Chapter 5

Junctional Rhythms

Objectives

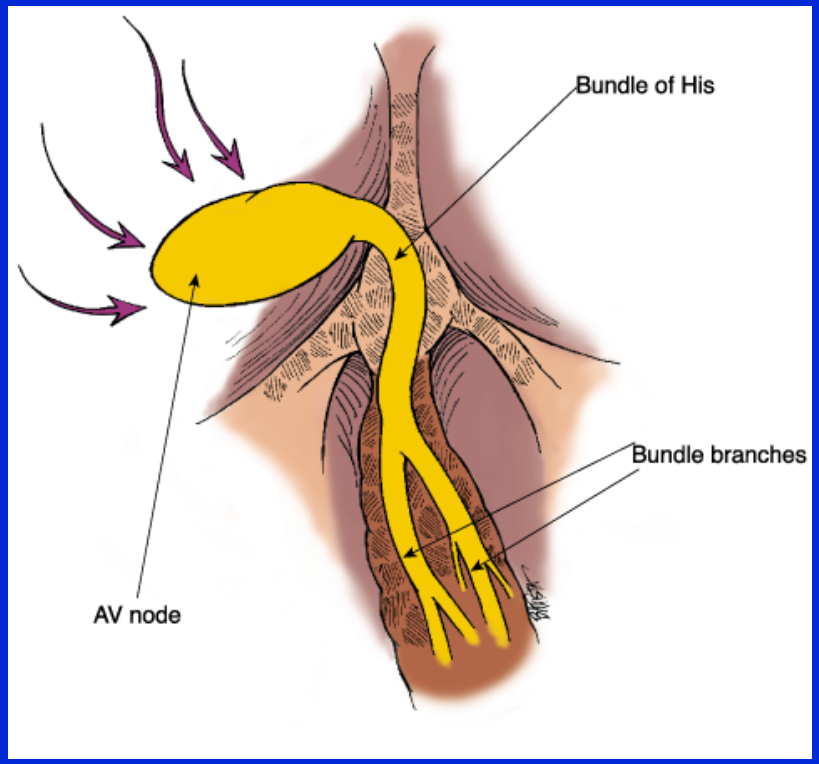
- Describe the ECG characteristics, possible causes, signs and symptoms, and initial emergency care for premature junctional complexes (PJCs).
- Describe the ECG characteristics and possible causes for junctional escape beats.
- Explain the difference between premature junctional complexes and junctional escape beats.

Objectives

- Describe the ECG characteristics, possible causes, signs and symptoms, and initial emergency care for a junctional escape rhythm.
- Describe the ECG characteristics, possible causes, signs and symptoms, and initial emergency care for an accelerated junctional rhythm.
- Describe the ECG characteristics, possible causes, signs and symptoms, and initial emergency care for junctional tachycardia.

