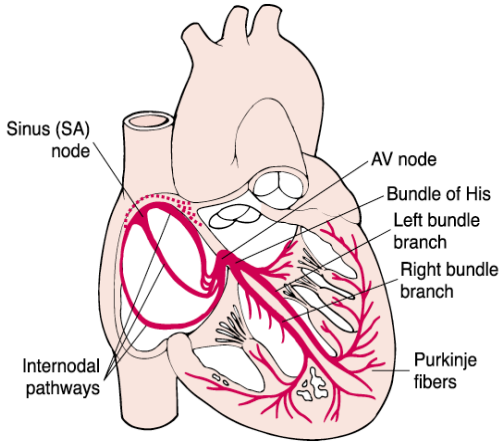
Arrhythmia Study Guide – 4 – Blocks, Pacers, and Weird Stuff



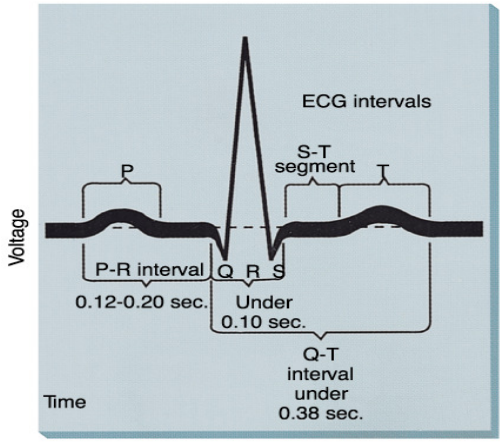
HEART BLOCKS

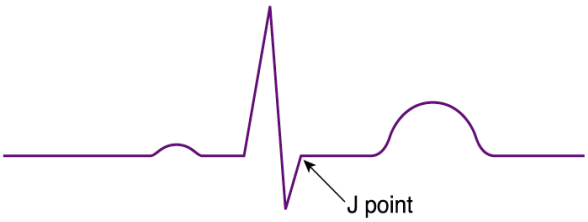
The AV junction is the area that provides the electrical link between the atria and the ventricles. An abnormal delay or interruption in the impulse conduction is an atrioventricular block (AV Block).

The PR interval determines the **type** of block.

The width of the QRS complex determines the **level** of the block.

Interruptions above the AV Junction (high block) will affect the conduction pathway to the ventricles less, and will have narrow QRS complexes. Interruptions below the AV Junction (low block) will affect the ventricular conduction more, and the QRS complex will be wide.



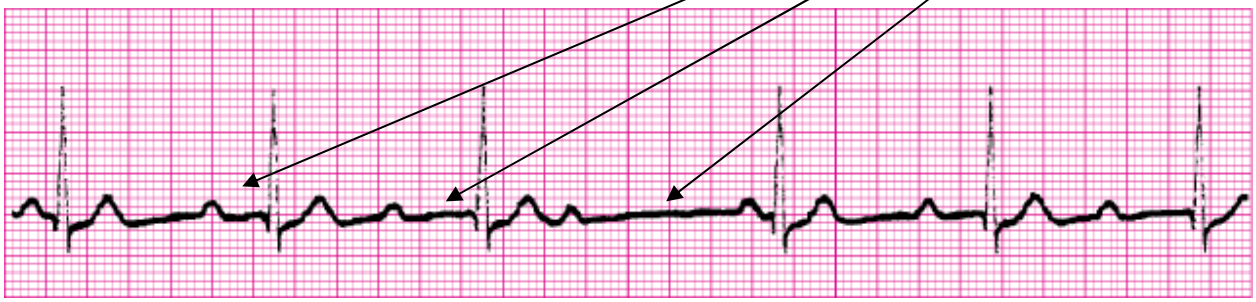


Measuring correctly using the correct points in the ECG is very important at all times, but especially with diagnosing AV Blocks. Review the diagram above to refresh measurement points and normals. The J-point is the beginning of the ST segment.

