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Atrial Fibrillation

How to manage the most common cardiac arrhythmia

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A racing heartbeat is familiar to anyone who has had to run up a flight of stairs or has been in a frightening situation. But for the more than two million Americans who suffer from atrial fibrillation (also referred to as AF or AFib), that sensation of a fast, irregular and chaotic heartbeat all too often becomes a way of life. Moreover, for many, it severely impairs their quality of life and may put their health at risk.

The heart beats close to 100,000 times a day. That's about 70 beats per minute, every minute, every hour, every day, every year. However, for some people, the rhythmic lub-dub, lub-dub, lub-dub of the heart is not as precise as a Rolex. For some reason, the heart's electrical system goes haywire, leading to less efficient blood circulation and an irregular and chaotic pulse. That's because the heart's atria (upper chambers) quiver rather than contract forcefully, which then leads to an irregular—and often rapid—beating of the lower heart chambers, called the ventricles (see the illustration on page 2).

The sinoatrial (SA) node, located in the upper right atrium, acts as a natural pacemaker that governs the heart's rate and rhythm. Special muscle fibers in the heart then conduct these electrical messages through the chambers. When a normally functioning SA node controls heart rhythm, it's called "normal sinus rhythm."

However, the specialized cells of the SA node are not the only ones capable of controlling electrical stimulation; the millions of heart muscle cells all have the ability to create their own electrical signals, disrupting the normal sinus rhythm in the process. If these cells misfire, the heart may race from a normal resting rate of 60 to 90 beats per minute (bpm) up to 200 bpm, then slow down after a few moments. This irregularity may occur hundreds of times a day, or only in several short episodes a year.

These misfirings can result in what are called premature or ectopic beats—that is, coming from a source other than the SA node. If there is a so-called "run" of premature beats in the atria, the heart rhythm can go into what's called atrial fibrillation. This fibrillation—the multiple or rapid firing of electrical signals from different areas of the atria rather than the SA node—alters the movement of blood through the atria.

In cases where a person's heartbeat is extremely fast—as high as 190 beats per minute after getting out of bed or rising from a chair—symptoms such as shortness of breath, dizziness, weakness, palpitation or chest pain may occur, and can range from mild to severe. Some people complain that it feels as if "my heart is going to jump out of my chest."

Atrial fibrillation, by far the most common sustained arrhythmia, can last for minutes, hours, days or weeks. While it's not always possible—or even necessary—to restore the heart to normal rhythm, most physicians attempt to restore the normal tempo of a healthy heart for those who have symptoms and an impaired quality of life as a result of the heart rhythm abnormality.

Contrary to popular belief, atrial fibrillation itself is not usually life threatening. However, the presence of atrial fibrillation increases the risk of blood clots forming in the heart, and if a clot travels to the brain, a stroke will result. The stroke risk in patients with atrial fibrillation is up to seven times that of the general public. At least 15 to 20 percent of all ischemic strokes are due to atrial fibrillation.

Who develops atrial fibrillation

Atrial fibrillation is quite common, found in a little less than 1 percent of the general population. It's the most common cardiac arrhythmia seen by doctors today. One in four men and women over age 40 are at risk of developing atrial fibrillation. The risk increases with age. It's estimated that 70 percent of all atrial fibrillation patients are between ages 65 and 85.

Approximately 2.6 million Americans have atrial fibrillation, but by the year 2050, this number is projected to grow to as many as 12 million due to an aging population, with more than half of people affected by atrial fibrillation expected to be over the age of 80.

Classification of atrial fibrillation

Based on a patient's most frequent complaints, atrial fibrillation is classified as paroxysmal, persistent or long-standing persistent. Here is how we define the three types:

- Paroxysmal atrial fibrillation is a recurrent condition in which the rapid heart rate and abnormal electrical signals spontaneously begin, typically last for a day or two, sometimes as long as a week, and then suddenly and mysteriously disappear. Symptoms range from barely noticeable to severe.
- Persistent atrial fibrillation lasts longer than a week or lasts less than a week, but symptoms are stopped following cardioversion (medical or electrical).
- Long-standing persistent atrial fibrillation is continuous atrial fibrillation that lasts longer than a year.

Over time, episodes of both paroxysmal and persistent atrial fibrillation may become more frequent and bothersome and eventually will result in long-standing persistent atrial fibrillation.

The risks to health

In addition to impacting quality of life, atrial fibrillation increases the risk of

The Heart's Electrical System

Each heartbeat is initiated by an electrical signal. The signal originates in a group of cells in the right atrium called the sinoatrial (SA) node and travels throughout the atria toward a region in the center of the heart called the atrioventricular (AV) node. This causes the atria to contract, pushing blood into the ventricles. The signal then travels through a network of specialized fibers to all parts of the ventricles. The ventricles contract, and blood is sent into the aorta and other arteries in the body.

