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Mini Review

Atrial Fibrillation in Athletes-Easier to Recognize Today?

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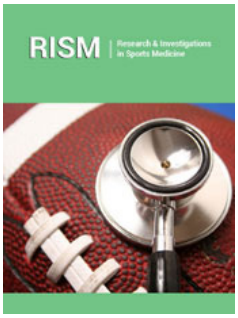

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Abbreviations: AF: Atrial Fibrillation; OHRM: Optical Heart Rate Monitors; HRV: Heart Rate Variability; ECG: Electrocardiogram

Introduction

Atrial fibrillation (AF) is the most common arrhythmia in athletes [1,2]. The risk of AF in athletes is fivefold higher than in their sedentary counterparts and people having only regular moderate physical activity. The risk is higher in endurance athletes, particularly in cyclists (OR 14.4%). Structural heart disease is observed in 40% of athletes with AF. The risk of lonely AF is higher in men. Women still represent a minority of participants in endurance sports and their risk is difficult to estimate. Available data show that that prolonged endurance exercise may also cause AF among athletic women [3,4]. Recent studies show that women seem to be affected by atrial fibrillation, less than male counterpart [5]. AF is also the most common arrhythmia in the general population, occurring in 1% of it [6]. However, it is rarely the cause of death compared to other arrhythmias found in athletes such as commotio cordis [7]. Other risk factors of AF in athletes comprise age, exercise intensity and above all – exercise duration. A threshold for the increased risk of AF is 1500 hours of exercise per life. Atrial volume is a strong predictor of AF (athletes with AF have a larger left atrial volume than those without) in older athletes (39±9 years old) and in veterans [3,4,8,9].

AF can be classified as paroxysmal, persistent or permanent. Paroxysmal AF is defined as AF that reverts to normal sinus rhythm within 7 days, and ca 50% of paroxysmal AF do so within 24 hours. Persistent AF is defined as AF that persists beyond 7 days. Permanent AF is defined as AF that is longstanding, usually defined as >1 year and which can either not be converted to sinus rhythm or when cardioversion has not been attempted [10]. These three forms of AF generally progress from one to another if the patient does not receive medical intervention.

Typically, the first episodes of AF usually occur in the 5th decade of life in a veteran of endurance sports and continuing with recreational physical activity. Usually they appear in a vagal context - after a meal or during sleep. AF episodes appearing during effort suggest structural disease or stimulant use. Initially, the episodes are sporadic, then more and more frequent. In 43% of veterans, degeneration into permanent AF is observed [11,12].

The etiology and pathophysiology of AF in athletes are not clear. Increased activity of the parasympathetic vagal system is the most important modulator and trigger of AF in athletes, whereas a substrate has still been a subject of debate. Structural remodeling of atrial myocardium in response to permanent pressure and volume overloading („overtraining syndrome"), inflammation and fibrosis are the most probable causative factors [13].

Treatment should be preceded by detailed thyroid function tests, queries for drug and stimulants use, structural heart disease exclusion, and thrombo-embolic risk assessment. Athletes with AF that is well tolerated and self-terminating, may participate in competitive

sports without therapy. Early ablation and/or early rhythm control may prevent degeneration into permanent AF. The most devastating complication of AF is systematic thromboembolism. Clots form in the left atrium because of the blood stasis produced by the AF. Approximately 15% of strokes in the United States are associated with AF [14]. Antithrombotic therapy must consider the bleeding risk in the context of the specific sport. Cessation of the competitive sport helps to achieve clinical improvement [15].

Among most important papers related to AF in elite sportsmen, a long-term prospective study performed by Furlanello and coworkers in Italy should be mentioned. The authors analyzed the presence of AF, paroxysmal or chronic, in a population of young elite athletes including previous Olympic and World champions, who were studied for arrhythmias that endangered their athletic careers. Among 1772 athletes identified with arrhythmias that underwent diagnostics procedures, 146 young athletes were studied from 1985 to 1997, with a mean follow-up of 62 months.

Of the whole group, 13 (9%) had AF (paroxysmal in 11 and chronic in 2), all were male. The paroxysmal AF occurred during effort in 7 athletes, after effort in one, and 3 at rest. AF was the cause of symptoms in 13 (40%) of 22 young elite athletes with long-lasting palpitations. Five young athletes had a substrate for AF: Wolff-Parkinson-White (WPW) in 3, arrhythmogenic right ventricular dysplasia in 1, healed myocarditis in 1, and what was considered idiopathic in 8. All elite athletes were alive with a mean of 62 months follow-up and seven continue in their sports: three after radiofrequency catheter ablation and 4 after a period of de-training [16].

