

Viewpoint

The Atlantic Rift: Guidelines for Athletic Screening—Where Should Canada Stand?

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ABSTRACT

Sudden cardiac death (SCD) in a young seemingly healthy athlete is a tragic and often highly publicized event. Preparticipation screening aims to identify those affected by cardiovascular diseases who may be at higher risk of SCD during sports participation. There are conflicting recommendations from the American Heart Association and the European Society of Cardiology regarding screening electrocardiograms (ECGs) before participation in sports. The use of an ECG as a screening strategy has been questioned, with a large number of abnormal test results observed in athletes resulting from the electrocardiographic changes that occur in a highly trained individual overlapping with findings suggestive of a pathologic condition. An

RÉSUMÉ

La mort subite d'origine cardiaque (MSOC) chez les jeunes individus apparemment en santé est un événement tragique et souvent très publicisé. Le dépistage avant la participation à un sport vise à déceler les individus atteints de maladies cardiovasculaires qui sont exposés à un risque plus élevé de MSOC. Des recommandations contradictoires proviennent de la Société Américaine de Cardiologie et la Société Européenne de Cardiologie concernant les électrocardiogrammes de dépistage (ÉCG) avant la participation. L'utilisation des ÉCG comme stratégie de dépistage a souvent été remise en question du fait d'un grand nombre de résultats anormaux observés lors des examens réalisés chez des athlètes en raison de modifications à l'ÉCG qui

Sudden cardiac death (SCD) is defined as an unexpected witnessed death of an apparently healthy individual occurring within 1 hour of symptom onset or an unwitnessed death occurring within 24 hours. Sudden cardiac death in athletes is the leading cause of nontraumatic death, with a wide range of incidence reported, from 1 in 3000 in some subpopulations to 1 in 1 million. Male persons, blacks, and basketball players seem to be at a higher risk.¹ Although rare, such deaths have a devastating impact because athletes are perceived as epitomizing good health; the sudden unanticipated death of an athlete precipitates questions and concerns often spurred by extensive media coverage. These deaths are particularly tragic because the majority result from inherited or congenital cardiac diseases that are detectable and for which several

therapeutic strategies are available to minimize the risk of death. The widespread publicity after such a death frequently includes calls for more effective screening of athletes. In most instances, however, there are no prodromal warning symptoms, and SCD is the first manifestation of disease in young athletes,² in contrast to middle-aged nonathletes in whom warning symptoms (chest pain, dyspnea) frequently occur before SCD.³ Of note, coronary disease events are clustered around the “finish line” in mass-participation events.⁴

Athletes, Recreational Sports Participants, or Weekend Warriors

A competitive athlete is defined as “one who participates in an organized team or individual sport that requires regular competition against others as a central component, places a high premium on excellence and achievement, and requires some form of systematic (and usually intense) training.” The distinction between competitive athletes and those involved in recreational sports lies in the ability and freedom of a participant to judge when it is prudent to reduce or stop physical exertion.⁵ Competitive athletes may also be defined

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abnormal 12-lead ECG triggers further examinations, which are expensive given the low diagnostic yield of most abnormal electrocardiographic patterns. Universal screening of young athletes poses logistic and financial challenges. There are currently no Canadian guidelines regarding preparticipation screening of athletes. Screening of athletes ignores the much larger group of young nonathletes who participate in vigorous recreational activity and who collectively represent a population in which a much larger number of SCDs can be predicted to occur. While waiting for the best screening approach in Canada, increased awareness of and access to automated external defibrillators, along with training in cardiopulmonary resuscitation, can help reduce the number of SCDs. In some jurisdictions, electrocardiographic screening has been eschewed in favour of such an approach. Specific physician training in the field of sports cardiology with availability of experts throughout Canada may be a useful start. We provide suggestions and call for the development of Canadian guidelines by appropriate organizations.

as individuals who are engaged in exercise training and competition on a regular basis, exercising > 10 hours per week. Elite athletes are a subgroup of this population. Differences in characterizing the sporting population likely contribute to the large variations in the reported incidence of SCD in sports. Athletes have been found to have a higher risk of SCD compared with nonathletes but not in all studies.⁶⁻⁸ Although deaths among young competitive athletes are higher than in their sedentary counterparts, the overall denominator for all exercising individuals dictates that exercise-related SCD occurs much more frequently in recreational athletes.⁹

