

Danger: electrical hazard

Eduardo Martinez Gomez *, Leire Goñi Blanco, and Ravi Vazirani Ballesteros 

Instituto Cardiovascular, Hospital Clínico San Carlos, Fundación para la Investigación Cardiovascular, Madrid, Spain

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Case

Eighty-nine-year-old woman arrived at the emergency department referring 2 h lasting chest pain. A rhythm strip was recorded (see [Supplementary material online, Figure S1](#)). In view of the findings, it was decided to implant a temporary pacemaker for a higher ventricular rate to be better optimized for cardiac intervention. After pacemaker implantation and at the beginning of the procedure, the following rhythm strip was recorded ([Figure 1](#)).

Question 1

What pacemaker programming mode could have prevented the development of a ventricular arrhythmia and continued to provide ventricular pacing in this particular context?

- A. V00
- B. 0D0
- C. VVI

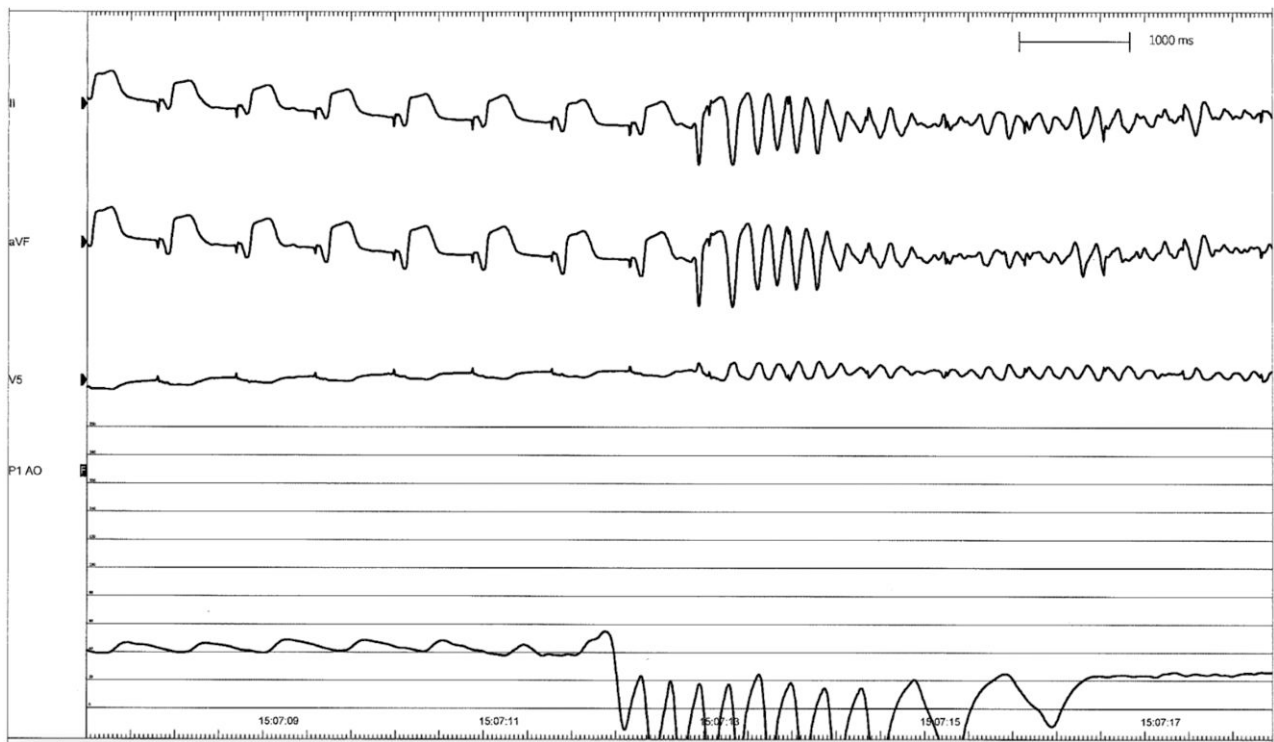


Figure 1 Rhythm strip recorded after pacemaker implantation at the beginning of the procedure.

