

Cardiovascular Imaging In Assessment Of Athletes

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Short editorial related to the articles: “Mechanisms of Heart Adaptation in Elite Female Athletes: Comparison with Healthy Individuals and Training Time” and “My Approach to “Athlete’s Heart”: Evaluation of the Different Types of Adaptation to Exercise”

Physical training is linked to a series of cardiac, morphological, and functional adaptations known as “athlete’s heart”.^{1,2} An athlete can be considered a youth or adult amateur or professional who exercises regularly and participates in official sports competitions. The changes demonstrated depend on the duration, intensity, and type of training (isotonic versus isometric).³

In recent years, a large number of studies have been published, which have improved our ability to understand the characteristics of physiological cardiac remodeling in athletes.⁴ Nevertheless, there are gaps regarding the differential diagnosis of athlete’s heart, especially when it presents with a more intense expression. It can be difficult to differentiate this condition from inherited heart diseases such as hypertrophic, dilated, or arrhythmogenic cardiomyopathy and left ventricular non-compaction.^{3,4}

Technological advances, such as 3-dimensional echocardiography, analysis of myocardial strain, cardiac magnetic resonance imaging, and multidetector computed tomography, have significantly improved the diagnostic capacity of current imaging modalities, allowing the identification of a greater number of pathological cardiovascular conditions that may affect the athlete population.³

The article by Mancuso⁵ offers a review of interesting aspects regarding the most current division of sports modalities (skill, strength, endurance, and mixed) and their relationships with morphofunctional cardiac changes. The article indicates that most sporting disciplines are characterized by a varying degree of isometric and isotonic components; therefore, the original dichotomous classification into strength (isometric) or endurance (isotonic) disciplines is not applicable for most athletes. Moreover, it updates diagnostic criteria and describes the main challenges related to differential diagnoses.

Another interesting point concerning physical sporting activity and athlete’s heart is the difference that may exist in terms of sex and training time.³

Women who practice sports regularly show similar cardiac adaptations compared to men, but generally to a lesser degree, in terms of absolute values. Female athletes exhibit modest absolute increases in left ventricular wall thickness and cavity size, as well as modest increases in right ventricular and bi-atrial cavity size in comparison with sedentary women.^{3,6}

In relation to age, some differences have been reported in senior athletes compared to younger athletes. Master athletes show lower left ventricular volumes and mass compared to their younger counterparts, although both parameters are still higher compared to age-matched untrained controls.⁷

Castillo et al.⁸ have presented an interesting study comparing a very specific group of women in professional soccer training. They conducted an evaluation between beginner and advanced athletes and compared them to a control group of sedentary women. The authors indicated differences between athletes and controls, as well as variations in young athletes, with regard to cardiac dimensions and strain evaluation. Myocardial strain analysis showed a decrease in radial strain, basal rotation, apical rotation, and twist. These data reveal yet another contribution of strain analysis to the understanding of cardiac physiology, with its intricate interaction between rotation and radial and longitudinal strain. This information provides clarification, especially when obtained by the same strain software and examiner.

In summary, the correct diagnosis of alterations that may be compatible with “athlete’s heart” currently represents a well-recognized clinical need, especially on the part of cardiologists who work with cardiovascular imaging.

Keywords

Echocardiography; cardiac remodeling; myocardial deformation

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