



Analyzing heart attack and examining its symptoms and prevention methods

Mostafa Rajabzadeh

Bachelor of Nursing, Torbat Heydarieh University of Medical Sciences

Esmael Amirazodi

Neurologist of Qaem Firozabad Hospital

Maede Taghilou

Bachelor of Biotechnology, Kashan University

Abstract

Cardiovascular diseases are the most common cause of death in industrialized countries. Among these diseases, you have certainly heard the name "heart attack"; A very important and dangerous disease that threatens the lives of many people in the world. Heart attack is one of the most common types of heart disease and one of the main causes of death in the world, and unfortunately, many people suffer from this problem. Despite the fact that thanks to timely measures and quality medical care, tens of thousands of people in the world survive death due to heart attacks, but still the percentage of death due to a severe heart attack is very high. A heart attack may seem scary at first, but many people go on to live normal lives after a heart attack and recovery. Answering the following questions can help you better understand what happened and how your heart is recovering. The heart muscle needs oxygen to survive, and a heart attack occurs when the flow of oxygenated blood to the heart muscle is reduced or completely cut off, which occurs when the coronary arteries that supply blood to the heart muscle become blocked. Accumulation of fat, cholesterol and other substances that are collectively called plaques. A blood clot may form around the plaque, which can disrupt the blood supply to the heart muscle.

Keywords: Heart diseases, heart attack, blood pressure, stroke symptoms.

Introduction

The heart is the most vital organ in the body, and any problems related to it should be taken seriously. Medical care and periodic checkups regarding the heart and its problems, especially hidden heart problems, are very important. One of the scariest and most dangerous problems that can happen to the heart is a heart attack. A heart attack is really a scary experience that if someone has experienced it or even seen someone close to them in this condition, they definitely know the depth of the danger of this complication. A heart attack, which in clinical terms is called myocardial infarction, occurs when a part of the heart muscle does not receive enough blood and as a result, the required oxygen does not reach the heart muscles. When the heart does not receive enough blood and oxygen, the function of the heart is disturbed. During heart attacks, the heart muscle is struggling to survive and needs oxygen. The longer the heart is deprived of oxygen and the later it receives the necessary treatments, the more severe the damage to the heart muscle will be. In a severe heart attack, the amount of damage and then the risk is definitely higher. The main reason for the occurrence of such a complication is the problems and blockage of the coronary arteries of the heart. In fact, due to taking these veins for various reasons, these arteries cannot supply the blood needed by the heart muscles. Coronary artery occlusion or CAD is known as the main cause of heart attack.

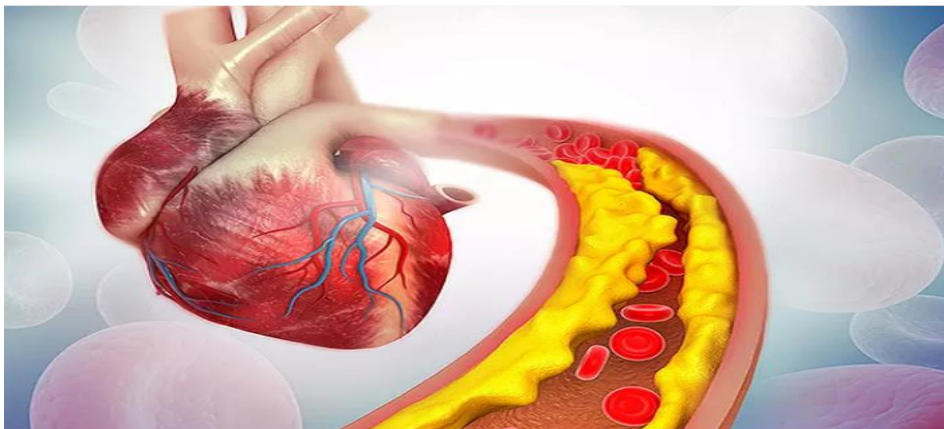


Figure 1: Obstruction of blood vessels to the heart or coronary arteries is the main cause of heart attack

