

Carotid Artery Occlusive Disease

What is carotid artery occlusive disease?

The carotid arteries are two blood vessels, one on each side of the neck, that carry blood from the heart to the brain. These arteries can become partially or completely blocked thereby decreasing blood flow to the brain. It is caused by a condition called atherosclerosis, also known as hardening of the arteries. Atherosclerosis is caused by a build up of cholesterol and calcium on the inside of the arteries. These deposits are called plaques, which may eventually become so thick that they completely block the flow of blood through the arteries. People with untreated blocked carotid arteries are more likely to have strokes.

What are the risk factors?

People who smoke cigarettes, are diabetic, have high levels of blood cholesterol, have high blood pressure, or have a genetic tendency toward it are at higher risk for developing a blocked carotid artery.

What are the symptoms?

Most people with blocked carotid arteries have no symptoms. The most common symptoms are transient ischemic attacks (TIAs), which are sometimes called mini-strokes and can last from minutes to 24 hours. Examples of TIAs include: slurred speech, weakness of the arm or leg, loss of vision, unsteady gait, or loss of coordination. A person suffering TIAs is at increased risk for a major stroke and should seek immediate medical attention.

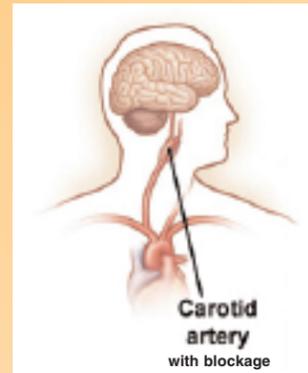
How is it diagnosed?

The doctor will listen to the neck arteries with a stethoscope. Blood flow through narrowed arteries is noisier than normal blood flow. Depending on what is

heard, tests may be ordered to measure the amount of blockage. These tests include ultrasound scans and/or special x-rays including an arteriogram, CT arteriogram, or magnetic resonance angiogram (MRA).

How is it treated?

Carotid artery occlusive disease is a permanent but correctable condition. Treatment is designed to prevent further blockage and stroke.



Carotid Artery Occlusive Disease

If there is some blockage but there are no symptoms, treatment may be just regular check-ups, with ultrasound studies to monitor the condition and medications that thin the blood or prevent the blood cells from forming clots. Even severe narrowing may produce no symptoms. If the blockage is very tight, surgery may be recommended to decrease the risk of stroke, even if there are no symptoms.

The most common surgery, carotid endarterectomy, involves removing the plaque from the artery. For some patients, a balloon angioplasty (inflation of a balloon to flatten the plaque against the artery wall), with placement of a stent, may be performed.

Renal Artery Stenosis

What is renal artery stenosis?

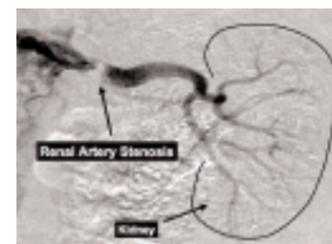
Normally, the kidneys rid the body of waste by filtering the blood and moving the waste into the bladder. Renal artery stenosis means there is a "blockage" or "narrowing" in the arteries that bring blood to the kidneys. It causes the kidneys to receive an abnormally low amount of blood flow. Renal artery stenosis can lead to high blood pressure and kidney failure. When a blockage or narrowing occurs, the kidneys release hormones that increase blood pressure to a point that even strong medications cannot control it. The decrease in blood flow also makes it harder for the kidneys to remove waste. Eventually the kidneys stop working.

What causes renal artery stenosis?

"Hardening of the arteries" or atherosclerosis causes most cases of renal artery stenosis. Normally your blood vessels have a smooth inner lining. As you get older, a buildup of calcium, cholesterol, and other materials can stick to this inner lining causing a blockage. Atherosclerosis typically causes renal artery stenosis in older people. In young people a disease called fibromuscular dysplasia causes the walls of the kidney blood vessels to become abnormally thick, which leads to narrowing and blockage. It is a condition that people are born with and is more common in women who are 20–40 years old.

What are the symptoms?

Renal artery stenosis usually develops slowly and many people do not have any symptoms. Doctors look for it in people who have high blood pressure despite taking medications to control it. Young



people with very high blood pressure may also have it. It can also cause kidney failure, congestive heart failure, or a build up of fluid in the lungs (pulmonary edema).

How is it diagnosed?