Causes of SCD in Athletes

The causes of SCD in athletes include structural, arrhythmogenic, and acquired cardiac abnormalities (Table 1). Some athletes experience syncope, chest pain, dyspnea disproportionate to the physical exertion, seizure, and palpitations before an event.^{2,10} In athletes ≥ 35 years, most events result from atherosclerotic coronary artery disease,^{2,11} whereas in those < 35 years, genetic and acquired cardiovascular abnormalities, particularly cardiomyopathies, are more commonly responsible.^{12,13} Screening for a family history of premature (< 40 years) cardiovascular disease and SCD should occur at a young age, because most SCDs in young athletes are caused by inherited cardiac disease.^{2,14}

Magnitude of the Problem

Sudden death in sports is rare, becoming increasingly prevalent with age. A literature review reveals large variations in the incidence of SCD among competitive and recreational athletes. Reported prevalence rates for SCD during sports vary and reflect methods of data collection, athlete demographics, and sporting discipline. Unfortunately, most reports regarding SCD in athletes are derived from voluntary reporting or the media. More detailed analysis of systematic registries such as the Italian pathology registry in Veneto and the National Collegiate Athletic Association Athletes registry reveals a

apparaissent chez les individus très entraînés et qui se superposent à des résultats évocateurs d'une pathologie. L'ÉCG à 12 dérivations qui est positif entraîne d'autres examens dispendieux étant donné le faible rendement diagnostique de la plupart des tracés anormaux d'ÉCG. Le dépistage universel des jeunes athlètes pose des difficultés logistiques et financières. Il n'existe actuellement pas de lignes directrices canadiennes concernant le dépistage des athlètes. Le dépistage des athlètes ne tient pas compte du groupe plus nombreux de jeunes non-athlètes qui participent à des activités récréatives vigoureuses et qui représentent collectivement une population chez qui l'on peut prédire la survenue d'un nombre beaucoup plus grand de MSOC. Dans l'attente d'une meilleure approche de dépistage au Canada, une sensibilisation accrue et un accès aux défibrillateurs externes automatiques ainsi qu'une formation en RCR peuvent aider à réduire le nombre de MSOC. Certaines autorités ont rejeté le dépistage par ÉCG en faveur d'une telle approche. Une formation particulière des médecins dans le domaine de la cardiologie du sport ainsi que la disponibilité d'experts à travers le Canada peut constituer un point de départ utile. Nous donnons des suggestions et demandons l'élaboration de lignes directrices canadiennes par les organismes appropriés.

prevalence of 3-4 per million population.^{15,16} Insofar as the debate for screening is concerned, the discussion needs to be guided by the prevalence of young athletes harboring disease rather than the prevalence of SCD. Several studies have reported that 1 in 300 young athletes and nonathletes are affected by inherited or cardiac diseases capable of causing an exercise-related SCD. The considerably lower SCD rate reflects the fact that most diseases implicated in SCD in the young have low event rates. The lowest rate of SCD among young competitive athletes (0.46 per 100,000 athletes per academic year) in high school grades 10-12 has been reported in Minnesota.¹⁷

Table 1. Causes of sudden cardiac death in athletes

Inherited: structurally abnormal heart
Cardiomyopathies
Arrhythmogenic cardiomyopathy, right ventricular cardiomyopathy, or dysplasia
Dilated cardiomyopathy
Hypertrophic cardiomyopathy, idiopathic left ventricular hypertrophy
Left ventricular noncompaction
Other
Coronary artery abnormalities
Valvular heart disease (bicuspid aortic valve)
Aortopathies (eg, ascending aortic aneurysm, Marfan syndrome)
Inherited: structurally normal heart
Channelopathies
Brugada syndrome
Catecholaminergic polymorphic ventricular tachycardia
Idiopathic ventricular fibrillation
Long QT syndrome
Acquired: structurally abnormal heart
Ischemic heart disease
Myocarditis
Exercise-induced arrhythmogenic right ventricular cardiomyopathy
Acquired: structurally normal heart
Commotio cordis
Substance abuse
Environmental factors (eg, hypothermia or hyperthermia, electrolyte disturbances)

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