Periodical cardiovascular screening is mandatory for elite athletes

Contra screening

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In recent years sudden cardiac death (SCD) in sport has received more media attention. The death of a young competitive, sometimes well-known, athlete is a tragedy with great impact on lay and medical communities. The public and medical awareness of SCD will result in public, medical and political demands to introduce preventive measures to avoid SCD. In many countries it is being debated whether mandatory screening of athletes is the answer and some international sports bodies such as the IOC, FIFA, UEFA and ICU have already adopted screening procedures to fight SCD in sport. In order to prevent SCD, a European screening protocol was proposed by Corrado et al.¹ Known as the Lausanne Recommendations, this protocol consists of a standardised questionnaire, physical examination and resting ECG. But still the question remains: Can SCDs be avoided and what should be done? In other words, 'to screen or not to screen'.

It is important to underline that the beneficial effects of sports and exercise by far outweigh the risk of sudden cardiac death. Physical activity is an important factor in the prevention and treatment of chronic diseases such as diabetes, heart and pulmonary diseases, hypertension, obesity and osteoporosis.² So it is important to promote a physically active lifestyle, and not scare people away from becoming and staying physically active.

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Screening in the healthy population

There are important criteria for the implementation of a screening programme.³ The condition has to be an important health problem. The epidemiology and natural history of the condition should be understood and there should be good functioning and validated screening tests. There has to be an effective treatment for identified patients and there should be evidence from high-quality randomised controlled trials that the screening programme is effective. Information on harm and benefit for the population and the cost-effectiveness of the screening programme should be clear.³

Incidence and causes of SCD

The incidence of SCDs is estimated at between 0.5 and 2.0 cases per 100,000 athletes per year and males are ten times more prone to SCD than females.⁴⁻⁶ The vast majority of deaths in athletes over 35 years are caused by coronary artery disease (CAD). In younger athletes, under 35 years, SCDs are related to hypertrophic cardiomyopathy (HCM), arrhythmogenic right ventricular cardiomyopathy (ARVC), myocarditis, contusio cordis, congenital coronary artery anomalies (CCAA), primary arrhythmia syndromes and coronary artery disease (CAD).^{4,7}

The cause of SCD in young athletes varies from country to country. In Italy ARVC (22%) is the most common cause of SCD in athletes.⁶ In the US, HCM (26%) is the major cause of SCD.^{4,5} In a recent autopsy study in young military recruits in the US Army with SCD in relation to exercise the leading causes of SCD were CCAA (61%), myocarditis (20%) and HCM (13%).⁸ About half of the deceased recruits showed premortem symptoms.⁸

Cardiovascular screening for cardiac abnormalities and SCD

There are two major screening programmes in the world. In the US competitive athletes are screened by means of a family and personal history and physical examination.⁹ In Italy there is also a mandatory screening for competitive athletes, which includes a resting ECG for detecting cardiac abnormalities.⁶ In 1982 the

incidence of SCD in Italy was 4.2/100,000 athletes. In 2004 the incidence of SCD decreased markedly to 0.9/100,000. The effect was mainly caused by a decrease in deaths from ARVC. The authors concluded that the Italian screening programme is successful in preventing SCD.⁶ But the results from this cohort study are not evidence for justifying screening athletes worldwide for SCD.¹⁰

The use of a resting ECG as a screening tool in detecting cardiac abnormalities in athletes is debatable. First, a substantial number of the cardiovascular diseases responsible for SCD (ARVC, CCAA, CAD and myocarditis) are difficult or impossible to diagnose in a screening process, even with the use of a resting ECG. Second, as seen in the research by Corrado,⁶ 9% of all screened athletes will need additional cardiovascular testing. This will lead to pseudodisease and rising medical costs.

Third, the sensitivity and specificity of a resting ECG in detecting cardiac abnormalities in athletes is not high enough to use in a screening programme. A major problem in using an ECG for screening is that the well-trained athletic heart demonstrates a major overlap into pathological findings. In a study of 1005 Italian athletes, Pelliccia showed a sensitivity of the resting ECG of 51% and a specificity of 61% in the detection for cardiac abnormalities.¹¹ Therefore the authors concluded that the use of a resting ECG in preparticipation screening has potential limitations.

After the screening process

The major question to be addressed is whether a screened person who is found negative is really guaranteed that she/he is not suffering from any cardiac disease or at risk for SCD? Approximately 2% of all screened athletes will be disqualified from competitive sports⁶ but we do not know the natural course with or without participation in sport.

There is no scientific evidence whether exclusion from competitive sports will alter the natural history of the cardiac abnormalities and really prevents SCD in athletes.¹² For instance, in the general young adult population the annual death rate from previously undiagnosed HCM is around one per million.^{13,14} Among asymptomatic people known to have HCM, the death rate (case fatality) related to sport is $\leq 0.2\%$ per year.^{13,14} These results are important with respect to advising and reassuring athletes/patients of their prognosis.

Conclusion

There is no scientific evidence for screening (elite) athletes to prevent SCD. The screening process for the relatively low incidence of SCD in athletes cannot always detect the athletes who are at risk for SCD. The screening instruments are neither sensitive nor specific

and little information is known about the natural course of a cardiac abnormality in relation to exercise. To date there are no formal cost-effectiveness analyses available based on real data and outcome. Therefore the supposed cardiovascular screening for (elite) athletes does not fulfil the requirements for a valid screening programme.

Maybe it is a better idea to educate athletes on the importance of their family history, what to do if they have a period of fever and how to recognise and deal with possible alarm symptoms (unexplained dyspnoea and fatigue, (near) syncope, dizziness, palpitations and chest pain) during exercise to prevent SCD.

There is a need for a national registration of SCDs in athletes with autopsy data and a need for the development of cardiac centres with an interest in this topic to develop scientific guidelines on how to prevent SCD in the young athlete. ■

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