

# AV Blocks

## AV Block Overview

The AV node has several functions in the heart. It can act as a redundant pacemaker, as seen in junctional escape rhythm, but it also acts to control and slow conduction between the atria and the ventricles. The AV node intentionally slows electrical impulses between the atria and ventricles to allow for adequate ventricular refill. The delay through the AV node is measured with the patient's PR interval and is considered normal between .12-.20 seconds. The AV node can also block impulses from reaching the ventricles if they occur too quickly as with atrial fibrillation or atrial flutter. When normal atrial impulses are delayed longer than .20 seconds or completely blocked from reaching the ventricles this is referred to as an AV Block.

## 1° AV Block

1° AV Block is defined as having a PR measurement  $> .20$  seconds. None of the impulses from the atria are completely blocked but just delayed longer than expected through the AV node.

### **Rhythm Characteristics:**

- Regularity: Regular
- PR  $> .20$  seconds
- P wave QRS ratio 1:1

### **Example Strip 1: Sinus Bradycardia with 1° AV Block**



Regularity: Regular Rate: 50 bpm P wave: 1:1 Ratio PR: .28 QRS: .08 QT: .56

Rhythm interpretation: Sinus Bradycardia with 1° AV Block

## 2° AV Block Type I

2° AV Block Type I, also called Wenkebach or Mobitz I, results when impulses from the atria are increasingly delayed until completely blocked by the AV node. 2° AV Block Type I can be identified by an increase in PR leading up to a P wave being completely blocked. The blocked P wave results in at least a 2:1 (P wave/QRS) conduction ratio with an irregular R-R interval. The P-P interval is regular because the depolarization of the atria is not affected by AV Blocks. Because not all of the impulses reach the ventricles the atrial rate will always be greater than the ventricular rate when a 2° AV Block is present.

### **Rhythm Characteristics:**

- Regularity:
  - R-R is Irregular
  - P-P is Regular
- PR lengthening prior to the block
- P wave QRS ratio at least 2:1 with block

### **Example Strip 2: 2° AV Block Type I**



Regularity: Irregular Atrial Rate: 59 bpm Ventricular Rate: 48 bpm

P wave: 1:1, 2:1 Ratio PR: Lengthening QRS: .07 QT: .40

Rhythm interpretation: Sinus Bradycardia with 2° AV Block Type I

## 2° AV Block Type II

2° AV Block Type II, also called Mobitz II, results when impulses from the atria are suddenly blocked at the level of the AV Node, Bundle of His, or within the bundle branches. 2° AV Block Type II has no lengthening prior to the blocked P wave. The blocked P wave results in at least a 2:1 (P wave/QRS) conduction ratio and the R-R can be regular or irregular. The P-P interval is regular because the depolarization of the atria is not affected by AV Blocks. Because not all of the impulses reach the ventricles the atrial rate will always be greater than the ventricular rate when a 2° AV Block is present.

### **Rhythm Characteristics:**

- Regularity:
  - R-R can be regular or Irregular
  - P-P is Regular
- PR consistent prior to the block
- P wave QRS ratio at least 2:1 with block

### **Example Strip 3: 2° AV Block Type II**



Regularity: Irregular Atrial Rate: 43 bpm Ventricular Rate: 34 bpm

P wave: 1:1, 2:1 Ratio PR: .18 QRS: .12 QT: .56

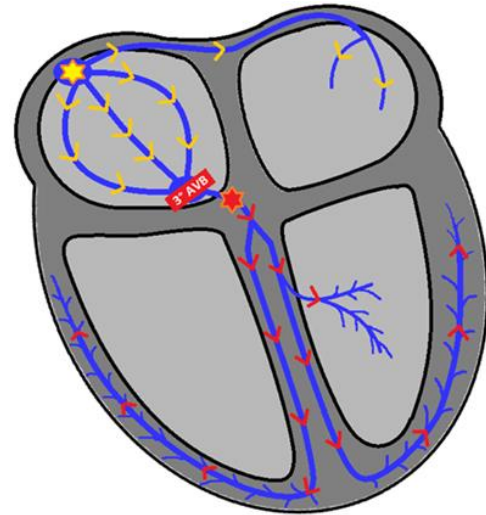
Rhythm interpretation: Sinus Bradycardia with 2° AV Block Type II and Bundle Branch Block