Several tests can detect renal artery stenosis. An ultrasound test uses sound waves aimed at the kidneys and can tell doctors if the kidney arteries are normal, narrowed, or completely blocked. An angiogram involves placing a small needle in the upper thigh and injecting contrast material (dye) into the kidney blood vessels. Doctors then take x-rays of the vessels to detect areas of narrowing or blockage. Computed tomography (CT scan) and magnetic resonance imaging (MRI) can also be used.

How is it treated?

Treatment usually starts with medication to lower the blood pressure. If the medicine does not work well enough or the stenosis becomes worse, treatments are performed that directly treat the blockage. Balloon angioplasty and stenting involves using a small balloon catheter to open the blocked or narrowed arteries. Doctors insert the catheter into a small needle which is guided to the blockage. When the balloon inflates, it flattens the blockage (plaque) against the walls of the artery. A tiny metal-mesh, expandable tube called a stent is then placed to hold the artery open. For some patients, surgery is the best treatment for renal artery stenosis. Bypass surgery detours around the blockage so that blood can flow normally. Endarterectomy is another surgical treatment which removes the blockage.

Why is treatment important?

Renal artery stenosis can cause extremely high blood pressure which damages the kidney and increases the risk for stroke and heart attack. Blockage can also lead to dialysis.

The Foot at Risk

For people with diabetes or poor circulation, proper foot care is very important. Many people with diabetes have nerve damage resulting in foot numbness. Foot injuries may go unnoticed and untreated for long periods of time. Those with diabetes are more likely to get infections and have poor circulation in their legs and feet which may result in amputation. Poor circulation or arterial blockages can prevent healing and increase the risk of leg amputation. Guidelines for good protective foot care are listed below.

Carefully check the feet and legs every day for injury, blisters, cuts, bruises, or signs of infection including redness, swelling, warmth or drainage. Use a mirror to fully see the bottoms of the feet. If you cannot see, have someone look at your feet for you. Report any abnormal findings to your doctor.

Keep legs and feet clean. Wash them daily in warm (NOT HOT) water. Hot water may cause burns or blisters.

Dry feet carefully, especially between the toes. Apply a light moisturizing lotion to the legs and feet every day. Don't apply lotion between the toes.



Foot Ulcers

Do not walk barefoot or wear open sandals, not even at home. Any injury (for example, a splinter) can cause an infection that might cause the loss of part of a foot or leg.

Wear properly fitted clean socks or stockings. Always wear socks with shoes. Avoid socks that do not allow moisture to dry.

Properly fitting shoes are important. Special shoes may be prescribed. New shoes should be worn only for short periods. Examine feet often to check that no sores are developing. Alternate shoes daily or allow the shoes to dry thoroughly between wearing.

Trim toenails straight across but not too short to minimize the possibility of ingrown toenails, which are prone to infection. If you can't see well or have known blockages in the arteries, a podiatrist should trim your nails. In addition, a podiatrist should cut any corns, calluses or ingrown toenails.

If your feet are cold at night wear socks. Do not use hot water bottles, heating pads, warm compresses, or heating lamps near your feet.

If you smoke, STOP now! Not smoking will help preserve your circulation.

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Abdominal Aortic Aneurysm (AAA)

What is an abdominal aortic aneurysm?

The aorta is the main artery of the chest and abdomen that carries blood from the heart to all the body's vital organs, and eventually to the legs and feet. An abdominal aortic aneurysm (AAA) is a weakening in the wall of the aorta that causes a widening or "ballooning" of a portion of the artery itself, much like a weak area of an old-fashioned rubber inner tube. An aneurysm may continue to grow larger and, if not treated, can burst (or rupture), often causing death.

What are the risk factors?

People over the age of 60, who have a family history of AAAs, suffer from high blood pressure or smoke are at increased risk. AAA is more common in men than women. A family history is of special concern, so if any members of a person's immediate family have an AAA, they should let their doctor know and a screening test can be scheduled.

What are the symptoms?

Most of the time no symptoms are associated with AAAs. Most are found by chance during routine physical examination, or when tests or x-rays are done for other health problems. Occasionally, a person may have low back pain or abdominal pain. Symptoms associated with an AAA require immediate attention.

How is it diagnosed?