Arrhythmias are abnormalities in the heart's rhythm. They can occur if the SA node develops an abnormal rate or rhythm, if the electrical signal is interrupted along its route, or if another part of the heart beats faster than the SA node and produces its own electrical signal.

The end result is an irregular and sometimes fast heart rate. While a normal heart rate is between 60 and 100 beats per minute, heart rate in atrial fibrillation can jump between 100 and 180 beats per minute many times during a one-minute interval.

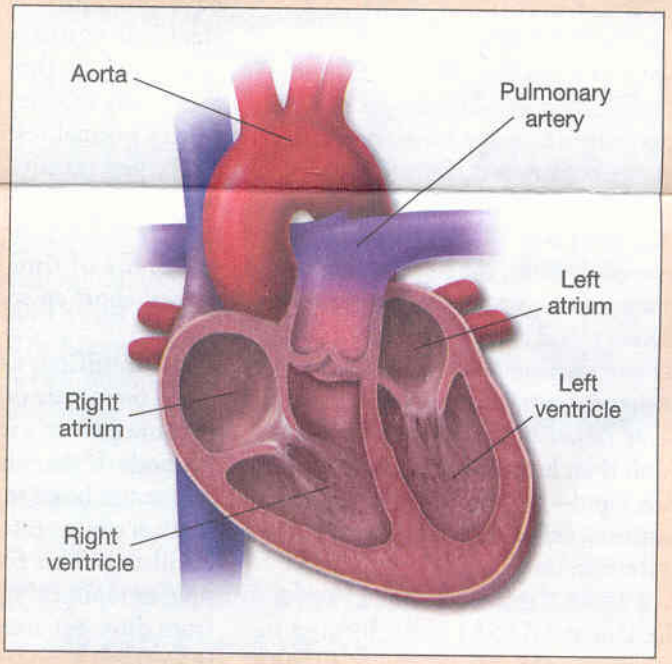
In arrhythmias called supraventricular tachycardias, the atria contract too rapidly. Atrial fibrillation is a type of supraventricular tachycardia in which the atria quiver and do not contract effectively. In ventricular tachycardia, the ventricles contract too rapidly, while in ventricular fibrillation, the ventricles quiver and do not contract effectively. The term bradycardia is used to indicate that the heart is beating too slowly.

Normal Heart Rhythm—An electrical signal originates in the SA node, travels through the atria and the AV node, and continues into the ventricles.

Atrial Fibrillation—The electrical activity in the atria becomes chaotic and uncoordinated, so that the atria quiver rather than contract effectively.

Ventricular Fibrillation—Chaotic and uncoordinated electrical activity in the ventricles causes the ventricles to quiver rather than contract effectively.

Heart Block—A cause of bradycardia in which the AV node delays or prevents the electrical signal from traveling from the atria to the ventricles.



heart failure, stroke and death. The mortality rate associated with atrial fibrillation is double that of patients with normal sinus rhythm. Moreover, in patients who already have heart failure, atrial fibrillation aggravates the condition. Conversely, heart failure also promotes atrial fibrillation.

As we've already mentioned, there is a risk of stroke with atrial fibrillation. One in every five ischemic strokes (caused by a blood clot blocking a narrowed artery or a clot that travels to the brain from somewhere else in the body) occurs in patients with atrial fibrillation. That's because blood can pool in the fibrillating atria—typically the left atrium—making it more likely to clot. Clots can form after just two days, then eventually break off and move to the brain, where they can cause a stroke.

In people over age 70, atrial fibrillation is the single most common risk factor associated with stroke. Not only does atrial fibrillation significantly increase the risk of stroke, but half of those patients with atrial fibrillation who experience a stroke die within a year.

Diagnosing atrial fibrillation

Symptoms of atrial fibrillation vary from person to person. Many people with atrial fibrillation have no symptoms. In such people, atrial fibrillation may be detected as an incidental finding during a physical exam or test that has been ordered for some other reason.

Symptoms of Atrial Fibrillation

Symptoms can vary from person to person. Some people with atrial fibrillation are fatigued by the ailment and it puts a crimp on everyday activities; others find themselves short of breath after a little physical exertion. Some people may also find that they have an inability to concentrate. Not everyone who develops atrial fibrillation will experience symptoms, and for those who do, symptoms can range from mild to severe.

