

- When SA node and atrial pacemakers fail to generate impulse, AV node may become secondary pacemaker of heart
- AV node located in general area of lower right atrium, near septum

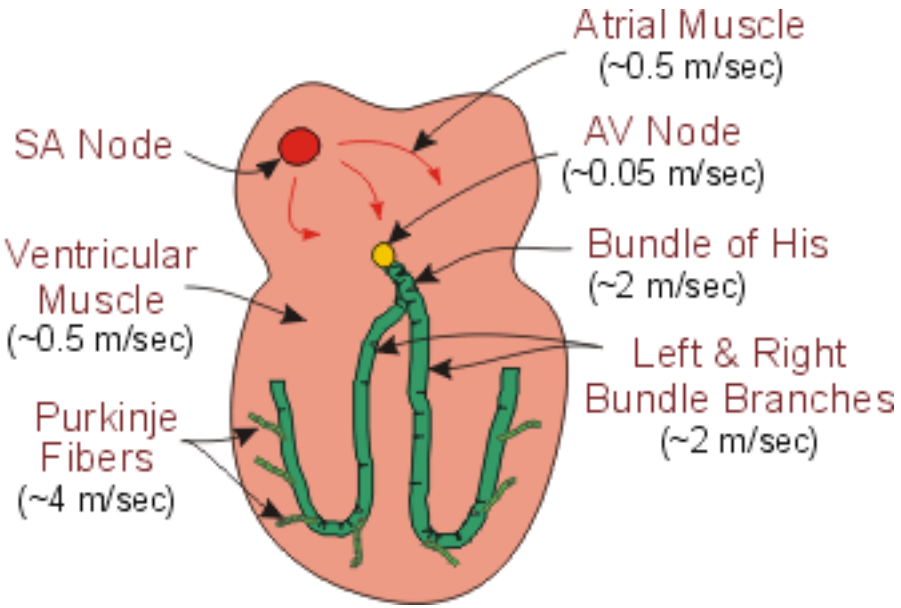


Overview

- AV junction = Cardiac tissue immediately surrounding AV node which can also initiate electrical pulses
  - Functions as heart's secondary/backup pacemaker
  - Rate is slower – 40-60 ipm
- Junctional dysrhythmias = Rhythms that start in either AV node or AV junctional area
  - Not usually lethal but patient must be assessed

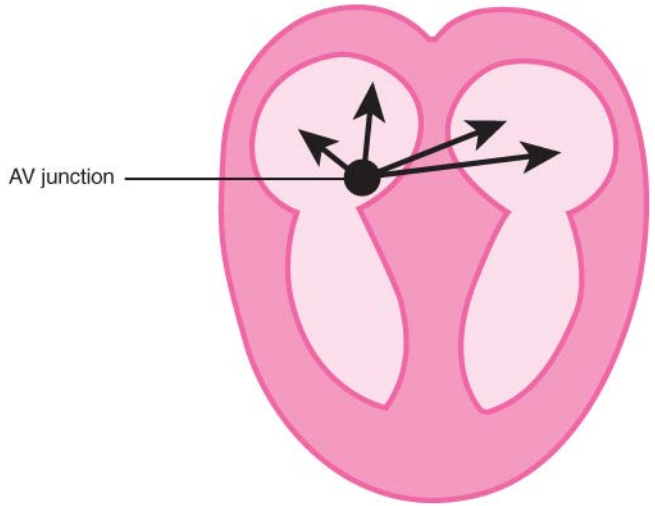
Overview

- Electrical pathway of junctional dysrhythmias
  - AV junction ➔ Bundle of His and bundle branches ➔ Purkinje's fibers ➔ Ventricular muscle



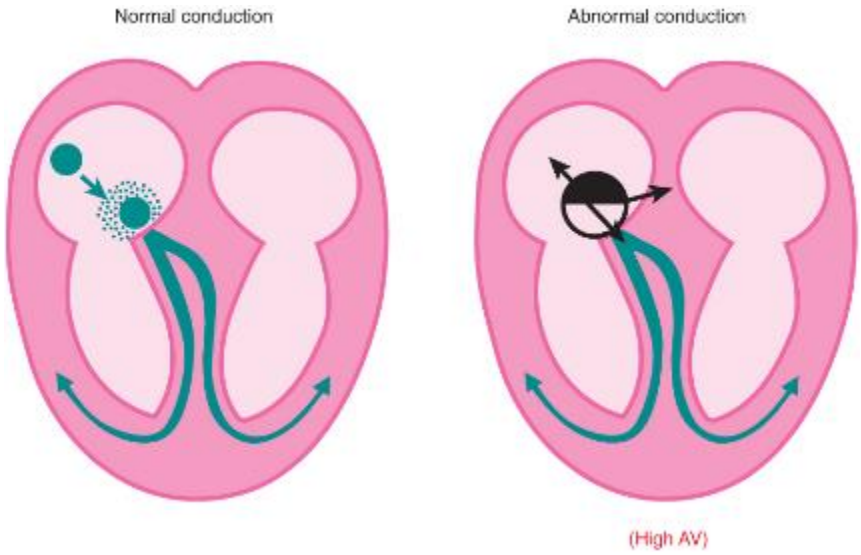
Overview

- Since ventricular conduction is normal, QRS is in normal range of 0.04–0.12 second
- Electrical impulse that depolarizes atria must travel backwards (retrograde) from AV junction through atria
  - This is why we see changes in P wave that identifies junctional dysrhythmia
    - Inverted
    - Buried (hidden)
    - Retrograde

