Peripheral Arterial Disease

Also in this issue...

- Cryoplasty and other leading-edge technologies
- Treatment options for PAD

Please visit our web site: www.MCG.edu/cvmed
Peripheral vasculardisease, or more specifically, peripheral arterial disease (PAD) most commonly affects the arteries in or leading to the lower extremities. PAD affects approximately 8 million Americans. Diabetics and smokers are particularly at risk and PAD becomes more common as one gets older. By age 65 it is estimated that 12 to 20 percent of the population will have PAD. Making the diagnosis is critical, as people with PAD also have a four to five times higher risk of heart attack or stroke.

Dr. Gautam Agarwal and Dr. Vishal Arora who have been formally trained in this field, bring their unique acumen, skills and synergies to provide the best possible unified treatment for our patients with peripheral artery disease. When asked “Why should doctors send their patients to MCG to manage PAD?” Dr. Deepak Kapoor, the Catheterization Laboratory director, replies that the care rendered at the MCG Cardiovascular Center of Excellence is differentiated by:

- Expertise and training possessed by our associates in catheterization lab and recovery units.
- Virtue of specialists in vascular surgery and interventional cardiology collaborating together to choose the best individualized treatment for each patient.
- Use of hybrid procedures involving combination of open and endovascular modalities to achieve optimal patient outcomes.
- Peer review of care and evidence based practices allow us to maintain the highest professional standards.

I think that you will find this issue timely and informative. As you can see, the recognition of PAD has grown and treatment options have increased and broadened as we provide a multidisciplinary approach to improving patients’ lives.

As always, we welcome your suggestions and cardiovascular questions. Please contact us at cvnews@mcg.edu.

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As an eighty-three-year-old diabetic with gangrenous toes and an ulcerated ankle, Laura Shaw thought she had run out of options when her surgeons insisted that amputation of her leg was a medical necessity. But on January 16, 1964, Dr. Charles Dotter performed an x-ray study and diagnosed complete occlusion of the femoral artery responsible for the blood supply to her lower leg. He proceeded to cross the blockage with a guide wire followed by a small-caliber catheter. Then he used sequentially larger catheters to make a channel wide enough to increase blood flow to her leg. Perfusion was instantly restored and within a week, her pain had disappeared and the ulcer had healed. Thus began the era of treating blocked arteries in the legs without a major operation.

Atherosclerosis is a systemic disease that affects all arterial beds. Peripheral arterial disease (PAD) affecting the lower extremities is but one manifestation of systemic atherosclerosis. Its presence is associated with systemic disease, increasing the risk of devastating effects on the heart and brain in the form of a heart attack or stroke. Patients at risk for PAD include the elderly, smokers, diabetics, and those with atherosclerotic disease in the coronary, carotid, and renal arteries. PAD typically presents as claudication, which is exertional lower extremity pain that improves with rest. In its more advanced form, it can present as critical limb ischemia (CLI) that manifests as rest pain, ulcers, or gangrene.

Although a minority of patients with claudication will progress to amputation, it is important to recognize and diagnose these patients; doing so will identify those at greater risk for cardiovascular and cerebrovascular morbidity and mortality. Once identified, these patients can be targeted with aggressive measures to decrease the future risk of heart attack and stroke.

The major goals in treatment of patients with PAD are twofold: first, to improve the patient’s ability to walk while preventing the progression to CLI or amputation; second, to decrease morbidity and mortality from heart attack and stroke. Patients with mild to moderate claudication are treated conservatively with medical therapy and aggressive risk factor modification, including an exercise regimen and smoking cessation. Patients with lifestyle-limiting severe claudication are candidates for revascularization, which in many patients can be achieved with minimally invasive endovascular techniques.

