

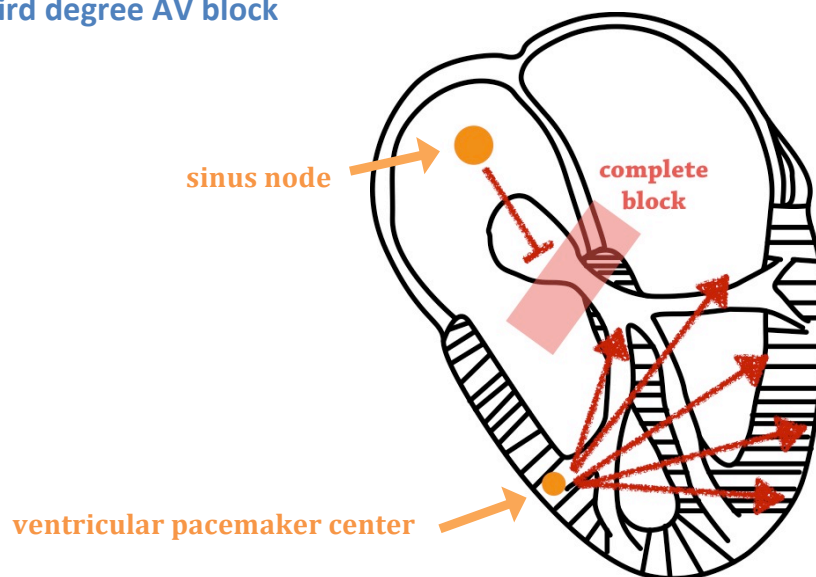
Level 6: High degree AV block—the mother of “too many P waves”

We already know that if there are more P waves than QRS complexes, high degree AV block is probably present. There are three forms of high degree AV block:

1. Second degree AV block Mobitz type I (or Wenckebach block)
2. Second degree AV block Mobitz type II
3. Third degree AV block

Let's start with the most extreme form of AV block...

Third degree AV block

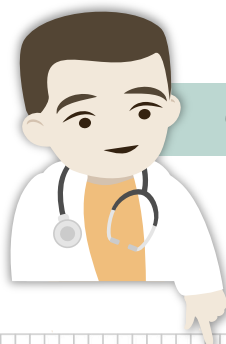
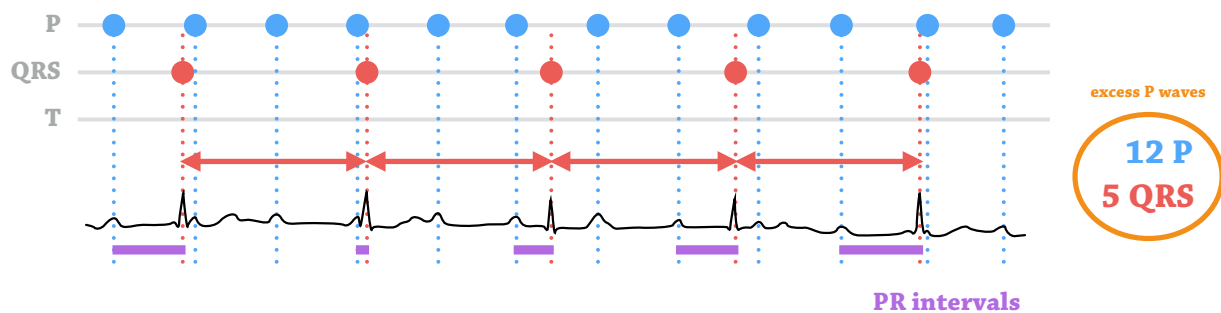


In third degree AV block, conduction through the AV node is completely blocked, and a ventricular center takes over the pacemaker function. Most of the time, the atria are beating in sinus rhythm. However, other rhythms can also be present in the atria, such as:

