

SURGERY

Arteries Cleared by Operation

A Los Angeles doctor has devised an operation that "sweeps" clogged arteries, which cause severe chest pain known as angina pectoris. Other advances are expected soon.

By HELEN BUECHL

WHEN YOUR CHIMNEY becomes so filled with soot that the smoke will not pass through, a man with special equipment can restore the passageway by sweeping it clean.

Why would not this same idea work for plugged-up arteries? A Los Angeles surgeon believes it could. He has perfected an operation that, in effect, renews the youth of such arteries in the heart. He is Dr. William P. Longmire Jr. of the University of California Medical Center.

He gathered together as patients relatively young men in the prime of life, between the ages of 38 and 54, who experienced such frequent and severe attacks of angina pectoris that they were unable to work and live a normal life. Angina pectoris results when the heart muscle fails to receive a sufficient supply of blood for nourishment. The result is extreme pain in the chest and left arm, plus a feeling of suffocation.

None of these "prime" patients had definite evidence of present or past coronary occlusion, nor its accompanying damage to the heart muscle known as myocardial infarction. But each man did have a typical history of severe anginal pain that was easily produced by the slightest effort or physical exertion. Tracings of the activity of each man's heart on an electrocardiogram made while each exercised had the tell-tale signs. Each man was diagnosed as a definite victim of coronary insufficiency with angina pectoris.

Clearing the Blockage

This meant that the heart muscle was being starved of its blood supply. The pain was its protest against this "blockade."

This pain is actually caused by coronary insufficiency, a blockage of the artery by deposits that cling to the inner lining of the artery. These deposits clog much as soot plugs chimneys.

Coronary insufficiency is not the same as coronary occlusion or thrombosis. A coronary thrombosis occurs when a blood clot lodges in such a manner as to shut off the flow of blood through the artery. The section of heart muscle it supplies "dies," at first softening like a weak spot on a tire's inner tube, and later, if the patient survives, forming tough scar tissue.

The operation, devised by Dr. Longmire, consists of reaming out the innermost layer of the artery, called the "intima," that is filled with fatty deposits known as atheromatous plaques. These have been responsible for narrowing down the opening to

the point where the circulation has been almost cut off.

The operating technique to relieve this condition begins with the removal of the fat which surrounds the pericardium, or outer sac of the heart. This exposes the coronary arteries which course over the surface of the heart. The surgeon studies the condition of the fat he removes. It serves as a useful landmark because it tends to be scarred and adheres to the most diseased portions of the arteries, pointing out to the surgeon those areas of the arteries that need "sweeping out."

In addition to the condition of the outer surrounding fat, the diseased portions of the blood vessel feel hard and rigid, instead of normally elastic and pulsating.

Next, the surgeon checks the smaller branches of the artery. If they also are clogged, the operation cannot be effective, and so is not performed. These branches are tested by applying gentle pressure over the artery for from three to six minutes.

If there is no change in the color of the heart muscle supplied by the artery, or in the continuous electrocardiographic tracing, or in the heart's action, no blood is passing through and the artery is presumably closed up. However, a slight change in the ap-

pearance of any of these indicates that some blood was circulating, before pressure was applied, and the operation might increase the flow.

The vessel is then slit at the point where it is most rigid. The thickened and obstructing intima, now more of a core than a lining, is separated from the rest of the arterial wall for a little distance, then cut through and its ends tied.

The surgeon's technique calls for precision and delicacy, as a coronary artery is only about as thick as a piece of cooked spaghetti. With the aid of magnifying lenses, the surgeon slips a special loop over the end of the divided core, and by pushing gently back into the artery he can dissect out the atheromatous inner layer, first in one direction from the incision, then the other, until there is a free flow of blood. A little powdered heparin sprinkled into the canal discourages clotting at that point, and the opening is sewed up with fine silk thread.

Results of Operation

The record for this operation includes four patients who found relief from pain, ranging from moderate to virtually complete, and who were then able to perform some work tasks.

These patients were obvious candidates for coronary thrombosis, or stroke, before the operation. Whether or not that will still occur, or whether improvement will



MECHANICAL HEART AND LUNG—This machine has assumed the duty of both the heart and lungs of more than 250 patients undergoing a heart operation. The machine was developed by Dr. Robert E. Gross of Children's Hospital, Boston.

be maintained, cannot be predicted. The first man was operated on late in 1957, so the period of postoperative observation has not been long in any case.

Dr. Longmire emphasizes that the operation is in the experimental stage; that it is indicated only in certain carefully defined cases; and that at this stage, it should not be thought of as a substitute for accepted methods of medical management of angina pectoris which is not wholly incapacitating to the individual.

Another advance has recently been made in the field of hypothermia. Surgeons know that by cooling the body's temperature, human requirements for oxygen and nourishment can be drastically reduced. In this low temperature state, the human heart can be stopped for a few precious minutes while the surgeon mends a vital defect.

Unfortunately the use of hypothermia presents several problems. If the body is cooled for too long a period, or at too low a temperature, brain damage can result due to insufficient oxygen supplies. However, a new technique has been devised which safely reduces the temperature of the body to 39.2 degrees Fahrenheit. At this temperature, the heart and circulation virtually stop spontaneously, and start up again when the blood is warmed. This method results in longer periods of time for the operations, and reduces the need for additional blood for the patient.

Wide Use of Machine

This operation is just one of the many techniques that modern medical science has devised for the ailing heart. Such modern equipment as the heart-lung machine has become common place in large hospitals throughout the country.

Dr. Robert E. Gross, surgeon-in-chief at Children's Hospital, Boston, and his associates developed such a machine with grants from the American and Massachusetts Heart Associations.

The machine has been used in more than 250 operations. It is efficient and keeps damage to the blood at such a minimum that it can be used on two patients in succession with only one priming of donated blood.

Despite these advances in operating and mechanical techniques, America's number one killer, heart disease, is not itself ready to die. Researchers in the fields of heart and kidney diseases are striving to devise methods of controlling many of the various forms of circulatory and renal diseases.

Scientists are now working on methods of dissolving clots already formed in the blood vessels. Operations, similar to Dr. Longmire's, are being performed on experimental animals in an attempt to discover methods of increasing blood flow. Much research is in progress to improve the plastic valves now replacing worn-out valves in the heart.

Preventive medicine is important in heart disease control too. If the factors that cause heart disease can be avoided, the annual death toll will drop drastically. Repeated attacks of rheumatic fever can now be prevented by continued use of drugs. Currently, scientists are attempting to isolate the factor that causes the initial attack.

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