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A case of non-conducted atrial bigeminy simulating a second-degree atrioventricular block. A Holter ECG diagnosis

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Abstract. – **A 82-years-old man, symptomatic for fatigue and lypothymia, was referred to our centre in order to evaluate the opportunity of a permanent pacemaker insertion. A 12-lead ECG was described as a Mobitz type II second-degree atrioventricular block with 2:1 conduction. This surface ECG revealed some sinus beats with normal AV conduction, everyone followed by a bizarre, non-conducted P' wave, inscripted in the previous T wave. The Holter ECG showed a sinus rhythm with a mean rate of 70 beats/minute: during the night and at 06:39 pm of the following day, ECG strip showed some sinus beats, everyone followed by an atrial non-conducted ectopic beat, characterized by prematurity and abnormal shape (P' wave), that appears as a small deformation on the preceding T wave. At the beginning and the end of the strip we can estimate respectively 9 and 4 sinus beats, that represent the normal rhythm of this patient. So, it is possible to compare the normal P-P interval (P-P = 0.84 sec) to the shorter P-P' interval (P-P = 0.40 sec) and make the correct diagnosis of non-conducted atrial bigeminy simulating a second-degree AV block with 2:1 conduction.**

Key Words:

Atrial bigeminy, Atrioventricular block.

Case Presentation

A 82-years-old man, symptomatic for fatigue and lypothymia, was referred to our centre in order to evaluate the opportunity of a permanent pacemaker (PM) insertion.

The patient, with a history of essential arterial hypertension, assumed a chronic therapy based on calcium-blockers and antiplatelet drugs.

A 12-lead ECG, obtained on the previous day, was described as a second-degree atrioventricular (AV) block with 2:1 conduction (Figure 1). A more careful observation of this surface ECG revealed some sinus beats with normal AV conduction, everyone followed by a bizarre, non-conducted P' wave, inscripted in the previous T wave. The frontal axis was equilibrated; the QRS morphology showed an incomplete right bundle branch block.

Does this patient really need the placement of a PM and is there another possible diagnosis for this ECG?

Discussion

In second-degree AV block, Mobitz type II, sinus beat has constant PR intervals but they are periodically blocked before reaching the ventricles, while in Mobitz type I block successive sinus impulses show progressive PR prolongation, followed by a dropped beat (Wenckebach phenomenon)[1-3].

The site of second-degree AV block is very useful for the clinician. The most important difference between Mobitz type I and type II is the site: type I is typically within the AV node (intranodal), while type II is usually below the AV node (infranodal). Therefore, in Mobitz type II block, the QRS complex almost always shows evidence of bundle branch or fascicular block[4-8].

When 2:1 conduction is present, it is difficult to distinguish between Mobitz type I and II blocks and the QRS pattern is often a major criteria to differentiate the two types[9].

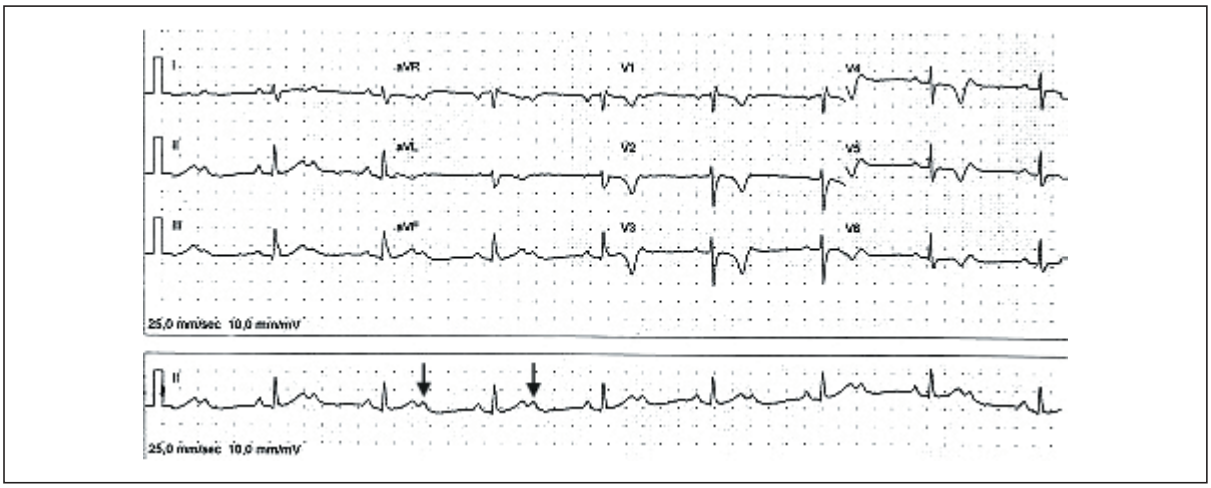

Figure 1. Twelve-lead surface ECG with an apparent second-degree atrioventricular block with 2:1 conduction (arrows).

Of greater clinical significance is the Mobitz type II block for its propensity to progress towards a complete heart block and to cause major complication as Morgagni-Adams-Stockes syndrome or sudden death[3,5], so necessitating of urgent, preventive, permanent PM placement.

