

Special article

Comments on the New International Criteria for Electrocardiographic Interpretation in Athletes

Luis Serratos-Fernández,^{a,*} Domingo Pascual-Figal,^b María Dolores Masiá-Mondéjar,^c María Sanz-de la Garza,^d Zigor Madaria-Marijuan,^e Juan Ramón Gimeno-Blanes,^b and Carmen Adamuz,^f on behalf of the Grupo de Cardiología del Deporte de la Sociedad Española de Cardiología

^aServicio de Rehabilitación, Fisioterapia y Medicina del Deporte, Unidad de Cardiología del Deporte, Hospital Universitario Quirónsalud, Pozuelo de Alarcón, Madrid, Spain

^bServicio de Cardiología, Hospital Universitario Virgen de la Arrixaca, El Palmar, Murcia, Spain

^cServicio de Cardiología Deportiva, Hospital IMED Levante, Elche, Alicante, Spain

^dInstituto Cardiovascular, Hospital Clínic, Barcelona, Spain

^eUnidad de Rehabilitación Cardíaca y Valoración Funcional, Hospital Universitario de Basurto, Unidad de Rehabilitación Cardíaca del IMQ, Bilbao, Vizcaya, Spain

^fDepartment of Sports Medicine, ASPETAR, Orthopaedic and Sports Medicine Hospital, Doha, Qatar

ABSTRACT

Keywords:
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Sudden cardiac death is the most common medical cause of death during the practice of sports. Several structural and electrical cardiac conditions are associated with sudden cardiac death in athletes, most of them showing abnormal findings on resting electrocardiogram (ECG). However, because of the similarity between some ECG findings associated with physiological adaptations to exercise training and those of certain cardiac conditions, ECG interpretation in athletes is often challenging. Other factors related to ECG findings are race, age, sex, sports discipline, training intensity, and athletic background. Specific training and experience in ECG interpretation in athletes are therefore necessary. Since 2005, when the first recommendations of the European Society of Cardiology were published, growing scientific evidence has increased the specificity of ECG standards, thus lowering the false-positive rate while maintaining sensitivity. New international consensus guidelines have recently been published on ECG interpretation in athletes, which are the result of consensus among a group of experts in cardiology and sports medicine who gathered for the first time in February 2015 in Seattle, in the United States. The document is an important milestone because, in addition to updating the standards for ECG interpretation, it includes recommendations on appropriate assessment of athletes with abnormal ECG findings. The present article reports and discusses the most novel and relevant aspects of the new standards. Nevertheless, a complete reading of the original consensus document is highly recommended.

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Comentarios a los nuevos criterios internacionales para la interpretación del electrocardiograma del deportista

RESUMEN

Palabras clave:
Electrocardiograma
Deportista
Reconocimiento médico

La muerte súbita cardíaca es la principal causa de muerte durante la práctica deportiva. Diferentes trastornos cardíacos —estructurales o eléctricos— se asocian con la muerte súbita cardíaca de los deportistas y la mayoría muestra alteraciones en el electrocardiograma (ECG) de reposo. Sin embargo, la interpretación del ECG del deportista supone un reto, dado que las manifestaciones eléctricas de la adaptación fisiológica al entrenamiento pueden dificultar su diferenciación de algunas cardiopatías. Moduladores como la raza, la edad, el sexo, la modalidad deportiva, la historia deportiva y la intensidad del entrenamiento pueden dificultar aún más su interpretación, por lo que son necesarios conocimientos específicos y experiencia en la interpretación del ECG del deportista.

Desde la publicación de las primeras recomendaciones de la Sociedad Europea de Cardiología en 2005, los criterios de interpretación del ECG del deportista han evolucionado rápidamente gracias a la creciente evidencia científica, que ha permitido mejorar su especificidad y, por lo tanto, reducir significativamente el número de falsos positivos sin afectar a la sensibilidad. Recientemente se ha publicado un nuevo documento de consenso internacional para la interpretación del ECG del deportista. El documento, fruto del consenso de expertos en cardiología y medicina del deporte reunidos en febrero

* Corresponding author: Servicio de Rehabilitación, Fisioterapia y Medicina del Deporte, Hospital Universitario Quirónsalud Madrid, Diego de Velázquez 1, 28223 Pozuelo de Alarcón, Madrid, Spain.

E-mail address: lserratos62@gmail.com (L. Serratos-Fernández).

de 2015 en Seattle (Estados Unidos), supone un importante hito, ya que, además de actualizar los criterios de interpretación del ECG, incluye recomendaciones sobre la actuación y la asistencia clínica al deportista con hallazgos anormales. En este artículo se exponen y se comentan los aspectos más relevantes y novedosos del documento; no obstante, es recomendable la lectura completa del original. © 2017 Sociedad Española de Cardiología. Publicado por Elsevier España, S.L.U. Todos los derechos reservados.

