3

THE PREPARTICIPATION SCREENING FOR CARDIOVASCULAR DISEASE IN COMPETITIVE ATHLETES

Pelliccia A

Institute of Sport Medicne and Science, Rome, Italy

Introduction

The sudden and unexpected cardiac death is a rare, but tragic and emotional event, which often assumes high visibility when it occurs in an elite and professional athlete. Unavoidably, this event also raises a number of practical and ethical issues, including feasibility and efficacy of preparticipation cardiovascular screening to prevent these catastrophes. At present, uncertainty still exists regarding the cost/effective strategy for identifying cardiovascular abnormalities at risk in young athletes.

The medical history and physical examination

The medical history and physical examination have originally been proposed by the American Heart Association as the most cost/effective protocol, which is also relatively easy to be implemented in large athlete populations; however, this protocol intrinsically lacks the capability to identify most of the potentially lethal cardiovascular diseases. Assessment of the efficacy of the history and physical examination in the screening of athletes is difficult, because no prospective data on a national basis are available. In the retrospective analysis conducted in 134 young athletes who died suddenly of cardiovascular disease assembled by Maron (1), only 4 athletes (3%) did the examination raised suspicion of cardiac disease and in just one (with Marfan syndrome) was the correct diagnosis made. It is of particular note that only one of the athletes with Hypertrophic Cardio-Myopathy (HCM) in this series had a correct diagnosis made during life.

The 12-lead electrocardiogram

The addition of non-invasive testing, such as 12-lead Electrocardiogram (ECG), has the power to increase the diagnostic efficacy of the screening and, indeed, is relied upon extensively in Italy, where a national-based screening program for competitive athletes has been implemented for almost 20 years. The additional value of the 12-lead ECG in the screening program is related to the presence of electrocardiographic abnormalities in the vast majority of individuals with cardiomyopaties that eventually died (over 90% in HCM and 80% in Arrhythmogenic Right Ventricular Cardiomyopathy - ARVC), making the suspicion and identification of these disease possible.

The efficacy of the screening program

Italian investigators have shown that implementation of the national screening is associated with substantial reduction in mortality due to timely identification of clinically silent, arrhythmogenic cardiomyopathies. A sharp decrease in the incidence of sudden cardiac deaths was observed in the Veneto region, from 3.6 in the 1979 to 0.4 deaths x 100,000 person-years in the 2004 in screened individuals, corresponding to 89% reduction in deaths. In comparison, there was no change in death rate in non-screened individuals. In the same time period there was a concomitant increase in the number of young athletes identified at screening with cardiomyopathies (from 4.4% in the 1979 to 9.4% in the 2004) and disqualified from competitive sport in accord to the current Recommendations. The observed decrease in mortality was largely consequence of the reduced deaths attributable to timely identification of athletes with cardiomyopaties (death rate decreased from 36% prior the screening to 17% after the screening).
In 2005, the study group of sports cardiology of the European Society of Cardiology proposed the implementation of the Italian model to screen competitive athletes in Europe, and similar statement has been endorsed by the medical committee of the International Olympic Committee (IOC), the FIFA and Union Cycliste Internationale (UCI).

Conclusion

Screening athletes for cardiovascular disease is a benevolent and ambitious project, which presents implicit difficulties and limitations. An effort to screen million athletes raises innumerable challenges in terms of organization, implementation and efficacy. However, the long-standing Italian experience with national screening program of competitive athletes is worthy of note for its objectives and results.
The Italian experience suggests that a nation-wide screening program is feasible and inclusion of the 12-lead ECG is capable to identify most common causes of sudden cardiac death in young athletes.

References

1. Maron BJ. Sudden death in young athletes. N Engl J Med 2003; 349(11): 1064-1075