

When you need an operation...

About Carotid Endarterectomy

American College of Surgeons

Carotid endarterectomy (care-rot'tid end-art-ter-rec'toe-me) is a surgical procedure that removes blockage from the carotid arteries, which are blood vessels located in the neck that supply blood to the brain. This procedure allows blood to flow more freely to the brain. When blood is prevented from traveling to the brain, a medical emergency called a *stroke* can occur.

This booklet will explain:

- Why you may need to have a carotid endarterectomy
- How the blockage is removed from the carotid arteries
- What to expect before and after the operation

Remember, although this procedure has a high success rate, it does have some risks. No two people undergoing carotid endarterectomy are alike. The reasons for and the outcome of any operation depend on your overall health, your age, and the severity and degree of arterial blockage as well as any accompanying cardiovascular disease.

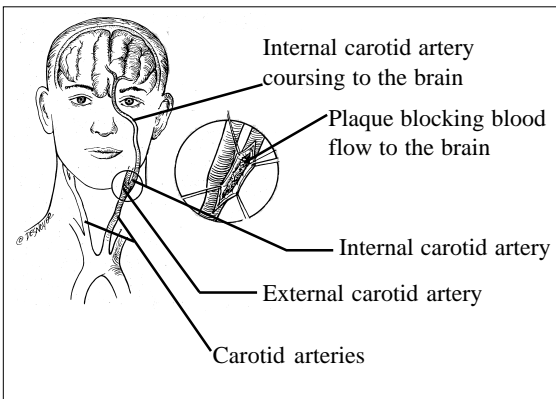
This booklet is not intended to take the place of your surgeon's professional opinion. Rather it can help you begin to understand the basics of this surgical procedure. Read this material carefully. If you have additional questions, you should discuss them openly with your surgeon.

About arterial blockage

Cerebrovascular disease is a condition that affects the blood vessels leading to and passing through the

brain. If you are being treated by a doctor for cerebrovascular disease, you should know that the objective of such treatment is to prevent stroke and transient ischemic attacks (TIAs), or ministrokes. Strokes and ministrokes occur when there is a marked reduction in blood flow and oxygen to the brain. A decrease in oxygen-rich blood can result in the destruction of brain tissue. All human beings' brains must be nourished with oxygenated blood if people are to function normally.

A reduction of blood flow to the brain can be caused by a narrowing of the arteries leading to the brain. This narrowing can be caused by a blood clot or a piece of fatty plaque that interferes with the



passage of blood to the brain, thus causing a stroke. Strokes can also occur because of uncontrolled blood pressure or the bursting of a weakened blood vessel in the brain.

Often, preventative measures are used to decrease the chances of having a stroke. Low doses of aspirin and similar “blood thinning” drugs such as warfarin (Coumadin) that prevent the formation of clots, and drugs that lower blood pressure are used to reduce

the chances of having a stroke. Increasingly, a surgical procedure is used to repair seriously blocked arteries or to reposition blood vessels that supply the brain with oxygenated blood.

Strokes occur most frequently in people who have high blood pressure, smoke, have diabetes (high blood sugar), are overweight, or have high cholesterol levels. Strokes can be mild or can inflict lasting damage to the brain. This damage results in a wide range of disabilities—from speech impairment to complete paralysis.

Strokes sometimes can be caused by a narrowing in one of the carotid arteries of the neck, the major vessels that supply blood to the brain. Carotid arterial blockage can now be pinpointed precisely through the use of ultrasound scans that work like sonar or through a special X ray test called *arteriography*, or magnetic scan angiography.

Where are the carotid arteries?

The carotid arteries, which lie on either side of the neck, are the two major arteries that supply blood to the head. Notice in the illustration that the carotid artery forks into two smaller arteries. Clots and plaque can form at this fork in the artery, thus interfering with or completely cutting off blood flow.

What are the symptoms of carotid arterial blockage?

Patients with carotid arterial blockage may have disturbances in one or more of the five “S’s”: *strength, sensation, sight, speech, and steadiness*. Two other “S’S”—*sleepiness and severe headache*—may also signal brain hemorrhage. Patients may have mental deterioration and loss of memory. There may be temporary blindness in one eye or

other visual defects. Numbness, weakness, or paralysis of an extremity or of one entire side of the body may exist. Difficulty in speech or the ability to swallow may occur. Coma and rarely convulsions may also be experienced. Obviously, these are severe symptoms that need immediate medical attention. But you should also understand that some people can have significant blockage of a carotid artery and have no symptoms at all. Strokes left untreated, as well as arterial blockage are life-threatening conditions.

How is carotid endarterectomy performed?

