



Analysis of atrial fibrillation disease and its causes, symptoms and treatment

Newsha Abdi

Shahid Beheshti University of Medical Sciences, School of Nursing and
Midwifery, Tehran, Iran

Abstract

Atrial fibrillation is the most common type of arrhythmia (irregular heartbeat) that can be associated with serious complications such as stroke. Atrial fibrillation (AF) is one of the relatively common cardiac arrhythmias in which the normal heart contraction rhythm is disturbed and the heartbeat changes from a regular and sinusoidal state to an irregular rhythm with a variable heart rate. This disease is more common in people who have a history of heart disease, diseases such as stenosis or insufficiency of heart valves, ischemic diseases and heart failure. Of course, there are people who have atrial fibrillation without a known heart disease. Due to the increasing prevalence of this arrhythmia, especially due to the increase in human lifespan, its complications appear more and nowadays atrial fibrillation and its complications are considered one of the major health and treatment issues of countries. The danger of this irregular rhythm is the increased possibility of blood clots and further stroke, heart failure and other complications related to the heart. The cause of clot formation in atrial fibrillation is that not enough blood is pumped by the atria, so blood collects in the atria and may clot. In this article, we are going to further investigate this disease, its causes, ways of prevention and related treatments, and risk factors for atrial fibrillation.

Keywords: Stroke, atrial fibrillation, heart disease, heart rhythm, blood pressure, prevention.

Introduction

Atrial fibrillation (AF) is an abnormal heart rhythm caused by a problem with the heart's electrical system. Normally, the electrical current that causes the heart to contract regularly contracts the atria and ventricles. In atrial fibrillation, an inconsistency in the contraction of the atria and ventricles leads to an irregular and rapid heartbeat. A fast and abnormal heartbeat can be dangerous if left untreated or controlled. Atrial fibrillation (AF) is one of the most common types of arrhythmia, whose main characteristic is a fast and irregular heartbeat. There are two types of atrial fibrillation: valvular atrial fibrillation and nonvalvular atrial fibrillation. Valvular atrial fibrillation is caused by a malfunction in the heart valves, while non-valvular atrial fibrillation is caused by a malfunction in the conduction system of the heart. The sinoatrial node in the heart is responsible for pacing and is responsible for the electrical stimulation of the heart muscles for contraction, which if disturbed for various reasons causes fibrillation. The probability of this disease increases with age. Atrial fibrillation is a heart condition that causes an irregular and often abnormally fast heartbeat. A normal heart rate should be regular and between 60 and 100 beats per minute when you are resting. In atrial fibrillation, the two upper chambers of the heart, i.e. the heart's atria, do not have a proper beat. Instead of a regular beat and a normal pattern, the atria contract irregularly and rapidly. Proper pumping of blood by the heart is important because with the proper pumping of blood by the heart, the oxygen and nutritional needs of the body are met. You can live with atrial fibrillation, but it leads to other heart rhythm problems, chronic fatigue, heart failure, and worst of all, an increased risk of stroke. In order to control this problem, it is necessary to see a doctor regularly.

Cause of atrial fibrillation

Atrial fibrillation is most often caused by changes in the heart tissue or disturbances in the electrical signals that help the heart beat. These changes can occur due to various conditions and factors such as high blood pressure, coronary artery disease that supplies blood to the heart muscle), congenital heart defects and aging, however, sometimes the cause remains unknown. When the heart beats normally, its muscle walls tighten and contract to push blood out of the heart and body. Then they relax until the heart is filled with blood again. This process is repeated every time the heart beats. In atrial fibrillation, the upper chambers of the heart (the atria) contract randomly, sometimes so rapidly that the heart muscle cannot relax properly between contractions. This reduces the efficiency and function of the heart. Atrial fibrillation occurs when abnormal electrical impulses are suddenly generated in the atria. These impulses overwhelm the heart's natural pacemaker (precursor node), which can no longer control the heart's rhythm. This causes your pulse and heart rate to be very irregular. Its cause is not fully understood, but it tends to affect certain groups of people, such as the elderly and those living with long-term (chronic) illnesses such as heart disease, high blood pressure, or obesity. It may be caused by certain conditions such as drinking too much alcohol or smoking. Atrial fibrillation is one of the risk factors of stroke. About 15% of people who have a stroke have atrial fibrillation. In people with atrial fibrillation, the irregular heart rhythm can lead to blood pooling in the heart chambers and blood clots may form. These clots can travel through the bloodstream to the brain and lead to a stroke.