CLI occurs when arterial blood flow is insufficient to meet the metabolic demands of the resting muscle or tissue, placing tissue viability in jeopardy. Unless there is an intervention that results in the improvement of arterial perfusion, progression to the need for amputation is imminent in these patients. Revascularization strategies for patients with CLI are limited and complex. The goal of treatment for CLI is to restore uninterrupted patency with pulsatile arterial flow in at least one of the three infrapopliteal vessels. Doing so enhances the delivery of oxygen and nutrients to meet the increased demands of the ulcerated or gangrenous tissue and thereby facilitates healing.

Historically, surgical treatment with a bypass has been the primary mode of revascularization for these patients. However, in the last four decades since Charles Dotter’s crude yet successful attempt to restore arterial flow through angioplasty, tremendous advances in catheter, wire, balloon, and stent technology as well as greater operator experience at percutaneous treatment strategies have provided valid and attractive alternatives for the treatment of limb ischemia. Newer technologies such as cryoplasty and laser atherectomy are now available and can either obviate the need for amputation or substantially decrease the extent of the amputation.

Normal Blood Flow vs. PAD Blood Flow

1. Normal blood flow from an artery to a muscle.

2. Restricted blood flow that is typical in cases of PAD can result in atrophy and tissue damage.
Peripheral arterial disease can be treated with endovascular or open surgical options. Frequently a combination of endovascular and surgical options is needed (hybrid procedure). These procedures are often very effective at restoring blood flow and limiting the effects of PAD.

**Endovascular Interventions**
Endovascular interventions including angioplasty and stenting are most effective for localized blockages. As experience grows the indications for treatment with these minimally invasive techniques has widened. New tools including IVUS (intravascular ultrasound), mechanical and laser atherectomy catheters as well as development of catheters and wires to cross total occlusions have immensely helped to treat greater number of patients with less invasive techniques.

**Bypass Surgery**
Bypass Surgery creates a detour around a narrowed, or blocked, section of the artery. This is typically performed using the patient’s own veins or a prosthetic (ePTFE) tube. This creates a new path for the blood to flow to the leg tissues and is particularly effective for extensive artery blockages. Femoral-to-Popliteal artery, femoral-to-tibial / peroneal artery bypasses are common lower extremity bypasses. With new advances in surgical care most patients with uncomplicated bypasses are discharged in 2-3 days. The long term results of bypass surgery are superior to endovascular interventions for patients with multiple blockages in most reported studies.

**Surgical Endarterectomy**
Surgical endarterectomy involves mechanically removing plaque from the interior of the artery. Endarterectomy is most commonly performed for carotid arteries and is widely used for the prevention of strokes. A small incision is made in the neck, and the plaque is removed. Most patients who undergo carotid endarterectomy are discharged the next day. Several studies have documented the efficacy of carotid endarterectomy for the prevention and recurrence of strokes. Endarterectomy is also performed in the femoral artery with excellent results. This leaves a wide-open artery and restores blood flow.

**Endovascular Aneurysm Treatment**
Some patients with peripheral arterial disease may also have an aneurysm. An aneurysm is a dilatation of the artery which can cause the vessel to burst and lead to subsequent bleeding and death. People with peripheral arterial disease have a higher risk of having aneurysm. The most common location is the segment of the aorta present in the abdomen. Aneurysms have been traditionally treated with open surgery. During the last two decades new technology has been developed to treat them with stents (endovascular repair). These stents are like sleeves which are placed inside the artery to prevent the aneurysm from leaking blood. Most patients treated with stents can be discharged the day after the procedure.

**Limited Amputation**
Amputation is the treatment of last resort. Due to a delay in diagnosis or treatment, gangrene of the foot may occur. Infection in the presence of poor blood supply can be extremely difficult to control or even fatal. In such situations amputation may be needed to prevent the spread of infection to other healthy tissues. Sometimes, this can be limited to a small portion of the foot or the toes with effective and aggressive treatment.

