12-Lead EKG: Part 3

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Objectives

1. Identify characteristics of atrial dysrhythmias.
Objectives

2. Identify characteristics of junctional dysrhythmias.
Objectives

3. Identify characteristics of ventricular dysrhythmias.
Atrial Rhythms
Cardiac Conduction System

- Sinoatrial Node (SAN)
- Atrioventricular Node (AVN)
- Right Bundle Branch (RBB)
- Left Bundle Branch (LBB)
- Left Posterior Fascicle (LPS)
- Left Anterior Fascicle (LAF)
- Purkinje Fibers (PF)
The Skinny on Atrial Rhythms

• The atrium is the pacemaker, next in line below the sinus node
The Skinny on Atrial Rhythms

• Theoretically, the atrium positions itself in an escape role if sinus node stops functioning
The Skinny on Atrial Rhythms

• The inherent rate of the atrium is 60 to 80 beats per minute
The Skinny on Atrial Rhythms

• Atrial escape beats are very uncommon (the atria likes to fire rapidly and is very likely to become hyper...
The Skinny on Atrial Rhythms

...and usurp control from the SA node than to escape and fire slowly when the SA node fails)
The Skinny on Atrial Rhythms

• Since atrial rhythms often result in very rapid heart rates, patients are often symptomatic
The Skinny on Atrial Rhythms

• Treatment is aimed at converting the rhythm back to sinus rhythm, or...
The Skinny on Atrial Rhythms

...if that is not possible, returning the heart rate to more normal levels
The Skinny on Atrial Rhythms
The Skinny on Atrial Rhythms

• Extremely variable in their presentation
  – some rhythms have no obvious P waves
The Skinny on Atrial Rhythms

- others have no Ps at all - instead (fibrillatory or flutter waves between the QRS complexes)
The Skinny on Atrial Rhythms

– some atrial rhythms are regular and others are completely irregular, even chaotic
The Skinny on Atrial Rhythms
– though most atrial rhythms are rapid, a few are slower
Criteria for Atrial Rhythms
Criteria for Atrial Rhythms

- Unlike sinus rhythms, which have a common set of criteria, atrial rhythms have multiple and variable possible criteria.
Criteria for Atrial Rhythms

• If the rhythm or beat in question meets any of the following criteria, it is atrial:
Criteria for Atrial Rhythms

– matching upright Ps, atrial rate > 160 at rest
Criteria for Atrial Rhythms

– no Ps at all; wavy or sawtooth baseline between QRSs present instead
Criteria for Atrial Rhythms

- P waves of > three different shapes
Criteria for Atrial Rhythms

- premature abnormal P wave (with or without QRS) interrupting another rhythm
Criteria for Atrial Rhythms

- heart rate > 130, rhythm regular, P waves not discernible (may be present, but can’t be sure)
Atrial Rhythms Criteria
Overview
Atrial Rhythms Criteria
Overview

• Wandering atrial pacemaker: irregular rhythm with at least three different shapes of P waves, HR < 100
Atrial Rhythms Criteria
Overview
Atrial Rhythms Criteria

Overview

• PACs: premature, abnormally shaped P wave followed by a QRS (PACs usually interrupt some sort of sinus rhythm)
Atrial Rhythms Criteria

Overview

• Non-conducted PAC: premature, abnormally shaped P wave NOT followed by a QRS...
Atrial Rhythms Criteria

Overview

...non-conducted PACs usually interrupt a sinus rhythm of some sort
Atrial Rhythms Criteria
Overview
Atrial Rhythms Criteria

Overview

• Paroxysmal atrial tachycardia: this is a burst of atrial tachycardia that interrupts another rhythm (usually sinus)
Atrial Rhythms Criteria

Overview

• Atrial tachycardia HR is 160-250, regular, with a narrow QRS
Atrial Rhythms Criteria
Overview
Atrial Rhythms Criteria
Overview

• Atrial tachycardia with 2:1 block: atrial rate 160 to 250 and regular, ventricular rate half the atrial rate
Atrial Rhythms Criteria
Overview
Atrial Rhythms Criteria

Overview

• Multifocal atrial tachycardia: irregular rhythm with three or more different shapes of Ps, HR > 100
Atrial Rhythms Criteria

Overview

• This is the same rhythm as wandering atrial pacemaker, but with a faster HR
Atrial Rhythms Criteria
Overview
Atrial Rhythms Criteria
Overview