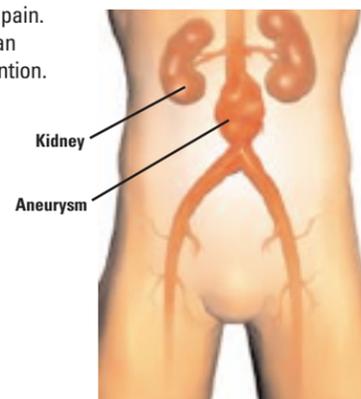
AAAs may be found when being examined by a doctor or by x-rays, such as an ultrasound, CT scan, or MRI. To get more information about the aneurysm and associated blood vessels, an arteriogram may need to be done. This involves the injection of an x-ray visible dye into an artery to get more detailed pictures of the aneurysm.

How is it treated?

After an AAA reaches a certain size, repair is needed to avoid the possibility of rupture. No treatment with medicines alone is sufficient for treating an AAA.

Surgery for AAAs has been done for more than 50 years. It has been successful in treating AAAs and has good long-term results. During surgery, the weakened portion of the aorta is replaced with a polyester or teflon graft that is carefully matched and sewn into place. The incision is on the abdomen or the flank.

New endovascular grafting technology allows the vascular surgeon to repair the AAA by delivering a graft inside the blood vessels through a small incision in each groin. Endovascular repair is not possible for every AAA.



Abdominal Aortic Aneurysm

Endovascular Aortic Aneurysm Repair

What is an endovascular abdominal aortic aneurysm (AAA) repair?

Endovascular means "inside a blood vessel." In an endovascular AAA repair, doctors place a strong, flexible tube called an endograft inside the aorta (blood vessel). Instead of one large incision on the abdomen, two small ones are made near each hip. The doctors then slide the endograft through the femoral arteries (leg blood vessels) and into the aorta. When it's in position it expands and seals off the aneurysm so it can't break open and bleed.

How is the repair done?

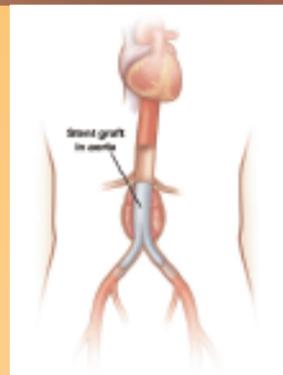
Before a repair is scheduled, the doctor uses special x-rays (CT scans and angiograms) to measure the exact size of the blood vessels above and below the aneurysm. Based on these measurements, the doctor chooses an endograft that will fit the size of the blood vessels. The doctor makes the two small cuts (near the crease between the abdomen and the thigh). Each part of the endograft is placed into the patient's blood stream with the help of x-rays. The endograft then expands to become a strong, flexible tube that seals off the aneurysm and reinforces the blood vessels (aorta and iliac arteries). An x-ray confirms that blood is going through the endograft and not leaking into the aneurysm.

What is recovery like?

Because it uses small cuts, endovascular AAA repair may cause less discomfort after surgery. Many patients have a short hospital stay of only a few days and often return to normal activity within 4 to 6 weeks.

Why is follow-up important?

It is possible for problems to occur without causing noticeable



Endovascular AAA

symptoms. The doctor can check for these problems by getting pictures (CT scans, ultrasounds) of the endograft at regular intervals. If a problem is detected it may need treatment. Follow-up includes a check up and CT or ultrasound scan at one month, six months, 12 months and every year thereafter.

Can all patients with AAA have an endovascular repair?

No. In order to work properly, an endograft must fit into and completely seal off the aneurysm. If the blood vessel is too large or has too many twists and turns, the endograft will not fit or seal off the aneurysm and the AAA will not be repaired. Doctors decide who can have an endovascular repair by looking at the x-rays (CT scans and angiograms).

Are thoracic aortic aneurysms treated with endografts?

In the chest, the aorta travels behind the lungs alongside the backbone. When this part of the aorta becomes enlarged it is called a thoracic aortic aneurysm (TAA). These aneurysms can be surgically repaired by splitting the ribs and replacing the enlarged part of the aorta. Some of these aneurysms can be treated with an endograft, which requires only a small incision on the groin area. The size, shape, and location of a TAA determine whether doctors can perform an endovascular repair.

Peripheral Arterial Occlusive Disease

What is peripheral arterial occlusive disease?

It is a type of atherosclerosis, a hardening and narrowing of the arteries that supply blood to the arms and legs. Atherosclerosis is caused by a build up of cholesterol and calcium on the inside of the arteries. These deposits are called plaques. The plaques may become so thick that they completely block the flow of blood through the arteries. In most cases, it affects the legs. Problems result when blood flow to the extremities is severely decreased.

What are the risk factors?

People who smoke cigarettes, are diabetic, have high blood cholesterol levels, high blood pressure, or have a family history of circulation problems are more likely to develop peripheral artery occlusive disease.

