

EDITORIAL COMMENT

The Case of an Asymptomatic Athlete With Short-Coupled Premature Ventricular Contractions



A Missed Opportunity*

Antonio Pelliccia, MD

The case of an asymptomatic athlete with short-coupled premature ventricular contractions (PVCs) that is reported in this issue of *JACC: Case Reports* by Milman et al. (1) is of particular interest and offers the opportunity for the present commentary.

Milman et al. (1) correctly underscore that short-coupled PVCs are recognized as a trigger for malignant ventricular tachyarrhythmias, even in patients without evidence of structural heart disease. Namely, PVCs originating from the Purkinje system have been documented at the onset of arrhythmic events leading to idiopathic ventricular fibrillation (VF) (2,3). However, this trigger seems to be underappreciated in the medical community, and relatively few studies that define the underlying mechanisms have been published (3-6).

Purkinje-related ventricular arrhythmias range from isolated ectopies, such as that described in this case, to monomorphic or polymorphic ventricular tachycardia and VF. The clinical manifestations vary from occasional palpitations to syncope to sudden death as a result of VF.

Very wisely, the authors of the recent European Society of Cardiology sport cardiology guidelines (GLs) (7) recognized that a few PVCs originating for

the Purkinje system usually have a benign clinical course in apparently healthy athletes without underlying cardiac disease. Although such PVCs should not be alarming, the GLs state that special attention should be paid to short-coupled PVCs. Namely, the GLs state that otherwise “benign” PVCs arising from the Purkinje network may give rise to polymorphic ventricular tachycardia or VF because of their short coupling interval. In such patients, the malignant electrical presentation mandates an aggressive approach and treatment (7).

Currently, use of an implantable cardioverter-defibrillator constitutes a class I indication for the management of Purkinje-related life-threatening arrhythmias, whereas ablation is a very promising option, especially for patients with multiple device therapies or electrical storms. Moreover, we foresee that ablation will be a very suitable therapy in patients with clustered arrhythmic sources, who have a high probability of success from this procedure. In effect, the long-term efficacy of ablative treatment, as reported by experienced centers, is >80% after a median period of 5 years (8).

One may argue that the mapping procedure is challenging in these patients given to the potential for rapidly syncopal and lethal evolution of the tachyarrhythmias. However, it is true that patients may have periods of less severe arrhythmia when only isolated PVCs or short runs of ventricular ectopies are present, and these periods offer the opportunity for safe mapping of the culprit ectopy (3).

This option also seems appropriate in the case of the athlete described by Milman et al. (1): his electrocardiographic recordings showed PVCs with a configuration highly suggestive of an origin near the

*Editorials published in *JACC: Case Reports* reflect the views of the authors and do not necessarily represent the views of *JACC: Case Reports* or the American College of Cardiology.

From the Institute of Sport Medicine and Science, Rome, Italy. The author attests they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

right bundle of the Purkinje network, with a consistent and alarming observation of a very short-coupled interval. Although the patient's clinical presentation displayed mild symptoms or performance limitation, the electrical characteristics of PVCs suggested clinical caution and prompted Milman et al. (1) to perform additional investigations to define the potential for life-threatening arrhythmias and eventually an indication for an implantable cardioverter-defibrillator.

Indeed, in my opinion, the case described by Milman et al. (1) offered the potential for a quite accurate mapping evaluation, which would have provided precious information for efficient ablation treatment.

Unfortunately, the athlete was reluctant to perform this additional investigation and, despite medical advice, refused to have conclusive diagnostic investigation and treatment.

The case reported by Milman et al. (1) clearly depicts the real-world scenario occurring in the stage of pre-participation cardiovascular screening. The actors are, on the one hand, a team of experienced physicians who were able to detect a potentially ominous cardiac condition and were ready to offer their expertise to solve the risky condition and, on the other hand, an athlete/patient who was unable (or unwilling?) to fully understand his perilous medical condition and simply avoided any appropriate solution.

Although we respect the individual's right to make decisions regarding his medical treatment, we nevertheless remain frustrated by the athlete/patient's behavior that, in fact, jeopardized the efficacy and the social value of the athlete's screening program. Undoubtedly, the noncompliant attitude of this athlete resulted in a failure to minimize the risk and in a waste of the medical time, competence, and costs, thereby calling into question the utility of the screening program.

A pertinent consideration, in such a scenario, concerns the shared decision making that is advised by the European Society of Cardiology GL as the best contemporary medical practice (7). We harbor justified concern that shared decision making may not be applicable in cases such as this one.

We believe that, when a life-threatening medical condition is detected and an athlete patient is unable (or unwilling) to completely understand the severity of the condition and the appropriate management, the physician has the ethical mandate (on the basis of the best available scientific evidence) to disqualify the patient from participation in sports. In such circumstances, the physician's decision should be considered the best possible strategy to minimize the risk to the candidate athlete.

Implementation of shared decision making requires an educated athlete/patient who is able to balance the benefits against the risks associated with sport participation in his or her specific condition and to make a decision free of pressure from family (as seen with minors), team, school, or sponsor.

Eventually, we believe that public health institutions and scientific cardiac societies have the mandate to educate the community of athlete patients regarding the best modalities to enjoy safe sport participation.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

The author has reported that he has no relationships relevant to the contents of this paper to disclose.

ADDRESS FOR CORRESPONDENCE: Dr. Antonio Pelliccia, Institute of Sport Medicine and Science, Largo Piero Gabrielli 1, Rome 00197, Italy. E-mail: ant.pelliccia@gmail.com.

REFERENCES

1. Milman A, Belhassen B, Sabbag A, Dubnov-Raz G, Beinart R. An asymptomatic athlete with short-coupled premature ventricular contractions. *J Am Coll Cardiol Case Rep* 2021;3:496-501.
2. Nogami A, Sugiyasu A, Kubota S, Kato K. Mapping and ablation of idiopathic ventricular fibrillation from the Purkinje system. *Heart Rhythm* 2005;2:646-9.
3. Haissaguerre M, Duchateau J, Dubois R, et al. Idiopathic ventricular fibrillation: role of Purkinje system and microstructural myocardial abnormalities. *J Am Coll Cardiol EP* 2020;6:591-608.
4. Scheinman M. Role of the His-Purkinje system in the genesis of cardiac arrhythmia. *Heart Rhythm* 2009;6:1050-8.
5. Deo M, Boyle PM, Kim AM, Vigmond EJ. Arrhythmogenesis by single ectopic beats originating in the Purkinje system. *Am J Physiol Heart Circ Physiol* 2010;299:H1002-11.
6. Haissaguerre M, Vigmond E, Stuyvers B, Hocini M, Bernus O. Ventricular arrhythmias and the His-Purkinje system. *Nat Rev Cardiol* 2016;13:155-66.
7. Pelliccia A, Sharma S, Gati S, et al. 2020 ESC guidelines on sports cardiology and exercise in patients with cardiovascular disease. *Eur Heart J* 2021;42:6-7.
8. Knecht S, Sacher F, Wright M, et al. Long-term follow-up of idiopathic ventricular fibrillation ablation: a multicenter study. *J Am Coll Cardiol* 2009;54:522-8.

KEY WORDS cardiac risk, electrocardiogram, exercise