Surgery for a Carotid Artery Problem

The carotid arteries carry blood to the brain. Plaque (a fatty material) can collect inside these arteries, affecting blood flow. This can lead to a stroke (sudden loss of brain function). Endarterectomy is a surgery that can remove plaque and help reduce the risk of stroke.

What Is a Stroke?

A stroke is brain damage caused by lack of blood flow. The results of this damage can be very serious. Stroke can cause severe disability, including paralysis, difficulty speaking, and trouble doing the simplest tasks. And some strokes are deadly. One warning sign of a stroke is a TIA (transient ischemic attack). It has the same symptoms as a stroke, but the symptoms go away within minutes or hours, and there is no permanent brain damage. Having had a TIA is a sign that you’re at increased risk of a stroke.

Symptoms of Stroke and TIA

Listed below are some common symptoms of stroke and TIA. If you have any of these symptoms, get help as soon as possible. Prompt treatment for a stroke is vital: The longer you delay getting medical help, the more damage a stroke can do. Call 911 right away if you have any of these symptoms:

- Paralysis or weakness on one side of the body
- Numbness or tingling on one side of the body
- Difficulty speaking
- Loss of vision in one eye
- Drooping of one side of the face
Why You Need Surgery
Your doctor has determined that endarterectomy is the best treatment for your plaque problem. Endarterectomy is a “minimally invasive” procedure to improve blood flow. It is not a cure. But it could prevent a stroke and save your life. Read on to learn more about your condition and how endarterectomy could help you.

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Your Brain’s Blood Supply

Blood carries oxygen and nutrients to wherever they’re needed in the body. The brain needs a steady supply of blood to work. Problems with the vessels that supply blood to the brain can block blood flow. If this happens, parts of the brain can become starved of oxygen and nutrients. This damages the affected area of the brain, which can impair certain body functions.

From the Heart to the Brain

The heart pumps blood throughout the body. Blood vessels called arteries carry blood to the limbs and to the organs, including the brain. The carotid arteries are two of the main pathways for blood traveling to the brain. There are two common carotid arteries, each traveling up one side of the neck. Each artery divides into two branches. The internal carotid artery carries blood into the brain, and the external carotid artery supplies blood to the face and scalp.

Healthy Carotid Arteries

When carotid arteries are healthy, the artery walls are smooth. The arteries are open, allowing blood to flow freely to the brain. The brain gets all the blood it needs to function well.
Plaque in the Arteries

Arteries can become damaged due to risk factors such as smoking, diabetes, and high blood pressure. Heredity (family history) also makes some people more prone to artery damage. A damaged artery no longer has a smooth lining. Cholesterol and other particles in the blood stick to the artery wall and form plaque. A buildup of plaque leads to stenosis (narrowing of the artery). This can reduce blood flow.

How a Stroke Can Occur

The surface of plaque may be rough. Blood can collect there and form clots. Also, plaque can rupture, causing pieces to break off and enter the bloodstream. At the same time, rupture can produce more blood clots. Fragments of plaque and tiny blood clots (emboli) then travel to and block smaller arteries in the brain. This cuts off blood flow to a portion of the brain, resulting in a stroke.

How a Stroke Affects You

When blood flow is cut off, brain tissue can die, causing loss of brain function. This results in problems such as difficulty speaking or controlling movements. The exact symptoms depend on which part of the brain is affected. Symptoms often occur on one side of the body only, the side opposite the blockage. A stroke does permanent damage that can cause long-lasting loss of function.

Is It a TIA?

A TIA is a short episode of strokelike symptoms. It's sometimes called a “mini-stroke.” TIA symptoms go away within 24 hours, but otherwise they are exactly the same as stroke symptoms. If you have stroke symptoms, don't waste time wondering whether you're having a TIA: Call 911 right away!
Your Medical Evaluation

Your doctor will evaluate you to assess your carotid artery stenosis. Your evaluation includes a medical history, an exam, and ultrasound imaging. In some cases, other imaging tests are done.