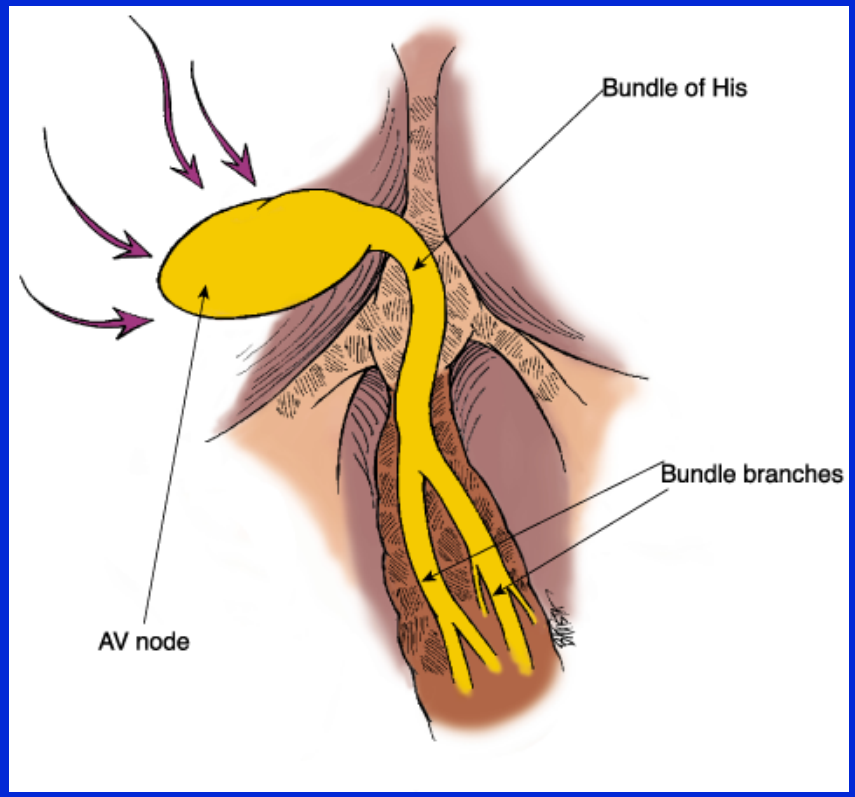
AV Node

- Specialized cells located in lower portion of right atrium
- Delays the electrical impulse
  - Allows atria to contract and complete filling of ventricles before next ventricular contraction



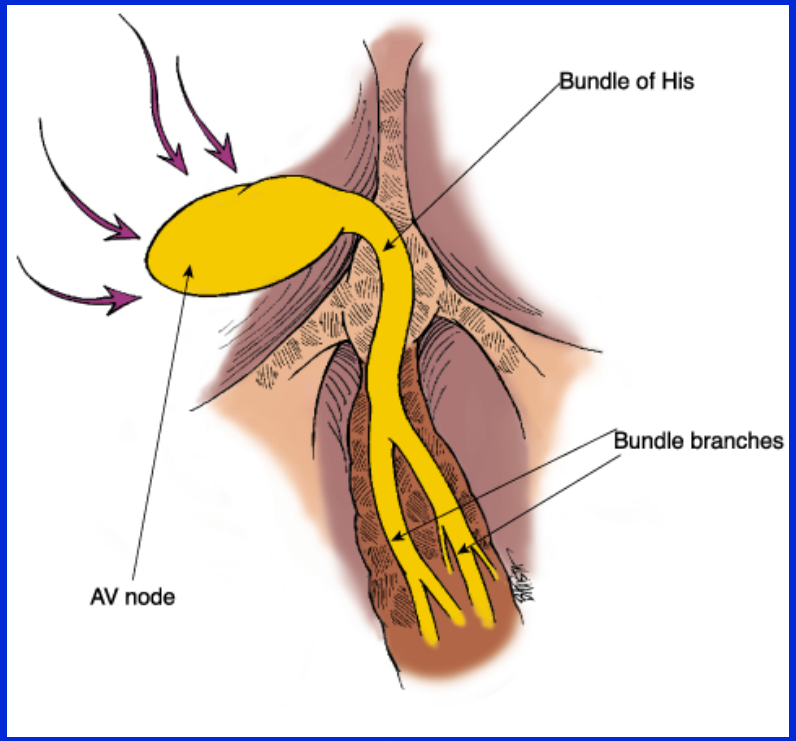
Bundle of His

- Connects AV node with bundle branches
- Has pacemaker cells capable of discharging at a rhythmic rate of 40–60 bpm



AV Junction

- AV node and the nonbranching portion of the bundle of His = “AV junction”