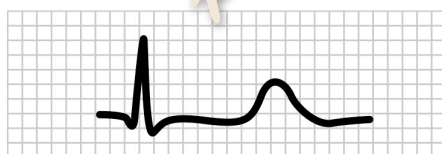
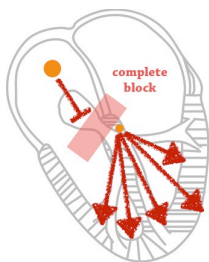
- Atrial fibrillation
- Atrial flutter
- Junctional rhythm
- Atrial tachycardia

There are **three key characteristics** in third degree AV block (in the most common situation that the atria are beating in sinus rhythm):

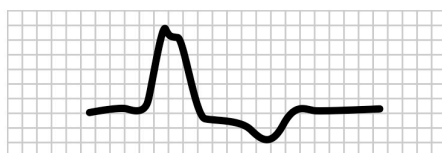
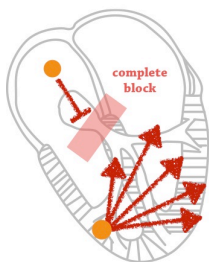
- **Excess of regular P waves:** The atrial pacemaker continues to fire regularly.
- **Variable PR intervals:** P waves and QRS complexes are completely independent of one another.
- **Regular QRS complexes:** The ventricular pacemaker fires at a regular but much slower rate.



One more thing about QRS morphology in 3rd degree AV block:



If the ventricular pacemaker is located close to the bundle of HIS, the impulses will be able to use the speedy pathways of the conduction system, and the resulting **QRS complexes will be narrow** (as is the case in the example above).



If the ventricular pacemaker is located further away from the conduction system, the impulse will have to take the non-speedy pathways and the resulting **QRS complexes will be broad**.

Now let's turn to situations when AV conduction is not completely blocked, which means that some atrial impulses will be able to travel down to the ventricles while others will be blocked. These types of blocks are called **second degree AV blocks**.

no AV block



second degree AV block



third degree AV block
(complete AV block)

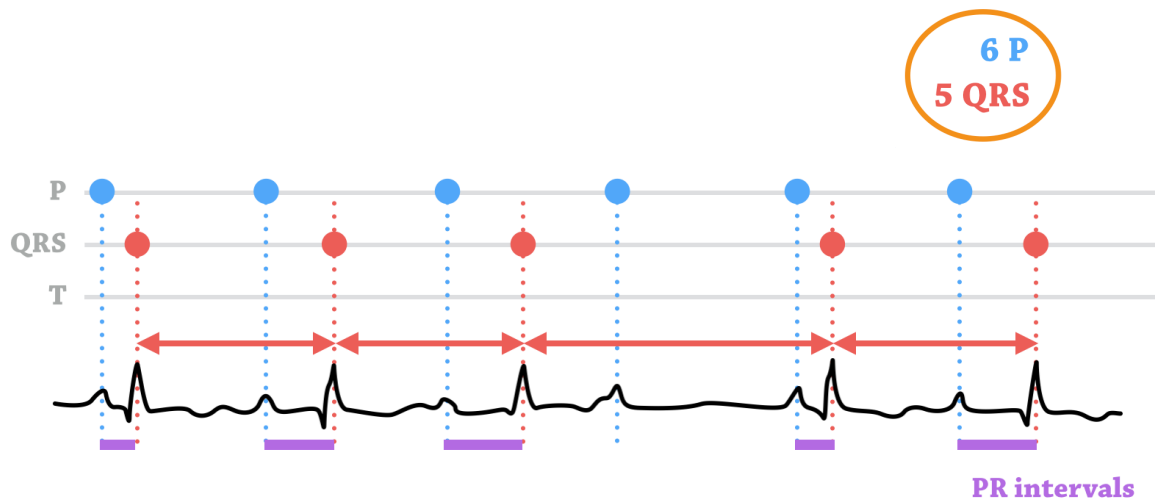


Second degree AV block Mobitz Type I (or Wenckebach block)

You could think of second degree AV block Mobitz type I as a progressive exhaustion of AV conduction; the PR interval progressively lengthens until one impulse is completely blocked (you can actually watch the decay of AV conduction).

