

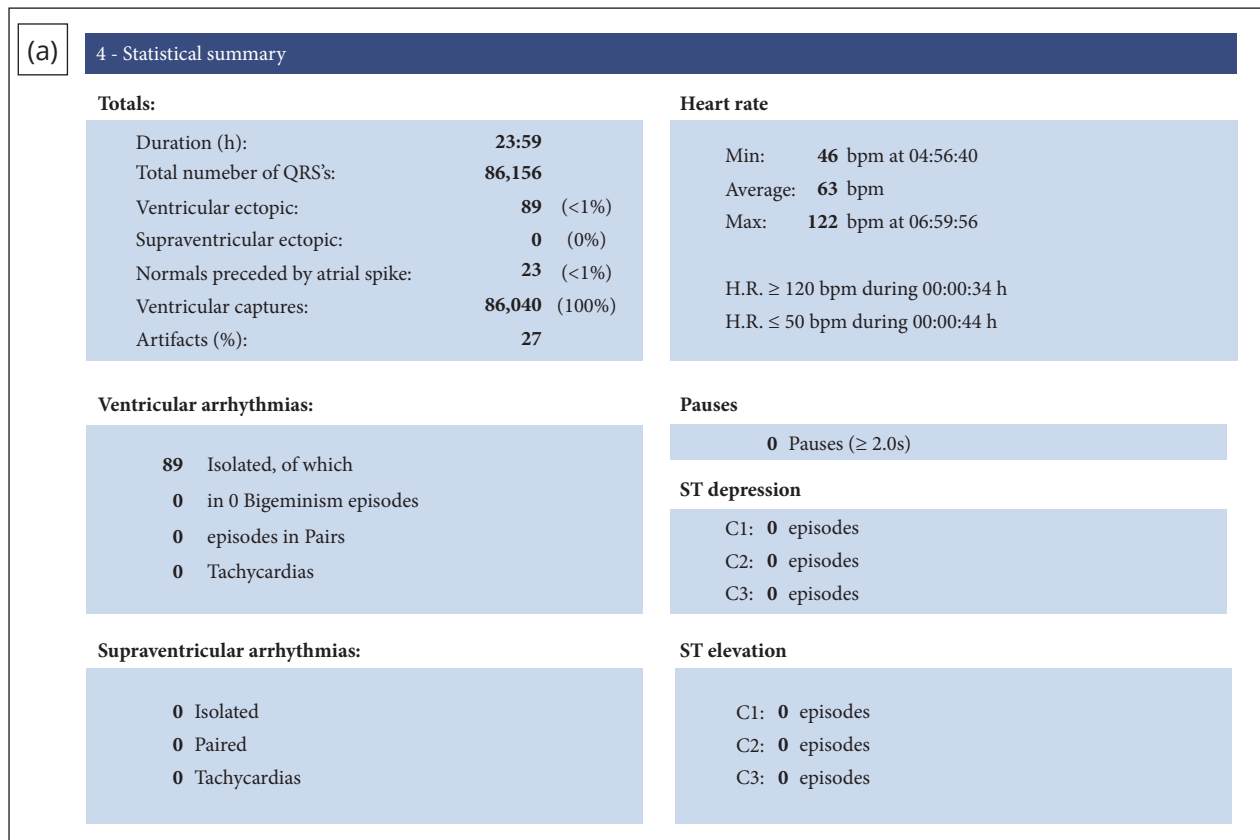
What is the Diagnosis?

CASE PRESENTATION

Patient from male gender, 78 years of age, referred to 24 h Holter exam due to complaints of being tired and palpitation. The hypothesis diagnosis or medical history was not described. The exam was recorded in a private clinic and digitally forwarded to analysis in our service. After the search for clinical information, we heard that the patient is a cardiac pacemaker user; however, there was neither information regarding reason or date of implant, brand, or model of the pulse generator nor programming of the device.

