More About AV Dissociation

Discussion

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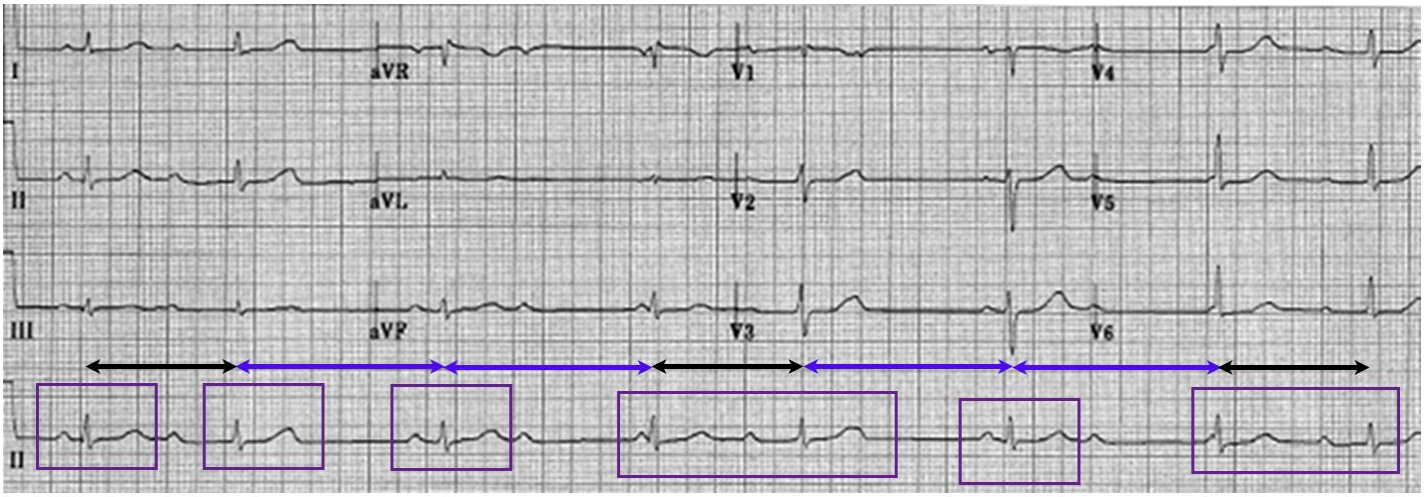

Figure 1

Let's focus on the Lead II rhythm strip at the bottom of the ECG. You will see that I have drawn boxes around six events. You will also note that we appear to have two distinct R-R intervals designated by the arrows in two colors – the shorter R-R intervals with black arrows and the longer R-R intervals with blue arrows.

In box #1 we see a *normal* P wave, a *normal* PR interval and a *normal* T wave. Having seen the whole ECG and Lead II rhythm strip on the LinkedIn post, you know that AV dissociation is present (actually, I even *told* you that it was present). Herein lies one of the biggest mistakes one can make when looking for AV dissociation – assuming that a normal PR interval indicates normal AV conduction. ***In the presence of AV dissociation, a normal PR interval means NOTHING – and it certainly does NOT indicate AV conduction!***

Take a close look at the QRS in the first box. It really is quite normal. Here's what you should be looking at much more closely: look at the ONSET of the QRS and the END of the QRS. These two observations are very, very important. Now you KNOW that this is what the QRS *should* look like. Now compare it to the first QRS in box #6. You immediately recognize the difference! That QRS has interrupted a P wave.

Now look at the T waves in box #4 – there are two of them. Concentrate on the first T wave in that box. While there are P waves before and after that T wave, no P wave encroaches on it. That is a *normal* T wave. Look at the second T wave in box #4. We don't see any P waves encroaching on it, either; however, the second T wave is larger and more rounded than the first. Also, you can definitely see that the second T wave encloses more area.

Why is it larger than the first? It is larger because *there is a P wave that is completely hidden within the T wave*. These P waves are all *upright* which means they have *positive* voltage. The T waves are also *upright*, meaning that they, too, have *positive* voltage. When you add two positive entities, the sum will be larger than either entity. If the P waves had been negative (inverted) and one became hidden by a positive T wave, it would *subtract* some of that positive voltage *and the T wave would be smaller than the others*.

Now let's turn our attention to the arrows. It is obvious that there are two populations of arrows – blue and black. All the blue arrows are exactly the same length and both black arrows are exactly the same length. Since the arrows are measuring R-R intervals, we can see that there are two groups of R-R intervals – long intervals of a fixed length and shorter intervals of a fixed length.

During pure AV dissociation that is NOT caused by a third degree AV block, the mathematical ratio of the atrial rate to the ventricular rate means that at some point an atrial impulse will manage to pass through the AV node and find the ventricles available for depolarization (i.e., no longer in their refractory period). When this happens, it will always result in a shorter R-R interval. Those QRS complexes on this ECG that end the shorter R-R intervals are there ***because the P wave that preceded them conducted!***

Now let's look at something that may prove very surprising to many of you: look closely at the PR intervals of each conducting P wave. They both conducted with a marked PR interval prolongation. ***Yet the normal PR intervals did NOT conduct!*** How can we be so certain?

The QRS complexes all look the same and all are narrow complexes. What we are seeing here is an idiojunctional rhythm that is interfering with the atrial control of the ventricles. An idiojunctional rhythm is a regular rhythm. If a P wave appears at a normal PR interval in front of a QRS, you must determine the timing of that QRS. If it occurred exactly when you would expect the QRS of the idiojunctional rhythm to appear – it did NOT conduct. If it appeared earlier than expected – then it was produced by the preceding P wave (which conducted).

For You Advanced ECG Nerds…

Now here is a question for YOU: There is AV dissociation and obviously a couple of atrial impulses have managed to get through the AV node and capture the ventricles. But there is a major issue here! Have you noticed it? The atrial rate is much faster than the junctional rate! The atria should be in complete control of the ventricles – but they aren't! Doesn't AV dissociation with an atrial rate that is faster than the ventricular rate define THIRD DEGREE AV BLOCK? Or does it not? Atrial (presumably *sinus*) impulses on this ECG are managing to enter the ventricles and excite them. How can that be with a THIRD DEGREE AV BLOCK? How is this possible?