In a recently published review, Bosomworth summarizes evidence that endurance athletes, both competitive and leisure-time sportsmen, as well as former elite athletes, are at higher risk of AF as compared with untrained controls [2]. Among male runners participating in Barcelona Marathon, AF prevalence was about 8 times higher [17]. AF developed in 10% of former Swiss elite cyclists and in 30% of former elite German handball players. In spite of enhanced AF in elite endurance sportsmen, AF seems to be reduced in leisure-time sportsmen performing exercise of moderate intensity and duration [18,19]. It should also be emphasized that obesity and hypertension are positively connected with AF [20]. Implementing moderate effort in obese patients reduces the frequency of FA [21].

Based on media information, severe cardiac arrhythmias are not rare in elite competitive sportsmen including Olympic and World champions. The best women ski runners in last decade; Marit Bjørgen from Norway, Justyna Kowalczyk from Poland and Swedish champion Charlotte Kala were diagnosed with atrial fibrillation and were treated successfully with atrial ablation [1]. All ski champs returned to professional sports and are were leading in world rankings. Among famous women sports figures with atrial fibrillation are Birgit Fischer, a legendary German canoeist, eight-time Olympic tennis champion Billie Jean King, also a 39-time Grand Slam title winner and Polish cyclist, former MTB World master Anna Szafraniec-Rutkiewicz. Birgit Fischer, being 50 and having hopes of qualifying for the 2012 Olympic games was diagnosed with AF during routine medical checks. Birgit, already the most decorated Olympian in German history, decided her health was more important than another medal and retired from her professional sports career, even though she believed she was in better shape than in her last Olympic comeback [2].

Among elite men champions with AF are NBA All-Star legend Larry Bird [3], Spanish cyclist Haimar Zubeldia, triathlete Karsten Madsen and Mardy Fish, a famous US professional tennis player [4]. Mardy Fish, then 31 and ranked eighth in the ATP Tour, had woken up in the middle of the night with a rapid heartbeat and pounding in his chest, symptoms of atrial fibrillation. In a USA Today interview he said: "I was completely panicking. I thought I was going to die." Fish was diagnosed with AF and after cardiac catheter ablation to restore normal heart rhythm, he returned to competitive sports. Larry Bird communicated in his autobiographic book that he continued to play in the NBA even with episodes of rapid heart rate, light-headedness and disorientation i.e., all atrial fibrillation symptoms, but he never told his team physician about the health problems. Only when he retired in 1992, was he diagnosed with AF.

Currently, most athletes, not only in endurance disciplines, use heart rate monitors (HRM). The role of HRMs is to assess the intensity of training, among others by measuring heart rate during exercise [22]. Many athletes sleep with HRMs, which during sleep can not only control the heart rhythm but also simply act as watches (optical heart rate monitors - OHRM). Although heart rate monitors are designed to control the heart rhythm in patients with sinus rhythm, they may accidentally detect arrhythmia [23]. This arrhythmia - both in training, at rest and while sleeping can be an AF attack. The unequivocal diagnosis of atrial fibrillation is technically impossible for most HRMs because they do not record P-waves and QRS complexes [24]. Nowadays, more and more heart rate monitors have a heart rate variability (HRV) function that indirectly suggests which arrhythmias may be an AF attack. Recently, optical heart rate monitors have appeared on the market, which are already register a recording similar to a classic electrocardiogram[5]. The recording quality, however, often leaves a lot to be desired (a lot of artifacts). Holter ECG or standard ECG seems to be the golden mean to confirm AF at athletes. Undoubtedly, however, new smartphone applications used by athletes will be an important source of additional information for doctors in detecting arrhythmia in amateur and professionals' athletes in the future, including AF [25].

(Endnotes)

1 https://fasterskier.com/fsarticle/lifelong-skiers-show-increased-risk-of-developing-heart-arrhythmias/

2 https://afibtreatment.com/celebrities-with-a-fib-birgit-fischer/

3 https://www.espn.com/nba/story/_/id/14712117/larry-bird-believes-nba-big-men-die-young-right

4 https://www.everydayhealth.com/atrial-fibrillation/living-with/world-class-athletes-with-atrial-fibrillation/

5 https://support.apple.com/en-us/HT208955

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