Please contact MCG to schedule an appointment for assessment of PAD:
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A bypass graft enables the blood to flow around an obstruction in the vessel.
In the past, the only option for a patient with an occluded artery in the leg was invasive surgery. Today, modified balloons, stents, lasers, and other devices provide us with sophisticated tools to open up stenotic vessels with minimal trauma. The Medical College of Georgia offers these state of the art treatments for peripheral arterial disease.

**Endovascular Procedures**
A very small incision is made in the skin, allowing a very thin tube (called a catheter) to be inserted into the blood vessels. These treatments are used to address disease in arteries supplying the brain, limbs, kidneys, and lungs.

**Angioplasty & Stent Implantation**
Angioplasty opens up or widens a narrowed artery by using a catheter with a balloon on its tip. A stent is a scaffolding device that is placed in the artery to make sure it remains open.

**Laser Atherectomy**
An atherectomy removes enough plaque from a clogged artery to create a channel through which a balloon angioplasty can be performed. In this procedure, a thin flexible laser catheter emits short pulses of ultraviolet light to remove plaque.

**Rheolytic Thrombectomy**
This procedure removes clots that are obstructing a patient’s peripheral arteries. It is a process that utilizes high-pressure saline jets located at the tip of the catheter to create a suction effect.

**Cryoplasty**
A balloon filled with extremely cold nitrous oxide gas is inflated to compress the blockage and dilate the vessel. This cooling balloon compression prevents cells from multiplying in the treated area and therefore prevents future blockages. Also, by freezing the artery wall into place, cryoplasty helps prevent the artery from restenosing, which may occur after standard balloon angioplasty.

**Cutting Balloon Angioplasty**
At the tip of the catheter is a balloon with three to four tiny knife blades that create small cuts, spaced evenly around the inside of the vessel wall. These cuts become controlled tears that then allow a second, low-pressure balloon to stretch and dilate the vessel. The advantage of the cutting balloon is its ability to reduce vessel stretch and vessel injury by scoring the blood vessel longitudinally rather than causing an uncontrolled disruption of the plaque.

**Embolization**
Endovascular operators use embolization to intentionally block blood vessels in situations where they are doing more harm than good. This approach is primarily used to control or prevent abnormal bleeding, to shut down the vessels that support a growing tumor, or to eliminate an abnormal connection between an artery and a vein.

**Rotational Atherectomy**
MCG is one of the few centers nationwide to have this expertise, which can prove valuable in the treatment of hard calcified blockages in the arteries supplying the legs, a condition which often proves unresponsive to other treatments.

Endovascular procedures are favored by doctors and patients because of their success rates, low (Continued on Page 5)
“My doctor has told me that I have peripheral arterial disease (PAD) in my legs and has recommended that I quit smoking cigarettes. I have smoked for many years and I do not have any breathing problems. Why is it important for me to quit smoking now?”

It is important that you follow your doctor’s recommendations to stop smoking. Quitting now will reduce your risk of heart attack, stroke, lung cancer and many other cancers, chronic lung disease, and slow further progression of PAD. This disease develops gradually over time. We know that smoking speeds up the process of plaque buildup, stiffening, and narrowing in the arteries. Toxic substances in tobacco smoke make the blood cells in the arteries more sticky and much more likely to form harmful blood clots. Think of arteries as normally smooth-flowing on the inside. In smokers, the lining of the blood vessels is rough and ragged, making it much more prone to plaque buildup and blood clot formation. The more cigarettes you smoke and the longer you smoke, the more rapid the progression of the disease. Eventually the blood supply to the legs may be impaired to the point that leads to gangrene and amputation of a limb.

Stopping smoking now is the single most important thing you can do to slow the progression of PAD, and to reduce your risk of other smoking related diseases. Quitting is difficult, because nicotine is addictive, but your health care practitioner can help you quit. There are many options available today to help smokers quit, including individual and group counseling, and medications.

Please call the MCG “Quit Smoking Clinic” at 706-721-8224, for assistance with quitting, or call 1-800-Quit Now.