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Atrial Fibrillation

What is atrial fibrillation?

Atrial fibrillation is a disorganized heart rhythm leading to a grossly irregular heart rhythm that is often quite fast. A normal heart beat originates in a collection of cells in the top part of the heart (the right atrium) called the sinus node. These cells are the normal pacemaker of the heart. The electrical impulse that comes from the sinus node causes the top chambers (atria) of the heart to contract, moving the blood to the lower chambers. This electrical impulse is then conducted rapidly to the lower chambers causing contraction of these chambers and thus the pumping of blood to the lungs and to the body. A normal resting heart rate ranges from 60 to 100 beats per minute. With exercise or with emotional stimulation, the heart rate increases.

In atrial fibrillation, the electrical activity of the atria becomes very disorganized with multiple waves of electrical activity cascading throughout the atria. Instead of the atria contracting in an organized fashion, the atria quiver like a sack of worms. This leads to a decrease in the heart's function by 20 to 25%. Because the lower chambers are seeing multiple electrical signals, the heart rhythm becomes very irregular and often is quite fast. Patients with atrial fibrillation are often aware of the heart beating irregularly and may notice a decrease in their ability to exert themselves. Fatigue and shortness of breath are common complaints.

What causes atrial fibrillation?

Many factors may help cause atrial fibrillation. Disease of the heart valves, particularly the mitral valve may lead to atrial fibrillation. A decrease in heart muscle function as a consequence of previous heart attack or due to a primary problem with the heart muscle (cardiomyopathy) often leads to atrial fibrillation. Certain metabolic disorders, such as an overactive thyroid gland, may cause atrial fibrillation. Approximately 30% of patients undergoing heart surgery will have atrial fibrillation post operatively. Excess caffeine or alcohol can also cause atrial fibrillation as can certain medications such as those used to treat asthma. Patients with lung disease have an increased incidence of atrial fibrillation. In many patients, however, atrial fibrillation occurs for no definable reason. The frequency of atrial fibrillation also increases with age.

What are the effects of atrial fibrillation?

Because the ability of the heart to pump blood is reduced by 20 to 25% in atrial

fibrillation, many patients will experience fatigue and shortness of breath. Most will sense a rapid and irregular pulse. When the heart rate is excessive, chest pain (angina pectoris) and/or congestive heart failure may result. If the heart remains in atrial fibrillation for more than 48 hours, there is an increased risk that blood clots may form within the atria due to the stagnation of blood due to atrial fibrillation. This increases the risk that a stroke could result if a small blood clot were to break off and travel to a brain blood vessel. This is preventable by promptly restoring normal rhythm or by the use of blood thinners.

What tests need to be done?

The diagnosis of atrial fibrillation is made by an electrocardiogram. When the atrial fibrillation is intermittent, recording the heart's electrical activity for a period of 24 to 48 hours can be helpful. This is done as an outpatient using a recording device known as a Holter monitor. At times the episodes are infrequent enough that a cardiac event recorder is used to try to capture an episode. These recorders can be worn for up to a month at a time. Because it is important to know about the health of your heart when atrial fibrillation occurs, an echocardiogram is frequently done. Using soundwaves, the heart chambers and valves can be visualized. This test also helps determine what patients are likely to stay in atrial fibrillation and which have a high chance of success in maintaining normal rhythm. Blood tests will be done to check your electrolytes and thyroid function. If other medical problems are present (such as coronary artery disease, lung disease, congestive heart failure, anemia and pericarditis) these will also require evaluation and treatment.

How is atrial fibrillation treated?

Because many of the symptoms of atrial fibrillation are due to the rapid heart rate, the first goal of treatment is to slow the heart rate to near normal. Digitalis (digoxin), a drug that has been around for many years, is often used for this purpose. Other drugs that may be helpful in slowing the heart rate include beta blockers and the calcium channel blockers diltiazem and verapamil.

Atrial fibrillation may be intermittent and may convert spontaneously. If not, medications or electrical conversion of atrial fibrillation may be necessary. If atrial fibrillation has not converted back to normal rhythm within 48 hours of its onset, there is an increased risk that blood clots may form in the top heart chambers (the atria). To help protect against blood clots breaking off and causing a stroke or other injury, a blood thinner called warfarin (coumadin) is often started. The dose of the warfarin is regulated through a blood test called a prothrombin time. Once you have been on warfarin for 3 weeks or more, an attempt at restoring normal rhythm may be made

What drugs are used to convert atrial fibrillation and maintain normal rhythm?

Medications to help restore and maintain normal rhythm include amiodarone, propafenone, sotalol, flecainide, procainamide, quinidine, diltiazem and beta blockers. After 3 to 4 weeks of blood thinners, one of these drugs is generally started. If the atrial fibrillation does not convert to regular rhythm on medications, a procedure called cardioversion is generally performed. This is usually a hospital procedure. A brief anesthetic is administered. While you are asleep, an electrical shock is delivered to the chest reorganizing the electrical activity of the heart and restoring normal rhythm. Following successful cardioversion, the warfarin is usually continued for 3 to 4 weeks. Often medications will be required long term to maintain normal rhythm. Despite this, there is a significant chance that atrial fibrillation may return.

What is chronic atrial fibrillation?

The success of conversion to a normal rhythm depends on the length of time atrial fibrillation has been present. If the abnormal rhythm has been present for months or years, successful conversion by any method is less likely. Recurrence of atrial fibrillation is more likely to happen in patients with significant underlying heart disease, in those with significant lung disease and in older patients.

Those patients who fail to convert to normal rhythm or who revert to atrial fibrillation despite medications will be in atrial fibrillation long term. This is referred to as chronic atrial fibrillation. These people should stay on long-term blood thinners to reduce the risk of stroke. In most cases, the heart rate can be controlled with proper medicines. In some patients the heart rate remains excessively fast and a procedure known as AV nodal ablation can be done to control the heart rate in conjunction with a pacemaker.

Are there new therapies for atrial fibrillation?

There is a surgical procedure that can be effective in treating atrial fibrillation. This is known as the maze procedure. In this procedure, cuts are made in the atria. The cuts are then closed with sutures. This creates lines of scar tissue within the atria which interrupts the waves of electricity within the atria which cause atrial fibrillation.

For patients with intermittent atrial fibrillation who are quite symptomatic, an atrial defibrillator can be implanted under the skin of the chest. This device can be used to shock the heart restoring normal rhythm.