First Degree AV Block is not a real block of an impulse, but a longer than normal delay of the impulse to travel through the AV Junction. The ECG strip looks normal except for the PR interval. The PR interval will be greater than 0.20 seconds.

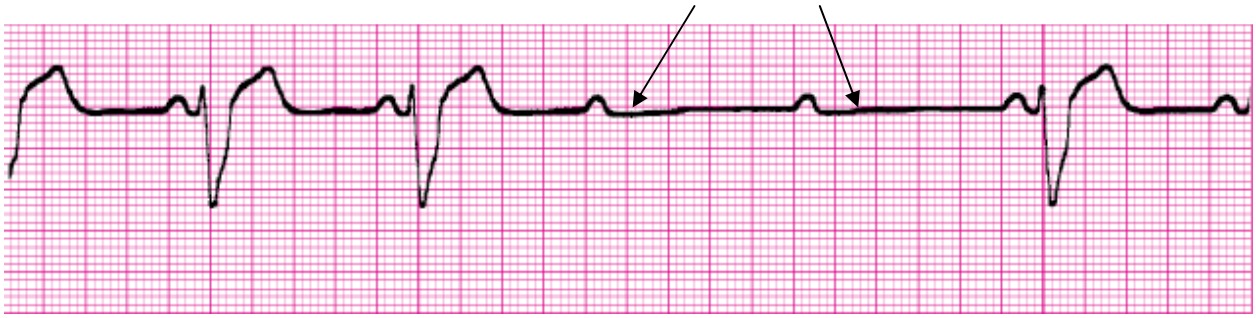
Second Degree AV Block is a true block of some atrial impulses. If there are more p-waves than QRS complexes, and the p-waves occur on time (they "march out" across the strip), then there is some typ of AV block. There are three types of Second Degree AV Block:

Type 1: Wenckebach or Mobitz Type I occurs above the Bundle of His and is characterized by a progressively longer PR interval and then a p-wave with no QRS complex following (the blocked impulse). A mnemonic to remember this type of block is "long, longer, drop; now you know its Wenckebach."