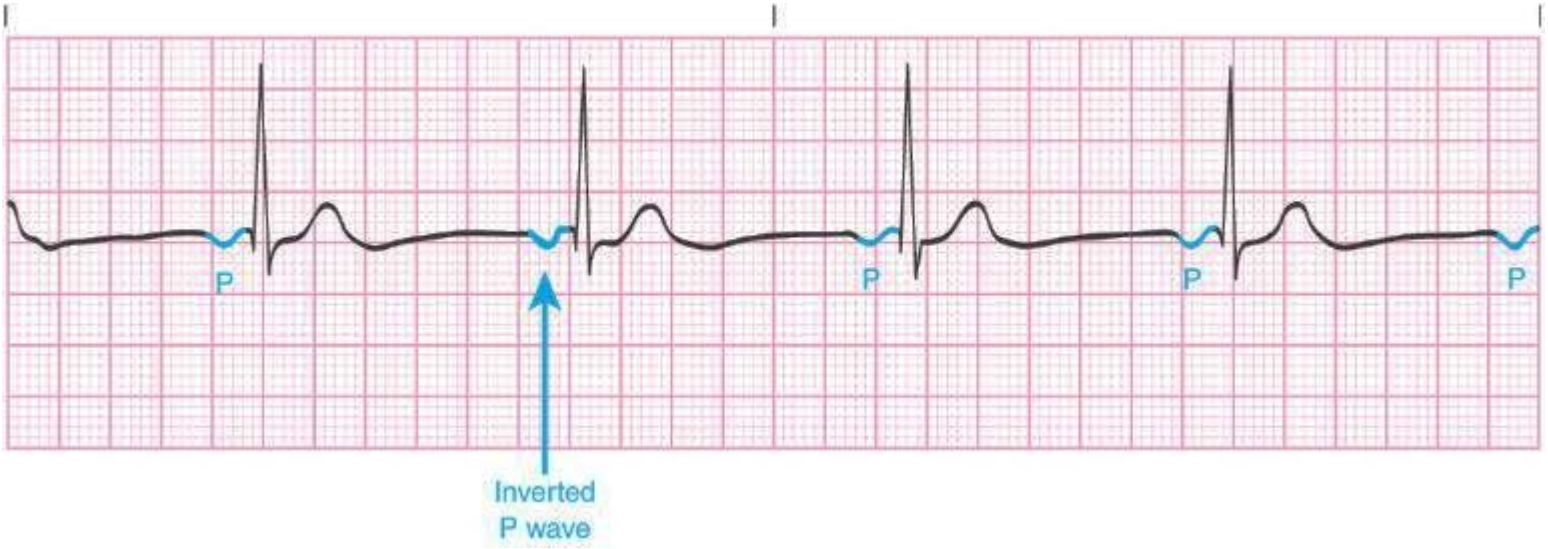


Inverted P Wave

- Characteristics:
  - Electrical impulse starts high in AV junction
  - Atria depolarize quickly in retrograde manner
  - P wave is upside down (inverted)
  - Since the distance to travel to ventricles is shorter than normal, the PR interval may be shortened (< 0.12 second)

