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Chapter 5
Junctional Rhythms

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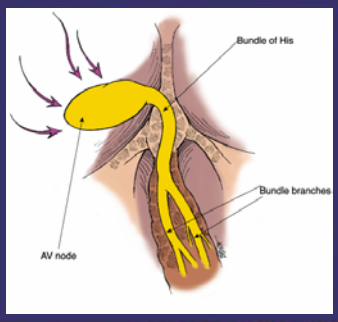
The AV Node

- AV node
  - A group of specialized cells located in the lower portion of the right atrium
  - Main function is to delay the electrical impulse

    Allows atria to contract and complete filling of ventricles before next ventricular contraction



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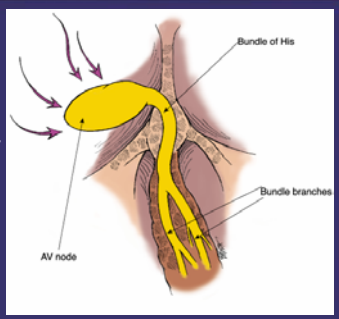
Bundle of His

- After passing through the AV node, the electrical impulse enters the bundle of His
  - Connects the AV node with bundle branches
  - Has pacemaker cells capable of discharging at a rhythmic rate of 40 to 60 beats/min



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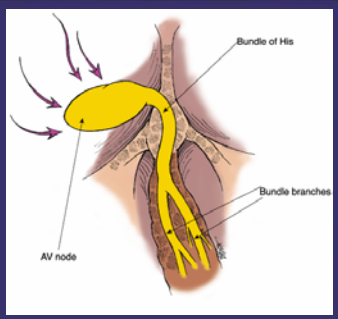
The AV Junction

- The AV node and the nonbranching portion of the bundle of His are called the "AV junction"



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The AV Junction

- The 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

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The AV Junction

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

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The AV Junction

- If atrial depolarization occurs before the ventricles, an inverted P wave will be seen before the QRS complex in leads II, III, and aVF
- If atrial and ventricular depolarization occur simultaneously, the P wave will not be visible since it will be hidden in the QRS complex
- If atrial depolarization occurs after ventricular depolarization, an inverted P wave will appear after the QRS complex

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Premature Junctional Complexes (PJCs)

- A PJC arises from an ectopic focus within the AV junction that discharges before the next expected sinus beat
- The QRS will usually measure 0.10 second or less
- Often followed by a noncompensatory (incomplete) pause

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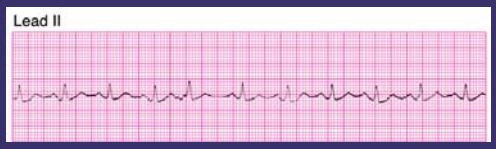
Premature Junctional Complexes (PJCs)

- 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



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Premature Junctional Complexes (PJCs)

- A PJC is not an entire rhythm—it is a single beat
- Identify the underlying rhythm and the ectopic beat(s)
  - Example: Sinus rhythm at 98/min with two PJCs

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PJCs – ECG Characteristics

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.
PR Interval	If a P wave occurs before the QRS, the PR interval will usually be less than or equal to 0.12 second. If no P wave occurs before the QRS, there will be no PR interval.
QRS Duration	Usually 0.10 second or less unless an intraventricular conduction delay exists

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PJCs – Causes

- Excessive caffeine, tobacco, or alcohol intake
- Valvular disease
- Ischemia
- Congestive heart failure
- Digitalis toxicity
- Increased vagal tone
- Acute myocardial infarction
- Hypoxia
- Electrolyte imbalance
  - Particularly magnesium and potassium
- Exercise
- Rheumatic heart disease

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PJCs – Clinical Significance

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

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PJCs – Intervention

- PJCs do not normally require treatment
- If PJCs occur because of the ingestion of stimulants or digitalis toxicity, these substances should be withheld

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Junctional Escape Rhythm – Causes

- 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

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Junctional Escape Rhythm – Intervention

- Intervention depends on the cause of the dysrhythmia and the patient's presenting signs and symptoms
- If the dysrhythmia is caused by digitalis toxicity, this medication should be withheld
- 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

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Junctional Escape Rhythm – ECG Characteristics