In this procedure, the surgeon makes an incision into the carotid artery. The surgeon uses a dissecting tool to remove the plaque that is clogging the inside of the artery. Removing the plaque is done through a process that is much like the way in which a roto-rooter removes a clog in a drain. The passageway is made broader, thus permitting increased blood flow. The artery is then closed; the surgeon may employ a technique that uses a patch of vein or plastic to enlarge the artery.

Is the operation better than using drug therapy?

Strong evidence now exists that a surgical procedure provides better protection against a stroke than aspirin does in patients with severe (greater than 70 percent) obstruction of the carotid artery and symptoms of stroke or TIAs. Research also indicates that an operation may be more beneficial than aspirin alone for carotid blockage in patients who do not have the symptoms, but have severe narrowing of the arteries. Oral anticoagulant drugs, or “blood thinners” only variably reduce the incidence of TIAs. They do not reduce the risk of completed strokes and may cause bleeding complications. A successful carotid endarterectomy can abolish disabling TIAs.

Who can have this procedure?

Generally, carotid endarterectomy is performed on patients who have an increased risk of stroke with at least 70 percent blockage of one or both carotid arteries.

Through a series of tests, your surgeon will locate and evaluate the blockage in the carotid arteries. Other factors will also be assessed before this procedure is recommended. For instance, active coronary heart disease may make this operation too risky to perform. Similarly, if a patient has other diseases, such as cancer, this operation might not be recommended. Furthermore, uncontrolled high blood pressure must be reduced before this operation is performed. If symptoms of impending stroke prevail, the doctor may opt to treat the blockage another way. The procedure is not performed to fix existing brain damage.

A patient must be physically strong enough to endure the operation and the tests leading to the operation. Age can be, but is not necessarily, a barrier in performing this procedure. Patients who are 80 years old and over have been successfully treated with carotid endarterectomy.

Preparing for the operation

If your surgeon decides that you are a candidate for carotid endarterectomy, you will undergo a series of tests prior to admission to the hospital to determine the overall health of your cardiovascular system (that is, your blood vessels and heart). You may be given standard tests to measure your complete blood count and electrolyte levels, as well as an analysis of your urine. Your surgeon may require additional studies depending on your age and condition. Prior to the operation, you will dress in a

surgical cap and gown, receive a sedative by injection, and have a needle placed in the back of your hand or in your forearm for connection to an intravenous line in the operating room. You may be given a general, local, or regional anaesthetic. The procedure generally takes two hours.

Immediately following the operation

Regardless of the type of anesthesia you received, you will remain overnight in the intensive care nursing area following the operation. Here, complications such as wound bleeding, low blood pressure, and mental status can be assessed and treated swiftly. Because you may have received intravenous fluids during the procedure, blood and electrolyte tests will be done. You may have your heart monitored by a continuous electrocardiogram to confirm that your heart is beating normally.

You will also undergo a series of neurological examinations to evaluate the strength of your arms and legs, your fine hand movements, and your ability to speak, see, and think clearly. These examinations will be done repeatedly, particularly in the first hours after the operation, until you are deemed to be in stable condition.

As with most operations, no drugs, food, or water will be administered orally for several hours or until the day following your procedure to allow the neck area to begin its healing process. (However, if you're thirsty you will probably be given ice chips to suck on.) You may be given aspirin in the recovery room. This aspirin therapy may be continued indefinitely—perhaps for the remainder of your life.

Once stabilized, you will be moved to a regular nursing unit where full activity will be encouraged during your two-to-five day convalescence.

Recovery

About one month after your operation, an outpatient examination will be done to assess brain function and wound healing. Your surgeon will check your wound and will determine whether your blood pressure is normal. After that, a yearly examination will be scheduled. At your yearly exam, you may undergo a series of noninvasive tests, such as ultrasound imaging and a test for blood flow detection, on the carotid artery that was cleared to ensure that narrowing has not recurred. Your blood pressure and cholesterol level will also be checked. More importantly, you will be instructed to report any unexpected symptoms associated with a deterioration in your condition, such as speech or visual impairment and weakness or numbness, *as soon as they occur*.

Long-term results

As a surgical procedure, carotid endarterectomy does have serious complications of death or disabling stroke, but the risk is no greater than that of leaving the disease untreated for one year. According to the experts, it is currently estimated that a 95 percent chance exists that patients will come through the procedure successfully.

Patients who have undergone carotid endarterectomy have been found to reduce the risk of stroke by as much as 71 percent. If you control or eliminate additional risk factors, such as smoking, high cholesterol, high blood pressure, and obesity, you can increase your chances of good health in the years following your operation.

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WHEN YOU NEED AN OPERATION...

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