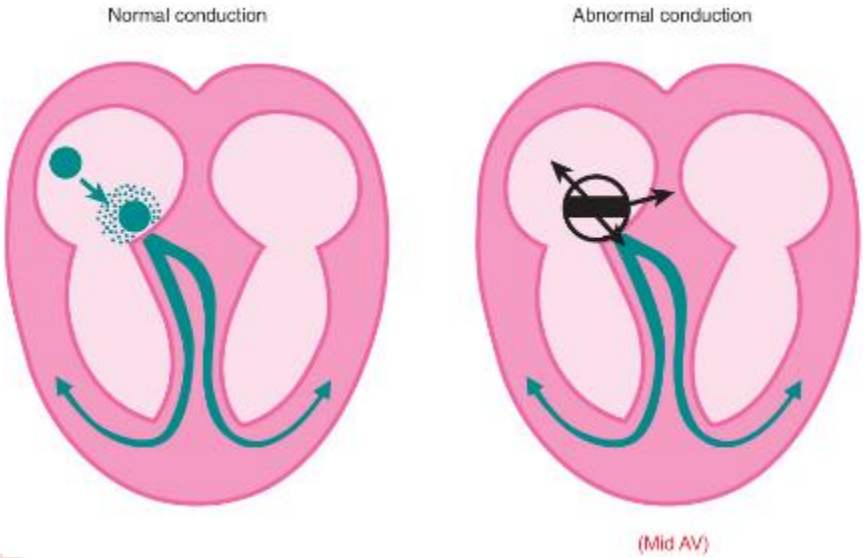


Inverted P Wave

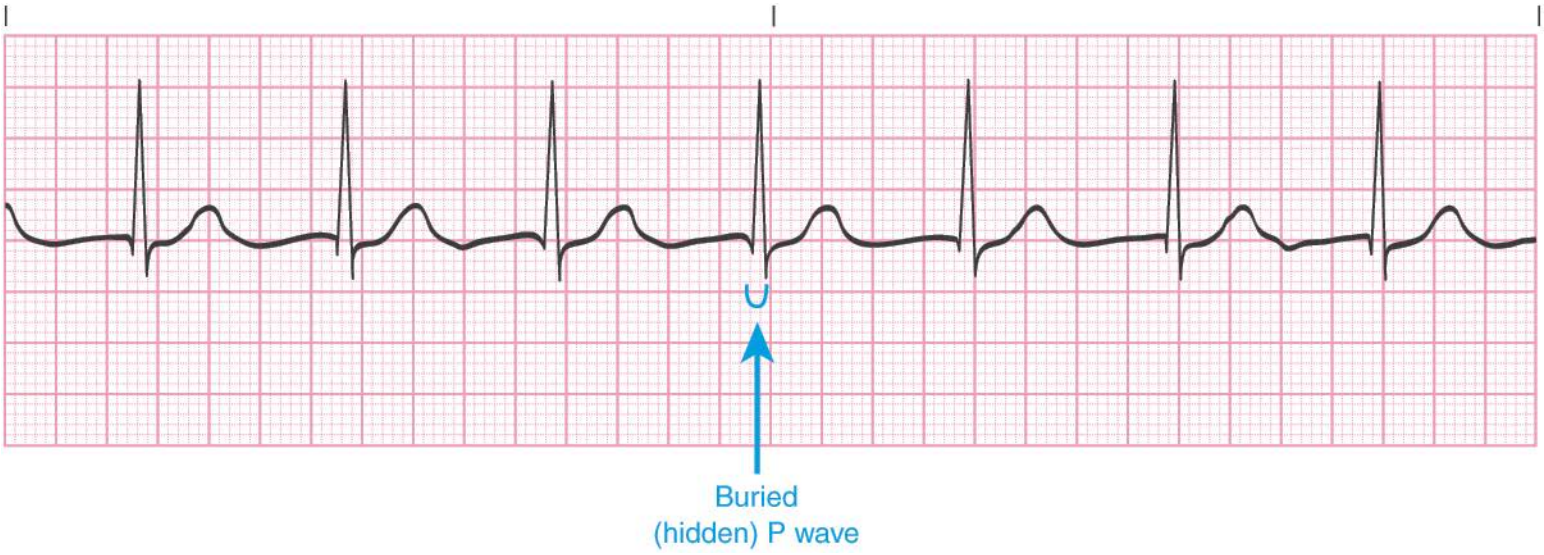


Buried P Wave

- Characteristics:
  - Impulse originates in mid-AV junctional area so distance to atria and ventricles almost the same
  - Atria and ventricles depolarize at almost same time
  - Force of atrial depolarization < force of ventricular depolarization
  - P wave and PR interval not seen

