

Editorials

Fitness-Related Cardiac Arrhythmias

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Most clinicians are aware of the well-established association between physical fitness and cardiac health. How many are aware, however, that high levels of physical fitness predispose patients to cardiac rhythm abnormalities? We were not—until each of us experienced one of the two most common serious fitness-related cardiac arrhythmias: atrial fibrillation/flutter (Dr. Weiss) and sinus bradycardia with ventricular tachycardia requiring pacemaker insertion (Dr. Walling).

What constitutes high-level physical fitness? It is impossible to precisely define. It could refer to anyone from elite professional athletes to amateurs who run, cycle, or exercise regularly at their local gyms. In all of those cases, the level of exercise and the fitness it engenders far exceed the population norm. There is no known exercise threshold above which fitness-related arrhythmias occur, and unidentified individual patient factors are likely involved.

Fitness-Related Atrial Fibrillation/Flutter

Most cases of atrial fibrillation/flutter occur in older adults with coronary artery disease, valvular disease, or other heart disease. It can also occur in individuals—most commonly middle-aged adults and sometimes younger persons—who have high levels of physical fitness and no underlying heart disease or medical conditions.

Atrial fibrillation is the most common serious fitness-related arrhythmia. Multiple studies have reported that the rate of atrial fibrillation in endurance athletes (e.g., runners, bicyclists, cross-country skiers) is two to 10 times greater than in controls.¹ It is estimated that for every 10 years of regular endurance exercise (defined in one large study as 30 minutes and often more of exercise, three or more times per week), the risk of atrial fibrillation increases by about 16%, and the risk of atrial flutter increases by 42%.² Well-known athletes, such as tennis icon Billie Jean King and basketball star Larry Bird, have developed atrial fibrillation/flutter—some when they were as young as 30 to 40 years of age.

Episodes of atrial fibrillation/flutter can occur during exercise or at rest. Although the etiology is uncertain, a variety of causes have been suggested, mostly focusing on atrial remodeling due to exercise-related pressure overload in the atrium, high vagal tone, or the inflammatory mediators that circulate when individuals have sore muscles.³⁻⁵ Direct inflammation of the atrium from the adjacent esophagus may contribute to these atrial arrhythmias in patients with acid reflux.^{6,7}

Fitness-related atrial fibrillation/flutter should be suspected when athletic individuals who are in their 30s or 40s or older report symptoms such as palpitations, shortness of breath, or dizziness when they are at rest or exercising. If the symptoms are occasional and atrial fibrillation/flutter is not confirmed with resting electrocardiography, a cardiac event monitor (not a Holter monitor) can be used to detect the arrhythmia, with the duration of monitoring (e.g., 30 days) determined by the anticipated frequency of the patient's symptoms.

Once an arrhythmia is confirmed, the patient should be asked about the use of performance-enhancing stimulants, although it is not clear whether they contribute to atrial fibrillation/flutter in athletes.⁸ More importantly, underlying heart disease should be excluded using echocardiography, exercise stress testing, and, when indicated, cardiac computed tomography angiography or cardiac catheterization. Additional testing for other potential causes or exacerbating factors such as hyperthyroidism and electrolyte abnormalities (e.g., hypomagnesemia) should be individualized. If the evaluation is negative for underlying heart disease and the patient's history is consistent with high-level exercise, a diagnosis of fitness-related atrial fibrillation/flutter can be made.

There is no consensus on the optimal treatment of fitness-related atrial fibrillation/flutter, although a reduction in exercise is often recommended. In a European study, male athletes reported fewer arrhythmic episodes after reducing athletic activity; the response was greater in younger athletes (30% reduction in episodes) than in older athletes (11% reduction in episodes).⁹ However, many highly active individuals may be reluctant to decrease their exercise intensity.

The optimal antiarrhythmic treatment is controversial. Some experts recommend ablation as a first-line therapy, whereas others recommend antiarrhythmic drugs as initial treatment.^{10,11} Anticoagulation should be considered to prevent embolic stroke when atrial fibrillation is present, depending on the individual's risk score (a risk calculator is available at <https://www.mdcalc.com/cha2ds2-vasc-score-atrial-fibrillation-stroke-risk>) and bleeding risk.

Fitness-Related Bradycardia

Physically fit individuals commonly have slow heart rates and often perceive bradycardia as a “badge of honor.”^{12,13} Amateur endurance athletes often have resting heart rates of 40 to 60 beats per minute, and high-level professional athletes can have resting heart rates in the 30s and even high 20s.¹⁴ Although bradycardia is often attributed to increased parasympathetic tone, recent research suggests it may result from remodeling of pacemaker ion channels and resetting of the intrinsic heart rate.^{15,16}

For most individuals, this “training bradycardia” is asymptomatic. These patients are, however, at risk of bradycardia-related problems such as dizziness or syncope later in life. The most life-threatening complication of bradycardia is, paradoxically, ventricular tachycardia generated from one or more ectopic ventricular foci breaking through the bradycardic sinus rhythm. In a study of 62 former professional cyclists with an average age of 66 years, 15% had ventricular tachycardia compared with only 3% of golfers matched for age, weight, hypertension, and cardiac conditions requiring medication ($P = .05$).¹⁷

Pacemaker insertion is the definitive treatment for symptomatic bradycardia. The prevalence of pacemaker insertions is growing in westernized countries as the population ages, with about 12% of insertions attributed to sinoatrial causes.¹⁸ Because the rate of pacemaker insertion in athletic older adults is at least triple that of matched controls, rates may continue to increase as fitness-oriented baby boomers age.¹⁷

Final Comments

Family physicians should always encourage appropriate physical activity levels, such as those recommended in the U.S. Department of Health and Human Services’ Physical Activity Guidelines for Americans.¹⁹ The benefits of exercise far outweigh the risks, but physicians should be alert for cardiac arrhythmias in patients who are physically fit and appear to have minimal risk of heart disease. Patients should be counseled to consider moderating their exercise so that it is closer to the recommended levels. Some require support in coming to terms with diagnoses they have done everything possible to avoid. In our own experience, we each had reactions of “It’s not fair” or “I’m shocked and insulted that I could have heart disease,” and we appreciated the understanding of our physicians during recovery.

Editor’s Note: Drs. Weiss and Walling are Associate Medical Editors for *AFP*.

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