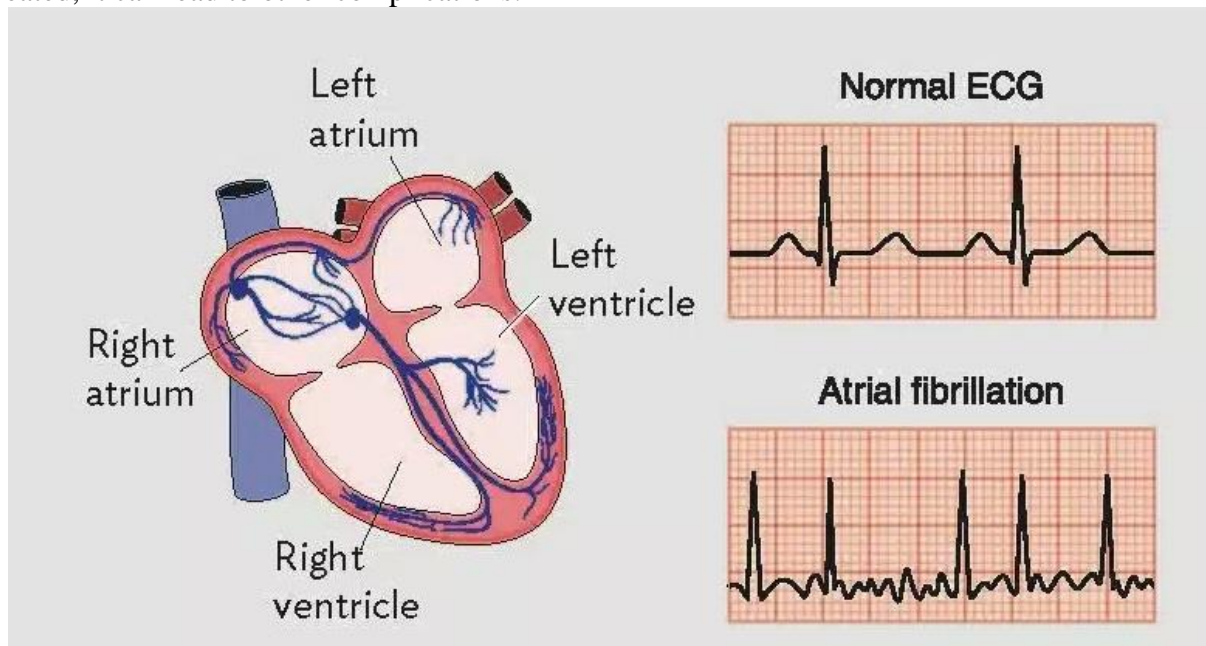
It seems that the main cause of atrial fibrillation is chronic inflammation and damage to the walls of the atria of the heart, especially the left atrium. Inflammation, fibrosis, structural changes and increased pressure on the left atrium wall all change its electrical function and provide the basis for abnormal heart beats and arrhythmias. Another cause of atrial fibrillation rhythm is enlargement of the left atrium. An increase in the size of the left atrial cavity, which occurs as a result of various heart diseases, especially mitral valve diseases, is one of the main causes of atrial fibrillation. The pressure inside the left atrial cavity is normally close to "zero". Increased pressure inside the left atrial cavity has a direct effect on the left atrial wall and prepares the ground for atrial arrhythmias, including atrial fibrillation. The most common cause of increased

left atrial pressure is general heart and left ventricular diseases such as heart failure and coronary heart diseases as well as systemic diseases such as high blood pressure. It can be said that atrial fibrillation, rather than being an independent disease, is actually a symbol of damage and stress to the entire cardiovascular system as well as the whole body.