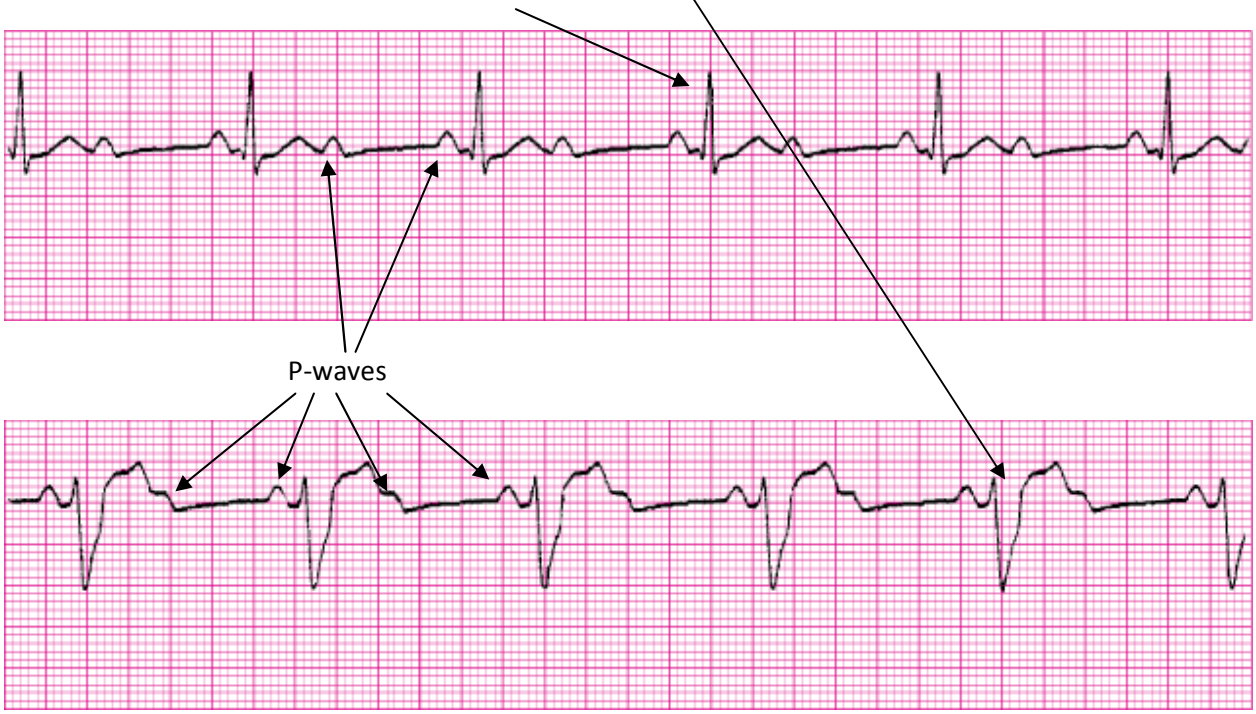


Type 2: Mobitz Type II occurs below the Bundle of His and is characterized by normal or slightly prolonged PR intervals, but dropped QRS complexes. QRS complexes that do occur are usually greater than 0.10 seconds.

Blocked impulse (a p-wave with no QRS)



2:1 AV Block: Two p-waves occur for every QRS complex. This can technically be a second degree type 1 (occuring above the bundle of His) or a second degree type 2 (occuring below the bundle of His). Since there are no consecutive PR intervals to measure or compare, the QRS complex is used to determine the type. A narrow QRS in a 2:1 block is usually a type 1, and wide QRS in a 2:1 block is usually a type 2. Usually, not always – so it's okay to say undeterminable and it's okay to say "probably type 1" or "probably type 2".



In Second Degree AV Blocks the p-waves are at a regular rate and march out across the strip. The ventricular rate is regular and half of the atrial rate due to the every other dropped QRS complex. If you could draw in a QRS after the p-wave, A QRS complex would fit in the dropped space in a regular rate/rhythm. There is a pattern of everything occuring when it should, not early – not late. The QRS is missing, not delayed. If it is missing, it's a second degree block of some kind.

Measuring the PR interval and the QRS complex and will tell you what kind.

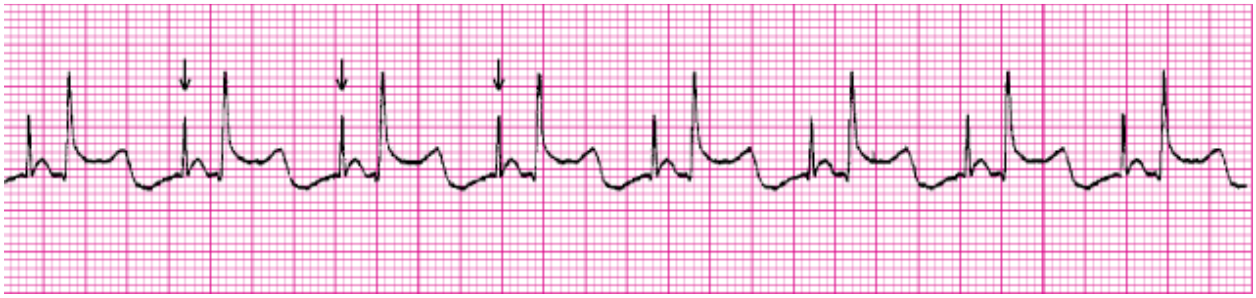
Third Degree AV Block occurs when there is no communication at all between the atria and the ventricles. The p-waves are at a regular rate, occur when they should, and the QRS complexes are at a regular rate and occur when they should for a ventricular rhythm – but they occur without any coordination of events: A *complete block.* The block can occur at the Bundle of His, at the AV node, or the bundle branches. The QRS may be narrow or wide depending on what escape pacemaker picks up the pace for the ventricles. Second degree AV block type 2 frequently progresses to Third degree block.