Heart Attack

In general, stroke and heart attack are used interchangeably. If we want to be a little more precise about them; It should be said that when the function of the heart is disrupted due to electrical problems, a heart attack occurs, which leads to cardiac arrest, but a heart attack is usually caused by a problem in the blood vessels. Both complications cause damage to the heart muscle. A heart attack, also known as "heart attack" and "myocardial infarction", occurs due to long-term failure of oxygen flow to the heart muscle (ischemia), which is actually associated with the death of the heart muscle (necrosis). Heart attack affects millions of people worldwide every year. An event that causes insufficient blood flow to the heart muscles is known as "coronary artery disease". Coronary arteries are vessels that are responsible for supplying blood to the cells of the heart, and when there is a blockage in these vessels, blood supply to the heart will also be disturbed. This also leads to myocardial infarction (heart attack), which causes disruption in the normal functioning of the heart. Depending on the duration of vascular occlusion, the damage to the myocardium will be different, and a heart attack can be asymptomatic or have long-term and very severe manifestations. A heart attack occurs when there is insufficient blood supply to the heart muscle. This complication is also known as Myocardial Infarction and affects the person suddenly. A heart attack is an emergency situation and if medical measures are not taken in time,

the patient's life will be threatened. The more time the blood supply disorder to the heart takes, the more the heart damage will be increased.

Types of heart attack

-Spasm (cramping) of coronary arteries or unstable angina

In this case, the patient faces an acute coronary heart attack. Chest pain may occur at rest, and the patient will experience pain for a longer period of time. It is not possible to treat this heart disease with medicine and rest. In contrast to unstable angina, there is stable angina. In this case, the occurrence of disease symptoms is related to physical activity. That is, the symptoms appear when physical activities have reached a certain level.

- Myocardial infarction

In this case, one of the main arteries of the heart is damaged. These arteries allow blood to supply oxygen and nutrients to the heart muscle. This disease can be acute. In this case, there is also a possibility of ventricular arrhythmia. This will increase the risk of cardiac arrest.

Causes of coronary artery occlusion

In general, the causes of coronary artery blockage and lack of blood supply to heart tissues can be summarized in the following two causes:

- Coronary artery disease

As a result of long-term accumulation and deposition of fat particles in blood vessels, in the form of "plaques" made of cholesterol and other calcified substances, we will witness the narrowing of these vessels. This condition is called "atherosclerosis". In the course of heart attacks and heart attacks, this plaque may break and its contents enter the bloodstream. In this case, a blood clot forms on the plaque, and this process, according to the recent findings of researchers, is the main cause of a heart attack. This clot, together with the plaque, causes narrowing and partial or complete blockage of the artery, and as a result, the blood flow to a part of the heart is stopped or reduced.

- Coronary artery spasm

Another less common cause of heart attack (heart attack) is spasm related to coronary arteries, in this case, blockage of arteries due to contraction and stiffness created in their walls. This phenomenon is observed in vessels where atherosclerosis has not occurred.

The exact cause of spasm in the coronary arteries is not known, but it can be influenced by some factors that are mentioned below:

- Using some substances and drugs such as: amphetamine, cocaine, tobacco, etc.
- Stress
- Facing extreme cold
- Smoking

Heart attack symptoms

The symptoms of a heart attack may be different from person to person, or may be asymptomatic in some people. Also, symptoms can range from mild (mild heart attack) to severe (severe heart attack) and can occur slowly and over time or suddenly. However, the more symptoms there are, the more likely a heart attack will occur. Signs and symptoms of a heart attack (myocardial infarction) can include the following:

- A feeling of intense pressure, fullness, pain, or discomfort in the center or left side of the chest that lasts for more than a few minutes.
- A feeling of pain or discomfort that disappears and reappears after a while
- Pain or discomfort that spreads to the shoulders, neck, arms, or jaw
- Chest pain that progresses or worsens
- Chest pain that does not improve with rest or nitroglycerin
- Chest pain accompanied by the following symptoms:
 - o Sweating, cool skin, or paleness
 - o Shortness of breath (can be the only symptom of a heart attack or stroke or accompanied by or preceded by chest pain. It can also appear at rest or with some activity)

- o Nausea or vomiting
- o Dizziness or fainting
- o Unexplained weakness or fatigue
- o Fast or irregular pulse

• Any sudden new symptoms or changes in the pattern of previous symptoms (for example, symptoms that are stronger or last longer than usual)

Although "chest pain" is a key warning sign and the most common manifestation of this disease (heart attack); But it may also occur with other conditions such as: indigestion, pleurisy, pulmonary embolism, aortic valve stenosis, heartburn, etc.