Atrial fibrillation is one of the common diseases. The risk factors of this disease include the following:

- High and uncontrolled blood pressure (hypertension)
- Heart valve problems
- Coronary artery disease (CAD)
- Alcohol consumption
- Being overweight or obese
- Sleep apnea
- Thyroid disorders

One of the important risk factors is having a family history of atrial fibrillation. The risk of atrial fibrillation also increases with age. Also, white men are more at risk of developing atrial fibrillation. Some risk factors for developing atrial fibrillation are controllable. Having a healthy lifestyle, maintaining a healthy weight, quitting smoking, avoiding alcohol, and avoiding over-the-counter and illegal drugs can reduce the risk of developing atrial fibrillation. Heart surgery can also be one of the causes of atrial fibrillation. One of the complications of open heart surgery or coronary artery bypass surgery (CABG) is atrial fibrillation, and if it is not controlled or treated, it can lead to other complications.



Types of atrial fibrillation

The main difference between the four types of atrial fibrillation is the duration of the attack (rhythm disturbances) in them. In general, the longer the atrial fibrillation lasts, the more likely the symptoms will be.

Type of atrial fibrillation	Duration of rhythm disturbances
Paroxysmal	A few seconds to less than seven days
Persistent	More than seven days, but less than one year
Long-standing persistent	At least twelve months
Permanent	Continuous – never ending

Symptoms of atrial fibrillation

Some people with atrial fibrillation have no symptoms, while others may experience symptoms.

Mild symptoms can include:

- Heart palpitations
- Irregular heartbeat
- Feeling of pressure, heaviness or pain in the chest
- Dizziness
- Mild fatigue and shortness of breath, especially during exercise

Some people have severe symptoms, such as:

- Severe shortness of breath
- Difficulty breathing during exercise
- Fainting, or feeling close to fainting, due to reduced blood flow to the brain
- Chest pain, which is usually caused by not enough blood reaching the heart muscle. This type of chest pain is called "angina" and can be caused by an increase in the heart's need for oxygen or insufficient supply of blood and oxygen to the heart. (For example, due to a condition where the blood vessels leading to the heart are narrower than normal.)
- Extreme fatigue and weakness

Some people with atrial fibrillation may not experience any symptoms, but if the diagnosis of this disease is confirmed, it is necessary to continue to undergo related treatments.

Diagnosis of atrial fibrillation

In the first visit to the doctor, an echocardiogram is usually requested. In an electrocardiogram, the heart's electrical activity is recorded using sensors placed on the chest, but since episodes of atrial fibrillation can occur at any hour of the day, the doctor asks for a number of days during activities to diagnose the disease. Record heart activity daily. For this purpose, a Holter monitoring device is used, which is similar to an electrocardiogram device and records the electrical activity of the heart continuously. Holter may be requested 24 hours, 48 hours, 72 hours. In some cases, more advanced devices are used to record heart activity for a week and a month.

For further investigations, the doctor may request a blood test to check the condition of the liver, kidney and thyroid, chest X-ray, echocardiography, exercise test and specialized imaging of the heart such as MRI or CT scan. To diagnose atrial fibrillation, an electrocardiogram or electrocardiogram (ECG or EKG) is used to measure the electrical activity of the heart. In some cases, the diagnosis of atrial fibrillation is made by long-term recording of the ECG, by some devices (devices that record the activity of the heart during one or two days) such as Holter. Other tests such as echocardiography may be done to check for heart failure or heart valve problems.

Blood tests may also be used to check for underlying causes, including thyroid disorders. In addition to that, sleep status and lung function tests are sometimes performed with the aim of ruling out the presence of sleep apnea or underlying lung diseases. A doctor may use an electrocardiogram (heart strip or EKG) to diagnose atrial fibrillation. An electrocardiogram shows the electrical activity of the heart, and the doctor can use it to diagnose heart rhythm disorders. In some cases, it is necessary to monitor the heart's activity over a longer period of time to detect an abnormal heart rhythm. In this case, you can get help from Holter heart monitoring. After atrial fibrillation is diagnosed, the doctor may order other tests to check the muscles, heart valves, and blood clots. These tests may include an echocardiogram, stress test, or cardiac catheterization to check for blockages.