* Corresponding author. Tel: +34 670405283, Email: emartinezg1@gmail.com

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- D. ADI
- E. AAI(R)

The correct answer is C

Discussion and explanation

The pacemaker was placed in asynchronous mode (V00), not sensing the patient's R-wave and causing electrical stimulation during the T-wave, thus causing the ventricular arrhythmia. VVI (option 3, correct) would have been of choice in a single-chamber pacemaker, as the patient's ventricular complex would have been sensed, causing inhibition of the next pacemaker impulse. ADI and AAI(R) only stimulate in the atrium, which is of no use in maintaining ventricular rates in complete atrioventricular (AV) block. DDO is used as a safe mode in certain situations (e.g. during magnetic resonance imaging in a non-dependent patient).

Electrocardiogram (ECG) on admission shows sinus rhythm with complete AV block and ventricular narrow QRS escape rhythm at 30 b.p.m. with ST elevation in aVF and DI. A temporary pacing lead was positioned in the right ventricular apex prior to coronary angiography. Next ECG shows paced ventricular rhythm in asynchronous mode (V00) with ST elevation. A premature ventricular complex (PVC) occurs (see [Supplementary material online, Figure S2](#), red arrow). The following pacing spike falls within the PVC's T-wave (vulnerable period) (see [Supplementary material online, Figure S2](#), blue star) inducing polymorphic ventricular tachycardia that quickly degenerates into ventricular fibrillation. Pacing spikes can even be observed in asynchronous mode during ventricular fibrillation (see [Supplementary material online, Figure S2](#), green stars). A careful evaluation of the blood pressure curve shows an initial drop of systolic value (see [Supplementary material online, Figure S2](#), yellow arrow), but still maintaining pulse pressure during ventricular polymorphic tachycardia (see [Supplementary material online, Figure S2](#), orange star). In contrast, total flattening of the blood pressure curve can be observed when it degenerates into ventricular fibrillation (see [Supplementary material online, Figure S2](#), purple star).

Question 2

What is the chronotropic drug of choice in the setting of a complete atrioventricular block during a myocardial infarction prior to placing a temporary wire?

- A. Adrenaline
- B. Isoprenaline
- C. Dopamine
- D. Noradrenaline
- E. Vasopressin

The correct answer is C

Discussion and explanation

Dopamine is the chronotropic drug of choice in the setting of acute ischaemia (in which isoprenaline is contraindicated) until the percutaneous coronary intervention is performed or a temporary wire is placed prior to the former.

Adrenaline is used in cardiac arrest, and noradrenaline is used in cardiogenic shock with vasoconstrictive properties but are not recommended for complete AV block. Vasopressin is a vasoactive agent used to reduce noradrenaline doses in various settings but has no chronotropic effect.

Question 3

What antiarrhythmic drug should be avoided in the setting of ventricular polymorphic ventricular tachycardia in a patient with acute ischaemia?

- A. Amiodarone
- B. Flecainide
- C. Propafenone
- D. Encainide
- E. All of the above

Correct answer: E

Discussion and explanation

In a patient with structural heart disease (e.g. acute ischaemia), class IC antiarrhythmic drugs (propafenone, encainide, and flecainide) have been shown to increase mortality, so they are contraindicated. Amiodarone can prolong the QT and perpetuate the generation of polymorphic ventricular tachycardia, thus being contraindicated in this particular type of arrhythmia.

In this setting, switching the pacemaker mode from V00 to VVI would have allowed the sensing of the QRS complex and the R on T phenomenon that initiated the arrhythmia.

Ventricular tachycardia and ventricular fibrillation can be induced by asynchronous cardiac pacing.¹ It is more frequent in particular situations, such as myocardial ischaemia and ionic disorders, secondary to repolarization disturbance.² It is crucial to set the temporary pacemaker in a synchronous mode, making it possible to sense properly and not delivering stimuli within the vulnerable period, especially in this scenario.

Supplementary material

[Supplementary material](#) is available at *European Heart Journal – Case Reports* online.

Consent: The patient expressed written consent for the ECG and anonymized clinical case in accordance with COPE guidelines.

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Data availability

The data underlying this article are available in the article and in its online [supplementary material](#).

References

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