TREATMENT METHODS

Once conservative medical management for venous insufficiency has been carried out or is no longer desired (reference *"hints for symptom relief and compression stocking"* sections) one can look for more definitive methods of treatment. If venous reflux or backward flow of blood is limited to the superficial venous system, (reference "*vein anatomy and physiology"* section) the abnormal veins in this superficial system may be removed, closed or otherwise taken out of the circulation with overall improvement in venous flow. This action forces blood to flow into the deep system where it should be in the first place, actually improving the flow within the vital deep veins. Reflux or incompetence of the deep system is another matter since the deep system of veins is necessary for limb survival and these veins cannot be closed or removed. Likewise, the veins in the perforator system (reference "*vein anatomy and physiology"* section) can also be closed to prevent the backward flow of blood entering the superficial system from the deep system causing further dilation of the veins in the superficial system. There are many avenues of treatment available to a surgeon who has specialized training in venous disorders. After a careful diagnosis and outline of all of the sources of venous insufficiency one can select the best options for definitive treatment. Frequently, several different methods are selected due to the complexity of venous reflux and the different veins affected by this disease process.

Formal vein stripping has been the gold standard of care for many years. However, this is usually no longer recommended due to the advanced techniques to be discussed further. Vein stripping usually requires hospitalization, a general or spinal block anesthesia as well as a longer recuperation time and multiple scars on the leg. Historically, vein stripping was often done without careful duplex ultrasound imaging. Ultrasound imaging is a fairly new technology and was not readily available as of several decades ago. Today, with ultrasound imaging studies of the venous system, once can carefully identify and map out source of venous reflux.

Inversion PIN stripping is a gentler form of vein removal and can easily be done, in experienced hands, under tumescent local anesthesia. This involves removing the vein by inverting it or turning the vein inside out resulting in less tissue damage around the surrounding tissues of the vein. This procedure can be done in an outpatient facility or vein center. Inversion PIN stripping is still done today in specific circumstances where a portion of the great saphenous vein or a major branch traverses a straight line and courses very near the skin surface.

Endovenous ablation (EVA) of the vein is performed using either laser energy (EVLT) or radiofrequency energy and is applied to the inside of the great or small saphenous vein and occasionally to the incompetent perforator veins (reference "*vein anatomy and physiology"* section). For example, endovenous laser ablation requires positioning of a very tiny laser fiber, usually beginning near or below the knee and threading this upward inside the vein to the saphenofemoral junction or the area in which the great saphenous vein begins. Energy is applied through the laser fiber and as the fiber is slowly pulled downward and out of the vein, the energy causes critical damage to the lining of the vein itself. With the aide of compression stockings following the procedure, the vein collapses allowing the body to scar it shut permanently. This is almost like "spot welding" to close the vein. Since its development and use beginning early in the 2000's, the laser energy has been statistically more successful in closing the refluxing veins than radiofrequency energy. Nearer developments continue to be made in this relatively young, highly specialized field. Endovenous ablation is some times done within a hospital setting under general or spinal block anesthesia; however, it is frequently done at a vein center like ours (WI Vein Center) under tumescent regional block anesthesia requiring no additional sedatives or pain medication other than ibuprofen (Advil). This decreases overall cost and allows immediate walking and continuing one's usual activity with minimal downtime.

Sclerotherapy is the sclerosis or closure of a vein by treatment with injection of an irritating or sclerosant solution, such as Sotradecol or other agents. Injection can be made directly into a visible vein or into deeper veins, not visible by the naked eye with the use of duplex ultrasound imaging. This process is called *Ultrasound directed sclerotherapy*. The result of introducing this irritant medication into the vein is to cause similar destruction to the lining of the vein. Once again, with the aide of compression stockings, the ultimate collapse and scarring down of the vein takes place, making it less visible because there is no longer any blood flowing through it. Blood flow is directed into the deep system of veins, thereby improving the venous circulation of the legs.

Microphlebectomy refers to a small incision vein removal of any residual bulging varicosities and is usually carried out following endovenous ablation or inversion PIN stripping. This process removes over dilated veins that will not collapse or become smaller once the head of pressure has been removed with the previously mentioned techniques. This is done in our hands with tiny, less than two millimeter incisions kept within skin crease lines of the legs, all under local anesthesia, allowing for a rapid return to work and essentially no downtime.

Surface laser treatment is offered using the Dornier 940 nanometer wave length of laser energy through a special hand piece. This directs the laser energy into the spider veins with the absorption onto the hemoglobin molecule of the red blood cells traversing through the spider veins and transferring heat energy to the vein wall, once again collapsing and ultimately scarring down the vein making it much less visible and more cosmetically pleasing. Occasionally, both surface laser and sclerotherapy are used to treat spider veins as a reticular vein is frequently found feeding this spider vein. The reticular vein must be treated or the spider veins will not stay closed.

Once again, it is important to have accurate diagnosis made with duplex venous ultrasound (reference "*duplex ultrasound imaging"* section) to find the exact location and source of venous reflux and abnormal flow and then select the most appropriate treatment to bring about the best result. There is a large amount of research into finding ways to replace or repair the abnormal refluxing veins within the deep system. At this time, the deep vein system can only be treated with compression stockings and other conservative medical management options. Research is difficult in the areas of valve replacement as the risk for blood clots forming in artificial valves is extremely high when these valves are placed in the venous system as opposed to the heart.