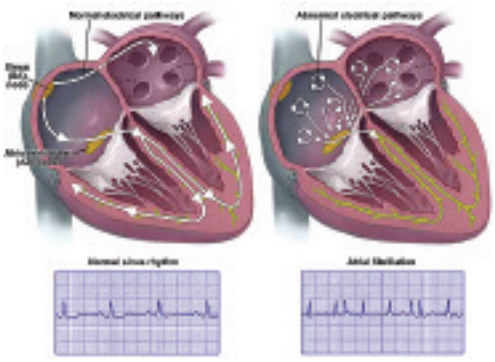
Atrial Fibrillation



Normal Heart Rhythm

A heartbeat consists of an initial contraction of its uppermost chambers (atria) and then contraction of its lower chambers (ventricles). The contraction of the heart occurs because of the electrical system within the organ. This is how it works:

1. An impulse begins in the SA (sinoatrial) node, which is in the right top chamber, called the right atrium. The SA node sends an impulse to the right and left atria, resulting in a contraction.

2. The squeezing action of the contraction pushes blood down into the lower chambers, or ventricles.

3. The electrical impulse moves into the AV (atrioventricular) node, which is the electrical connection between the atria and ventricles.

4. Next, the impulse moves from the atria into the ventricles. Again, the electrical impulse causes a contraction. The contraction of the ventricles pushes blood from the heart and into the lungs and the rest of the body.

5. The veins in the lungs, called pulmonary veins, send oxygen-rich blood from the lungs back into left atrium and the cycle repeats. A normal heart beat occurs approximately 60 to 100 times each minute when an adult is at rest.

Atrial Fibrillation

In the United States, the most prevalent irregular heart rhythm is called Atrial fibrillation (AF or AFib). This type of abnormal heart rhythm begins in the atria. Unlike the impulse described above, that systematically traverses the heart, atrial fibrillation occurs when numerous electrical impulses begin at the same time, each vying for the opportunity to pass through the AV node. As a result, the heartbeat is fast and haphazard. The atrial rate may be as high as 300 to 600 times each minute, and only a limited number of impulses successfully reach the ventricles; instead they get "stuck" in the AV node.

Causes of Atrial Fibrillation

Common causes:

- Hypertension (high blood pressure)
- Coronary artery disease
- Diseased heart valves
- Post-heart surgery
- Chronic lung disease
- Heart failure
- Cardiomyopathy
- Congenital heart disease
- Pulmonary embolism

Less frequent causes:

- Hyperthyroidism
- Pericarditis
- Viral infection

At least 10 percent of persons with atrial fibrillation do not have other heart disease. Their atrial fibrillation (AF) may be a result ofby other factors such as stress, caffeine, medications, alcohol, imbalances in electrolytes or metabolism, or serious infections. Sometimes a cause cannot be determined. Risk for AF increases with age, particularly after age 60.

Atrial Fibrillation Symptoms

Some persons with AF have no symptoms. Symptoms include:

- Palpitations - the heart may suddenly feel like it is pounding or beating very rapidly
- Fatigue
- Lightheadedness or dizzyness
- An uncomfortable feeling in the chest
- Shortness of breath (even at rest)

Diagnosis

A number of tests are available to diagnose AF:

Electrocardiogram, or ECG or EKG: the heart's rhythm is mapped with ink on graph paper.

Holter monitor: a recorder worn on the outside for a few days. Electrical impulses are recorded and later analyzed so that the heart's rhythm can be studied.

Portable event monitor (loop recorder): an external recorder worn for a longer period, such as a month. This tool is useful for those whose AF symptoms are infrequent.

Transtelephonic monitor: two bracelets or a monitor that may be pressed against a person's chest when symptoms occur. The patient's heartbeat rhythm is then transmitted to the physician's office.

Problems Associated with Atrial Fibrillation

Chronic AF can lead to serious health problems.

- In AF, blood is more prone to clotting. If a clot forms in the heart and travels to the brain, the result may be a stroke. In fact, persons with AF have a seven times greater risk of stroke. Clots may travel to other organs as well.
- AF reduces the ability of the heart to pump effectively by about 20 to 25 percent. Ultimately, this may result in heart failure.
- Chronic atrial fibrillation may lead to death.

Treatment - Medication & Lifestyle

Treatment is done to return the heart to a normal rhythm, called a sinus rhythm. Treatments may include medications, changes in lifestyle, heart procedures or surgery. Treatment depends on factors such as severity of symptoms.

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Medications

The first course of treatment includes medications, such as those that control heart rhythm, slow the heart rate or prevent blood clots to reduce the chance of stroke.