Briefly, the minimal frequency observed was of 46 bpm, the maximum of 122 bpm, with mean heart frequency of 63 bpm. Eighty-nine beats were classified as isolated ventricular ectopias. The tendency graph shows the registered curves. The traces below are representative examples of the recording.

Some questions: what is the base rhythm? What is the likely programming of the pacemaker? Does the system work normofunctionally? Is there any abnormality observed?



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Figure 1. Statistical abstract and tendency graph of the events in the 24 hours of the exam.

Continuation...

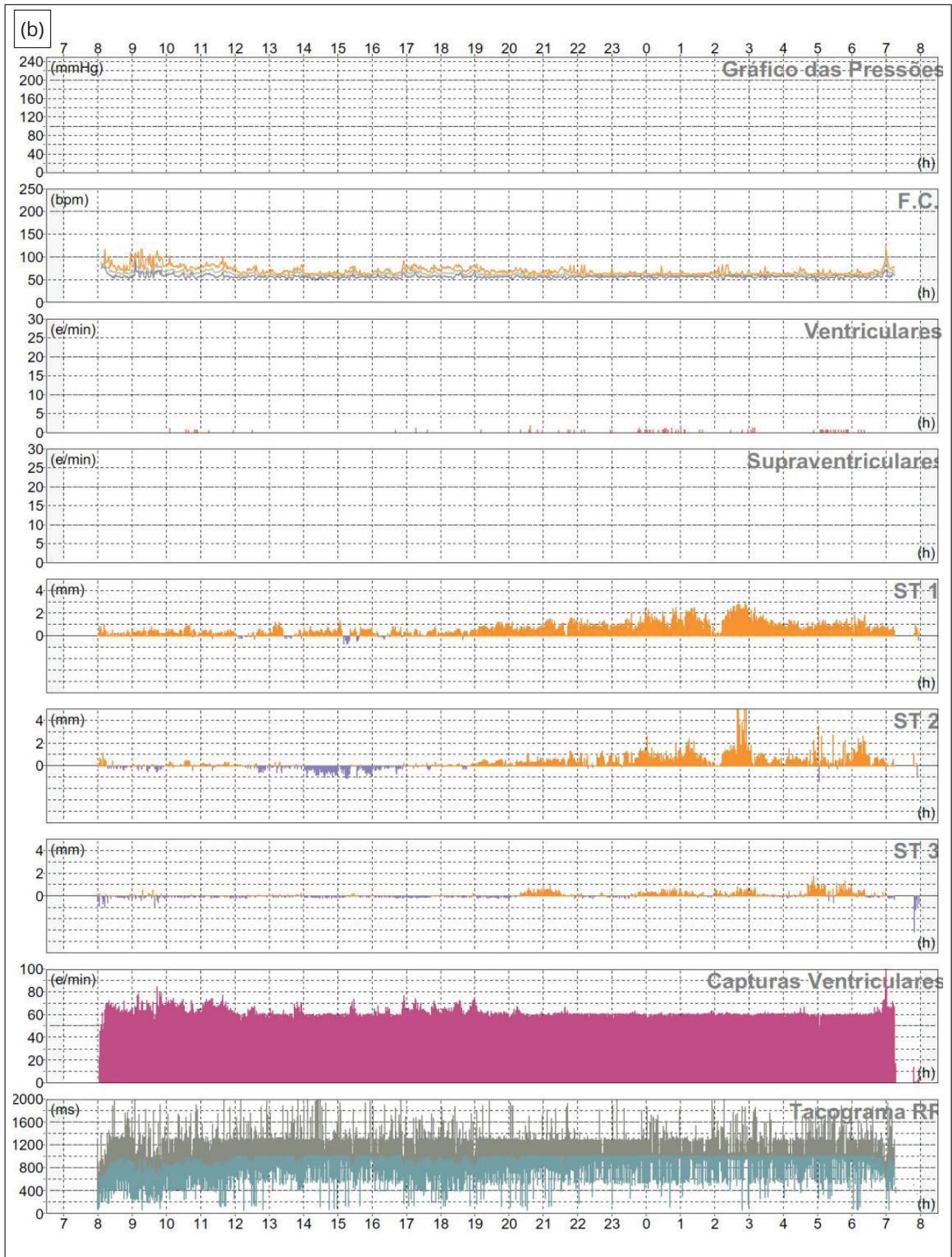


Figure 1. Statistical abstract and tendency graph of the events in the 24 hours of the exam.