Rate	40 to 60 beats/min
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 less than or equal to 0.12 second. If no P wave occurs before the QRS, there will be no PR interval.
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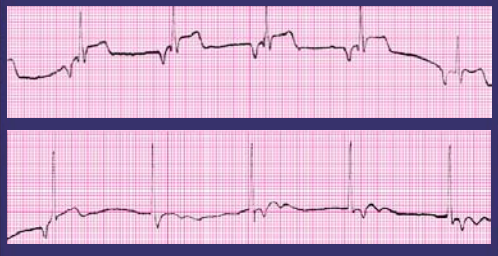
Junctional Escape Rhythm



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Accelerated Junctional Rhythm

- An ectopic rhythm caused by enhanced automaticity of the bundle of His
- Results in a regular ventricular response at a rate of 61 to100 beats/min

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Accelerated Junctional Rhythm – ECG Characteristics

Rate	61 to 100 beats/min
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 less than or equal to 0.12 second. If no P wave occurs before the QRS, there will be no PR interval.
QRS Duration	Usually 0.10 second or less unless an intraventricular conduction delay exists

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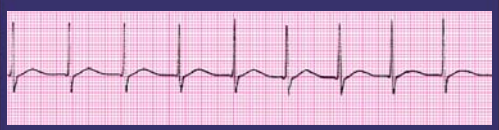
Accelerated Junctional Rhythm



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Accelerated Junctional Rhythm – Causes

- Causes
  - Digitalis toxicity
  - Acute myocardial infarction
  - Cardiac surgery
  - Rheumatic fever
  - COPD
  - Hypokalemia
- The patient may be asymptomatic, but monitor closely

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Accelerated Junctional Rhythm – Intervention

- If the dysrhythmia is due to digitalis toxicity, this medication should be withheld

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Junctional Tachycardia

- Junctional tachycardia is three or more sequential PJCs occurring at a rate of more than 100/min
- Paroxysmal junctional tachycardia is a term used to describe a junctional tachycardia that starts and ends suddenly
  - Often precipitated by a PJC

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Junctional Tachycardia

- When the ventricular rate is greater than 150 beats/min, it may be difficult to distinguish junctional tachycardia from atrial tachycardia
  - The rhythm may simply be called supraventricular tachycardia (SVT)

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Junctional Tachycardia – ECG Characteristics

Rate	101 to 180 beats/min
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 less than or equal to 0.12 second. If no P wave occurs before the QRS, there will be no PR interval.
QRS Duration	Usually 0.10 second or less unless an intraventricular conduction delay exists

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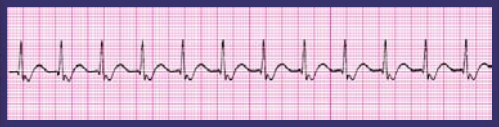
Junctional Tachycardia



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Junctional Tachycardia – Causes

- Myocardial ischemia or infarction
- Congestive heart failure
- Digitalis toxicity

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Junctional Tachycardia – Clinical Significance

- With sustained ventricular rates of 150 beats/min or more, the patient may complain of a sudden feeling of a "racing heart" and severe anxiety
- Decreased cardiac output may occur as a result of the fast ventricular rate

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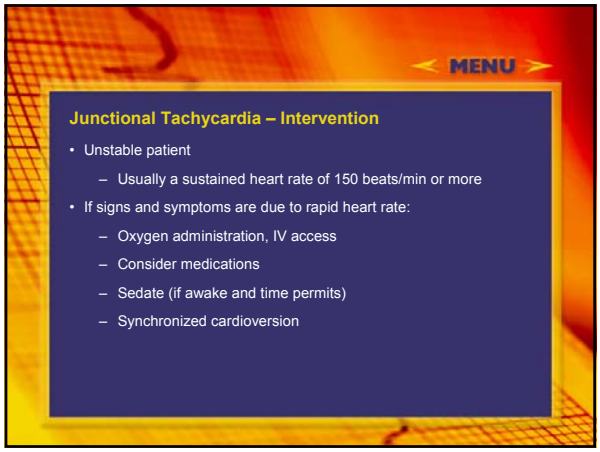
Junctional Tachycardia – Intervention

- For a stable but symptomatic patient:
  - Oxygen therapy, IV access
  - Vagal maneuvers
  - Adenosine
  - Amiodarone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Junctional Tachycardia – Intervention
• Unstable patient
– Usually a sustained heart rate of 150 beats/min or more
• If signs and symptoms are due to rapid heart rate:
– Oxygen administration, IV access
– Consider medications
– Sedate (if awake and time permits)
– Synchronized cardioversion