There is no PR Interval. In the example below, if you tried to measure PR interval – you would find one shorter, then a really long one, then a shorter one again. PR intervals don't do that. Count the number of big boxes from the first p-wave to the second p-wave. There are 4 boxes. Count 4 more – the p-wave is buried in the t-wave. You can see a little bump that isn't present on the other T-waves. Count from that – 4 more boxes to the next p-wave – and so on. The atrial rate is 80, the ventricular rate is regular at 30.

PACERS

Pacemakers are composed of the pulse generator (power source) and the pacing leads. They provide an artifical electrical impulse to stimulate the heart to contract. Pacers can be temporary or permanent. They can be set at a fixed rate to fire consistently, or at a demand rate to fire when the patient's heart rate drops below a certain rate. They can be single chamber (atrial or ventricular) or dual chamber (atrial and ventricular). A spike will precede the event the pacer triggers.

Spikes noted by the arrows for atrial pacer activity.



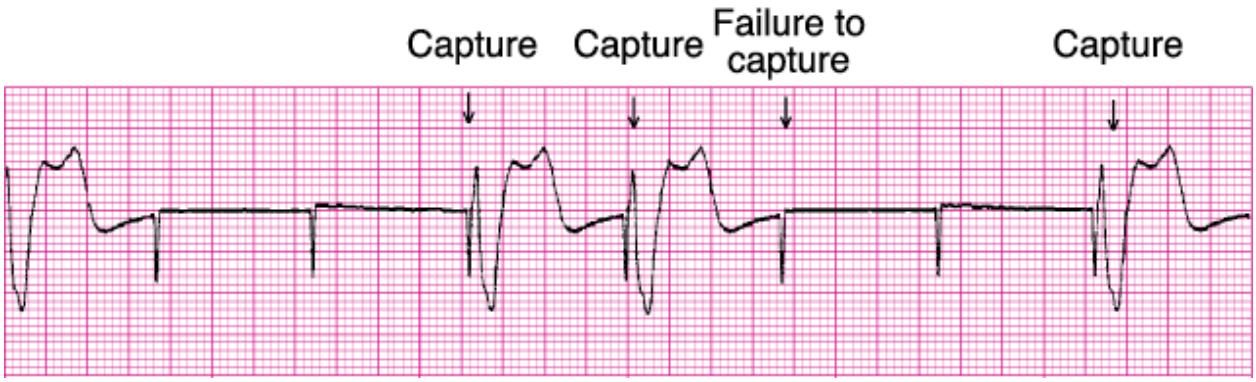
Spikes noted by arrows for ventricular pacer activity.

This is a strip for dual pacers. Note the spike prior to the p-waves and the spike prior to the QRS complex.

