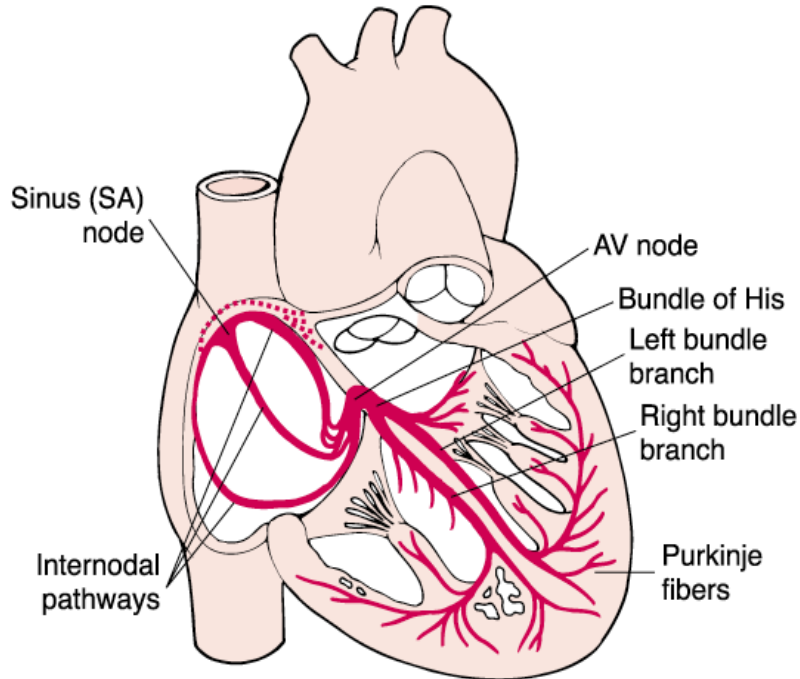


Arrhythmia Study Guide – 3 – Junctional and Ventricular Rhythms



JUNCTIONAL RHYTHMS

The AV Junction (Bundle of His and surrounding cells) only acts as pacemaker of the heart when the SA Node is not firing normally or the impulse is blocked. Rhythms originating in the AV junction are called ***junctional dysrhythmias***.

In a junctional dysrhythmia, the impulse travels backwards to activate the atria. The P-wave, if seen at all, will be inverted and the PR interval will be shorter than usual (less than .12 seconds) because the impulse doesn't have to travel as far to stimulate the ventricles. The p-wave may be buried in the QRS complex and not discernable on the ECG strip. The QRS complex will be normal because once the AV junction fires, the impulse follows normal pathways to the ventricles.

Premature Junctional Complexes (PJC) – a PJC occurs when an irritable site within the AV Junction fires before the next expected SA node impulse. This interrupts the sinus rhythm causing an abnormal beat and a delay while the sinus node resets its rhythm. This delay is called a noncompensatory pause. PJC is not an entire rhythm, it is a single beat that may be alone, or in a pattern (bigeminy, trigeminy, etc.). To identify PJCs, look at the entire rhythm. Identify sinus activity by checking p-waves, and look at beats where the p-wave is inverted or absent. Measure the rate by counting the boxes between the R waves of the sinus beats. This will determine bradycardia, tachycardia, or normal rate for the underlying sinus rhythm. Measure distance between the p-waves, and then measure the distance between the junctional beat and the preceding p-wave. Is it early or late? If the junctional beat occurs earlier than

the next sinus beat would have, then it is a premature junctional complex. Causes of PJC's include CHF, mental and physical fatigue, Digitalis toxicity, and stimulants: caffeine, tobacco, cocaine.

Sinus tachycardia with PJC – p-wave is inverted and occurs before the expected sinus beat.



Junctional Escape Beats – The same rules for PJC's hold true for junctional escape beats. The difference is while PJC's are early beats, junctional escape beats are late beats, occurring after the next sinus beat should have happened. Junctional escape beats frequently occur during episodes of sinus arrest or pauses caused by nonconducted PACs. When the AV junction doesn't detect an expected stimulus, it will pick up the slack and fire.

Sinus rhythm with a junctional escape beat after a period of sinus arrest.



Junctional Rhythm – When several junctional escape beats happen in a row, they become a junctional rhythm. Junctional rhythm and junctional escape rhythm mean the same thing and are used interchangeably. The intrinsic rate of the AV Junction is 40 to 60 beats/min. Less than 40 BPM is termed **junctional bradycardia**, more than 60 BPM and less than 100 BPM is **accelerated junctional rhythm**. More than 100 BPM is **junctional tachycardia** (rare dysrhythmia). If junctional tachycardia starts and stops suddenly it is **paroxysmal junctional tachycardia**.

Junctional beats/rhythms are characterized by absent or inverted p-waves, absent or shorter than normal PR intervals, and normal/narrow QRS complexes.

Treatment of junctional rhythms depend on the severity of the signs and symptoms of the patient. If the patient is tolerating it well, there is time to observe the patient and look for underlying causes to correct. If the patient is symptomatic initiating drug therapy or withholding drugs known to cause junctional rhythms at toxic levels should be considered.