As suggested by Wogan et al.[9], when a second-degree AV block with 2:1 conduction is present (or suspected), a careful search of a long ECG tracing for two consecutive, conducted P wave should be made. In our patient (Figure 1), in fact, the short ECG strip could be interpreted as a Mobitz type II (infranodal) second-degree AV block with 2:1 conduction.

Figure 2 shows the information revealed about this case using a 24-hours continuous

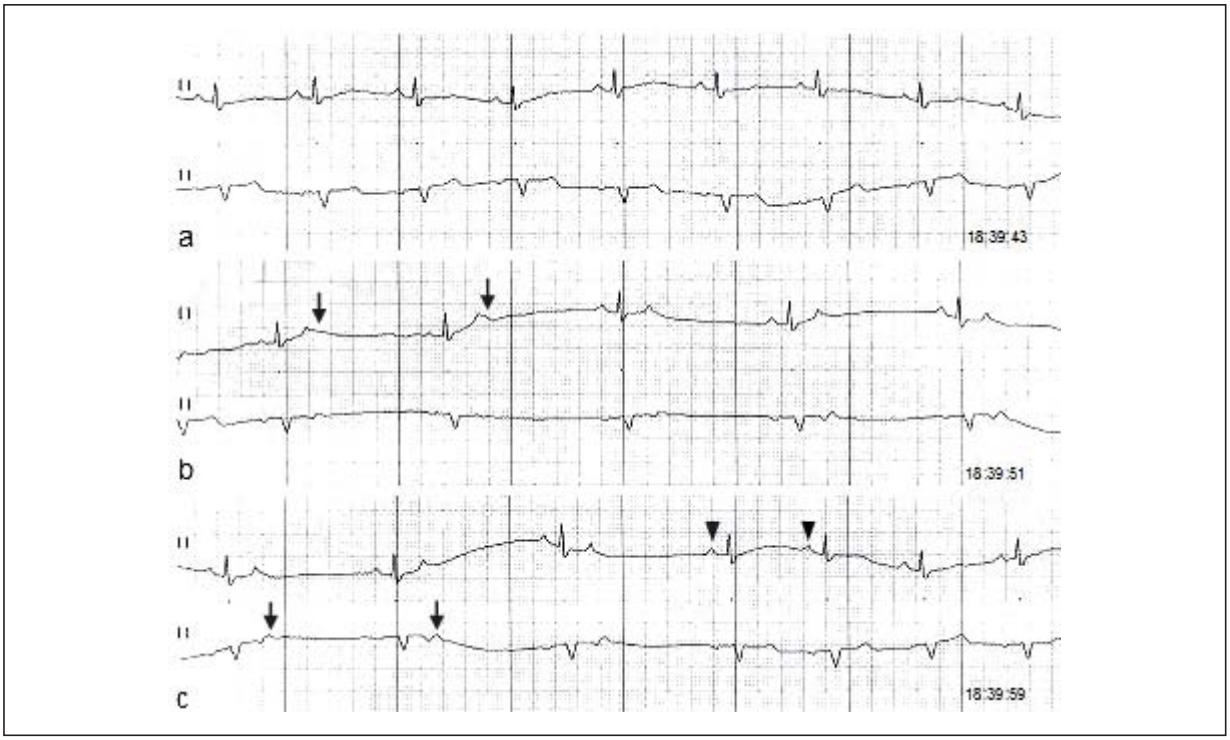

Figure 2. Holter ECG showing the normal rhythm, interrupted by an episode of non-conducted atrial bigeminy (b and part of c: arrows), followed by the recovery of the sinus rhythm (second part of c: arrowheads).

ECG monitoring (Holter ECG), performed in our centre. Holter ECG showed the following:

1. A sinus rhythm with a mean rate of 70 beats/minute;
2. A maximum heart rate of 96 beats/minute at 5:06 pm, during effort (walking);
3. A minimum heart rate of 35 beats/minute at 5:43 am, during the night-rest;
4. During the night and at 06:39 pm of the following day, ECG strip showed some sinus beats, everyone followed by an atrial non-conducted ectopic beat, characterized by prematurity and abnormal shape (P' wave), that appears as a small deformation on the preceding T wave (Figure 2 b,c). At the beginning and at the end of the strip (Figure 2 a,c) we can estimate respectively 9 and 4 sinus beats, that represent the normal rhythm (rate: 73 beats/minute) of this patient. So, it is possible to compare the normal P-P interval (P-P = 0.84 sec) to the shorter P-P' interval (P-P = 0.40 sec) and make the correct diagnosis of non-conducted atrial bigeminy.

Heart block is not really present: these P' waves that follow the normal beats are non-conducted because of their prematurity, falling during the refractory period of the AV node. Non-conducted premature atrial contractions (PACs) rarely occur. Non-conducted atrial bigeminy, as in our case, is a more rare condition that can simulate a second-degree AV block with 2:1 conduction.

The observations obtained by Holter ECG have permitted a correct diagnosis, so excluding the indication for a permanent PM insertion and a worse prognosis.

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