The important point is that chest pain and discomfort, which is also interpreted as "angina" and is caused by myocardial ischemia, is divided into three categories: stable angina, unstable angina, and variant angina.

Angina includes the following important items:

- Stable angina

It occurs due to atherosclerosis and coronary artery disease:

- It is created during physical activity such as sports
- It is usually predictable and the type of pain is similar to its previous types
- It takes a short time, about a few minutes
- It is resolved with rest and medication

- Unstable angina

Due to the rupture of plaques and the formation of clots, it occurs:

- Occurs even at rest
- The pain pattern is variable
- It is unpredictable
- It is usually more intense and longer than the stable type and lasts 30 minutes or more
- May not improve with rest or medication
- It can be a danger sign for a heart attack

- Variant angina or Prinzmetal

Occurs as a result of coronary artery spasm:

- Usually occurs while resting
- It is usually severe
- May improve with medication

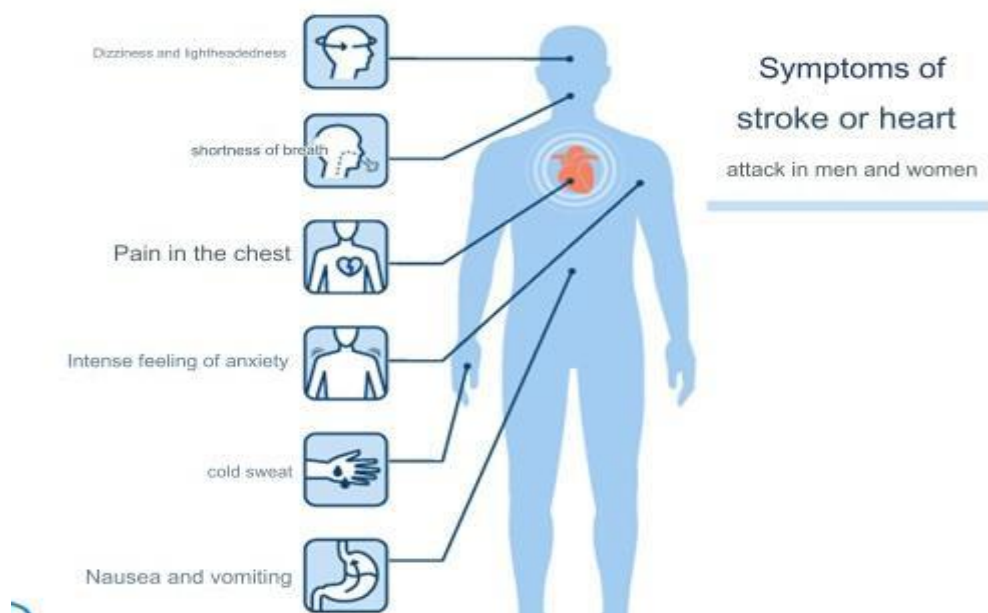


Figure 2: Heart attack symptoms

You should know that the most common symptoms of heart attack are the same in men and women, so don't look for strange symptoms of heart attack in women. Of course, it is said that the incidence of silent heart attacks is higher in women and it usually causes their death in the first attack. Also, some diseases such as polycystic ovary syndrome or PCOS are unique to women and can increase the risk of this complication in them. You should know that women are more prone to heart attacks after menopause, this is due to the decrease in estrogen levels in the body. In order to prevent heart diseases in women, it is recommended that women who are over 40 years of age should regularly contact a specialist and take periodic checkups seriously.