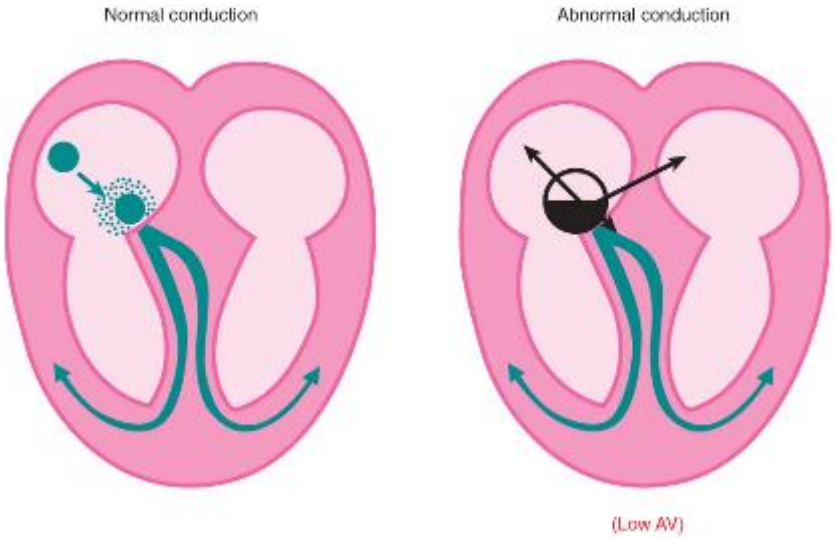


Buried P Wave

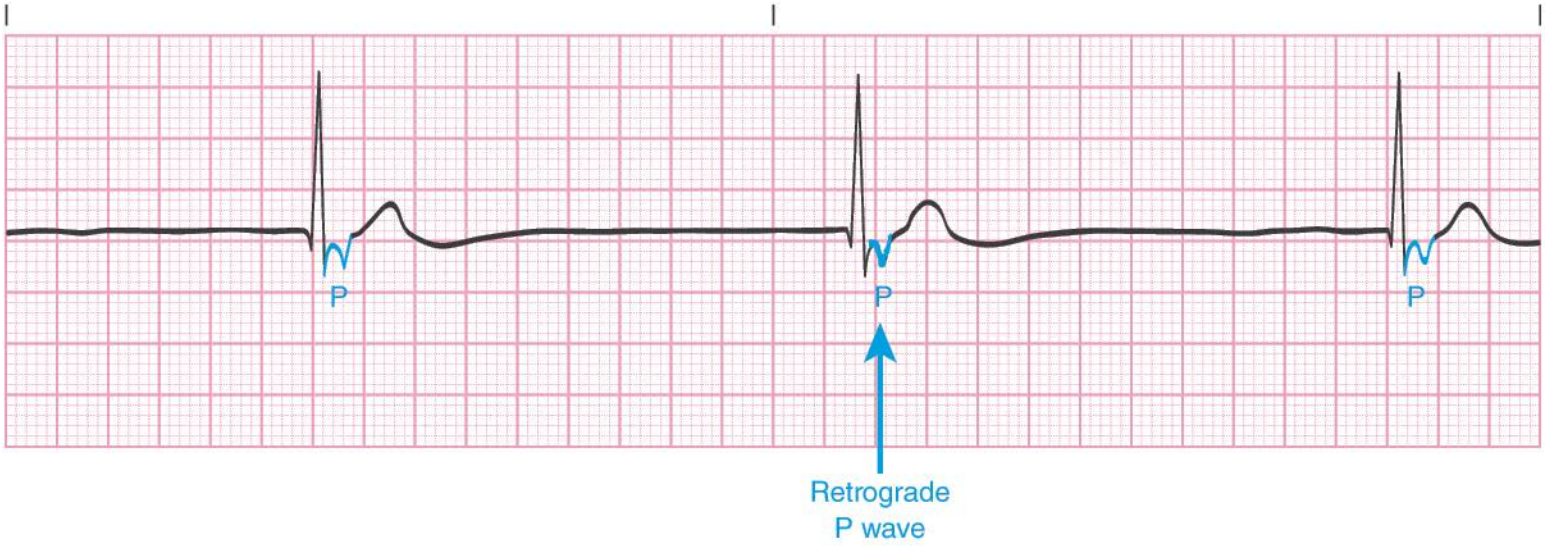


Retrograde P Wave

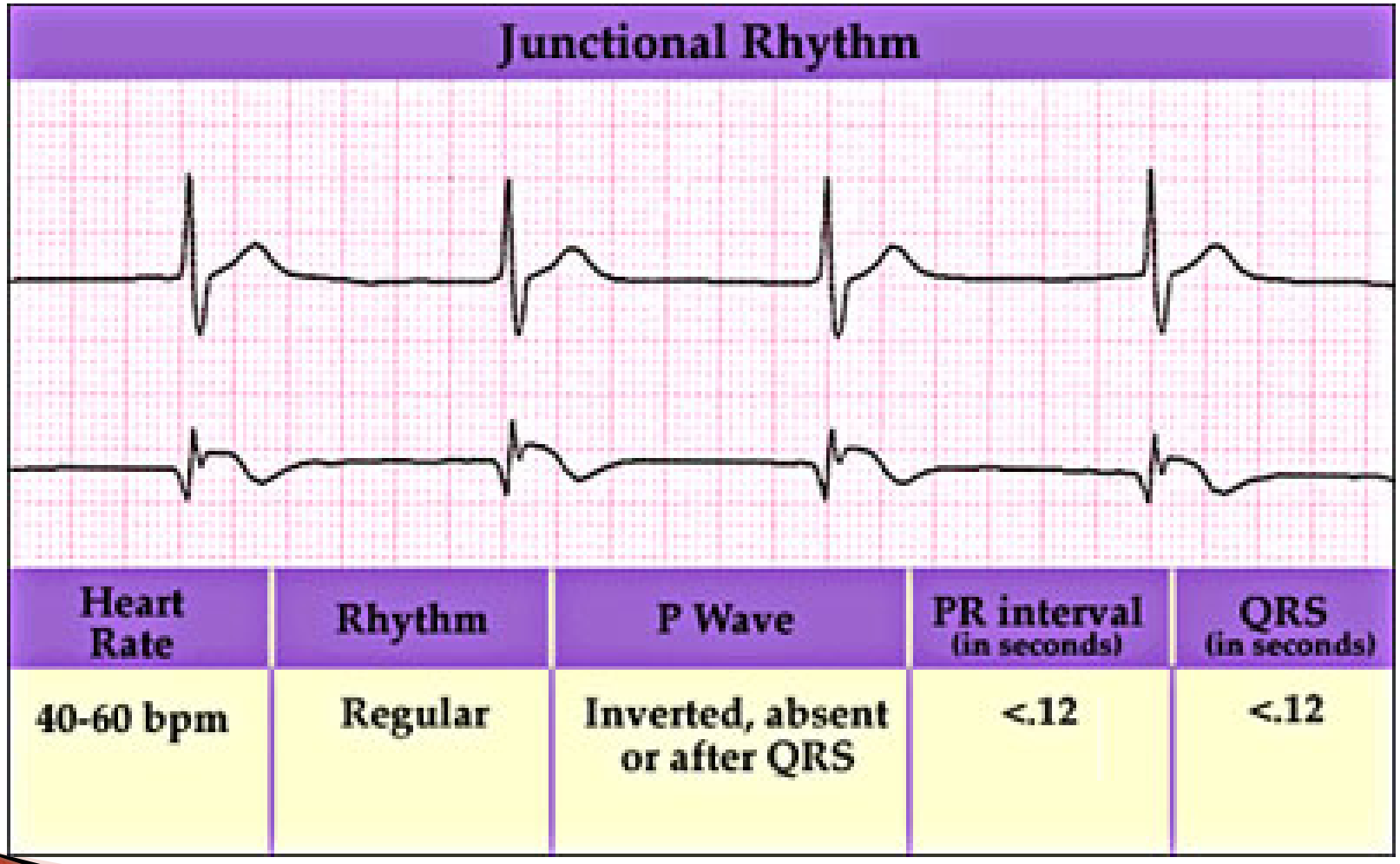
- Characteristics:
  - Impulse originates in lower part of AV junctional area
  - Impulse must travel farther to atria than ventricles
  - Atria depolarize slightly later than ventricles
