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Ver 6.4.16
CAROTID ARTERY DISEASE

To work efficiently, the brain needs a constant supply of oxygen and nutrient-rich blood. A significant portion of the blood flow to your brain comes from the carotid arteries. Both the Left and Right Internal carotid arteries supply blood to the major areas of the brain responsible for everyday activities including: speaking, thinking and walking.

(Figure 1)

The left picture shows the critical stenosis in the left carotid artery before stent implantation. After deployment of the Nitinol stent blood flows briskly into the left side of the brain. (Figure 1)
This picture displays the long term effect of radiation therapy on the common carotid artery both pre and post stent implantation. (Figure 2)

Atherosclerosis is caused by a buildup of fatty substances like cholesterol called “plaque” which results in a thickening and hardening of the vessel resulting in decreased blood flow to the brain tissues. (Figure 3)
RISK FACTORS FOR CAROTID ARTERY DISEASE
Certain factors can increase your risk of atherosclerosis and carotid artery disease. Some of these risk factors cannot be modified or changed such as:

- Increasing age,
- Gender,
- Family history of stroke

The risk factors which you can control include:

- High blood pressure,
- Smoking,
- Diabetes,
- Obesity,
- Elevated cholesterol

SYMPTOMS OF CAROTID ARTERY DISEASE
Most individuals have no symptoms of carotid artery disease. Others may experience the symptoms of a TIA (temporary stroke or mini stroke), or stroke. A stroke or “brain attack” is an injury to the brain caused by lack of oxygen. This occurs in about 700,000 people a year in the United States. About 280,000 patients die each year from stroke-related causes. Transient ischemic attacks (TIA’s) are warning signs that you are at high risk for experiencing a stroke. If you have any of the warning signs of a stroke or TIA, it may be a sign of blockage in the carotid arteries. These may include but are not limited to:

- Sudden numbness or weakness of the face, arm or leg, especially on one side
- Sudden trouble speaking or understanding
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking, loss of balance or coordination
TESTS WHICH AID IN THE DIAGNOSIS OF CAROTID ARTERY DISEASE:

Carotid Duplex or Ultrasound:
This noninvasive screening test involves imaging your neck with a sound wave probe. This is done in our office by a licensed vascular technician taking approximately 30 minutes. (Figure 4)

Angiogram:
A catheter (small hollow tube) is used to inject contrast (dye) into the carotid arteries. This invasive test is performed by me at the cardiac catheterization labs. (Figure 5)
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**Computerized Axial Tomography Scan**: (CT or CAT scan)

This uses x-rays to create three-dimensional images of the carotid arteries or brain. It can be done with contrast (x-ray dye) if I want to see the blood vessels. (Figure 6)

(Figure 6)

**Magnetic Resonance Angiogram / Imaging**: (MRA/MRI)

An MRA uses a very strong magnet to make three-dimensional images the carotid arteries or brain. An MRA can show atherosclerosis of the carotid arteries, or areas of the brain damaged by a previous stroke. (Figure 7) This can be done with or without contrast or dye.

(Figure 7)
TREATMENT OPTIONS FOR CAROTID ARTERY DISEASE

Treatment options for atherosclerotic carotid artery disease include:

- Medication- aspirin, statins, antiplatelet therapy, diet
- Surgery- Endarterectomy with or without patch angioplasty
- Carotid Artery Stenting- placing a Nitinol self - expanding mesh across the blockage

Using stents in the treatment of carotid artery disease offers a non-surgical option for patients which we believe offers excellent outcomes with lower risks than surgery.

CAROTID ENDARTERECTOMY

Carotid Endarterectomy (CEA) is a surgical procedure that removes the blockage from the affected carotid artery. An incision is made in your neck into the artery where the plaque is, a patch is sewed in place and then the artery is closed with stitches. The procedure is usually done under general anesthesia. CEA is one of the most common surgical procedures in the United States having been performed for over 50 years. (Figure 8)
CAROTID ARTERY STENTING (CAS)

Carotid stenting is an endovascular treatment which means that it is done in a special catheterization laboratory without general anesthesia or surgical incisions. Clinical studies have shown that carotid stenting is as safe and as effective as CEA with less risk. The procedure uses a stent (small latticed metal tube) to open partially blocked arteries and to hold the plaque against the artery wall. The picture below shows a Carotid Stent. (Figure 9)

The stent is made from nickel-titanium or a stainless steel alloy, a metal that is bendable but springs back into its original shape after being bent. An embolic protection device (EPD) is also used to help catch any pieces of plaque or other particles that may be released during the procedure. Pictured below is an example of an EPD. (Figure 10)

The stent is introduced into the narrowed blood vessel on a catheter, after an embolic protection device has been temporarily placed beyond the narrowed area of the artery. The stent is released and stays in place permanently, holding the artery open and improving blood flow. All of the devices, except the stent, are taken out of your body at the end of the procedure. Figure 10)
In some cases, the protection system inserted does not have a distal filter as shown but rather is inserted below the blockage and prevents any debris from traveling up into the brain. This “proximal protection “system (figure 11) will be used upon my discretion if I believe this will result in a safer procedure for you. In the end the idea is to provide a safe environment for the treatment of the blockage with excellent long term results.

