Active vs Passive Rhythms as an Explanation of Bigeminal Rhythm with Similar P Waves*

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We describe the criteria for differential diagnosis between 3:2 sinoatrial block from atrial bigeminy due to an ectopic focus in the sinus or parasinus zone. In the 3:2 sinoatrial block the RR interval of the basic rhythm is similar to the short R-R interval of the paired rhythm. In atrial bigeminy, the R-R interval of the basic rhythm is similar to the long R-R interval of the paired rhythm. (Chest 1991; 99:735-36)

We consider that bigeminal rhythm exists when a couplet of QRS complexes is followed by a pause. The differential diagnosis of bigeminy is not easy because it may be explained by various mechanisms including the following: (a) atrial bigeminy; (b) 3×2 sinoatrial block; (c) concealed atrial trigeminy; (d) sequence escape-premature beat; (e) 2×1 and 4×1 atrial flutter; (f) 3×2 atrioventricular block; (g) junctional rhythm with 3×2 exit Wenckebach block; (h) sequence escape beat-sinus capture; (i) coincidence with atrial fibrillation.

In our opinion, the most difficult diagnosis of all these sequences is to differentiate between 3×2 sinoatrial block and atrial bigeminy when the origin of the atrial premature beat is in the sinus or parasinus.
zone. In both situations, the P wave of the premature beat is similar to the basal P wave. This has prognostic and therapeutic relevance because the clinical implications and treatment differ in the two situations. Thus, sinoatrial block is a rhythm often associated with drug administration and more severe bradyarrhythmias which may even require pacemaker implantation. On the other hand, atrial bigeminy is in itself a benign active arrhythmia, which nevertheless may be associated with symptomatic atrial tachyarrhythmias.

Figure 1 shows examples of both sequences. The key to their differential diagnosis is to compare the duration of the rhythm (R-R interval) prior to or posterior to bigeminal rhythm with the short and long RR interval of the bigeminal rhythm. The explanation is readily understood from the Lewis diagram seen in Figure 1. Effectively, in the upper part of Figure 1, the basal rhythm prior to bigeminy has an R-R interval between AB and BC. This distance is similar to that of bigeminal rhythm (DE). The pause (long R-R interval of bigeminal rhythm-CD or EF) is clearly longer than that of AB, BC or DE. In the case of a sinoatrial block, the basal R-R interval is similar to the short R-R interval of the sequence bigeminal rhythm-pause. In the case of atrial bigeminy (lower strip) due to sinus or parasinus premature beats, the R-R interval of the basal rhythm (E-F and F-G intervals) is similar to the pause after bigeminy (B-C and D-E intervals). The Lewis diagram at the bottom of Figure 1 explains this. A basal rhythm is obviously needed to make this differential diagnosis. When we record an ECG and observe this type of bigeminal rhythm, we therefore have to wait until basal rhythm appears. This usually can be seen when this bigeminal rhythm appears in Holter monitoring.

Aside from a brief mention of this problem in both Schamroth's book1 and our book2 we have not found any explanation of this differential diagnosis in other cardiology or electrocardiology texts.

In our ECG laboratory we have found that this type of bigeminal rhythm (two supraventricular beats with a P wave of similar morphology) is not extremely rare (at least six cases have appeared in the last 1,000 ECGs) and we think that in view of clinical and therapeutic implications (active vs passive rhythm), all cardiologists should be aware of the importance of this differential diagnosis.

REFERENCES