

## Answers to quiz: ECG – implantable loop recorder and case discussion

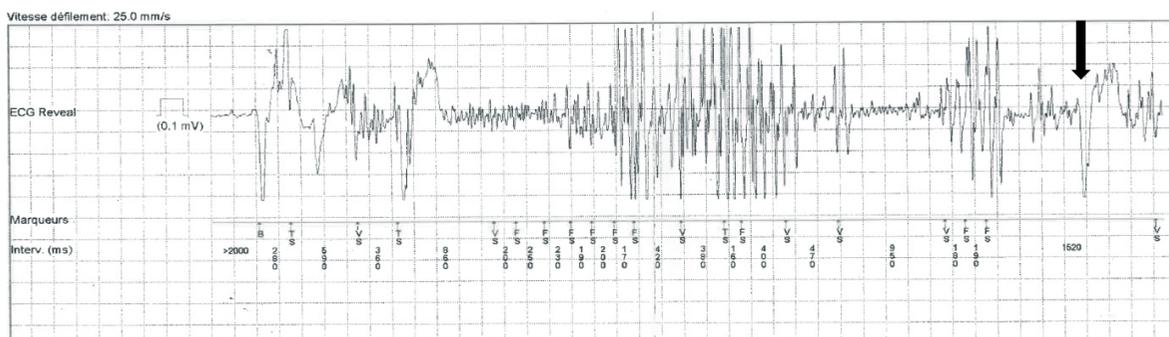
**1. False.** Vagally-mediated atrioventricular block is usually preceded by gradual slowing of the sinus rate (PP lengthening) and atrioventricular conduction (prolonging PR). Cycle length gradually increases in this case (from 860 to 930 ms), but the PR interval stays constant, and a trigger is clearly identified (premature ventricular contraction causing the atrioventricular block).

**2. Correct.** The tracing shows 4 QRS complexes following sinus P waves, then a premature ventricular contraction (that can be recognized by a wider morphology) with a coupling interval of 490 ms. Then two blocked P waves are visible (with a junctional escape beat), before one-to-one conduction resumption. This mechanism is called bradycardia-dependent (or pause-dependent) atrioventricular block or phase 4 atrioventricular block. Its occurrence is related to the inactivation of sodium channels due to spontaneous depolarization within diseased His-Purkinje fibers, during a post-compensatory pause, followed by inability to conduct electrical impulses due to a very low resting membrane potential (phase 4 of action

potential). This implies a proclivity for spontaneous diastolic depolarization. The pause generated by the premature ventricular depolarization allows extra-time for diastolic depolarization of His-Purkinje myocytes during phase 4 of their action potential.

**3. Correct.** Different triggers have been described for phase 4 atrioventricular block, the most frequent being premature (atrial or ventricular) contractions; sinus rhythm acceleration or atrial tachycardia termination. The trigger identified here is the premature ventricular contraction.

**4. Correct.** The P waves are visible and the tracing may suggest an episode of Torsades de Pointes. Three QRS complexes are following the blocked P waves, and then the Torsades de Pointes begins. External interferences may not be suggested, as they would have been present from the beginning of the tracing. This Torsades de Pointes episode was spontaneously resolving. The end of the episode is shown below: the arrow shows a QRS complex, before sinus rhythm resumption.



**5. Correct.** In the vast majority of previously published case reports, patients presenting with phase 4 atrioventricular block received a pacemaker. Phase 4 atrioventricular block may frequently manifest with a syncopal episode at initial presentation.

Sok-Sithikun Bun, Emile Ferrari  
Cardiology Department, Pasteur University Hospital, Nice,  
France

**Conflict of interest:** None to declare

**Peer-review:** Internal and external

**Authorship:** S-S.B., E.F. are equally contributed to preparation of manuscript and fulfilled authorship criteria

**Acknowledgement and funding:** None to declare

**Address for correspondence:** Sok-Sithikun Bun, Cardiology Department, Pasteur University Hospital, Nice, France

E-mail: sithi.bun@gmail.com Phone: +33493038597 Fax: + 377 97 98 97 32

**Received:** 02.08.2021 **Revised:** 15.08.2021 **Accepted:** 15.08.2021

**Copyright ©2021 Heart, Vessels and Transplantation**



**Yachting harbour of Bruinisse, Lake Grevelingen. The Netherlands. Christiaan Vrints, Antwerp, Belgium.**