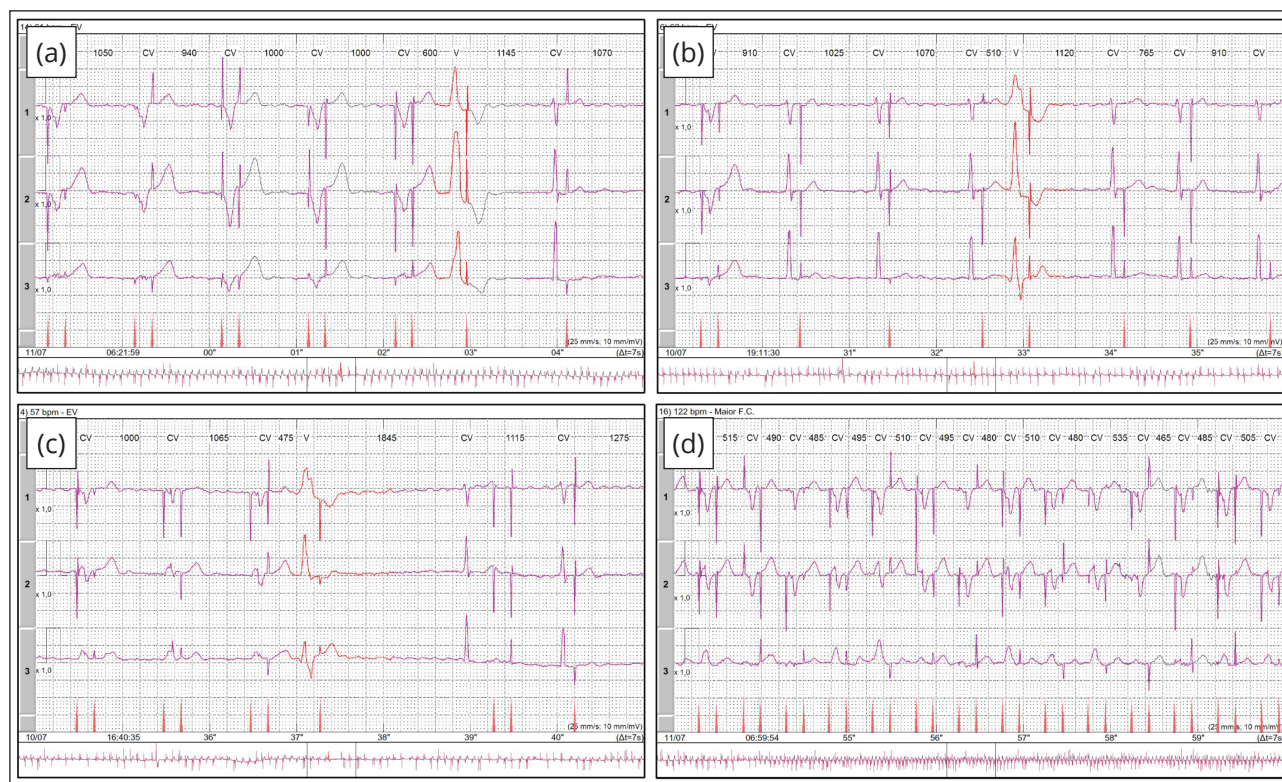


Figura 2. (a,b) Trace examples; (c) lower heart rate and (d) higher heart rate.