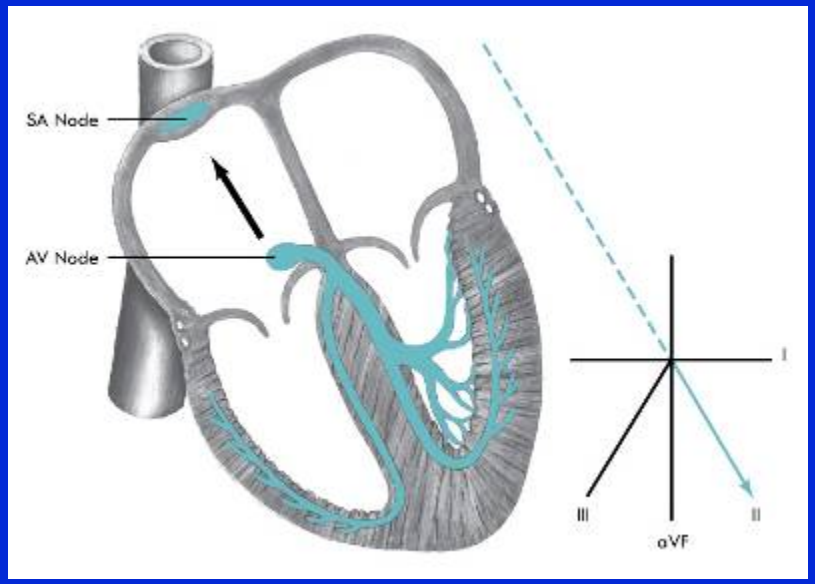


AV Junction

- AV junction may assume responsibility for pacing the heart if:
  - The SA node fails to discharge
  - An impulse from the SA node is generated but blocked as it exits the SA node
  - The rate of discharge of the SA node is slower than that of the AV junction
  - An impulse from the SA node is generated and is conducted through the atria but is not conducted to the ventricles

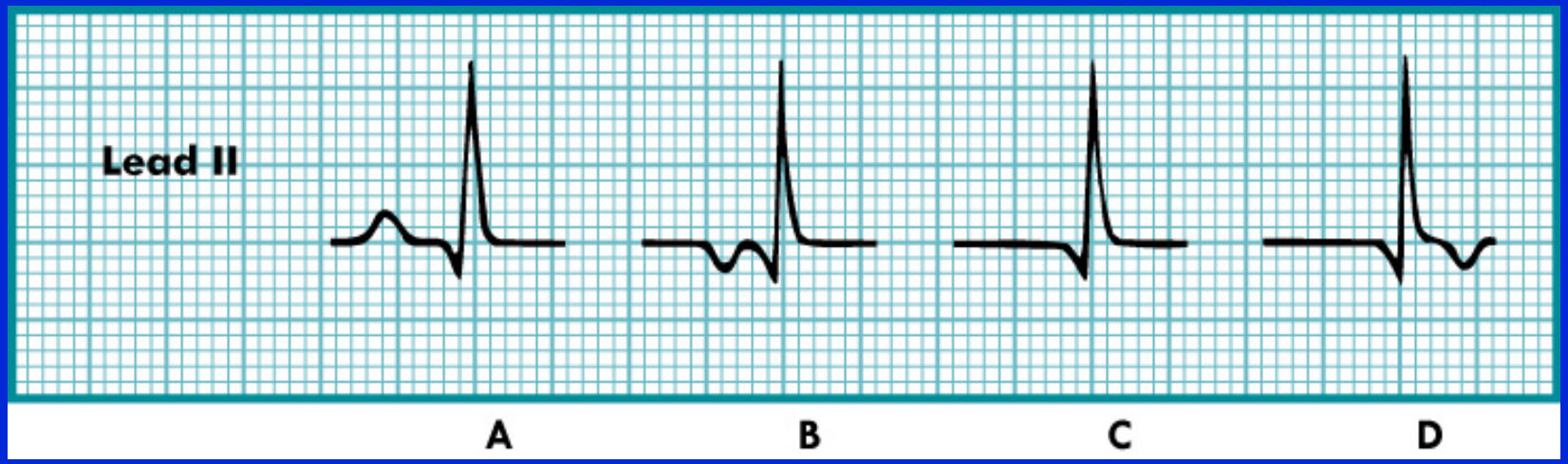
AV Junction

- If the AV junction paces the heart, the electrical impulse must travel in a backward (retrograde) direction to activate the atria



AV Junction

- P wave may appear before, during, or after the QRS complex



Premature Junctional Complexes (PJCs)

PJC—
How Do I Recognize It?