Causes of heart attack

The cause of heart attack is mainly related to coronary artery disease or CHD. During that, the main arteries that are responsible for supplying blood to the heart are damaged. This damage (atherosclerosis) usually occurs due to the increase in blood cholesterol level and the formation of plaque. Smoking, unhealthy diet, lack of regular exercise, excessive consumption of alcoholic beverages, high blood pressure and even diabetes are among the reasons that can provide the basis for atherosclerosis. A heart attack can be caused by a blood clot. Plaques play an important role in the formation of blood clots. If they burst, the resulting chemicals can cause blood clots. As the clot moves towards the heart, the blood supply is disturbed and as a result, a heart attack occurs.

Necessary measures in case of heart attack

In case of heart attack symptoms, it is better to do the following as soon as possible:

- Call emergency services immediately. Emergency personnel can start treatment on the way to the hospital.
- Stop any activity. Sit or lie down in whatever position is most comfortable for you.
- Take nitroglycerin. If you are using nitroglycerin, take the normal dose.
- Take aspirin. If you are not allergic to aspirin, take one 325 gram tablet or two 81 gram tablets.
- Relax and wait. Keep your cool while you wait for help to arrive.
- Keep a list of your medications in your wallet, notebook, or cell phone.

People prone to heart attack

Several risk factors for the occurrence of MI (heart attack) are known, which can be prevented by knowing them and managing them properly.

These risk factors fall into the following two categories:

- Risk of genetic or out-of-control factors

- Genetic hypertension
- Low levels of HDL cholesterol and high levels of LDL cholesterol and triglycerides due to genetic factors
- Family history of heart disease (especially if it starts before the age of 55)
- Old age (in men over 45 years old and in women over 55 years old)
- Menopause in women
- Incidence of preeclampsia in pregnant women (pregnancy hypertension)
- Immune deficiency disease or problem such as: rheumatoid arthritis, lupus, etc.
- Type 1 diabetes

These categories are things that cannot be changed but can be managed with a healthy lifestyle.

- Risk of acquired or controlled factors

- Acquired high blood pressure
- Low level of HDL cholesterol and high level of LDL cholesterol and acquired triglycerides (caused by lifestyle and diet)
- Smoking
- Stress
- Alcohol consumption
- Sedentary lifestyle
- Overweight
- A diet high in saturated fat
- Type 2 diabetes

Ways to diagnose a stroke or heart attack

Diagnosis of heart attack is based on symptoms, manifestations, history of previous and family diseases and diagnostic tests. Some of these common tests include:

- Laboratory tests

During the damage and death of myocardial cells, some proteins and enzymes enter the blood stream, and by measuring and evaluating them, it is possible to comment on the occurrence of heart attack.

These types of tests include some important items. such as:

- Complete blood count (CBC) test
- Cardiac enzymes and biomarkers test
- Troponin test
- Lipid profile measurement
- Serum myoglobin test Creatine kinase test (CK-MB)
- Comprehensive metabolic panel
- electrocardiogram (ECG)

The electrocardiogram test, which measures the speed, rhythm, intensity and timing of the heartbeat and its electrical signals, is the most important tool for the initial assessment of the patient's condition in heart attack. This test confirms the diagnosis in 80% of cases.

According to the degree of coronary artery occlusion, two types of MI (heart attack) can be expected in the electrocardiogram:

- MI (heart attack) with ST segment elevation (STEMI) in complete stenosis
- MI (myocardial infarction) without ST segment elevation (NSTEMI) in relative stenosis

-Imaging methods (such as coronary angiography)

Angiography is used to definitively confirm the diagnosis in people with a high probability of heart attack (heart attack) and also to determine the location of heart vessel blockage. During a process called "Cardiac Catheterization", a flexible tube called a "catheter" is inserted into a blood vessel from the neck, groin, or arm, and through this, contrast material is introduced into the blood stream of the coronary arteries. they do Then, as a result of X-ray radiation, the blood flow of the vessels and possible blockages are evaluated.