  - P wave appears after QRS
  - No measurable PR interval



Retrograde P Wave



Junctional Bradycardia Dysrhythmia

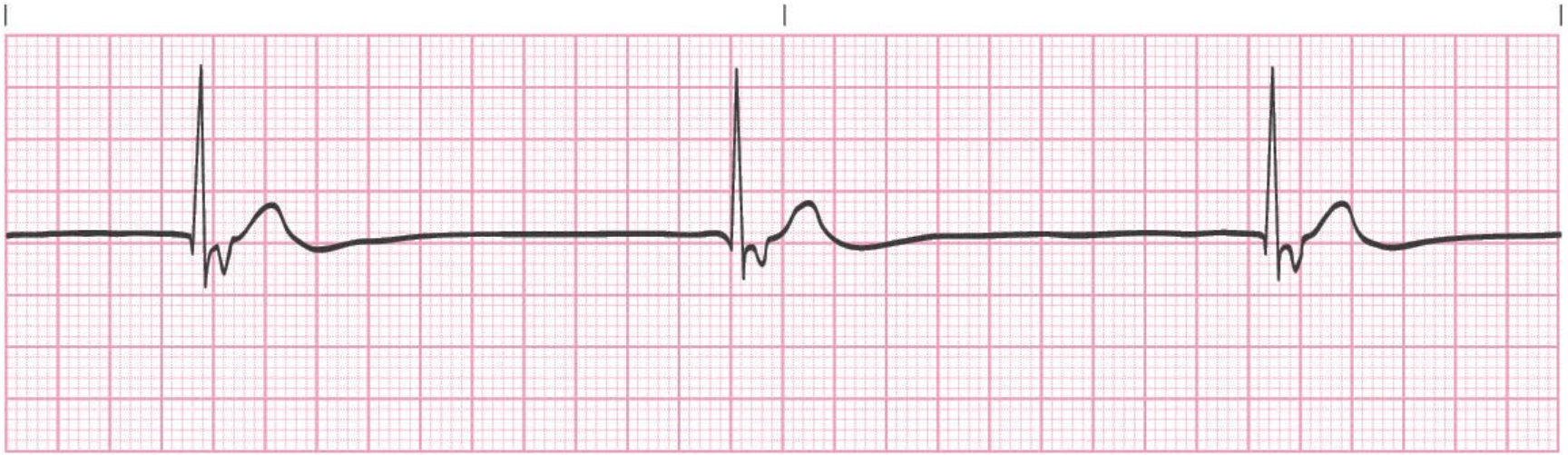


Junctional Rhythm				
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
40-60 bpm	Regular	Inverted, absent or after QRS	<.12	<.12