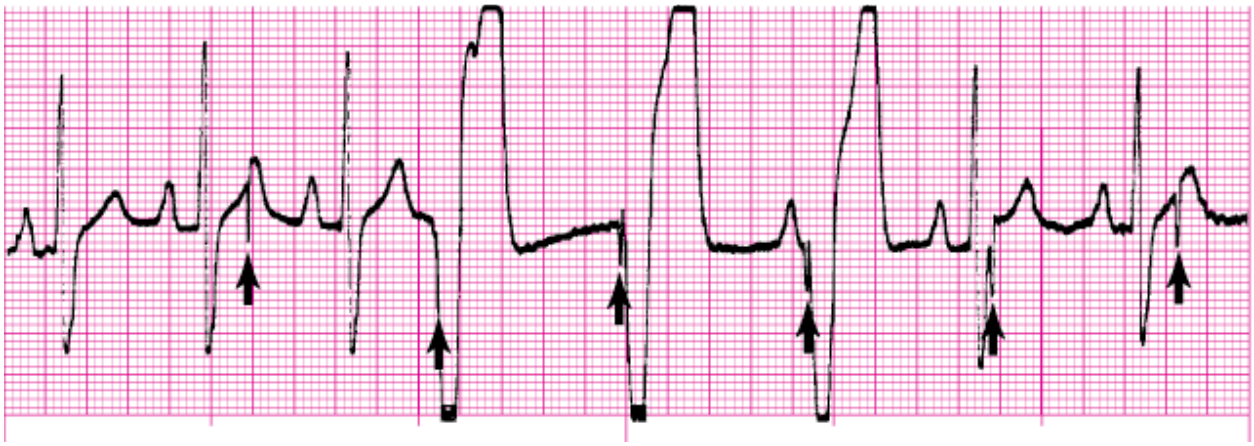
If a pacer malfunctions it is a

Failure to Pace: The pacer fails to fire. There will be an **absence of pacer spikes** and a return to the underlying rhythm that required the pacer placement. Treatments include adjusting the sensitivity setting, replacing the battery or lead, checking and tightening connections between the generator and the lead.

Failure to Capture: The pacemaker stimulus fails to depolarize the myocardium. There will be visible pacer spikes, but no p-waves or QRS complexes. Treatment includes increasing the pacemaker output setting (increasing the stimulation threshold), replacing the battery, replacing/repositioning the lead.



Failure to Sense: Sensitivity is sensing the intrinsic electrical activity of the heart. *Undersensing* means the pacemaker doesn't pick up the depolarization of the myocardium. The ECG will show pacer spikes occuring to close to the QRS complex. This can result in pacer spikes of the t-waves creating an artificail R on T phenomonen. The strip below is an example of undersensing. Treatments include increasing the sensitivity setting, replacing batteries and/or leads.