Medical History

Your doctor will ask you to describe any symptoms that you may have had. These include numbness, weakness, and vision or speech problems. You’ll also be asked about factors that affect the health of your blood vessels, such as smoking, high cholesterol levels, and high blood pressure (hypertension). You’ll describe any current health problems, such as heart disease, kidney disease, lung disease, and diabetes. And you’ll be asked about previous treatments and surgeries for artery problems.

Physical Exam

During your physical exam, your doctor will check your blood pressure and your pulse. He or she will also listen for the sound of blood traveling through a narrowed carotid artery. This sound is called a bruit (pronounced “broo-ee”). The blood vessels in your eyes may also be checked for emboli that can indicate carotid artery problems. Your doctor may then test for signs that you may already have had a stroke. This includes checking reflexes, strength, vision or other senses, and the ability to understand and use language.
Duplex Ultrasonography

Ultrasonography (ultrasound) is a noninvasive test. A scanner uses harmless sound waves to create images. A gel is applied to the neck to help the scanner create accurate images. This test checks for stenosis in the carotid arteries. It also shows how stenosis is affecting blood flow through the arteries. The results can indicate whether an artery is narrowed enough to need treatment. Duplex ultrasonography may be the only imaging test you need.

Other Imaging Tests

In certain cases, further testing is helpful. A CT or MRI may be used to check the brain for signs of a previous stroke. Any of the tests below may be used to take pictures of the arteries.

- **CT (computed tomography)**: A series of x-rays is taken with a special x-ray machine. Computers use these x-rays to create three-dimensional images. For CT angiography (CTA), contrast fluid (“x-ray dye”) may be injected to help arteries show up clearly.

- **MRI (magnetic resonance imaging)**: This test uses a strong magnet to create detailed images of the body. A different type of contrast fluid may be used to highlight the arteries.

- **Angiography**: This test is performed using a catheter inserted into an artery in the groin. Contrast fluid is then injected through the catheter into the carotid artery, and x-ray images (angiograms) are taken.
Your Treatment Plan

Based on your evaluation, your doctor suggests a treatment plan. He or she has recommended endarterectomy. The factors that influenced this decision will be explained to you. Your doctor will also discuss with you the risks and benefits of the surgery.

Factors That Affect Treatment Options

Your doctor has assessed certain factors to determine your treatment plan. These factors include your overall health, the amount of narrowing, whether stroke symptoms exist, and your anatomy. Feel free to ask any questions you may have on these factors and on your treatment plan.

Risks and Complications

Risks and possible complications of endarterectomy include, but are not limited to:

- TIA or stroke
- Bleeding at the incision site
- Heart attack
- Temporary or permanent hoarseness, numbness, or swallowing problems
Getting Ready for Surgery

You will be told how to prepare for surgery. This often includes special instructions about medications. Be sure to follow all of your doctor’s instructions as you prepare.

A Week Before

• Tell your doctor about any allergies you have.
• Tell your doctor about medications you take. This includes over-the-counter medications, herbs, and supplements.
• Make medication changes as directed by your doctor. You may be told to stop taking certain medications you normally take. You may also be told to start taking certain medications before surgery.

The Day Before

• Arrange for a ride home when your hospital recovery is finished.
• Don’t eat or drink after midnight, the night before the procedure. (Ask your doctor whether you should continue to take any medications during this period.)
• Follow any other special instructions from your doctor.

On the Day of the Procedure

When you arrive at the hospital, you’ll change into a hospital gown. Hospital staff will prepare you for the procedure. An IV (intravenous) line will be started to provide you with fluids and medications. You will then be taken to the room where the surgery is performed.
Your Endarterectomy

Endarterectomy is the removal of plaque from the carotid artery through an incision in the neck. This surgery has very low risk of stroke or complication. It typically involves a quick recovery with little pain. In most cases, the patient is asleep under general anesthesia during surgery. In some cases, the patient is awake, with local anesthesia to control pain.

