Can You REALLY Recognize AV Dissociation During a Ventricular Tachycardia?

Discussion

Jerry W. Jones, MD FACEP FAAEM

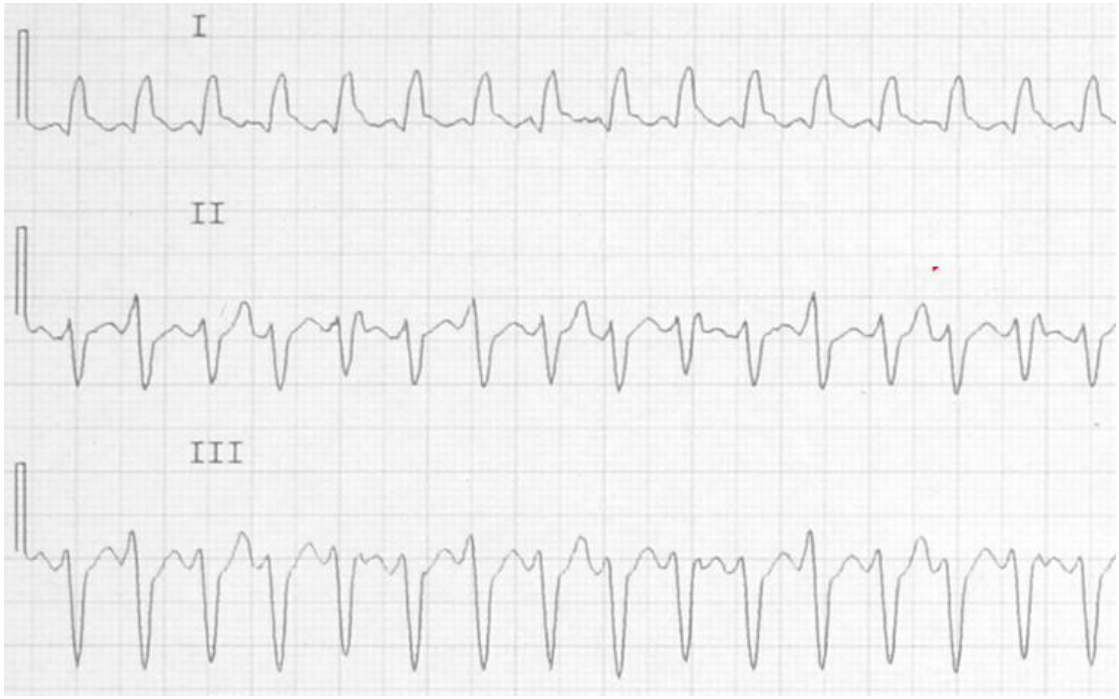

Figure 1

Most people really have no idea what they are looking for when they scan a wide complex tachycardia for signs of **AV dissociation**. This isn't a simple or easy task – it takes study and training. AV dissociation is not going to be obvious, and it certainly isn't going to jump out at you! You MUST look for it but you MUST also know what you are looking for.

AV dissociation occurs when the atrial impulse – usually from the sinus node – continues to beat with some competing interference from the ventricular ectopic rhythm. Occasionally, an atrial impulse manages to get through the AV node and His bundle and enters the ventricles, capturing them. That means that the atrial impulse found the ventricular myocardium to be repolarized enough to conduct an action potential, so the atrial impulse produces a *conducted* QRS.

What does this look like? You will see an upright P wave (except in Lead aVR where it will be inverted, as usual) followed by a QRS. The QRS will usually be a bit narrower than the ventricular ectopic beats (the VT). The PR interval may be normal, or it may be a bit prolonged. Bottom Line: the PR interval does NOT have to be normal and the QRS does not

have to be perfectly normal, either. But one thing is certain: that QRS will appear EARLY and OUT OF SYNC with the rest of the ventricular ectopic tachycardia!

I have just described a *capture beat*. CAPTURE BEATS APPEAR EARLY – NEVER LATE! Be careful because there are a number of internet sites that show beats that are very late and label them "capture beats." They aren't capture beats – they are just regular sinus beats that occurred when the ventricular tachycardia stopped momentarily. CAPTURE BEATS ARE ALWAYS EARLY!