• Atrial flutter: zigzag or sawtooth-shaped waves between the QRS complexes
Atrial Rhythms Criteria

Overview

- there are no P waves
- flutter waves are all the same distance from each other
Atrial Rhythms Criteria
Overview
Atrial Rhythms Criteria

Overview

• Atrial fibrillation: wavy or undulating baseline between QRS complexes
Atrial Rhythms Criteria

Overview

– there are no P waves
– regularity is irregular
Atrial Rhythms Criteria Overview
Atrial Rhythms Criteria

Overview

• Supraventricular tachycardia:
  – regular rhythm with narrow QRS complex and indistinguishable P waves, HR > 130
Atrial Rhythms Criteria

Overview

—the origin of the rhythm is unclear but is above the ventricle, as evidenced by the narrow QRS
Cardiac Conduction System

- Sinoatrial Node (SAN)
- Right Atrium
- Atrioventricular Node (AVN)
- Right Bundle Branch (RBB)
- Left Atrium
- HIS Bundle
- Left Bundle Branch (LBB)
- Left Posterior Fascicle (LPS)
- Left Ventricle
- Left Anterior Fascicle (LAF)
- Purkinje Fibers (PF)
The Skinny on Junctional Rhythms

• Junctional rhythms are less common than sinus or atrial rhythms
The Skinny on Junctional Rhythms

• The inherent rate of the AV node is 40 to 60 beats per minute...
The Skinny on Junctional Rhythms

...the heart rate may actually go much faster or slower, and can result in symptoms of either
The Skinny on Junctional Rhythms

• Treatment is aimed at alleviating the cause of the junctional rhythm
The Skinny on Junctional Rhythms

• The goal is to return control to the SA node for more normal heart rates
Criteria for Junctional Rhythms

• Junctional rhythms are very easy to identify - the criteria for junctional rhythms:
Criteria for Junctional Rhythms

– regular rhythm or premature beat with narrow QRS and one of the following:
Criteria for Junctional Rhythms

• absent P waves
• inverted P waves with short PR interval preceding the QRS
Criteria for Junctional Rhythms

• inverted P waves following the QRS
Junctional Rhythms
Criteria Overview

• Premature Junctional Contraction (PJC): premature beat with inverted/absent P wave and a narrow QRS
Junctional Rhythms
Criteria Overview
Junctional Rhythms Criteria Overview

- interrupting a sinus rhythm of some sort
- PR will be < 0.12 second if inverted P precedes the QRS
Junctional Rhythms
Criteria Overview

• Junctional bradycardia:
  – regular rhythm with a narrow QRS and inverted or absent P waves, HR < 40
Junctional Rhythms
Criteria Overview
Junctional Rhythms
Criteria Overview

• Junctional bradycardia:
  – PR will be < 0.12 seconds if inverted P precedes the QRS
Junctional Rhythms
Criteria Overview
Junctional Rhythms
Criteria Overview

• Junctional bradycardia:
  – regular rhythm with a narrow QRS and inverted or absent P waves, HR < 40
Junctional Rhythms
Criteria Overview

• Junctional bradycardia:
  – PR will be < 0.12 seconds if inverted P precedes the QRS
Junctional Rhythms
Criteria Overview

- Junctional rhythm: same as junctional bradycardia, except HR 40 to 60 beats per minute
Junctional Rhythms
Criteria Overview
Junctional Rhythms
Criteria Overview

- Accelerated junctional rhythm:
  - regular rhythm with narrow QRS and inverted or absent P waves, HR 60 to 100
Junctional Rhythms
Criteria Overview
Junctional Rhythms Criteria Overview

• Accelerated junctional rhythm:
  – PR will be < 0.12 seconds if inverted P precedes the QRS
Junctional Rhythms
Criteria Overview
Junctional Rhythms Criteria Overview

- Accelerated junctional rhythm:
  - regular rhythm with narrow QRS, inverted or absent P waves, HR 60 to 100
Junctional Rhythms
Criteria Overview

• Accelerated junctional rhythm:
  – PR will be < 0.12 seconds if inverted P precedes the QRS
Junctional Rhythms Criteria Overview

• Junctional tachycardia:
  – same as accelerated junctional rhythm, except HR > 100 beats per minute
Junctional Rhythms
Criteria Overview
Junctional Rhythms Criteria Overview

