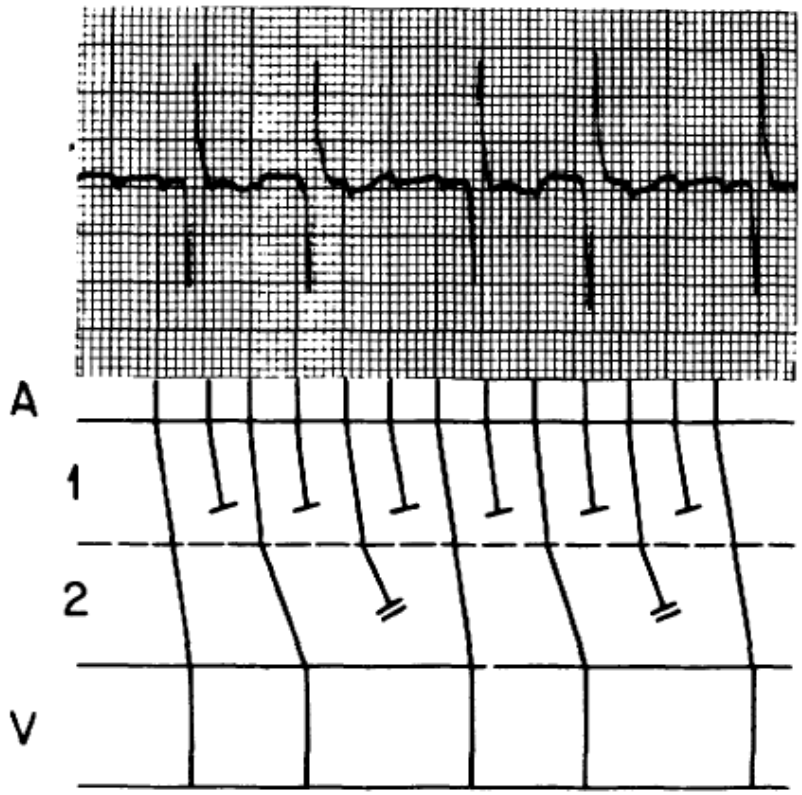
# A Tale of Two AV Blocks

**Jerry W. Jones, MD FACEP FAAEM**

Both these snippets involve a **Mobitz I AV block**. Let's start with **Snippet #1**. Although a Mobitz I AV block is not the *only* process that can result in a bigeminal rhythm, it is certainly the first one we should consider since it is the most common cause. Snippet #1 is atrial flutter with a Mobitz I AV block. It comes from the classic article by Bernard D. Kosowsky, MD et. al., Multilevel Atrioventricular Block*, Circulation* Vol. 53, No. 6, Page 914;1976.

Here is the dysrhythmia laddergrammed for you (as in the article):

## Snippet #1




As you can see, there are TWO levels represented in the AV nodal tier. The only thing I would have laddergrammed differently would be to start the diagram with the flutter wave preceding the one they started with, but theirs works because they kept the same approach all the way through.

This is a 2:1 block in the first level and a 3:2 Mobitz I block in the second level. You can clearly see the prolongation of the second F-R interval in each Mobitz I episode, yet there is no change in the upper level 2:1 block.

This concept is often referred to as *alternating Wenckebach*. There are a number of articles written on this topic but the Kosowsky 1976 article in *Circulation* was – and still is – the most definitive. This pattern typically appears during a rapid atrial rhythm. I have seen examples of it occurring during atrial tachycardia and even during sinus tachycardia (rare!).

The noticeable characteristic is group beating with the Mobitz I episode occurring *between* beats. This particular type of multilevel AV block ends with THREE non-conducted beats (beat blocked in tier 1 – beat blocked in tier 2 which ends the Mobitz I episode – beat blocked in tier 1).

As you have probably already surmised, there are a number of different possible combinations of this pattern in addition to the one illustrated: Mobitz I block in UPPER tier with 2:1 block in LOWER tier, 2:1 block in BOTH tiers and Mobitz I block in BOTH tiers. Bear in mind that when there are Mobitz I blocks in BOTH tiers, they will not necessarily be 3:2 blocks or even have the same ratio. One tier may be 5:4 and the other7:6.

If you read the short exchange I had with Dawn Altman (https://www.ecgguru.com/ecg/ecg-challenge-grouped-beating-double-tachycardia-answer), I referred to a rhythm strip posted on her website that I had interpreted (that's how we met for the first time). It was an alternating Wenckebach that was a bit more complex than this one. It was actually a THREE level AV block. The base rhythm was atrial fibrillation, so for the junctional allorhythmias to manifest, there had to be a 3rd degree AV block above the junctional accessory pacemakers. The multilevel block consisted of a 3rd degree AV block in the first tier, a 9:8 Mobitz I AV block in the second tier and a 7:6 Mobitz I AV block in the third tier.

Alternating Wenckebach rhythms are very unstable rhythms and if you visit her website, you will see that in that rhythm strip the ratios are constantly changing. They also don't last very long. While you are there on Dawn's website – ***ECG Guru*** – check it out. There's a lot of ECG examples and great discussions from the introductory level to very advanced.

OK… so what is the *physiological* distinction of this dysrhythmia as opposed to the other? This type of block is based on a ***transverse dissociation*** within the AV node. The levels are separated transversely. Just as in the laddergram the levels are stacked – one upon another.

Now, let's move on to Snippet #2…

## Snippet #2

Again, it doesn't take long to note that 1) there is group beating and 2) that the PR intervals are prolonging only during every 2nd beat. The intervening beats have a consistent PR interval. There is only one non-conducted P wave at the end of the episode.

This is *not* a multilevel AV block. This is a block occurring in the *fast* and *slow* pathways within the AV node itself. Today, we know that those pathways extend *outside the AV node* into atrial tissue, but that is not our concern in deciphering this rhythm strip.

This snippet represents a 6:5 Mobitz I AV block in the slow pathway.

Granted, we can see the Mobitz I AV block in the slow pathway, but consider this: the fast pathway is also conducting and appears to be doing quite well. If that's the case, shouldn't ALL the PR intervals, then, be the same duration as those for the fast pathway? How is it that the fast pathway is allowing the slow pathway to manifest its conduction which is *slower* than that of the fast pathway? The only way this could happen would be if there is a *concurrent 2:1 AV block in the fast pathway*! The beats that demonstrate PR prolongation are *those beats that are occurring when the fast pathway is blocked*!

This dysrhythmia is based physiologically on a ***longitudinal dissociation*** within the AV node.

Well… there you have it! If you would like to see my notes on the Kosowsky article arranged a bit more succinctly, check Dr. Jones's ECG Blog on my website.

If you feel you need some improvement in your ECG interpretations – whether it involves the recognition of very subtle acute myocardial infarctions or more complex dysrhythmias – please consider joining us in either ***The Masterclass in Advanced Electrocardiography*** or ***The Masterclass in Advanced Dysrhythmias***. Check my website for dates and enrollment information.

During nearly 40 years as a practicing internist and emergency physician, I saw many instances where colleagues misdiagnosed *obvious* MIs or else depended solely on the ECG machine's interpretation – sometimes with disastrous results. I saw cardiologists called in the middle of the night because of the repolarization abnormality of a bundle branch block. That is why I now devote myself to teaching *advanced* electrocardiography full-time… ***because when someone's life is in YOUR hands, you need more than just elementary knowledge and skills!***

In your search for the solution to a problem…

when you feel you have *finally* exhausted all possibilities…

always remember this:

YOU OBVIOUSLY HAVEN'T!

WEBSITE: https://medicusofhouston.com

EMAIL: jwjmd@medicusofhouston.com