How the Endarterectomy Is Performed

An incision is made in the skin over the artery. The artery is opened and plaque is removed. The incisions in the artery and the skin are then closed.

The Procedure

Opening the artery.
The surgeon places clamps on the artery above and below the blockage. This temporarily stops blood flow. The surgeon then makes an incision in the artery itself.

Placing a shunt. A shunt may be used to preserve blood flow to the brain during the procedure. After the shunt is in place, the clamps are removed from the internal carotid artery. In some cases a shunt is not needed because the brain is receiving enough blood through other arteries.

Removing plaque. The surgeon loosens plaque from the artery wall. The plaque is then removed, often in a single piece. The surgeon inspects the artery to confirm that all of the plaque has been removed. He or she then closes the incision using either sutures or a patch.

Making the skin incision. The surgeon makes an incision in the skin over the carotid artery. The image above shows a common incision site and length.
**Closing the Incision**

**Suturing.** The surgeon may suture (stitch) the incision closed. The clamps are then removed. Next, the skin incision is sutured closed. A tube (drain) may be put in place to keep fluids from collecting around the area.

**Patching.** The surgeon may close the artery with a patch of strong, flexible fabric. The clamps are then removed, the skin incision is sutured, and a drain may be put in place.
After Surgery
After the procedure, you will most likely stay 1 or 2 days in the hospital. Your recovery at home should take about a week. After you’re recovered, be sure to follow your doctor’s instructions for follow-up. Your doctor can also advise you on ways to improve the health of your blood vessels and your whole body.

Recovering in the Hospital
During your hospital stay, you’ll receive medications to control pain if you need them. You will also be monitored, and you may have certain tests. If you have a drain in place, it will be removed before you leave the hospital. An adult friend or family member should drive you home.

Recovering at Home
Take it easy, but get back to your normal routine as much as possible. You can expect to be back to your usual activities in about a week. Meanwhile:

- Take medications as prescribed.
- Keep the neck incision clean and dry.
- Avoid lifting anything over 10 pounds for about a week.
- Don’t drive until your doctor clears you to do so.
- If you shave, do so carefully around the incision. You may want to use an electric razor.

Ask a friend or family member to help with chores, especially those that involve lifting.

When to Call Your Doctor
If you have stroke symptoms, call 911. Call your doctor if:
- You have problems at the incision site, such as swelling, redness, warmth, or increasing pain.
- You experience mental confusion or headaches.
Follow-Up

After the procedure, you’ll have a follow-up exam and tests. Ultrasound or other imaging tests may be needed regularly from now on. Restenosis (re-narrowing of the artery) is uncommon after endarterectomy, but it does sometimes occur. If so, you may need to have another procedure.

Controlling Arterial Disease

The same factors that put you at risk of stroke also put you at risk of other health problems. These include heart attack, kidney problems, and other types of arterial disease. Lifestyle changes and medications can help treat these risk factors and keep you healthier. Start with these changes:

• **Exercise regularly.** A common goal is to exercise 30 minutes or more a day, most days. Talk to your doctor before starting an exercise program.

• **Make healthier food choices.** Include more vegetables, fruits, whole grains, and low-fat dairy products. Meanwhile, cut back on animal fats, sweets, and processed foods. A dietitian can help you learn more.

• **Quit smoking.** Smoking increases the risk of blood clots and also increases blood pressure. Talk to your doctor about how to quit for good.

• **Take medications as directed.** You may be prescribed medications to help control blood cholesterol, diabetes, and hypertension. Controlling these problems helps keep arteries healthier. You may also be prescribed medications to prevent blood clots.
Looking Toward the Future

Treatment for carotid artery stenosis can reduce your risk of stroke. But the conditions that led to the problem may still exist. Talk with your doctor about what you can do to improve the health of your arteries and your overall health. The resources listed below can help.

Resources

- National Cholesterol Education Program
  www.nhlbi.nih.gov/chd