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SUDDEN CARDIAC DEATH

Sudden Cardiac death (SCD) in the young is rare. In the SAF from 1996 to 2005, there was 19 cases of SCD of which 5 occurred during training. No official figures are available for competitive sports in Singapore. The incidence in high school athletes in US is 1 in 100 000 to 1 in 200 000.

Based on an autopsy study in Sweden, the most common causes after biopsy include hypertrophic cardiomyopathy (13%-25%), arrhythmias (13%), myocarditis (9%), pulmonary embolism (7%), Long QT syndrome (4%), dilated cardiomyopathy (4%) and coronary anomaly (2%). Of those with structurally normal hearts (16%), the cause is uncertain. Premature IHD (25%) is seen in those older than 25 years. HOCM has a low prevalence of 0.07% -0.1% in young white individuals but is the most common cause of sudden cardiac death.

The 12-lead ECG is a sensitive and powerful tool for identification and risk stratification of athletes. It is abnormal in up to 95% of cardiomyopathies and the majority of ARVD (arrhythmogenic right ventricular dysplasia). It can detect lethal conditions like the Long QT syndrome, Lenegre disease, Brugada syndrome and Wolff-Parkinson-White Syndrome which together accounts for up to 60% of sudden deaths in young competitive athletes.

The European Society of Cardiology (ESC), Japan and the International Olympic Committee (IOC), as well as several US and international professional sports leagues, endorse the use of ECG in the pre-participation screening of athletes. The ESC and IOC recommend pre-participation screening with history, physical and ECG from age of 12 repeated every 2 years. Italy is the only country in the world that routinely uses ECG for pre-participation screening in competitive sports and its program begins at 12 years of age.

In the US, the American Heart Association (AHA) in 2007 reaffirmed its recommendations against universal ECG screening, citing a low prevalence of disease, poor sensitivity, high false-positive rate, poor cost-effectiveness, and a lack of clinicians to interpret results. Instead, the AHA recommends a detailed personal and family history and physical examination alone, then screening young people who have higher risks.

In Singapore, every SAF serviceman, whether a National Serviceman or regular, goes through a pre-enlistment medical examination at the SAF Medical Classification Centre. The medical assessment includes a resting electro-cardiogram (or ECG), chest X-ray, blood tests and urine tests, and a physical examination. Individuals with a history of death in the immediate family before 40 years of age, or sudden death may be referred for specialist assessment and additional investigations. For regulars, medical screening is done once every two years from age 25 until age 40 and annually thereafter.

The European/IOC recommendation is based on the 25 year Italian study, launched in 1983, in which all individuals aged 12 -35 years, engaged in organized sports, obtain an annual medical clearance. This includes history, physical examination and ECG. This observational study of 42 386 young athletes by Dr Domenico Corrado (University of Padua Medical School, Italy) published in the October 4, 2006 issue of the Journal of the American Medical Association reports that the introduction of a nationwide pre-participation screening program including ECGs for young athletes in Italy has led to an almost 90% drop in sudden cardiac deaths in one region of the country from 3.6 per 100 000 person-years in 1979-1980 to 0.4 per 100 000 person-years in 2003-2004 (p for trend <0.001), whereas the incidence of sudden death among the unscreened nonathletic population did not change significantly during that time. Most of the reduced death rate was due to fewer cases of sudden death from cardiomyopathies.

In this study, the most common disqualifying conditions are rhythm and conduction abnormalities (39%), hypertension (27%), valvular (21%) and HOCM (3.6%). This study led to the proposal of using the 12 lead ECG by the IOC and the ESC in 2005. The recommendations for the use of echocardiograms and exercise electrocardiograms is not as clear.

Exercise ECG offer better detection of cardiac abnormalities among athletes that are missed by resting, or baseline, ECGs. This is based on a study reported online July 3, 2008 in BMJ by Dr Francesco Sofi (University of Florence, Italy). This study is unique in that it identifies an older population of athletes who are at risk of coronary artery disease. The majority of those with abnormal exercise ECGs had normal resting ECGs suggestive of ischemia or arrhythmias. Importantly, most of them would have been overlooked on history and physical examination alone.

For cardiologists, the identification of important cardiac abnormalities and the decision to ground athletes remain one of the more complex aspects of clinical practice. The 36th Bethesda guidelines may provide recommendations based on the current consensus but decision to sideline athletes have to be tailored to the individual.

What is as important is comprehensive emergency planning to ensure efficient response to a sudden cardiac death. Having an on site defibrillator only solves half the problem. A structured emergency action plan is critical. This involves early activation of EMS, early CPR, early defibrillation and early transition to advanced cardiac life support.