AV dissociation has a cousin called **VA dissociation**. VA dissociation may or may NOT prove ventricular tachycardia. AV dissociation *almost* always indicates ventricular tachycardia. It is often presented as 100% absolute proof of ventricular tachycardia. It is NOT! However, the supraventricular rhythm resulting in AV dissociation is so rare and improbable that you may safely assume you will retire without ever having seen a case. So, for practical reasons, we say that AV dissociation indicates ventricular tachycardia.

OK, so what are we looking for?

1. ***Look for disturbances in the ventricular rhythm*** – a QRS that appears just a little bit *too early*. You may or may not see a P wave before it since they are sometimes hidden by the repolarization of the ventricular rhythm.

2. ***Check the morphology of the QRS complexes paying special attention to the onset and the termination (J-point) of the QRS complexes***. Let's look at Lead II from the ECG (Figure 1):

Figure 2

The QRS complexes with the arrows represent the actual ventricular rhythm in this rhythm strip (Lead II form the tracing in Figure 1). Look at three things: the *onset of the QRS*, *the termination (J-point) of the QRS* and the *T wave* that follows each of the ventricular ectopic beats.

Now compare QRS #2 with QRS #4. They are very different, aren't they? QRS #2 has a wide, tall R wave (actually, an "r" wave) which is quite different from the r wave in QRS #4. That's not just an r wave in #2; that is an r wave PLUS a sinus P wave!

Now look at the T wave following QRS #3. It's very different than the T waves associated with the QRS complexes with arrows – it's much larger than the T wave following QRS #4. That's because it isn't just a T wave – it's a T wave PLUS a sinus P wave.

Look at the termination of QRS #5. Compare it to the termination of the typical ventricular ectopic QRS #4. Again, it's very different because there is a sinus P wave superimposed on the J-point of that QRS.

So those are the specific places to look for the sinus P waves of AV dissociation! You will discover more of them now since you understand exactly *where to look* and exactly *what you are looking for* – which leads us to the next topic…

3. ***Know what the P waves should look like when searching for AV dissociation***. The P waves should be upright in all leads except Lead aVR. If you see a QRS that appears too early, then you know that it was produced by a sinus-conducted P wave. If you don't see the P wave, look in the T wave of the preceding QRS. During rapid rhythms it is easy for a P wave to be swallowed up by a T wave.

   If you see a definite P wave followed by a QRS at a conductible (though not necessarily *normal*) PR interval – but the QRS appears *later* than the next expected ventricular ectopic beat – that is NOT a capture beat. The ventricular tachycardia has just *stopped momentarily* and allowed conduction to occur normally. VTs are well-known for being *paroxysmal* (start-stop-start-stop-start, etc.).

4. ***Fusion beats – the most difficult indicator of AV dissociation to recognize***. Fusion beats are the difficult little sibling to capture beats. Whereas capture beats occur early and cause an obvious disruption in the ventricular rhythm, fusion beats are also sinus conducted beats – but the activation of the ventricles occurs mostly simultaneously with the ventricular ectopic depolarization. Depending on exactly when the fusion beat captures the ventricles (and always only part of the ventricles – remember, it's a *fusion* beat), the fusion QRS may look almost exactly like the

prevailing ventricular ectopic QRS complexes or somewhat different. Usually, they will appear a bit narrower, and this may be a very subtle finding:

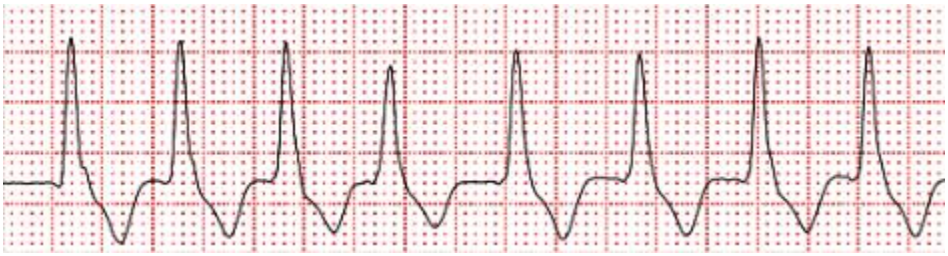

Figure 3

Can you spot the fusion beat in this short run of ventricular tachycardia? It's subtle (4^{th} beat).

Soon I will write an article on VA dissociation. Until then, keep studying and learning.