Junctional Bradycardia Dysrhythmia

- Characteristics:
  - Impulses originate from single site in AV junctional area
  - Rate < 40 ipm
  - P wave either inverted, buried or retrograde
  - PR interval, if present, < 0.12 second
  - QRS = 0.04–0.12 second
  - P–P intervals (if seen) and R–R intervals regular and equal
  - May be caused by heart disease or medications such as digitalis, sedatives, calcium channel blockers, or beta blockers
  - May be serious if rate falls significantly or patient becomes unstable

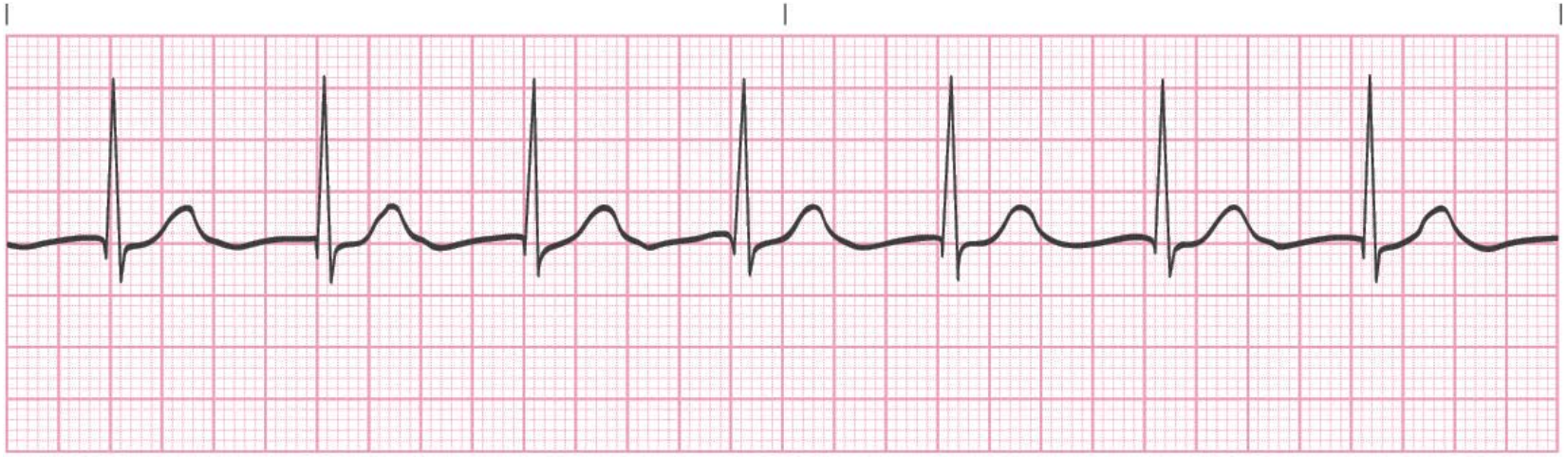
Junctional Bradycardia Dysrhythmia



Accelerated Junctional Dysrhythmia / Junctional Tachycardia

- Characteristics:
  - Impulses originate from single site within AV junction
  - Rate = 61–100 ipm (accelerated junctional) or 101–150 ipm (junctional tachycardia)
  - P wave is inverted, buried, or retrograde
  - PR interval, if present, < 0.12 second
  - QRS = 0.04–0.12 second
  - P–P intervals (if seen) and R–R intervals regular and equal
  - May be dangerous if patient becomes unstable

Accelerated Junctional Rhythm



Junctional Tachycardia

From Aehlert B: ECGs made easy, *ed 4, St Louis, 2011, Mosby, Inc., an imprint of Elsevier, Inc.*