- A PJC arises from an irritable site within the AV junction that fires before the next expected sinus beat
- QRS will usually measure 0.10 sec or less
- Often followed by a noncompensatory (incomplete) pause

PJC—
How Do I Recognize It?

- A P wave may or may not be present with a PJC
- If a P wave is present, it is inverted (retrograde) and may precede or follow the QRS

PJC—
How Do I Recognize It?

- Not an entire rhythm; it is a single beat
- Identify underlying rhythm and ectopic beat(s)
  - Example: Sinus rhythm at 98 bpm with 2 PJCs

PJC—How Do I Recognize It?

Rate	Usually within normal range, but depends on underlying rhythm
Rhythm	Regular with premature beats
P waves	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF

PJC—How Do I Recognize It?

PR interval	If a P wave occurs before the QRS, the PR interval will usually be 0.12 sec or less; if no P wave occurs before the QRS, there will be no PR interval
QRS	Usually 0.10 sec or less unless it is aberrantly conducted or an intraventricular conduction delay exists

PJC—How Do I Recognize It?

Rate	Usually WNL, but depends on underlying rhythm
Rhythm	Regular with premature beats
P waves	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF
PR interval	If a P wave occurs before the QRS, the PR interval will usually be 0.12 sec or less; if no P wave occurs before the QRS, there will be no PR interval
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PJC—
What Causes It?

- Congestive heart failure
- Acute coronary syndromes
- Mental and physical fatigue
- Valvular heart disease
- Digitalis toxicity
- Electrolyte imbalance
- Rheumatic heart disease
- Stimulants: caffeine, tobacco

PJC—
What Do I Do About It?

- Most individuals with PJCs are asymptomatic
- PJCs may lead to symptoms of palpitations or the feeling of skipped beats

PJC—
What Do I Do About It?

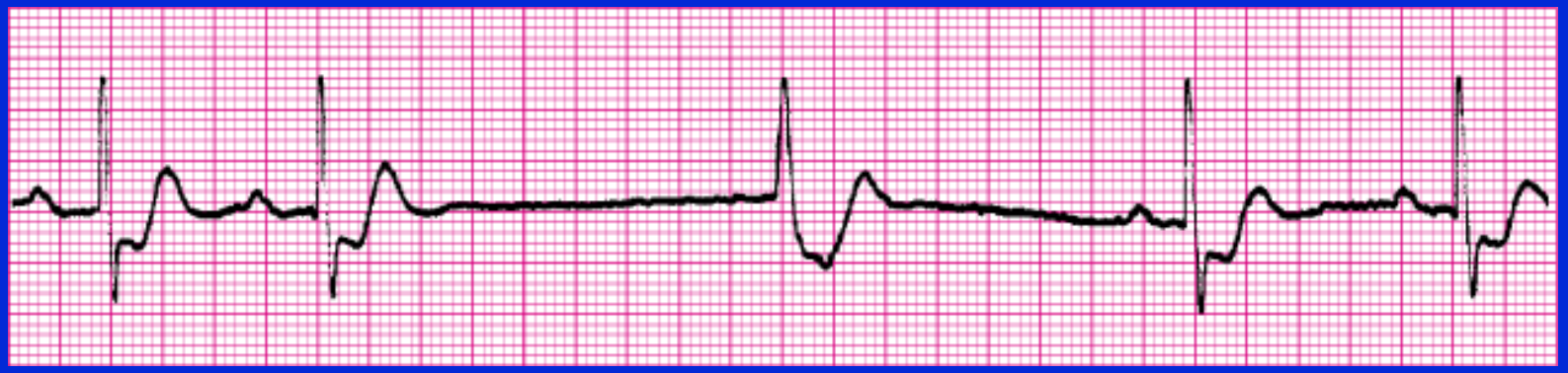
- If PJCs occur because of the ingestion of stimulants or digitalis toxicity, these substances should be withheld

Junctional Escape Beats

Junctional Escape Beat—How Do I Recognize It?