The most common tests used to diagnose atrial fibrillation are:

-Electrocardiogram (ECG or EKG)

An ECG draws a picture of the electrical impulses moving through the heart muscle on graph paper. An EKG provides an electrical snapshot of the heart. For people who have symptoms that come and go, it may be necessary to use a special monitor to "catch" the arrhythmia.

- **Holter monitor**

A small external recorder is used for a short period of time, usually one to three days. Electrodes (sticky patches) are placed on the skin of your chest. Wires are connected from the electrodes to the monitor. Electrical impulses are continuously recorded and stored in the monitor. After the monitor is removed, a technician uses a computer to analyze the data to assess the heart rhythm.

- **Portable event monitor**

A monitor used for about a month for patients who have fewer episodes and symptoms of irregular heartbeat. Electrodes (sticky patches) are placed on the skin of your chest. Wires are connected from the electrodes to the monitor. When symptoms occur, the patient presses a button to activate the monitor. This device records the electrical activity of the heart for a few seconds. The patient then sends the device's recorded data over a phone line to the doctor's office for evaluation. A portable event monitor is very useful for determining what heart rhythm is causing your symptoms.

- **Transtelephonic monitor**

When you develop symptoms of atrial fibrillation, a tape of your current heart rhythm can be transmitted to your doctor's office over the phone, using a monitor with two bracelets, or by placing the monitor against the chest wall. These monitoring devices help your doctor determine whether an irregular heart rhythm (arrhythmia) is causing your symptoms. Atrial fibrillation is the most common type of arrhythmia (irregular heartbeat) that can be associated with serious complications such as stroke. In this article, we are going to investigate more about this disease, its causes, ways of prevention and related treatments.

Who is more susceptible to atrial fibrillation

The probability of atrial fibrillation increases with age. Atrial fibrillation usually occurs in people who have underlying heart disease. Almost all types of heart disease can increase a person's risk of developing atrial fibrillation, but the most common causes include:

- High blood pressure
- Heart attack
- Heart failure (a condition in which the heart does not pump blood as well as it should)
- Heart valve disease
- Heart surgery and in less frequent cases, after some types of surgery.
- Breathing interruption (apnea) in sleep; It means a condition in which a person's breathing stops or decreases for a short period of time but often during sleep.

Also, some behaviors and medical problems are associated with an increased risk of atrial fibrillation; such as:

- Alcohol consumption
- Hyperthyroidism
- Types of chronic lung diseases
- Obesity
- Diabetes
- Chronic kidney disease

Risks and complications of atrial fibrillation

Stroke is a serious complication associated with atrial fibrillation, which is five to six times more likely to occur in people with atrial fibrillation. This complication occurs when a blood clot forms in the left atrium and a piece of this clot is separated, then this piece enters the blood circulation and blocks a small blood vessel. In the event of a stroke, if the brain is deprived of oxygen for a long period of time, it can be permanently damaged. Of course, the isolated blood

clot can reach the vessels of other organs, including the eyes, kidneys, spine, or important blood vessels of the arms or legs.

To reduce the risk of stroke, there are non-drug options and drug options such as anticoagulants, the choice of the best drug depends on the patient's condition, medical history and individual risk factors. Some people live with atrial fibrillation for years without problems. However, atrial fibrillation can lead to further problems: Because the atria beat rapidly and irregularly, blood does not flow through them as quickly. This increases the risk of blood clots. If the clot is pumped out of the heart, it can travel to the brain, resulting in a stroke, or to the lungs, causing a pulmonary embolism. People with atrial fibrillation are 5 to 7 times more likely to have a stroke than normal people. Clots can also travel to other parts of the body (kidneys, heart, intestines) and cause other damage. Atrial fibrillation can reduce the heart's pumping ability. Irregularity can make the heart work less. In addition, atrial fibrillation that occurs over a long period of time can significantly weaken the heart and lead to heart failure. Atrial fibrillation is associated with an increased risk of stroke, heart failure, and even death.

