

001 Allard Lecture

PREDICTION AND PREVENTION OF CARDIOVASCULAR EVENTS IN AIR FORCE OFFICERS

PREVISION ET PREVENTION DES EVENEMENTS CARDIOVASCULAIRES CHEZ LES OFFICIERS DE LA FORCE AERIENNE

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Introduction: The most frequent reason for aircraft diversion is cardiac emergency and the most serious reason is in-flight sudden cardiac death (SCD) (1,2). The occurrence of SCD in the cockpit is very low but it instantaneously causes pilot incapacitation and possibly a tragic aircraft accident (3). Generally, SCD contributes to 50% of all cardiovascular deaths worldwide and the survival rate remains unacceptably low ($\leq 10\%$) (4,5). For over a decade, the SCD scenario has changed, the prevalence of ventricular fibrillation declining while the occurrence of asystole and pulseless electrical activities has increased (6-8).

Background: The causes of SCD are varied in different age groups and geography. In young western victims (age < 35 years), the frequent etiologies are hypertrophic cardiomyopathy and anomalous coronary artery (9). However, myocarditis and sudden unexplained death are more common among young Asians (10,11). Beyond the age of 35 years, occult coronary artery disease (CAD) remains the major issue (4,9,10).

Cardiovascular risk scores (i.e. Framingham, New Zealand, The SCORE, etc.) are routinely applied by aviation authorities and others to predict future cardiovascular event, including SCD, but their prediction rate is disappointing (12,13). Various invasive and non-invasive tools including rest, ambulatory and stress ECG, late potentials, heart rate variability, etc., have been studied but none is able to predict SCD (5,14). The only reliable test is left ventricular systolic function (LVEF) (14), however, a recent community-based study indicates that the number of young SCD victims with preserved LV systolic function is increasing (15). Thus, SCD prevention, in attempt to identify the high risk candidates and lowering the risk to active aviators, remains a challenging chapter in Aviation Medicine.

Summary: Understanding the arrhythmogenic substrates of heterogeneous victims is one of the keys to developing a SCD prevention program. In this review, sample cases of sudden unexplained death syndrome (16), myocardial infarction in the young (17), near fatal myocarditis and sudden coronary death without major risk factors will be presented. Non-invasive cardiac imaging techniques such as cardiac MR or coronary CT scan have been used to identify target pathology for specific treatment (18) or risk stratification (19). Genetic risk score for predicting CAD has been developed and tested in larger population (20). For the individual person, a healthy life style remains highly recommended since it could reduce coronary events by 48 %, even in participants who are genetically susceptible to CAD (20).

References for Allard Lecture

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