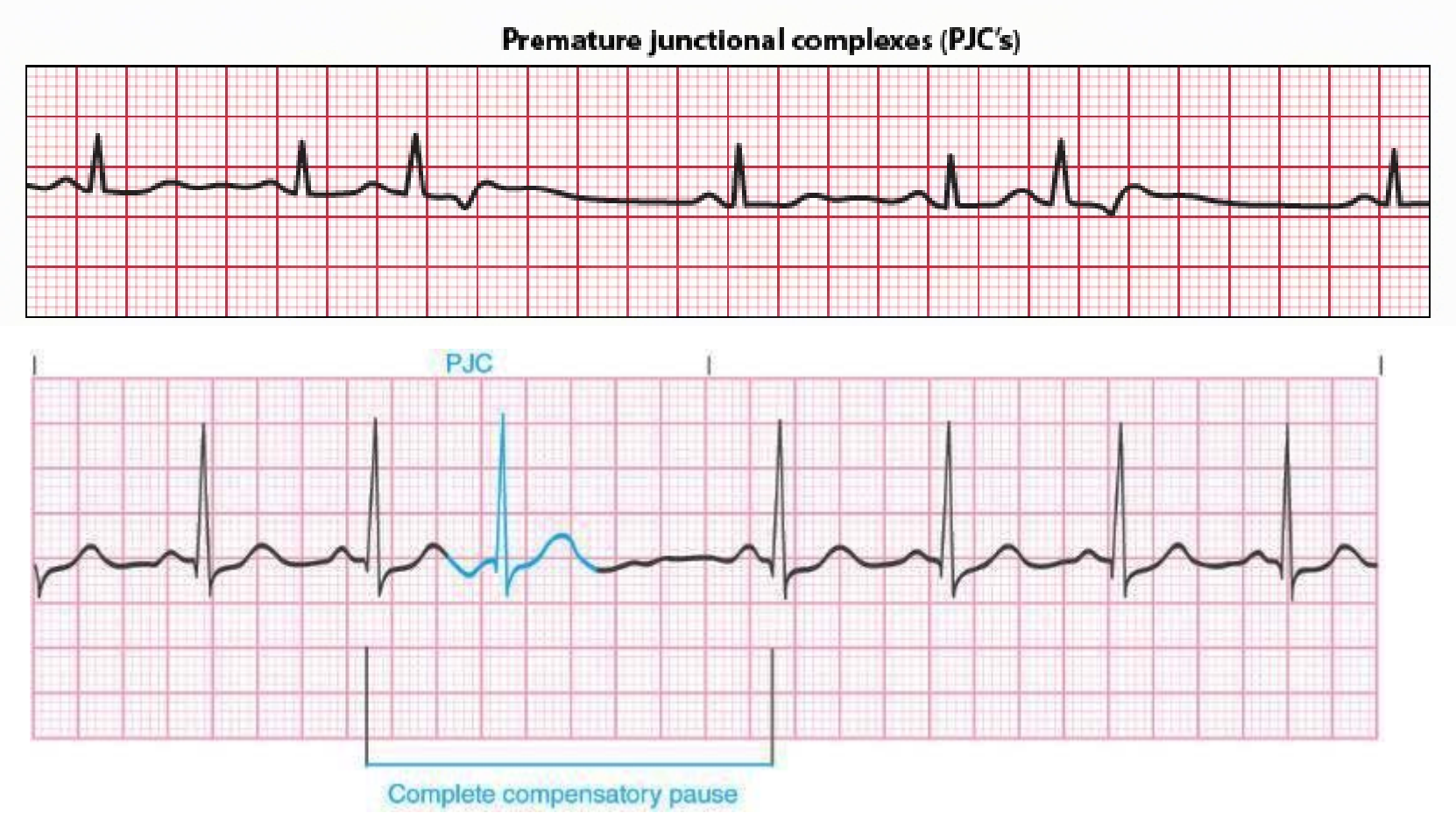
Accelerated Junctional Dysrhythmia / Junctional Tachycardia

- Causes:
  - Heart failure
  - Acute coronary syndrome
  - COPD
  - Digitalis toxicity
  - Damage to AV Junction from an acute inferior wall MI or rheumatic fever
  - Electrolyte imbalance
  - Hypoxia
  - Heart disease
  - Drugs such as atropine, caffeine, or amphetamines
- May also result from pain, fever, acute anemia, or exercise

Premature Junctional Complex

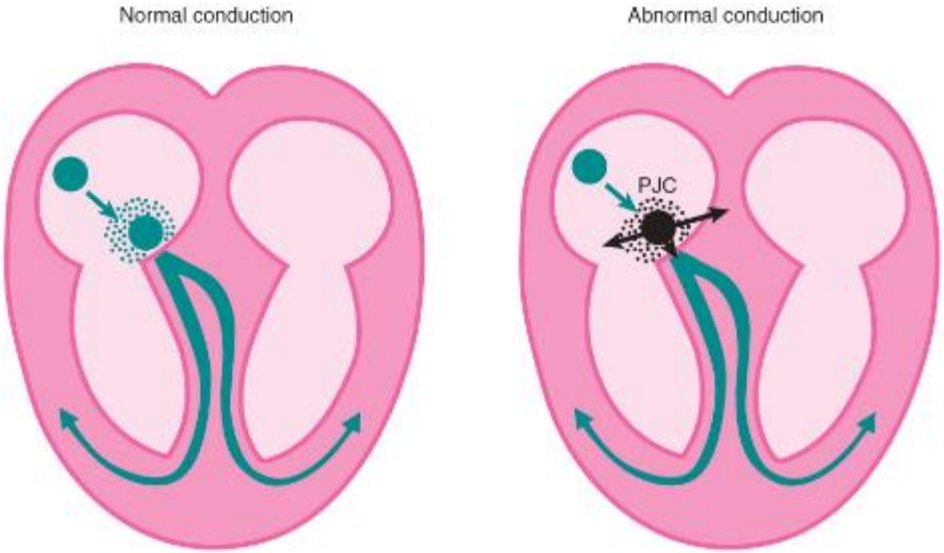
- Also known as PJC or premature junctional contraction
- Characteristics:
  - Originates from single site in AV junction
  - Occurs earlier than next expected complex of underlying rhythm
  - Common and can occur in any rhythm
  - P wave either inverted, buried, or retrograde
  - PR interval, if present, < 0.12 second
  - QRS= 0.04-0.12 second
  - P-P and R-R intervals vary