Complications of atrial fibrillation

Although the disease itself may not be dangerous, the secondary effects it causes to the patient can be life-threatening. This disorder causes some blood to remain inside the atria after the contraction of the atria and not to be completely drained. Over time, this blood can form a blood clot and move to other body parts with the next heartbeat and cause serious problems for a person, one of which is a stroke. When stroke risk factors are taken into account, atrial fibrillation increases the risk of stroke four to five times. Strokes that occur as a result of atrial fibrillation are more severe than heart attacks caused by other causes. Also, in this disorder, the atria lose their coordination with the contraction of the ventricles. As a result of this disorder, the heartbeat becomes fast and irregular, which causes the blood circulation in the body not to happen properly and the possibility of heart failure increases. Also, atrial fibrillation increases the risk of heart attack.

Prevention of atrial fibrillation

By making a few lifestyle changes to keep our heart healthy, we can help reduce the risk of atrial fibrillation. Changes include:

- Following a healthy diet plan to maintain heart health
- Avoiding alcohol consumption
- Maintain a healthy weight
- Regular physical activity
- Stress management
- Don't smoke
- Treatment of any associated diseases that can increase the risk of atrial fibrillation.

Treatment of atrial fibrillation

The aim of the treatment is to restore the normal rhythm of the heartbeat and prevent the formation of blood clots and other complications caused by atrial fibrillation. There are many treatment methods for this disease, including lifestyle changes, taking certain medications, and surgical interventions.

- Cardiac cardioversion

In the cardioversion method, by sending electric shocks to the heart, the normal rhythm of the heart can be restored and atrial fibrillation can be removed. Cardioversion can also be done using drugs. In some emergency cases, the only effective treatment for atrial fibrillation is cardioversion. In some cases, it is not possible to use this method. For example, if atrial fibrillation occurs for more than 48 hours, the risk of blood clot formation and subsequent stroke increases. In this case, cardioversion is not possible.

- drug therapy

In patients with atrial fibrillation, a combination of drugs is usually prescribed. These drugs may include blood thinners or anticoagulants that reduce the risk of blood clots and thus the risk of stroke. Also, some medicines control the heart rate and prevent the heart rate from increasing. Some drugs also specifically play a role in controlling the heartbeat rhythm and prevent it from becoming irregular.

- Ablation of the heart

In some cases, the use of drugs or cardioversion may not be effective in the treatment of atrial fibrillation. In this case, cardiac ablation may be performed. This method can completely cure atrial fibrillation by removing part of the heart tissue that leads to the irregular heartbeat rhythm. In cardiac ablation, a catheter is inserted into the heart through the blood vessels, and through it, low-voltage and high-frequency radio frequencies are sent to the heart. Then, with the destruction of a small part of the heart tissue that causes the arrhythmia, the heartbeat returns to normal.

- Heart surgery

In some cases, surgery is used to treat atrial fibrillation. Heart surgery has several different methods. Maze procedure is a type of heart surgery in which small incisions are made in the atria to help conduct electrical current in the heart.

- Heart pacemaker or pacemaker

In rare cases, after cardiac ablation, the doctor may recommend implantation of a pacemaker to treat atrial fibrillation. A pacemaker is often used to treat bradycardia (slow heart rate). In patients whose bradycardia leads to some symptoms, a pacemaker may be used. If atrial fibrillation is controlled or treated through the mentioned methods, probably no other important symptoms will appear. Some people with chronic atrial fibrillation need to use blood thinners for the rest of their lives. Side effects of these drugs can lead to other problems as well.

Conclusion

Atrial fibrillation is rarely fatal. However, this disorder can lead to other complications such as stroke and heart failure, which can lead to death. Most people aged 65 and older with this disorder take blood thinners to reduce the risk of complications such as stroke. This improves the overall prognosis for affected individuals. According to the American Heart Association (AHA), 35 percent of people who do not take blood thinners will have a stroke. In short, atrial fibrillation may affect your lifespan. It is a heart disorder that needs to be managed. However, there are many treatments available that can help you control your symptoms and reduce your risk of major events like stroke and heart failure, so there's nothing to worry about. Atrial fibrillation prevalence has been on the rise. The risk of stroke is 5-times higher in a patient with known atrial fibrillation compared to the general public. It is estimated that 19.6% of patients over the age of 65 will have apparent atrial fibrillation by 2030. The most feared side effect of atrial fibrillation is an acute stroke, which can lead to severe morbidity and mortality. It has been shown that 60% of strokes secondary to atrial fibrillation can be avoided with the use of anticoagulants.

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