What is Athletic Heart Syndrome?

ABSTRACT

A common term for an enlarged heart that is associated with repeated strenuous exercise is athletic heart syndrome (AHS). This article reviews AHS, other serious conditions that appear similar to AHS, and how to identify a young athlete at risk for sudden cardiac death.

KEYWORDS: athletic heart syndrome, enlarged heart, strenuous exercise, sudden cardiac death

Athletic heart syndrome (AHS) is a common term for an enlarged heart associated with repeated strenuous exercise. As a result of the increased workload required of the heart, it will increase physiologically by enlarging chambers and muscle mass, or hypertrophy by enlarging the size of the chambers and increasing the volume of blood pumped per stroke. Consequently, the heart has to contract less frequently and, at rest, will beat as few as 45 times per minute as compared with an average number of 75 beats in a normal heart.

The athlete who needs a high capacity for oxygen transport benefits from a larger stroke volume, a low heart rate and a hypertrophied ventricular wall. But while the heart continues to function adequately as a pump by altering its rate and contractility when confronted with sudden demand, chronic demand causes dilation and hypertrophy of the cardiac muscle.

The changes in heart structure and function seen in AHS would suggest illness if seen in non-athletes. In athletes, however, these are normal physiologic adaptations to physically demanding lives. When abnormalities in heart structure or function are detected in an athlete, it is important to ensure the abnormalities are indeed due solely to exercise conditioning, and not to a cardiac disorder.

What other, more serious conditions appear similar to AHS?

Hypertrophic cardiomyopathy (HCM)

HCM is responsible for 50% of all sudden cardiac death (SCD) in young athletes. It is an autosomal, dominant condition with variable penetration. The clinical criteria for

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diagnosis is a hypertrophic left ventricle without systemic or valvular obstruction, like hypertension or aortic stenosis.

HCM manifests only in entering adolescence. The first symptom of this condition can be syncope or thoracic pain, but sometimes SCD is the first symptom. The definitive diagnosis is made by echocardiography, but there are some clues in physical examination, like a systolic murmur potentiated by the Valsalva manoeuver and an S4, as well as with simple laboratory testing, like electrocardiogram modifications and cardiomegaly in chest X-rays, that increase the suspicion of HCM.

There are obviously some limitations to these tests; the gold standard is the echocardiogram, which often shows a hypertrophic left ventricle with asymmetric septal hypertrophy, outflow obstruction in Doppler or thickening of the anterior mitral valve leaflet.

Dilated cardiomyopathy (DCM)

Normally, DCM is caused by viral infections, like Coxsackie B. In most cases, it is asymptomatic until the signs and symptoms of congestive heart failure appear. Before these symptoms, DCM can cause ventricular arrhythmias and SCD, making the diagnosis difficult.

Marfan's syndrome

This congenital syndrome is responsible for cardiovascular problems like aortic dissection, mitral valve prolapse, aortic insufficiency or arrhythmias.

Long QT syndrome

Long QT syndrome is a congenital disease where torsades de pointes syndrome may occur and is thought

SUMMARY OF KEY POINTS

The changes in heart structure and function seen in athletic heart syndrome would suggest illness if seen in non-athletes.

When abnormalities in heart structure or function are detected in an athlete, it is important to ensure the abnormalities are indeed due solely to exercise conditioning, and not to a cardiac disorder.

to be caused by early repolarization after slow depolarization. As a result, polymorphic ventricular tachycardia may be present and lead to SCD.

Mitral valve prolapse and aortic stenosis

These conditions are also related to SCD, but they are less prevalent in provoking arrhythmias.

How can one identify a young athlete at risk for SCD?

Until now, there have been no specific procedures to identify at-risk athletes and, more importantly, no definition of when an athlete should be disqualified or allowed to compete. The most common screening practice is a series of questions based on pre-syncope symptoms, chest pain, palpitations, dyspnea and a family history of HCM, SCD, long QT syndrome or undiagnosed syncopal episodes. Also consider a clinical history of drug abuse, the use of anabolic steroids, recent viral infections and very tall athletes with arachnodactily or an arm span greater than their height. Clinically suspicious athletes need to go for further testing.

Resources

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Please refer to Abdulla A. Athletic Heart Syndrome. Perspectives in Cardiology. Oct 2005:21(9);29-31.

This article was originally published online at https://www.semanticscholar.org/author/Aly-Abdulla/31997206

CLINICAL PEARLS

Consider a clinical history of drug abuse, the use of anabolic steroids, recent viral infections and very tall athletes with arachnodactily or an arm span greater than their height.

Clinically suspicious athletes need to go for further testing.