Symptoms of atrial fibrillation can include the following:

- Fatigue
- Palpitations (irregular, rapid or pounding sensation in the neck or chest)
- Shortness of breath
- Lightheadedness
- Dizziness
- Chest pain/discomfort

Palpitations are a common symptom of atrial fibrillation, and if you experience palpitations—or any of the other symptoms associated with atrial fibrillation (see the box above)—you should make an appointment with your family doctor. If atrial fibrillation is present on your electrocardiogram or if your history suggests atrial fibrillation, your doctor may then refer you to an electrophysiologist (a cardiologist who specializes in the heart's electrical system) for further testing and/or treatment.

The electrophysiologist will probably ask many of the following questions, so in order to prepare for your visit, write down your answers beforehand. Whenever an abnormal heart rhythm is suspected, your doctor may recommend one or more tests to diagnose the arrhythmia and determine if it is causing your symptoms.

- What particular symptoms are bothering you?
- When did you first begin to experience these symptoms?
- Did you start taking any new vitamins, supplements or prescription medications before the onset of symptoms?
- Are these symptoms paroxysmal (occasional or intermittent, starting and stopping on their own) or persistent (present all the time or lasting at least a week at a time continuously)?
- On a scale of 1 to 5, with 1 being little or no bother and 5 being severely bothersome, how would you rate your symptoms?
- Is there anything that appears to worsen your symptoms?
- Is there anything that appears to lessen your symptoms?

What Happens When You Have Atrial Fibrillation

Here's a good way to visualize what goes on when you have atrial fibrillation: You're out in the middle of a placid lake in a canoe. You drop a stone overboard, causing the water to ripple out in gentle circles away from the boat. That stone represents your atrioventricular (AV) node and it controls the rhythmic water ripples, which are the heartbeats. When the water is calm again, toss a handful of smaller stones into the water. A chaotic pattern of uncoordinated water ripples develops. This represents your heartbeat in atrial fibrillation.

Making treatment decisions

A nuisance to some, a danger for others, atrial fibrillation runs the gamut of patient complaints and has many possible solutions—if, in fact, a solution is needed. We first ask about any patient: Do we need to do anything to reduce the risk of stroke? Many people are at low risk, and so we don't need to

do anything. But for those who score high on a basic self-test evaluating their risk, anticoagulation therapy is an option that shouldn't be ignored.

A point we make with our patients is that, unlike some arrhythmias, atrial fibrillation is generally not a life-threatening problem. For most people, it's just a darned nuisance. The reason to do something about atrial fibrillation, if we choose to do anything at all, is because of the bothersome symptoms that may adversely affect your quality of life.

We have three treatment goals when it comes to atrial fibrillation:

- Restoration and maintenance of sinus rhythm whenever possible
- Controlling heart rate
- Preventing clot formation

The various approaches we can take to treat atrial fibrillation or prevent a recurrence of the ailment make use of some of the following:

Medications. Drug therapy is typically the first line of treatment for atrial fibrillation. Drugs can be used as a monotherapy or in combination to control heart rate during atrial fibrillation, to restore heart rhythm or simply to reduce atrial fibrillation symptoms.

- Antiarrhythmic drugs can be used to get the heart back to normal sinus rhythm.
- Beta-blockers, calcium channel blockers and digoxin are examples of medications that can be used to control the rapid ventricular rate.
- Anticoagulants, such as aspirin, warfarin (Coumadin) and dabigitran (Pradaxa), can be used to help prevent ischemic stroke in patients at risk.

Cardioversion. Electrical cardioversion uses a powerful but brief electric shock delivered to the heart through paddles placed on the chest. This helps to restore normal heart rhythm when medication does not improve symptoms. Antiarrhythmic drugs are also used to restore and maintain the heart's normal rhythm.

Radiofrequency catheter ablation. Areas of the heart muscle that trigger abnormal rhythm are eliminated through an innovative, minimally invasive medical procedure called pulmonary vein antrum isolation (PVAI), which delivers concentrated radiofrequency energy waves that heat and destroy the source of abnormal electrical signals.

Surgical ablation. Appropriate candidates for surgical ablation of atrial fibrillation are patients undergoing other cardiac surgical procedures who have bothersome atrial fibrillation symptoms and asymptomatic patients who are undergoing cardiac surgery (and their ablation can be performed with minimal risk). The procedure can also be considered for atrial fibrillation patients who have failed one or more catheter ablation attempts and for patients who are not candidates for catheter ablation.

Making treatment decisions about atrial fibrillation can be tricky. Any patient who experiences an episode of atrial fibrillation needs to be evaluated by a cardiologist, who can determine the best course of therapy.