Medications that control heart rhythm include Quinidex (quinidine); Norpace (disopyramide phosphate); Tambocor (flecainide acetate); Rythmol (propafenone); Betapace (sotalol); Tikosyn (dofetilide) and Cordarone (amiodarone). Because these drugs are quite powerful, you may be admitted to the hospital when you first begin taking them so that your heart can be continually monitored. While the medications are effective in 30 to 60 percent of cases, they may lose their effectiveness over a period of time. In some cases, these medications may lead to other types of irregular heartbeats.

Drugs that slow the heart rate include Lanoxin (digoxin), Toprol, Lopessor (metoprolol). These medications do not impact the rhythm of the heart.

Bloods that prevent clotting include Coumadin (warfarin) or aspirin; while they lower the risk of stroke they do not completely prevent it.

In some cases, changes to lifestyle can help alleviate AF. For example, if you find that AF is related to certain types of activities, those activities should not be performed. If alcohol is a factor, it may be important to cut down intake. Those whose AF may be related to tobacco use should quit smoking. Caffeine intake should be reduced if it is suspected to be a factor. Some medications, such as over-the-counter cold and cough drugs, may cause AF and should not be taken.ask your doctor or pharmacist what type of cold medication is best for you. Talking with your physician or pharmacist may help determine what lifestyle changes may impact AF symptoms.

Treatment: Procedures

Medications and changes in lifestyle may not correct the AF or control it adequately. In these cases, you may be advised to have a procedure. The procedures that may correct or control AF include electrical cardioversion, catheter ablation, pulmonary vein isolation, ablation of the AV node, or device therapy.

Electrical Cardioversion

Cardioversion often results in a normal rhythm, although this may only be temporary. A short-acting anesthesia is administered and the patient receives an electrical shock on the chest wall so that the heartbeat returns to normal.

Catheter Ablation

Two types of ablation include pulmonary vein antrum isolation or ablation of the AV node. A cardiologist who specializes in treating abnormal heart rhythms (electrophysiologist) performs these procedures.

Pulmonary vein antrum isolation: Studies indicate that most atrial fibrillation stems from the pulmonary veins; in this procedure, two catheters are placed into each of the right and left atria.

During the procedure, intracardiac echocardiography allows the electrophysiologist to visualize the left atrium. One catheter in the left atrium locates the abnormal electrical impulses coming from the pulmonary veins while the other catheter delivers the radiofrequency energy to ablate (create lesions) outside the pulmonary veins. The procedure is done for the four pulmonary veins. The lesions that are created will heal in one to two months, forming a scar surrounding the pulmonary veins. This scar blocks electrical impulses from entering the pulmonary veins. Because the path of an abnormal impulse is disrupted the atrial fibrillation cannot occur.

AV node Ablation: In this ablation procedure, the catheters are inserted into the veins in the groin and guided toward the heart. Radiofrequency energy travels through the catheter to damage the AV node. As a result, the heart rate becomes quite slow because electrical impulses from the atria at the uppermost part of the heart are unable to pass down into the ventricles (bottom chambers). The patient requires a permanent pacemaker and anticoagulant medications. Because it is not the most desired treatment option, it is not often used to treat AF. Because it is not the most desired treatment option, it is not often used to treat AF.

Device Therapy

- **Implantable atrial defibrillator:** device that treats AF symptoms. Patients may activate the device when symptoms occur or it can be automatically activated. While the device improves symptoms, it does not cure AF.

- **Permanent Pacemaker:** A pacemaker sends small electrical impulses to the heart muscle. So that an appropriate heart rate is maintained, pacemakers are implanted in AF patients who have a slow heart rate.

Treatment: Surgery

Candidates for surgery include those with chronic AF that cannot be effectively treated with medications or procedures, as well as patients with AF who are having heart surgery to correct other cardiac conditions.

During the Maze procedure, a series of accurately placed incisions in the right and left atria, which direct the electrical impulses to defined pathways that reach the AV node.

A modified Maze procedure involves surgical pulmonary vein isolation in which the surgeon uses alternative energy sources (rather than incisions) to create lesions. These energy sources include radiofrequency, cryothermy, microwave, and laser. The sources create lesions, which causes scar tissue to develop. The scar tissue blocks the pathway of abnormal impulses. When possible, minimally invasive techniques are employed.

Another procedure, radiofrequency ablation, involves the use of a special catheter that heats the tissue and creates lesions that are similar to those produced by the Maze procedure. A variety of surgical techniques use this type of special catheter.

Other procedures to create lesions include:

- Cryothablation (use of cold to create lesions, and also called cryothermy)
- Microwave Technology (use of microwaves to create lesions)
- Laser (use of lasers to produce the lesions).