

Vaporizing Blood Vessel Obstructions

New laser device may offer hope for critical limb ischemia

For patients with below the knee occlusions resulting from peripheral vascular occlusive disease (PVOD), treatment options have been disappointing and often lead to limb amputation. The most severe form of peripheral vascular occlusive disease is called critical limb ischemia and often occurs in patients with diabetes mellitus.

Physicians from Upper Michigan Cardiovascular Associates, PC, in collaboration with Marquette General Health System, now offer new therapeutic options that may provide hope to those patients facing possible limb amputations. A new device known as a “cool laser” may be applied to certain patient populations who have significant critical limb ischemia. This laser vaporizes obstructions in blood vessels, which may lead to healing of chronically ischemic lower extremities and possibly, result in limb salvage. This “cool laser” device was only recently approved by the U.S. Food and Drug Administration (FDA).

Critical limb ischemia is a progressive accumulation of plaque and thrombus in the lower extremity arteries that eventually obstructs blood flow and, if left untreated, can lead to chronic lower extremity pain, the development of foot ulcers, and eventually limb loss. In the United States, more than one million people are affected by this disease every year. Approximately 100,000 of these patients suffer some type of amputation involving either a toe, foot, or leg.

The “cool laser” offers an alternative to standard balloon angioplasty and stenting. This device may be applied to chronic total occlusions both above the knee and below-the-knee. Typically, the above-the-knee revascularizations are very successful but, again, are patient selective. The below-the-knee revascularization procedures are also successful, but a more limited number of patients are candidates for this type of procedure. In either case, both above-the-knee and below-the-knee blockages are now more easily treated with this device and are being used more frequently as an alternative to surgical options.

Other PVOD Treatments

Balloon angioplasty is a procedure involving a catheter that is inserted into an obstructed artery and expanded to reduce the blockage and increase blood flow. Stents are also used in this context and are made of stainless steel wire meshes that can be inserted at the site of an occlusion to help scaffold the blood vessel open.

Some stents contain therapeutic medicines to help reduce blockage, but currently, those types of stents are only recommended for vessels involving coronary artery circulation. There are ongoing trials investigating whether or not this type of stent may also be applied in the lower extremities with hopes of keeping vessels open longer.

Using larger stents is a common practice in arteries in the pelvic region, kidney arteries, and carotid vessels. Good, long-term results have been reported worldwide.

Unlike balloons and stents, the new laser device is a catheter with small flexible silica fibers that are about the width of a human hair. These fibers are used to deliver short bursts of ultraviolet energy directly to an obstruction or narrowing within an artery. The wavelength used by these lasers is very plaque specific and does not appear to damage other structures within the artery. Because this method disintegrates plaque, the concern regarding plaque dislodging and traveling to other portions of the blood stream are minimized.

This device was recently approved by the FDA in April 2006. Prior to approval, there was an extensive investigation on this device, demonstrating a high percentage of limb salvage rates for patients with otherwise nonoperable disease.

Identifying PVOD Patients

Treating patients with critical limb ischemia begins with an ankle brachial index, a very simple test that is used to identify abnormal blood flow in the lower extremities. In general, a resting ankle brachial index of less than 0.9 is consistent with significant obstructive disease in the lower extremities and should undergo further evaluation, especially in the diabetic population.

Even employing the most meticulous wound care techniques, the prognosis for limb salvage in chronic limb ischemia remains poor until blood flow is reestablished to the limb. In general, patients should seek medical attention if they identify situations where healing in the lower extremities is prolonged. Also, if patients experience pain in the legs with walking or, in general, feel their legs are cool, this may be an indication for further testing.