VENTRICULAR RHYTHMS

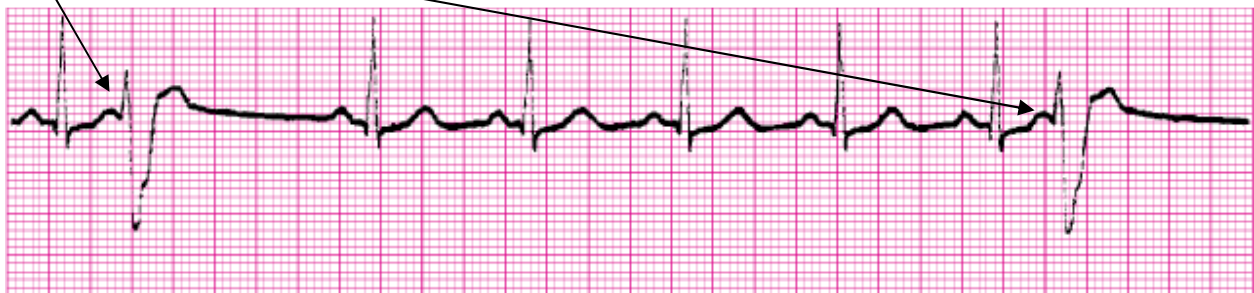
The ventricles are the heart's least efficient pacemaker and only assume the duty if they are not receiving impulses from the other pacemakers, or there is an irritable site (often caused by ischemia or injury) in the ventricles that causes an early beat or rapid rhythm. When the impulse begins in the ventricles, the pathways are abnormal resulting in an ECG with absent p-waves and wide QRS complexes.

Premature Ventricular Complexes (PVCs) – PVCs can be from an irritable site in either ventricle. It will occur before the next expected sinus beat. The QRS complex will be wide (greater than 0.12 seconds). PVCs coming from the same irritable site (**focal point**) will look the same and are **uniform PVCs**. PVCs with different focal points will look different and are **multiform or multifocal PVCs**. Two PVCs in a row are called **couplet** or **paired PVCs**. Three or more in a row is a **run or burst of ventricular tachycardia**.

Sinus rhythm with uniform PVCs



R-on-T PVCs occur with the R wave of a PVC falls on the T wave of a preceding beat. R-on-T PVCs can precipitate Ventricular Tachycardia.



Characteristics of PVCs: rate is usually within normal range depending on the underlying rhythm. The rhythm is generally regular with the exception of the PVC events. For the PVCs themselves – there is no p-wave, no PR interval, and the QRS complex is wide.

Ventricular Escape Beats: The same rules for PVCs apply to ventricular escape beats except that PVCs are early and ventricular escape beats are late (occurring after the time frame for the expected sinus beat). While PVCs are a response to irritability caused by damage, escape beats are in response to the absence of other impulses – a protective mechanism. Medication can be administered to reduce or

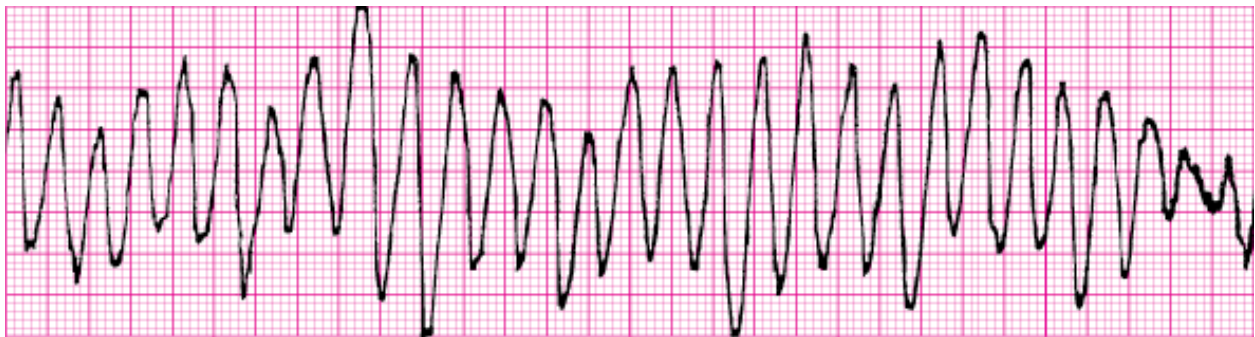
eliminate PVCs, but since ventricular escape beats are the only thing preventing cardiac arrest, treatment is geared to correcting, not eliminating the ventricular escape beats.

Three or more ventricular escape beats in a row is called an **Idioventricular Rhythm (IVR)**. The intrinsic firing rate is 20 to 40 BPM. An IVR of less than 20 is an **agonal** rhythm. An IVR of 41 to 100 BPM is an **accelerated idioventricular rhythm (AIVR)**.



Ventricular Tachycardia exists when three or more PVCs occur in a row at a rate greater than 100 BPM. It is **unsustained** if it lasts less than 30 seconds. It is **sustained** if it lasts more than 30 seconds. It is **monomorphic** if it is uniform in appearance indicating a single focal point, **polymorphic** if it varies in shape and amplitude from beat to beat indicating multiple focal points. **Torsades de Pointes** is a type of polymorphic V-tach that looks like the ECG is twisted going from low amplitude to high amplitude in a cycle. Think about low magnesium levels with Torsades.

Torsades de Pointes



Polymorphic Ventricular Tachycardia



Ventricular Fibrillation is a chaotic rhythm in the ventricles. The ventricles quiver, there is no cardiac output, and no pulse. It can be coarse (high amplitude greater than 3 mm) or fine (low amplitude less than 3 mm)

OTHER RHYTHMS TO KNOW

Asystole – there is no ventricular activity in the heart at all. Some atrial activity may be present, but in the absence of ventricular activity – there is no cardiac output. The strip is a straight isoelectric line that may have the occasional blip if there is atrial activity, as demonstrated by the strip below.



PEA – *Pulseless electrical activity* is a clinical condition, not a dysrhythmia and occurs when the ECG is showing electrical activity by displaying a rhythm, but there is no contracting occurring, **no cardiac output, no pulse**. So – Rhythm on a monitor with no pulse in the patient is PEA.

Source: ECGs Made Easy by Barbara Aehlert, RN, BSPA

Into to Basic Arrhythmias by Branden Nelson