What are the symptoms?

This disease progresses silently, without symptoms, until the arteries have become seriously blocked. The first symptom is usually pain in the legs when walking or exercising. As the blockages worsen, so does the pain. One or both legs may be affected and pain may also be felt in the thighs or buttocks. This pain usually occurs with walking, quickly goes away when resting, and returns when activity is started again. Feet may seem cooler. Some hair loss may happen on the legs and the top of the feet. Cuts and scrapes take longer to heal. When the circulation is bad enough a person may have pain even while resting or have sores that will not heal.

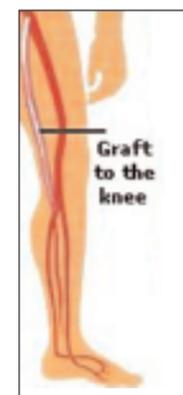
How is it diagnosed?

The doctor will do a physical examination and take a medical history. Pulses should be checked in the feet, legs, and groins. If the pulse exam is abnormal, ultrasound may be performed to identify the location and amount of arterial narrowing. Other special x-rays, such as an arteriogram may be required.

How is it treated?

If you smoke, stop! Prescribed medications should be taken as needed to lower blood pressure or lower the level of fats in the blood. Diet changes may be needed. Exercise is also important to maintaining good arterial circulation.

Not all blockages require a procedure. However, procedures to improve circulation may be required for serious blockages. The treatment choices include: (1) removing the blocked portion of the artery; (2) creating a bypass using a piece of vein or synthetic material; or (3) catheterization and balloon dilation, where a small tube is inserted into an artery in the groin and a small balloon is inflated to widen the blocked area of the artery. If the disease is extremely severe and improving the circulation is not possible, amputation of a leg or foot may become necessary.



Leg Bypass

Balloon Angioplasty

What is a balloon angioplasty?

Balloon angioplasty is a way of opening a blocked blood vessel. Instead of using surgery to cut the blood vessel open, doctors can slide a small tube on the inside of the blood vessel and direct it to the area that is blocked using x-rays. Inflating the balloon on the end of the tube pushes the blockage out of the way and allows more blood to flow through the artery.

Why do people need a balloon angioplasty?

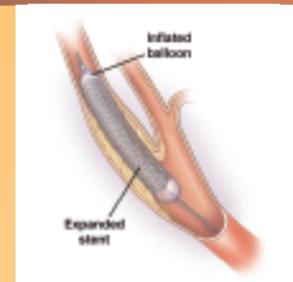
Balloon angioplasty treats blockages that usually occur because of atherosclerosis (hardening of the arteries). Arteries are tubes that blood flows through in order to bring oxygen and nutrients to all of the body's vital organs and muscles. When blockages occur, blood flow decreases and the organs or muscles that the artery supplies do not get enough oxygen or nutrients. This problem can cause different symptoms depending on which artery is blocked. For example, blockages in the leg arteries can cause cramps with walking while blockages in the kidney arteries can cause high blood pressure and eventual kidney failure.

Can all blockages be treated with balloon angioplasty?

No. Some blockages are best treated with surgery. The location of the blockage and the patient's symptoms often help doctors determine which treatment is better.

What is a stent?

A stent is a strong, flexible, metal tube that can be permanently placed on the inside of a blood vessel. After balloon angioplasty stretches a blood vessel to open a blockage, doctors often use a stent to hold the blood vessel open and increase blood flow through it.



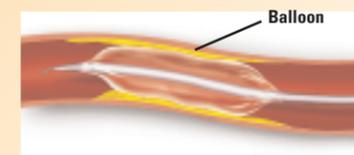
Balloon Angioplasty

What is an angioplasty like? Is it painful?

Most patients feel some pressure during angioplasty but the procedure is not usually uncomfortable. The doctor uses local anesthesia (lidocaine) to numb the skin on the upper thigh before placing a small needle into the leg artery. The needle is then removed and replaced with a flexible tube through which the doctor can complete the rest of the procedure. Injecting a substance called contrast agent (x-ray dye) helps the doctor see the blood vessels on the x-ray and direct the balloon or stent into position. After balloon angioplasty patients usually spend one night in the hospital for observation, and they can return to their full activity level 24 to 48 hours later.

Which blood vessels can be treated with angioplasty?

Although angioplasty is possible in almost any artery, it is most commonly used to treat blockages in the coronary (heart), iliac/femoral (leg), renal (kidney), and carotid (neck) arteries.



Angioplasty