Premature Junctional Complex



Premature Junctional Complex

- Characteristics:
  - May be followed by complete compensatory pause
  - Underlying rhythm must be identified
    - Usually easier to identify in sinus or bradycardic rhythm
  - Not a lethal dysrhythmia, but must be monitored closely as it may trigger more serious dysrhythmia



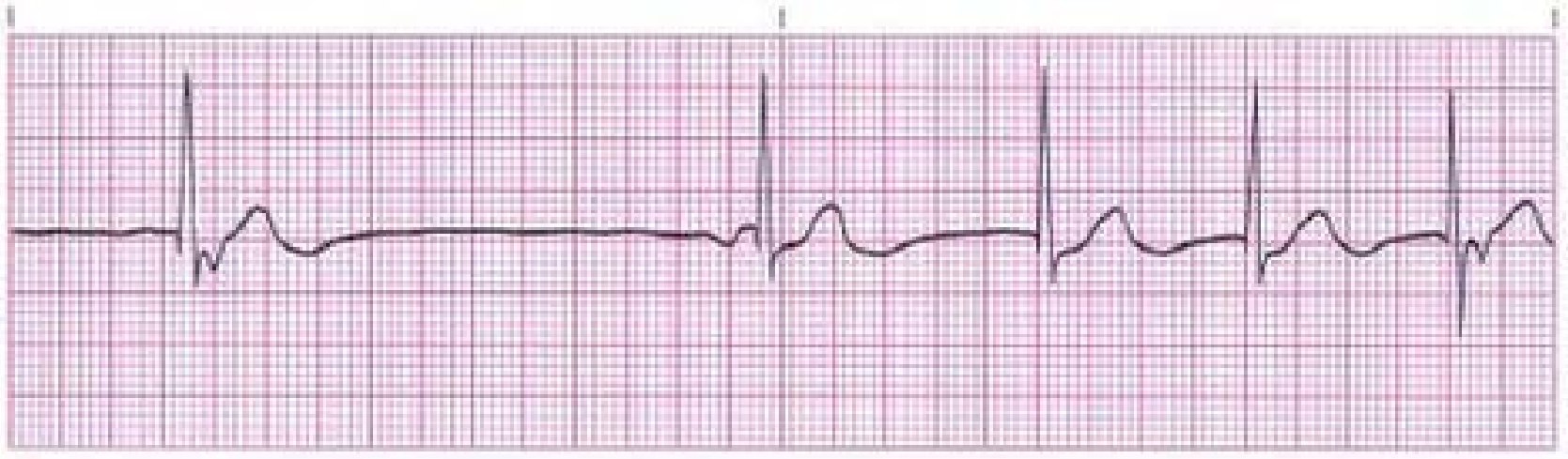
Premature Junctional Complex

- Causes:
  - Excessive dose of certain cardiac drugs
  - Hypoxia
  - CHF
  - Coronary artery disease

- May also be caused by pain, fever, fear, anxiety, sudden excitement, exercise, increased irritability of myocardium, or effects of digitalis, atropine, nicotine, caffeine, and amphetamines

Wandering Junctional Pacemaker Dysrhythmia

- Characteristics:
  - May be caused by heart disease, myocardial infarction, or drug toxicity
  - Has 3 or more junctional sites



Wandering Junctional Pacemaker Dysrhythmia

- Characteristics:
  - Originates from at least 3 sites within junctional area
  - Size and shape of each complex determined by site of origin
  - P waves are either inverted, buried, or retrograde
  - PR interval, if present, < 0.12 second
  - QRS = 0.04–0.12 second
  - P–P and R–R intervals vary
  - Rate may vary, but usually 40–60 ipm
  - Not usually lethal but may progress to more serious dysrhythmia

Junctional Escape Rhythm

- Often seen after successful CPR
- Rate = 40–60 bpm
- P waves are absent, inverted, or retrograde
- Causes:
  - Rate of impulse formation of dominant pacemaker drops below that of escape pacemaker in AV junction
  - Electrical impulses from SA node or atria fail to reach AV junction due to sinus arrest, SA exit block, or 3rd Degree AV block

Junctional Escape Rhythm