The **key characteristics** of this type of AV block are:

- **Excess of regular P waves:** The atrial pacemaker continues to fire regularly.
- **Variable PR intervals:** The PR interval progressively lengthens.
- **Irregular QRS complexes:** Conduction of atrial impulses down to the ventricles is irregular, and the missing beat produces a longer pause; thus, QRS complexes are irregular.

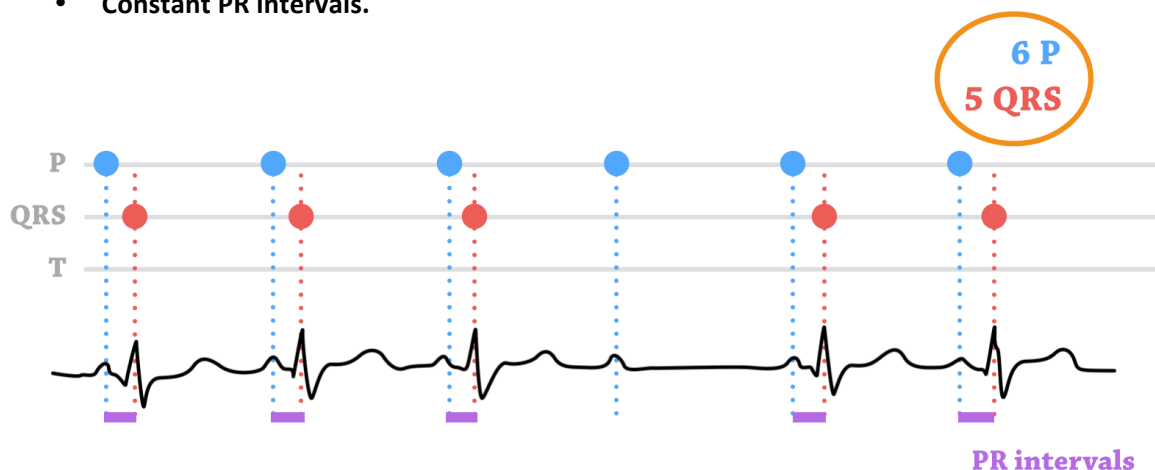


Second degree AV block Mobitz type II

Second degree AV block Mobitz type II is very similar to Mobitz type I with the exception that PR intervals remain constant. After a sequence of conducted beats, a QRS complex is dropped. QRS complexes appear at regular intervals except for the places where they are dropped.

Here are the **key characteristics** of second degree AV block Mobitz Type II:

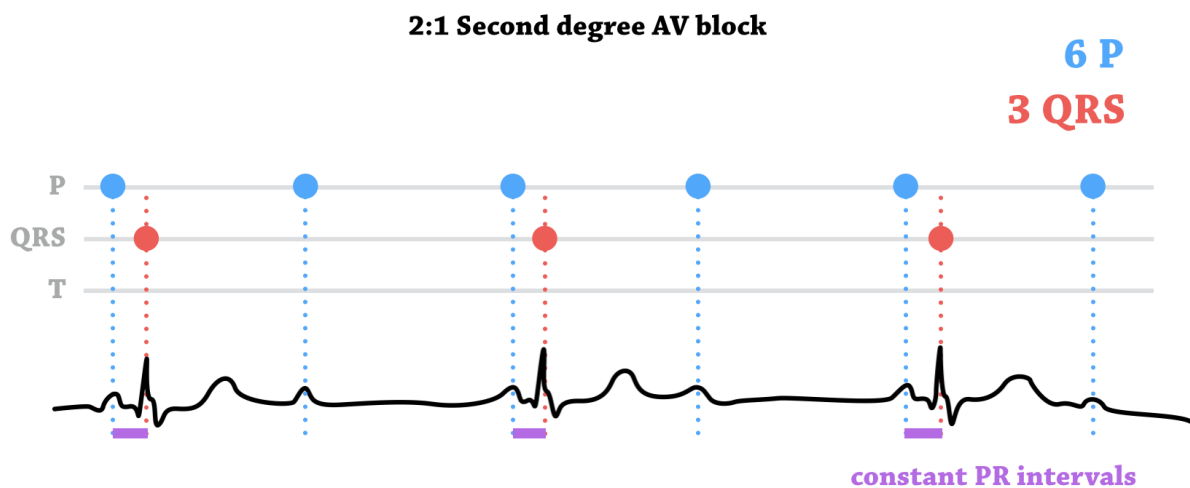
- **Excess of regular P waves:** The atrial pacemaker continues to fire regularly.
- **Constant PR intervals.**



