

Heart Attack Symptoms, Signs, and Treatment

The heart muscle differs from all other musculature in the body. It is a syncytial muscle, in that the muscle fibers communicate with one another and also possess an intrinsic muscular rhythm, engendered by an electrical system that conducts signals to keep the activity in a normal rhythm. The heart is truly a pump. Consisting of four chambers, an atrium and a ventricle on each side, the left heart pumps blood to the whole body; the blood is returned by the venous system to the right heart, which pumps it into the lungs, where it is enriched with oxygen and returns to the left heart where it is, again, pumped to the body. For its own function, and indeed for its survival, the heart muscle receives blood from two coronary arteries that originate in the aorta and branch off to supply both sides of the heart.

A heart attack, the threat of myocardial infarction or death of muscle tissue, results from interruption or interference of adequate blood supply to the muscle, leading to muscle damage and inability of the pump to function. The heart may come to a standstill or suffer arrhythmia (irregular heart rhythm) that prevents normal pumping activity, and this can be fatal. The problem is one of sudden or rapid obstruction of blood flow in one of the main or in the branches of the coronary arteries. If the flow is not reconstituted by treatment in an optimal window of time, permanent damage or infarction can occur. Moreover, the longer the time it takes, the greater the amount of heart muscle can be adversely affected. The obstruction is due to arteriosclerosis, coronary artery disease that



Maintaining Your Health on Mackinac

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roughens the lining. Disruption of the plaque suddenly can acutely narrow the coronary artery and interrupt blood flow. Spasm of the artery caused by irritation of the lining further lessens blood flow.

It is believed that about one million Americans have a heart attack every year. Most victims wait some three to four hours after signs and symptoms ensue to call the emergency medical systems. Emergency medical care can make the difference between life and death. The steps taken by emergency paramedics and physicians are expertly designed to diagnose and treat a heart attack, and time is of the essence.

The symptoms, an acute onset of chest pain after physical exertion, a crushing sensation in the chest, radiation of pain from the chest into the left arm or neck, are indicative of *angina*, that is pain that results from deprivation of sufficient blood to the heart muscle and the potential for infarction. If the chest pain persists for 15 minutes or longer, or if you suspect that you are having a heart attack, every minute counts and the immediate

thing to do is to call for emergency medical help. Paramedics in the field and later emergency physicians will try to determine the diagnosis, the progression of the attack, and the extent of damage that is occurring or has occurred. It is recommended that you chew an aspirin when the symptoms ensue and swallow it, unless you are allergic to aspirin. This helps to thin the blood and minimize clot formation.

An electrocardiogram (ECG) is obtained in which electrodes are attached to the skin and the electrical conductivity of the heart is recorded. Certain patterns of abnormality help to identify areas of the heart muscle affected. During the progression of the attack, the ECG may not show the degree of damage as it takes time for the damage to be reflected in these patterns. Similarly, certain heart enzymes, troponin and CK-MB, that enter the bloodstream are measured and are useful markers in determining the degree of muscle damage. Again, it may take up to four hours or more for these tests to become positive. It will take a few hours from the onset of the attack, of constant observation

and repeated testing, before decisions are made as to management of the attack and procedures for treatment.

When the ECG and other tests indicate that a heart attack is significant, the next step is to get access to a medical center equipped to perform heart catheterization and objectively identify the site or sites of blockage in the coronary arteries. A catheter is inserted into a major artery in the groin, threaded up into the aorta and dye is injected into the orifices of the coronary arteries. This arteriogram, or angiogram as it is called, can simultaneously be used to open the blocked artery or arteries. The catheter is used to deploy a tiny balloon under X-ray guidance into the blocked area and open it up and restore blood flow, a technique termed balloon angioplasty. Another technique used employs a tubular steel mesh device, called a stent, placing it across the narrowed and blocked area to keep it open. These procedures immediately restore blood flow and limit or prevent the heart attack from becoming full blown.

During a heart attack, until catheterization can be done, intravenous administration of clot-dissolving medications, or thrombolytic agents, are best used within two hours after symptoms begin and no later than 12 hours after.

In the event that these techniques are not effective, especially if there are multiple blocked or narrowed arterial segments, surgical bypass of the coronary arteries may be recommended. This is usually done at a later time, when the heart has stabilized and the muscle has

had time to heal.

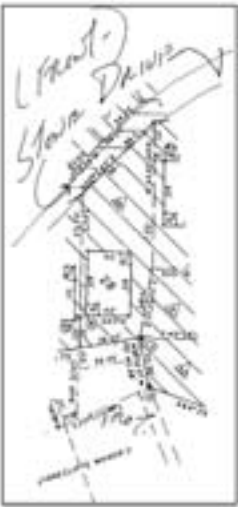
In general, following a heart attack, an individual can expect to be hospitalized for three to five days. This will include the observation, assessment, balloon angioplasty/stent placement, and follow-up. Serial ECGs, chest X-rays, blood tests, and further testing of heart and lung functions will be required. Congestive heart failure, if it ensues, will require in-hospital management and control. Certain drugs are indicated, such as aspirin and clopidogrel (Plavix) to help reduce the risk of clotting. Drugs that lower cholesterol and medications to strengthen heart muscle are started and other co-morbidities like hypertension and diabetes are regulated with treatment.

Chest pain manifesting as angina requires urgent attention. Even in the absence of a heart attack, some type of stress testing must be done, to evaluate the heart under increased workload, to determine if there is a cardiac source for the pain. If there is no heart problem, tests for gastrointestinal, chest wall, or lung problems should be completed.

Chest pain that lasts longer than 15 minutes and is thought to be continuing requires immediate medical attention. Do not hesitate to call. There is sure evidence that urgent management will identify and immediate treatment will effectively treat incipient heart attack. Delay is consonant with increasing heart muscle damage and potential morbidity or mortality.

Dr. Silva is a professor of surgery at Wayne State University and a resident of Woodbluff on Mackinac Island.

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