Abbreviations

ARVC: arrhythmogenic right ventricular cardiomyopathy
CMR: cardiac magnetic resonance
ECG: electrocardiogram
HCM: hypertrophic cardiomyopathy
SCD: sudden cardiac death
TWI: T wave inversion

INTRODUCTION

Interpretation of electrocardiogram (ECG) findings is an essential skill for any physician involved in the cardiac evaluation of athletes. The European Society of Cardiology Society guidelines recommend ECG testing in all screening programs performed prior to the practice of sport.¹ The use of ECG as a basic screening test for athletes, alongside clinical history and physical examination, is justified by its ability to detect cardiomyopathies and channelopathies, which are the main causes of sudden cardiac death (SCD) in athletes younger than 35 years. The cost-effectiveness of this test has also been demonstrated in studies of European athletes.² Electrocardiogram interpretation, however, is not easy, as manifestations of athlete's heart, ie, physiological adaptations to an athlete's heart as a result of exercise, can resemble changes seen in cardiomyopathies and channelopathies.

Numerous revisions aimed at improving the specificity of ECG interpretation, while maintaining its high sensitivity, for the detection of cardiopathies associated with SCD,³⁻⁸ have appeared since the European Society of Cardiology published its first recommendations for ECG interpretation in 2005.¹ Some of the revised recommendations were included in consensus documents published following the Summit on ECG Interpretation in Athletes, which brought together experts in sports cardiology and medicine in Seattle in 2012.⁴⁻⁷ The Seattle Criteria were the most widely used recommendations on ECG interpretation in athletes until the recent publication of the new international consensus statement that emerged from the 2015 consensus summit, also held in Seattle.⁹⁻¹¹ This new document has 3 main objectives: a) to update ECG interpretation standards based on new research and up-to-date evidence, b) to develop a clear guide to the appropriate evaluation of ECG abnormalities for conditions associated with SCD in athletes, and c) to help physicians take clinical decisions based on the characteristics of each athlete.

It should be clarified that the document is aimed not only at clinical cardiologists, but also at a wide range of specialists involved in the medical care of athletes, such as general practitioners, pediatricians, and sports physicians. In brief, the additional clinical evaluation and management recommendations are designed to help a wide range of health care professionals to take better clinical decisions related to the health of the athletes under their care. Because many of the recommendations are based on consensus opinions reached at the 2015 summit, the authors stress that the document is designed to serve as a guide and that physicians should

also base their decisions on their own experience and the individual characteristics of each athlete. The systematic use of these new criteria can be expected to further improve their reliability and reduce interobserver variability.

In this article, we discuss the key features of the new consensus document, highlighting both changes to previous criteria and more challenging aspects of ECG interpretation.

THE IMPORTANCE OF WHO AND HOW

The document underlines the importance of interpreting ECG findings within the context of each athlete. In other words, the ECG should not be used as an isolated diagnostic test. Factors that can influence the prevalence of certain ECG abnormalities in athletes are age, sex, race, type and intensity of training, and athletic history (Figure 1). Electrocardiogram abnormalities in athletes who have not been training for long or exposed to intense training should be interpreted carefully and not immediately attributed to physiological alterations induced by exercise.

One of the novel aspects of the new consensus standards is the inclusion of recommendations for athletes aged 12 to 16 years (juvenile pattern) and those aged 30 years or older. This second group has a considerably increased prevalence of heart disease.

The decision to order additional tests is determined by personal history (appearance of symptoms such as syncope or presyncope, chest pain, dyspnea, or palpitations largely during exercise), a family history of hereditary cardiovascular disease or sudden death, and/or an abnormal physical examination, even when accompanied by normal ECG findings. The authors also recall that some of the diseases associated with SCD in athletes, such as congenital anomalous coronary arteries, premature coronary atherosclerosis,

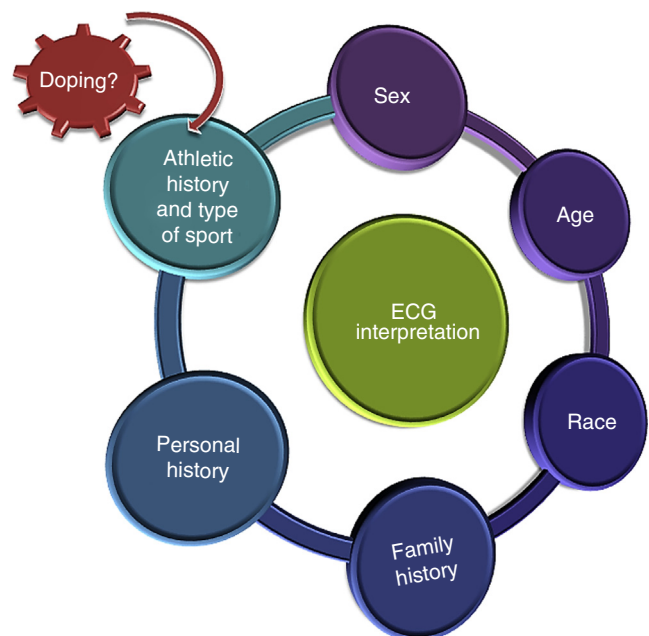


Figure 1. Context for interpreting ECG findings in athletes. ECG, electrocardiogram.

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