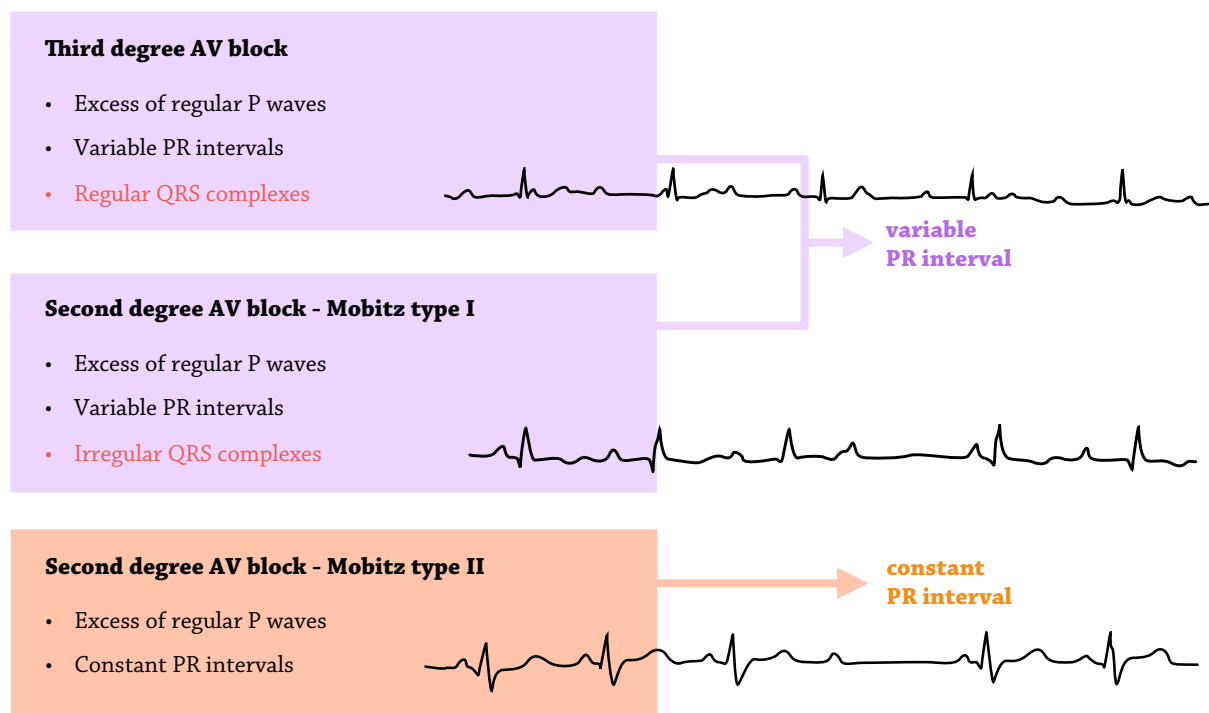
And finally, there is a special form of second degree AV block, which is really a hybrid between Mobitz I and Mobitz II.

2:1 AV block

In 2:1 AV block every other P wave is blocked. There are twice as many P waves as QRS complexes. We cannot really tell if PR intervals become longer or not (i.e., if it's Mobitz I or Mobitz II) because there's only one PR interval before each dropped QRS! That's why this type of second degree AV block is referred to as 2:1 AV block.



Summarizing what we've learned about high degree AV blocks





Here's an algorithm that will help you discriminate between the different high degree AV blocks like a pro!