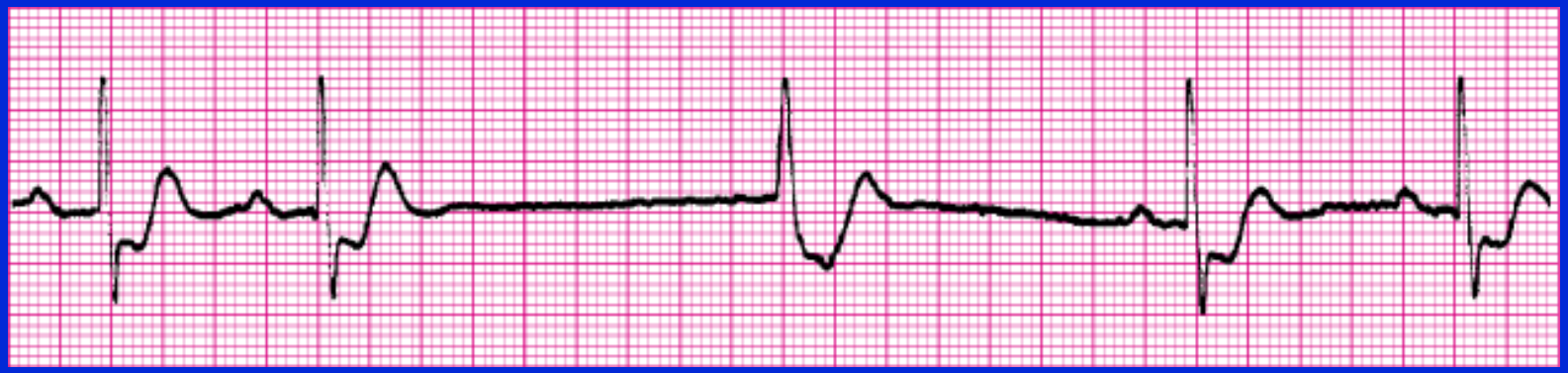
- A junctional escape beat originates in the AV junction and appears late (after the next expected sinus beat)
  - A junctional escape beat is protective—preventing cardiac standstill

Junctional Escape Beat—How Do I Recognize It?



Rate	Usually WNL, but depends on underlying rhythm
Rhythm	Regular with ***LATE*** beats
P waves	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF

Junctional Escape Beat—
How Do I Recognize It?



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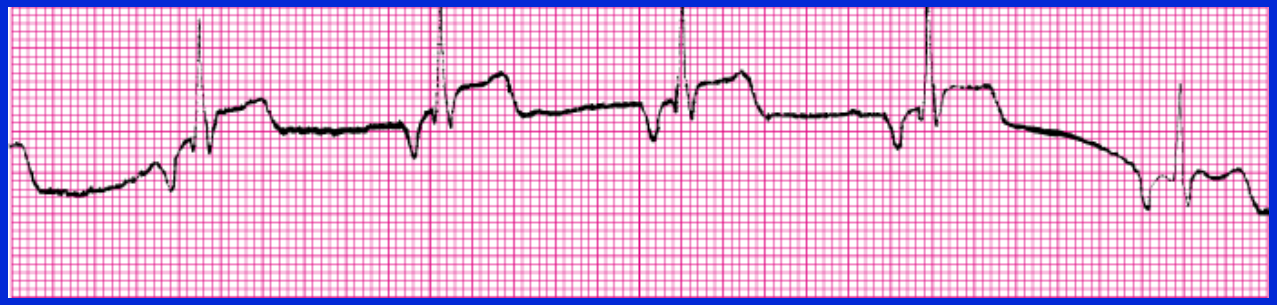
Junctional Escape Rhythm

Junctional Rhythm—How Do I Recognize It?