(Figure 11)
CAROTID ARTERY STENT PROCEDURE

Preparing for Your Procedure

On the day prior to your treatment you may be asked to withhold some of your blood pressure medication so as not to interfere with the blood pressure response during the actual stent procedure.

On the morning of the stent procedure, make sure you take aspirin and other blood thinning medications prescribed by me. Tell me about any allergies you have, especially to contrast dye or iodine. Tell me if you cannot take aspirin, since aspirin and other medications are usually begun prior to a procedure and continued for several months afterwards. Blood pressure medicines should be withheld the morning of the procedure. Do not eat any solid food on the morning of the procedure.

Medications and risk factor changes

Medications typically prescribed include aspirin, Plavix®, Effient® or Ticlid®. These medications lower the risk of blood clots. In addition, I may prescribe medications to manage your blood pressure or cholesterol.

During Your Procedure

Once you are in the angiographic suite, you will be moved onto an x-ray table. The procedure will be done through an artery in your leg, so your groin area will be washed with an antibiotic solution and then covered with a sterile sheet. I will inject a local anesthetic (numbing medicine) into the area where the catheters will be inserted. You may feel a sting when the needle is put into your groin and a brief warm sensation when the medicine is injected.

Next, I will insert the guiding catheter into your artery. I will inject contrast (X-ray dye) into the guiding catheter to allow me to see the arteries in your neck and brain. Your face and neck may feel warm or flushed when this happens, but this usually goes away after a short time.
I will pass the Carotid Embolic Protection System (CPD) into the carotid artery as shown below to help capture any plaque or particles that could travel into the smaller vessels (fig 12)

You should not feel any discomfort during this part of the procedure.
I will insert the Carotid “Stent System through the vessels to the area of the plaque. After careful positioning, I will open the stent to cover the plaque. Here is the imaging after implantation of a **10mm x 7mm x 4cm Acculink carotid stent**. (Figure 13a). The area where the carotid arteries start is shown above. Figure (13b)
I will insert a balloon catheter into the carotid stent to open it wider. The stent will remain in place permanently, but the balloon will be removed. I will then remove the Carotid Embolic Protection System and all other devices from your body. The above shows a cartoon of a stent implanted at the carotid artery bifurcation of the internal and external arteries. (Figure 14)

Following the Procedure

You will be taken to a special observation unit where nurses and physician will monitor your condition closely. Your vital signs (heart rate and blood pressure) and the area in which the catheter was inserted will be checked frequently. In addition, your neurological status will be checked by your nurse who will ask you questions, instruct you to move your fingers and toes, and check your pupils with a flashlight. Your blood pressure and puncture site will also be closely watched. I may use a special vascular closure device to close the small incision in your groin.

It is possible that you may be on special intravenous medications that require closer observation in an Intensive Care Unit for one night for your safety. Otherwise normally, you will spend one night in our monitored unit.

While you are in the hospital, you should let us know if you have any dizziness, severe headache, sudden numbness in your legs, arms, or just one side of your body, sudden weakness, blurred vision, blindness in one or both eyes, difficult swallowing or speaking, or pain at the puncture site in your groin.
After the Carotid Stent Procedure

You may need to stay in the hospital for one or rarely two nights. Before you leave the hospital, I will give you guidelines for activities, diet, and medications. We will also give you your Stent Implant Card which has important information regarding your Carotid Stent.

After you are discharged, be sure to call us immediately if you have any new symptoms or worsening of the symptoms you had before the stent placement, such as:

- Severe headache
- Slurred speech
- Problems at your puncture site such as increasing swelling, pain or bleeding
- Weakness or numbness affecting one side of your body (for instance, your right arm, leg, or face becomes weaker than your left)
- Blurry vision or sudden loss of vision, one or both eyes

Because medications will be an important part of your treatment, I will prescribe many to take at home. It is important to follow your medication regimen exactly. These medications will help prevent blood clots from forming in the newly opened carotid artery. Notify us if your medications cause unpleasant reactions, but do not stop taking them unless instructed to do so. I may be able to prescribe new medications that better suit you. It is important to keep all scheduled follow-up appointments. Below is the final angiogram after successful placement of a 10mm x 4cm Precise Carotid Stent. (Figure 15)
There is always a chance of complications from any procedure. These include:

allergic reactions, bleeding, heart attack, stroke, or TIA, even death, damage to your blood vessels, emboli, blood clots or re-narrowing blocking blood flow through the stent, infection or bruising of your groin area at the catheter insertion site.

**Note:** Many times we prescribe combinations of antiplatelets and anticoagulants to decrease the risk of forming a blood clot in your artery. If your pharmacist tells you that the medications cannot be taken as we have ordered please contact me at the office.

**YOUR STENT IMPLANT CARD**

Tell any dentist or doctor who treats you for any reason that you have a stent implant in your neck, and keep your Stent Implant Card with you at all times. Your Stent Implant Card identifies the doctor who implanted your stent and how to reach us, the hospital where you received your Carotid Stent, the date it was implanted, and where it was placed in your carotid artery. It also identified important information about your stent, such as the size of the stent and the date the stent was manufactured. The card gives your doctor valuable information that is necessary if you need an MRI or MRA. There are also phone numbers on the card that your doctor can call if he/she has any questions.

If you have any further question, please feel free to call me at the office:
713-529-5530