Junctional Rhythms

Premature Junctional Contractions:

A PJC is an extra ventricular contraction that originates in an ectopic pacemaker in the AV junction and occurs before the next expected beat of the underlying rhythm.

It consists of a normal or abnormal QRS complex with or without an abnormal P wave

Diagnostic Characteristics:

Heart Rate:
- -HR is that of the underlying rhythm

Rhythm:
- -the rhythm is irregular when PJC's are present

Pacemaker Site:
- -ectopic pacemaker in the AV junction

P waves:
- -P waves may or may not be associated with the PJC's.
- -if they are present, they are abnormal, varying in size, shape, and direction from normal P waves
- -P waves associated with PJC's will be inverted
- -absent P waves (with PJC's) indicate that either retrograde atrial depolarizations occurred during the QRS complexes or atrial depolarizations have not occurred because of retrograde AV block between the ectopic pacemaker site and the atria

PR Intervals:
- -if the P waves of the PJC's precede QRS complexes, they are usually abnormal (less than 0.12 second)

R-R Intervals:
- -intervals are unequal when PJC's are present
- -the interval between the PJC and the preceding QRS complex is shorter than the R-R interval of the underlying rhythm
- -a full compensatory pause commonly follows a PJC because the SA node is usually not depolarized by the PJC

QRS Complexes:
- -normal (less than 0.10 second)

Frequency and Pattern of Occurrence of PJC's:
- -isolated
- -group beats (couplets; if 3 or more occur consecutively, junctional tachycardia is present)
- -repetitive beats (bigeminy, trigeminy, quadrigeminy)

Cause of the Arrhythmia:
- -digitalis toxicity (most common cause)
- -enhanced automaticity of the AV junction
- -increase in vagal/parasympathetic tone on SA node
- -excessive doses of certain cardiac drugs (procainamide, quinidine)

-excessive doses of sympathomimetic drugs (epinephrine, isoproterenol, norepinephrine)
-CHF
-hypoxia
-coronary artery disease

**The electrophysiological mechanism responsible for PJC's is either enhanced automaticity or reentry.

Clinical Significance:
-isolated PJC's are not significant
-if digitalis is being administered, PJC's may indicate digitalis toxicity and enhanced automaticity of the AV junction
-frequent PJC's (more than 4-6 per minute) may indicate an enhanced automaticity or a reentry mechanism in the AV junction and warn or more serious junctional arrhythmias

Junctional Escape Rhythm/Junctional Rhythm:

Junctional rhythm is an arrhythmia originating in an escape pacemaker in the AV junction with a rate of 20 to 60 beats per minute.

Diagnostic Characteristics:

Heart Rate:
-40 to 60 per minute

Rhythm:
-essentially regular

Pacemaker Site:
-escape pacemaker in the AV junction

P waves:
-P waves may be present or absent
-if present they will be inverted

PR Interval:
-if there is a P wave, the PR interval will be short (less than 0.12 second)

R-R Intervals:
-usually equal

QRS Complexes:
-normal (0.10 second or less)

Cause of Arrhythmia:
-Junctional rhythm is a normal response of the AV junction under the following circumstances:
1. when the rate of impulse formation of the dominant pacemaker (usually the SA node) drops below that of the escape pacemaker in the AV junction

2. when the electrical impulses from the SA node or atria fail to reach the AV junction because of sinus arrest, SA exit block, or third-degree (complete) AV block

Clinical Significance:

-signs and symptoms and clinical significance of junctional rhythm are the same as those in symptomatic sinus bradycardia
-symptomatic junctional rhythms must be treated immediately, preferably by transcutaneous pacing and atropine

Accelerated Junctional:

Accelerated Junctional is an arrhythmia originating in an ectopic pacemaker in the AV junction with a regular rhythm and a rate of 60 to 100 beats per minute.

Diagnostic Characteristics:

Heart Rate:
-60 to 100 per minute

Rhythm:
-essentially regular

Pacemaker Site:
-ectopic pacemaker in the AV junction

P waves:
-may be present or absent
-if present, they will be inverted

PR Intervals:
-if there is a P wave, the PR interval will be short (less than 0.12 second)

R-R Intervals:
-usually equal

QRS Complexes:
-normal (less than 0.10 second)

Cause of the Arrhythmia:
-digitalis toxicity (most common cause)
-excessive administration of catecholamines
-damage to the AV junction from an inferior MI or rheumatic fever
-electrolyte imbalance (especially hypokalemia)
-hypoxemia

Clinical Significance:

-It is clinically significant because is commonly indicates digitalis toxicity
-signs and symptoms and significance are the same as atrial tachycardia

Junctional Tachycardia:

Junctional Tachycardia is an arrhythmia originating in an ectopic pacemaker in the AV junction with a regular rhythm and a rate greater than 100 beats per minute.

Diagnostic Characteristics:

Heart Rate:
-greater than 100 per minute

Rhythm:
-essentially regular

Pacemaker Site:
-ectopic pacemaker in the AV junction

P waves:
-may be present or absent
-if present, they will be inverted

PR Intervals:
-if there is a P wave, the PR interval will be short (less than 0.12 second)

R-R Intervals:
-usually equal

QRS Complexes:
-normal (less than 0.10 second)

Cause of the Arrhythmia:
-digitalis toxicity (most common cause)
-excessive administration of catecholamines
-damage to the AV junction from an inferior MI or rheumatic fever
-electrolyte imbalance (especially hypokalemia)
-hypoxemia

Clinical Significance:
-It is clinically significant because is commonly indicates digitalis toxicity
-signs and symptoms and significance are the same as atrial tachycardia

Paroxysmal Supraventricular Tachycardia:

PSVT is an arrhythmia originating at the site of a rapid reentry circuit in the AV junction with a rate between 160 and 240 beats per minute.

Diagnostic Characteristics:

Heart Rate:
-usually 160 to 240 beats per minute
-onset and termination of PSVT are typically abrupt, with the onset often being initiated by a premature atrial impulse
-a brief period of asystole may follow the termination of the arrhythmia
-PSVT is characterized by repeated episodes (paroxysms) of tachycardia that last from a few seconds to many hours or days and recur for many years
-vagal maneuvers usually terminate PSVT

Rhythm:
-essentially regular

Pacemaker Site:

-a reentry mechanism in the AV junction that may involve the AV node alone or the AV node and an accessory conduction pathway located between the atria and ventricles

P waves:

-usually absent
-if present, they will be inverted

PR Intervals:

-none if absent
-if inverted P waves are present, intervals are abnormal (less than 0.12 second)

R-R Intervals:

-usually equal

QRS Complexes:

-normal (less than 0.10 second)

Cause of the Arrhythmia:

-increase in catecholamines and sympathetic tone
-overexertion
-stimulants (coffee)
-electrolyte or acid-base abnormalities
-hyperventilation
-emotional stress

**The electrophysiological mechanism responsible for PSVT is a reentry mechanism involving the AV node alone, or the AV node in conjunction with an accessory conduction pathway.

Clinical Significance:

-signs and symptoms and significance are the same for atrial tachycardia
-syncope may also occur after the termination of PSVT because of the asystole that may follow its termination
-usually treated with vagal maneuvers and Adenocard 6 mg, 12 mg, 12 mg rapid IV push