Coronary Angiography

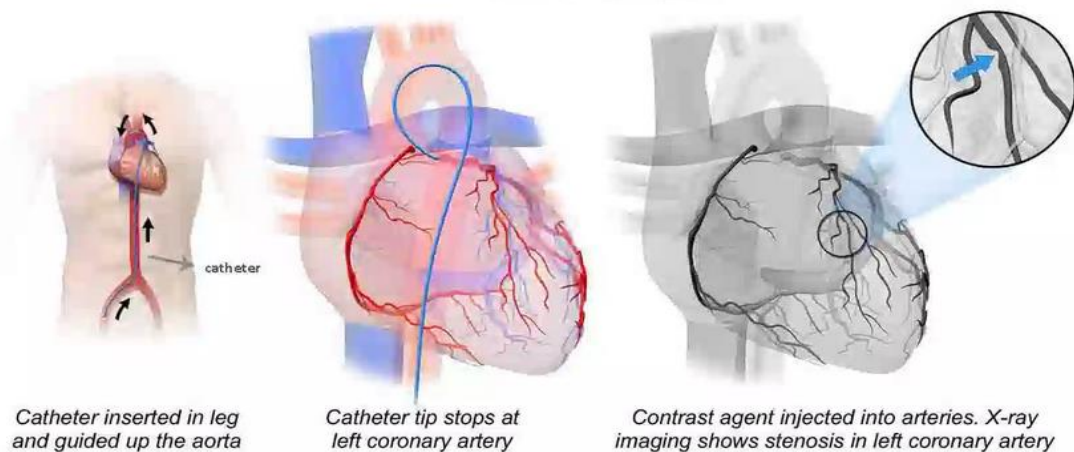


Figure 3: Schematic image of angiography

Ways to prevent heart attack

When heart attack patients are referred to the hospital, the necessary treatments will be given to them according to the severity of the heart attack and the amount of damage to the heart. These treatments also include prescribing a series of drugs. Sometimes, more advanced treatment methods may be needed to solve various problems of a heart attack patient.

- The first treatment methods and initial measures of heart attack are aimed at returning the blood flow to the heart tissue as quickly as possible. Every second that passes after the attack occurs and the heart muscle remains without blood and oxygen, more tissue is destroyed from the patient's heart. Cardiac massage and cardiopulmonary resuscitation is one of the important treatment methods.
- Other common treatments that are prescribed for a heart attack patient include drugs that are specifically considered for heart attack. Of course, again, the type of drugs, their number and dosage depends on the severity of heart attacks.
- Other important treatment methods that are performed include surgical methods and combined treatments. Coronary angioplasty is one of the most common and important treatment methods. Cardiac stent may also be considered to treat patients. In angioplasty, which is the balloon of the heart, the doctor will remove the blockage of the arteries with the help of ballooning. This method can be done with the help of a laser.
- Some treatments for heart surgery patients include placing an artificial heart valve in place of the damaged valve. Other treatment methods that may be used depending on the condition of the patient and the extent of the damage are:
 - o Bypass surgery
 - o Atherectomy
 - o Cardiac catheterization
 - o Open heart surgery
 - o Heart transplant.

A heart attack (myocardial infarction) can happen to anyone; But what is important is that by knowing the risk factors of heart attack and trying to control them, it is possible to prevent myocardial infarction or its recurrence. In fact, it is possible to deal with heart problems by modifying the lifestyle (nutritional status, physical activity, etc.).

Some of the works that are suggested in this field include the following:

- Modifying the diet in terms of aggravating factors such as: fat, cholesterol, sugar and high salt and using healthy and useful foods
- Blood pressure monitoring
- No smoking
- Physical activity and sports
- Dealing with overweight
- Dealing with overweight
- Regular health monitoring by a doctor
- Management of underlying diseases such as: diabetes, kidney diseases, vascular diseases, etc.
- Stress control
- Participation in "Cardiac Rehabilitation" programs

Distinguish between heartburn and heart attack

Heartburn or acid indigestion pain is related to your esophagus. But since the esophagus and heart are close to each other, either can cause chest pain. This is why many people confuse heartburn and heartburn. Heartburn is a common disease caused by the reflux of stomach acid into the esophagus. This can cause chest pain that sometimes spreads to the neck, throat, or jaw.