DISCUSSION

Despite being highly unwanted, to analyze 24h Holter exams without a minimum of clinical information is, unfortunately, almost the routine in our environment. When it comes to patients providing cardiac pacemakers, the lack of information brings additional difficulties, due to the vast range of programming and specific algorithms for each model of the device, impairing the electro cardiac interpretation.

Let us move on to the analysis of the exam.

The tendency graphs (Fig. 1b) does not suggest any abnormality. Meanwhile, the statistical abstract (Fig. 1a) shows minimal heart frequency of 46 bpm, relatively uncommon in patients with pacemakers.

The traces show cardiac rhythm associated with the presence of two spicules of pacemakers, better identified by the markers in red at the base of the traces, which suggests a double chamber pacemaker. The mean interval between the stimulated heartbeats is of 1.000 ms, suggesting a minimal programmed frequency of 60 bpm. It is observed that the interval between the spicules is of 200 ms.

The moment of higher heart frequency (Fig. 2d) shows that the elevation is due to the automatic action of the pacemaker, suggesting activation of adaptation by the biosensor. Regarding the double chamber pacemaker, the likely programming of the case should be DDDR.

The careful analysis of the traces shows still an absence of P waves and pattern of baseline typical of atrial fibrillation.

However, more than facts, an essential data draws the attention: after the first spicule of the pacemaker, the ventricular capture follows (QRS), being the second spicule occurring after the electric ventricular activation (Figs. 2a-c). Still, in Fig. 2b, it is observed spontaneous QRS followed spicule of a pacemaker, without apparent capture of biological electric activity.

The same happens with ventricular ectopias signed as extended QRS, in red, marked in V at the top of the traces: ventricle extra-systoles followed by spicules.

The amount of data above strongly suggests that there is an inversion of the connection of the electrode leads to the pacemaker generator, with the atrial electrode connected to the ventricular exit and the ventricular electrode connected to the exit of the generator.

This way, the stimulation of the atrial channel of the pacemaker captures the right ventricle, generating the QRS after the first spicule. When there is spontaneous QRS, either by the native AV or by the ventricular ectopia, the pacemaker feels such activity and deflagrates stimulation (VAT), wrongly transmitted to the right atrium due to the inadvertent change in the position of the electrodes (Figs. 2a-c)

With the inversion in the connection of the electrodes, the presence of atrial fibrillation may inhibit the emission of ventricular spicules from the pacemaker completely. Two factors, however, justify that this fact has been detected only in rare moments of recording (Fig. 2c): First, generally the amplitude of the F waves from the atrium in fibrillation is usually of low amplitude and the second is that nominal sensitivity of the ventricular channel of pacemakers is usually higher than the atrial sensitivity.

Concluding, the emitted report was the following:

1. The rhythm of atrial fibrillation, with a low ventricular response.
2. Presence of activity of cardiac pacemaker of atrioventricular stimulation and automatic adaptation of heart frequency by the biosensor, mode DDDR, base frequency programmed in 60 ppm and maximum frequency registered in 122 bpm, with a mean frequency of 63 bpm.
3. There are suggested signs of inversion in the connection of the electrode leads to the generator of the pacemaker, with the atrial electrode connected to the ventricular connection and the ventricular electrode to the atrial connection of the generator. With the emission of the first spicule of the pacemaker, there is inadvertent capture of the right ventricle, followed by the emission of the second spicule, after 200 ms of the AV interval.
4. Rare ventricular ectopia, with the occurrence of 89 isolated ventricular extra-systoles.
5. Short and rare moments of inhibition of the cardiac stimulation by the detection of electric ventricular fibrillation through the ventricular channel of the pacemaker, it is generating longer R-R interval of 1.8 s.

The clinical situation of the patient was informed immediately after the conclusion of the exam so that the necessary measures to the correction of the problem could be taken.

CONCLUSION

The authors describe the electrographic aspects found in a 24h Holter of a patient with an inadvertent connection of the electrode leads to the double chamber pacemaker.

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