### 3° AV Block w/ Junctional Escape

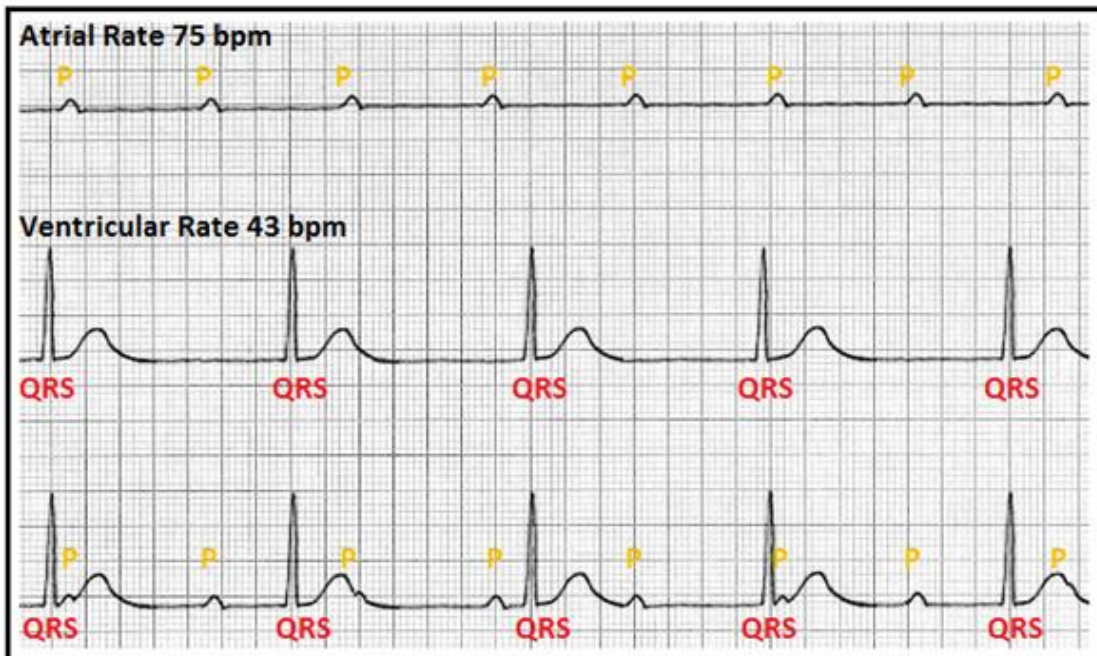
3° AV Block occurs when all of the electrical impulses from the atria are blocked before they reach the ventricles. If the impulses are being blocked at the level of the AV Node it's possible for the Bundle of His to pace the heart resulting in a Junctional Escape Rhythm. When the atria and ventricles are depolarizing independently of one another, this is referred to as AV Dissociation. When AV Dissociation is present the P-P intervals will be regular as well as the R-R intervals but they will not have any relationship to one another. When a patient is in 3° AVB their atrial rate will always be faster than their ventricular rate.

#### Rhythm Characteristics:

- Regularity:
  - R-R is regular
  - P-P is regular
- QRS is relatively narrow
- PR is not applicable
- AV Dissociation



#### Example of 3° AV Block with Junctional Escape



### 3° AV Block w/ Ventricular Escape

3° AV Block occurs when all of the electrical impulses from the atria are blocked before they reach the ventricles. If the impulses are being blocked at the level of the Bundle of His or Bundle Branches a ventricular escape rhythm or IVR is the only rhythm left to pace the heart. The ventricular escape rhythm will have wide QRS complexes and will be dissociated from the atrial rhythm. When AV Dissociation is present the P-P intervals will be regular as well as the R-R intervals but they will not have any relationship to one another. When a patient is in 3° AVB their atrial rate will always be faster than their ventricular rate.

#### **Rhythm Characteristics:**

- Regularity:
  - R-R is regular
  - P-P is regular
- QRS is wide
- PR is not applicable
- AV Dissociation

#### **Example Strip 4: 3° AV Block with Ventricular Escape**



Regularity: Regular Atrial Rate: 69 bpm Ventricular Rate: 40 bpm

P wave: Dissociated PR: NA QRS: .20 QT: .50

Rhythm interpretation: 3° AV Block with a Ventricular Escape Rhythm

## Ventricular Standstill

When 3° AV Block occurs and there is no escape rhythm this is called Ventricular Standstill. Atrial depolarization is still occurring so P waves can be seen on the ECG tracing but since there is no escape rhythm there will be no QRS or T waves.

### **Rhythm Characteristics:**

- Regularity:
  - P-P is regular
- QRS absent

### **Example Strip 4: Ventricular Standstill**



Regularity: NA Atrial Rate: 75 bpm Ventricular Rate: 0 bpm

P wave: NA PR: NA QRS: NA QT: NA

Rhythm interpretation: Ventricular Standstill

## References

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