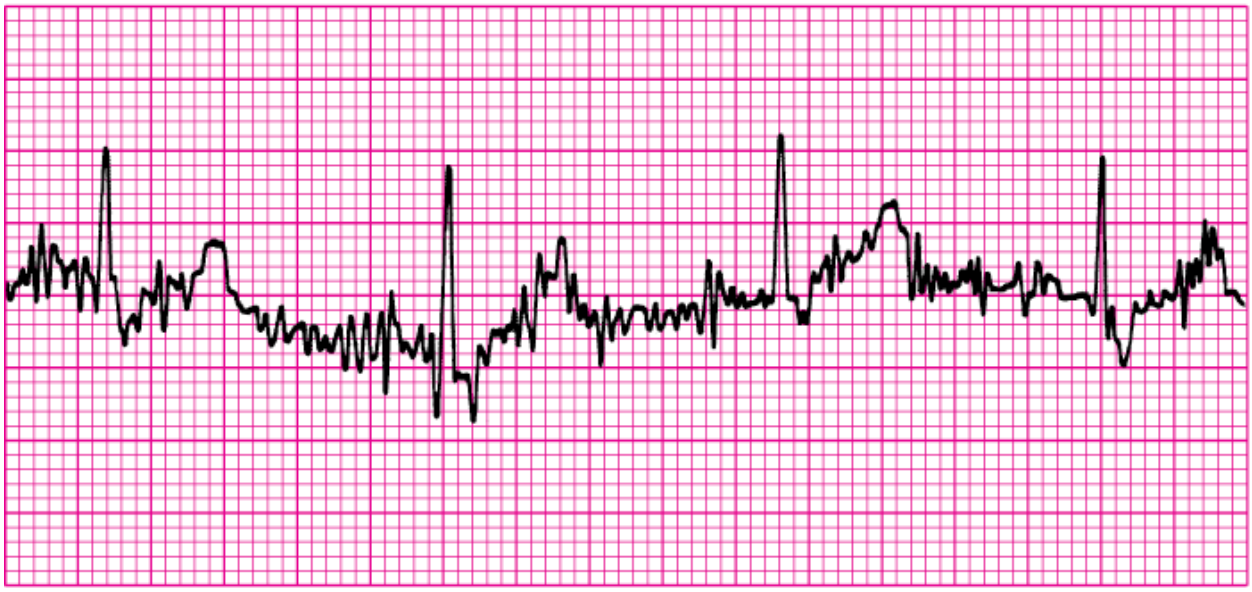


Oversensing means the pacemaker senses activity inappropriately, interpreting signals incorrectly. The pacer may sense a high T-wave as a QRS complex and not fire. The ECG will show pacer spikes at a rate slower than the pacemaker's preset rate or no paced beats when the patient's rate is slower than the preset rate. Strong electromagnetic fields like MRI equipment or welding equipment can cause oversensing. Treatment is avoiding strong electromagnetic fields ☺. And adjusting the sensitivity setting and/or replacing leads.

WEIRD STUFF

ECG's are electrical impulse recorders. There are several things that can interfere with accurate recording. Loose leads, broken lead wire, or poor electrical contact could make this tracing.

Seizures, shivering, Parkinson's, any muscle tremors – or even normal respiratory movement when a lead is placed directly over the ribs may cause a wandering baseline.



Artifact can be from the patient moving in bed, or it can be a 60-cycle interference from crossing the cable wires with other electrical wires (bed control?), or frayed or broken wires.

Practice Strips – Study Guide 4 – October 3, 2012.

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Intervals – PR: QRS: QT: Overall Appearance:

Interpretation (name that rhythm):

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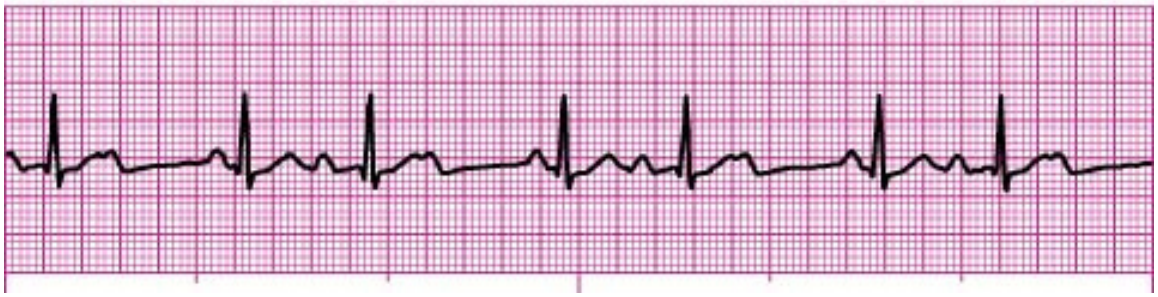

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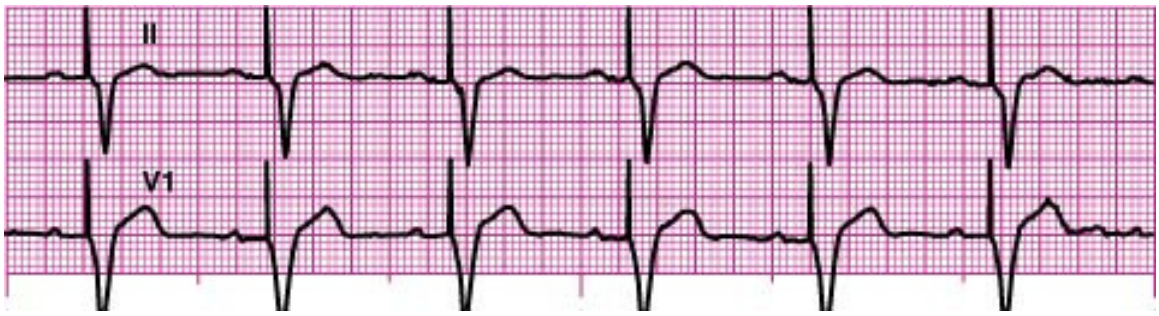

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