• Junctional tachycardia:
  – PR will be < 0.12 seconds if inverted P precedes the QRS
Ventricular Rhythms
The Skinny on Ventricular Rhythms

• Ventricular rhythms are the most potentially lethal of all rhythms
Cardiac Conduction System

- Sinoatrial Node (SAN)
- Right Atrium
- Atrioventricular Node (AVN)
- Right Bundle Branch (RBB)
- Left Bundle Branch (LBB)
- Left Atrium
- HIS Bundle
- Left Posterior Fascicle (LPS)
- Left Ventricle
- Left Anterior Fascicle (LAF)
- Purkinje Fibers (PF)
The Skinny on Ventricular Rhythms

• The inherent rate of the ventricle is 20 to 40 beats per minute
The Skinny on Ventricular Rhythms

• Ventricular rhythms can result from escape or usurpation with a varied heart rate of 20 to 250 beats per minute
The Skinny on Ventricular Rhythms

• Though some ventricular rhythms can be well tolerated...
The Skinny on Ventricular Rhythms

...most will cause symptoms of decreased cardiac output, if not frank cardiac standstill
The Skinny on Ventricular Rhythms

• Most ventricular rhythms respond well to medications...
The Skinny on Ventricular Rhythms

...however, some of the very medications used to treat ventricular rhythms can cause them
The Skinny on Ventricular Rhythms
The Skinny on Ventricular Rhythms

- Some ventricular rhythms can only be treated by electric shock to the heart...
The Skinny on Ventricular Rhythms

...and despite aggressive treatment, are usually lethal
The Skinny on Ventricular Rhythms
The Skinny on Ventricular Rhythms

• Ventricular beats have wide, bizarre QRS complexes
The Skinny on Ventricular Rhythms

• Some ventricular rhythms have no QRS complexes at all
The Skinny on Ventricular Rhythms

• Wide QRS
  (> 0.12 seconds) without preceding P wave

• No QRS at all
The Skinny on Ventricular Rhythms

- Premature, wide QRS beat without preceding P wave, interrupting another rhythm
Ventricular Rhythms

Overview

• PVCs: premature, wide QRS beat without preceding P wave, interrupting another rhythm (usually sinus)
Ventricular Rhythms Overview
Ventricular Rhythms

Overview

- Agonal rhythm (dying heart): irregular rhythm with wide QRS and no preceding P wave, HR < 20
Ventricular Rhythms Overview
Ventricular Rhythms

Overview

• Idioventricular rhythm: regular rhythm with wide QRS and no preceding P wave, HR 20 to 40
Ventricular Rhythms Overview
Ventricular Rhythms
Overview

• Accelerated idioventricular rhythm: regular rhythm with wide QRS and no preceding P wave, HR 40 to 100
Ventricular Rhythms Overview
Ventricular Rhythms

Overview

• Ventricular tachycardia: same as accelerated idioventricular rhythm, HR > 100
Ventricular Rhythms Overview
Ventricular Rhythms

Overview

• Torsades de pointes: wide QRS without preceding P wave
Ventricular Rhythms Overview
Ventricular Rhythms Overview

–QRS complexes rotate around an axis, pointing up and down, HR > 200
Ventricular Rhythms

Overview

torsades is recognized more by its characteristic oscillating pattern than by any other criteria
Ventricular Rhythms
Overview

• Ventricular flutter: zigzag pattern of QRS complexes with HR 250 to 350
Ventricular Rhythms Overview
Ventricular Rhythms Overview

• Ventricular fibrillation: no QRS complexes at all, just a wavy baseline looking like static
Ventricular Rhythms Overview
Ventricular Rhythms
Overview

• Asystole: no Ps or QRS complexes, flat line
Ventricular Rhythms Overview
Ventricular Rhythms
Overview

- Ventricular pacing: spike before each wide QRS complex
Ventricular Rhythms
Overview
Ventricular Rhythms

Overview

• AV sequential pacing (dual chamber pacing): spike before the P wave and before the wide QRS
Ventricular Rhythms Overview
PVC’s Defined

Coupled PVC's: occur in pairs
Ventricular Bigeminy

Bigeminal PVC's: every other beat is a PVC.
Ventricular Quadrigeminy

Quadrigeminal PVC's: every fourth beat is a PVC
R on T Phenomenon

R on T: occur on the peak of the T wave of the preceding beat
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