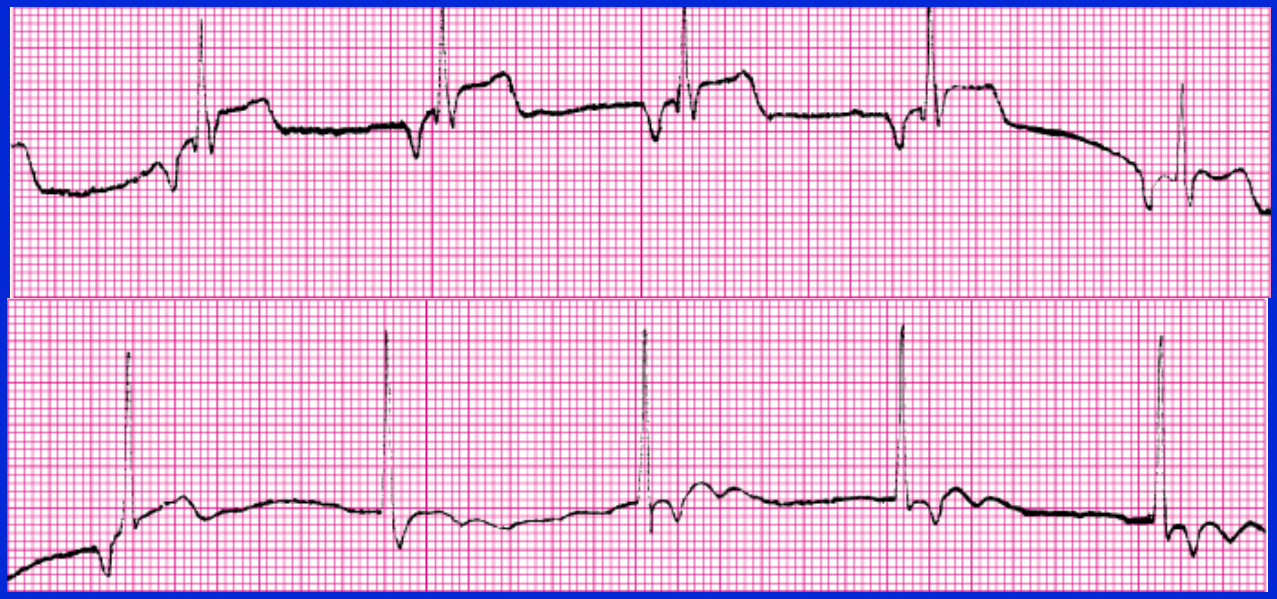
- A junctional escape rhythm is several sequential junctional escape beats

Junctional Rhythm—
How Do I Recognize It?



Rate	40–60 bpm
Rhythm	Very regular
P waves	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF

Junctional Rhythm— How Do I Recognize It?



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Junctional Escape Beats/Rhythm—What Causes It?

- Acute myocardial infarction
  - Particularly inferior wall MI
- Rheumatic heart disease
- Valvular disease
- Disease of the SA node
- Hypoxia
- Increased parasympathetic tone
- Immediately after cardiac surgery
- Patients taking:
  - Digitalis
  - Quinidine
  - Beta-blockers
  - Calcium channel blockers

Junctional Rhythm—What Do I Do About It?

- The patient may be asymptomatic or may experience signs and symptoms associated with the slow heart rate and decreased cardiac output

Junctional Rhythm—What Do I Do About It?

- Signs and symptoms may include:
  - Weakness
  - Chest pain or pressure
  - Syncope
  - Altered level of consciousness
  - Hypotension

Junctional Rhythm—What Do I Do About It?