Treatment of heart attack

Also, in order to reduce pain, improve the function of the heart and its muscles, solve underlying problems and prevent the progression of heart attack and death, special intervention and treatment measures can be taken, which include the following:

-Use of certain medications, including:

- Pain reliever
- Fibrinolytic and antithrombin (to prevent clot formation and expansion)
- Antihyperlipidemia (such as: statins, to reduce blood fat levels, especially LDL)
- Beta-blockers (in order to reduce the heart load and deal with arrhythmias)

- ACE inhibitor (to prevent high blood pressure)

- Oxygen therapy to improve the oxygen condition of the heart muscle

Since myocardial infarction is caused by a disproportion between the need and consumption of oxygen by the heart tissue, the increase in myocardial demand, if not met, leads to ischemia and eventually cell death. For this reason, oxygen therapy has been a routine part of the treatment of heart attack patients for more than a century. By making oxygen available to the ischemic tissue of the myocardium, the possibility of infarction and subsequent cell death is reduced. Although there are discussions about the excessive increase of oxygen and its destructive effects on heart tissue due to its vasoconstriction effect, which has been discussed by various clinical studies.

- Coronary angioplasty using balloon and stent (PCI)

In this method, the catheter tube enters the body using the vessels of certain points such as the groin. At the beginning of the tube, a balloon is installed, which expands and opens the vein when it reaches the blockage. Also, along with it, there is a spring-like metal piece called "Stent" (Stent), which remains permanently open inside the vessel to prevent the vessel from closing again. In addition, there are other methods such as: atherectomy and laser angioplasty, which, unlike the above method, remove plaques from the vessel wall.

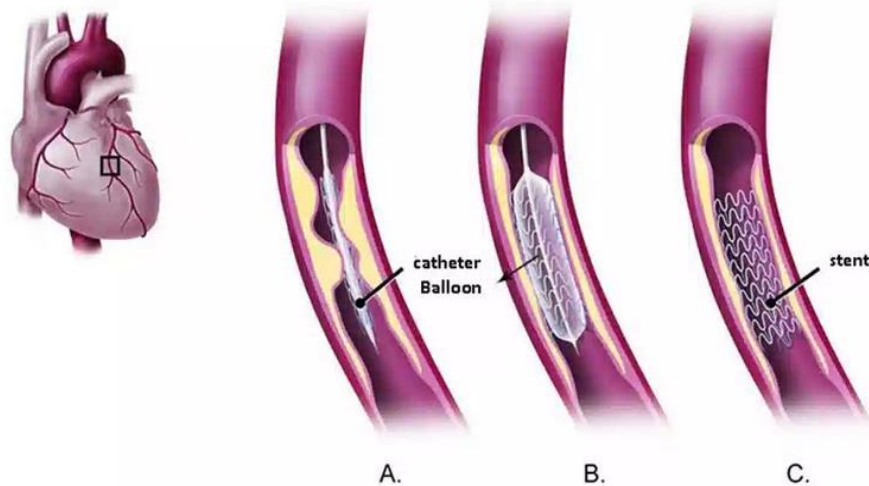


Figure 4: Schematic images of various treatment methods for coronary artery occlusion

- Coronary Bypass Surgery

In this type of surgery, the doctor connects two points, for example: before and after the cramp area, by using healthy vessels (artery or vein) from other parts of the body, such as the leg, and thus creates a new path. It will be created for blood flow.

Conclusion

Death due to heart attack is one of the main causes of death worldwide. Due to the incorrect lifestyle these days and the increase in stress and mental pressure in daily life, a heart attack is not out of mind for anyone. By knowing the risk factors and initial symptoms of a heart attack and the symptoms of a silent stroke, as well as CPR training, you will take a positive step towards the health of yourself and those around you. In this article, we learned what a heart attack is and what factors affect this heart attack disease. We also learned; Although heart attack disease (myocardial infarction) can be very dangerous, it can be prevented by preventing it and taking appropriate measures.

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