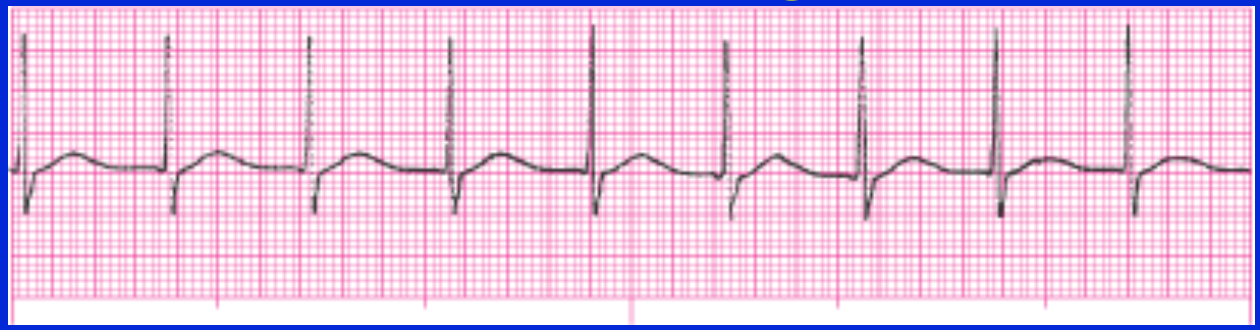
- If the patient's signs and symptoms are related to the slow heart rate, consider:
  - Atropine sulfate and/or transcutaneous pacing
  - Dopamine intravenous infusion
  - Epinephrine intravenous infusion

Accelerated Junctional Rhythm

Accelerated Junctional Rhythm—How Do I Recognize It?

- An ectopic rhythm caused by enhanced automaticity of the bundle of His
- Results in a regular ventricular response at a rate of 61–100 bpm

Accelerated Junctional Rhythm—How Do I Recognize It?



Rate	61–100 bpm
Rhythm	Very regular
P waves	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF
PR interval	If a P wave occurs before the QRS, the PR interval will usually be 0.12 sec or less; if no P wave occurs before the QRS, there will be no PR interval
QRS	Usually 0.10 sec or less unless it is aberrantly conducted or an intraventricular conduction delay exists

Accelerated Junctional Rhythm—What Causes It?

- Digitalis toxicity
- Acute myocardial infarction
- Cardiac surgery
- Rheumatic fever
- COPD
- Hypokalemia

Accelerated Junctional Rhythm—What Do I Do About It?

- The patient may be asymptomatic, but monitor closely
- If the rhythm is caused by digitalis toxicity, this medication should be withheld

Junctional Tachycardia

Junctional Tachycardia—How Do I Recognize It?

- Nonparoxysmal junctional tachycardia
  - Usually starts as an accelerated junctional rhythm
  - Heart rate gradually increases to more than 100 bpm
  - Usual ventricular rate is 101–140 bpm

- Paroxysmal junctional tachycardia
  - Starts and ends suddenly
  - Often precipitated by a PJC
  - Ventricular rate is generally more than 140 bpm

Junctional Tachycardia—
How Do I Recognize It?

Rate	101–180 bpm
Rhythm	Very regular
P waves	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF

Junctional Tachycardia—
How Do I Recognize It?

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Junctional Tachycardia—How Do I Recognize It?

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Junctional Tachycardia—What Causes It?

- Thought to be caused by enhanced automaticity

- May occur because of:
  - Acute coronary syndromes
  - Congestive heart failure
  - Theophylline administration
  - Digitalis toxicity

Junctional Tachycardia—What Do I Do About It?

- Junctional tachycardia associated with an acute coronary syndrome may:
  - Increase myocardial ischemia
  - Increase the frequency and severity of chest pain
  - Extend the size of a myocardial infarction
  - Cause congestive heart failure, hypotension, or cardiogenic shock
  - Predispose the patient to ventricular dysrhythmias

Junctional Tachycardia—What Do I Do About It?

- Depends on severity of patient symptoms
- Observe if patient tolerates rhythm well
- If symptomatic:
  - Oxygen therapy, IV access
  - Vagal maneuvers, adenosine
  - Possible beta-blocker, calcium channel blocker, if no contraindications exist

Questions?