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VENOUS CLINIC AND ARTERIOVENOUS MALFORMATION CENTER AT THE METHODIST DEBAKEY HEART & VASCULAR CENTER

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We recently modified our name from the Methodist DeBakey Heart Center to the Methodist DeBakey Heart & Vascular Center, to emphasize the importance and commonality of the vascular system with heart disease. Nevertheless, although we have incorporated the phrase "vascular" into our identity, this does not adequately convey the importance of the venous component of the circulatory system. The prevalence of venous disease exceeds that of arterial disease by a ratio of 4:1 (Table 1).

Table 1. States of Venous Disease

Venous disease compromises the following disease states:
Varicose veins
Deep venous thrombosis and its sequelae
Post-phlebitic syndrome
Venous Ulcers
Venous stenoses
May Thurner Syndrome
Arteriovenous malformations
Axillo-Subclavian Vain occlusions
Thoracic Outlet Syndrome

Despite this fact, there has been a paucity of interest in venous disease from major academic centers and there is no venous clinic in the Texas Medical Center. This is most likely because it is generally non-life or limb threatening and often regarded as "cosmetic." Until recently, venous disease has also been largely ignored by the device industry, which, as with academia, has been heavily invested in arterial disease management. It is clear, however, that it has been naïve to regard venous problems as inconsequential and fallacious to deny their impact on quality of life. Varicose veins are often very symptomatic and their treatment can revolutionize life quality for young patients. The consequences of venous incompetence, namely leg swelling, lipodermatosclerosis and ulceration, can cause disabling symptoms. Negativity toward clot removal in patients with deep vein thrombosis (DVT) condemns many to lifelong limb swelling and postphlebitic syndrome.

The drivers for change in venous disease management include a better understanding of venous pathophysiology to inform rational interventional choices, the availability of new therapies, an increasing belief in the benefit of clot removal and on the horizon, the remote prospect of endovascular placement of venous valves (Table 2-3).

Table 2. Minimally Invasive vs. Surgical Venous Procedures

a) Minimally Invasive Venous Procedures
Sclerotherapy
Laser therapy for telangiectases and spider veins
Laser and RF ablation of saphenous veins
Catheter thrombectomy
Venous thrombolysis
Venous angioplasty and stenting
Perforator ablation
IVC filter placement and retrieval
Embolization Techniques
b) Surgical Venous Procedures
Surgical Thrombectomy
Deep venous reconstruction
Major venous reconstruction and bypass
First Rib resection for subclavian vein thrombosis
Saphenous stripping
Subfacial Perforator Ablation
Valve Repair
Valve Transplant

Table 3. Ancillary Procedures

Unna boot application
Stocking fitment and retail
Wound debridement
Wound Care
Skin grafting

Rationale for Methodist Venous Clinic

Although our group has a fairly large venous practice (approximately 33% of the total), patients are mixed into the general vascular population, there has been no specific venous marketing and the practice has been heavily focused on catheter-based procedures. This has been developed as a function of our interest in minimally invasive venous therapies, particularly RF ablation, of which we were early adopters. This generated a significant amount of media coverage, which served to launch the venous program. Partnering with the catheter manufacturers has also resulted in Internet and podium exposure. Our interest has not only been procedurally related, but also academic, leading to many presentations and publications. We believe that it is this combination of academic credibility — extensive experience in venous disease together with the credibility of the Methodist brand — which will allow us to further develop this program. The numerous "venous clinics" which have developed around the city are often developed as commercial, "easy buck" enterprises, often with very questionable imaging and technical skills. This "shadiness factor" is well recognized by patients, referring physicians and industry alike, and represents a major market opportunity for the Methodist venous clinic.

Mission Statement

It is our mission to provide the best in venous imaging and venous therapy in Texas.

The clinic will serve the tripartite mission of the Methodist DeBakey Heart & Vascular Center by providing excellence in both patient service and student, resident and physician education in venous disease. It will also serve as a catalyst for the development of multidisciplinary research programs, which will attract both federal and private research funds.

The clinic will focus on the application of minimally invasive therapies, based on the thorough understanding of the pathophysiology of venous disorders. Treatment will be based on scientific data where available and will collect such data when it is not available. Optimal utilization of imaging capabilities, especially duplex scanning, is the key to understanding venous disease (Tables 4-5).

Table 4. Venous Imaging

Duplex scanning
CT Venography
MR Venography
Contrast Venography
Intravascular Ultrasound

Table 5. Quantitative Venous evaluation

Valve reflux studies
Air Plethysmography
Ambulatory Venous Pressure Monitoring

Basic Venous Anatomy and Physiology

Veins are generally referred to as the capacitance vessels, emphasizing their incredible capability to undergo spasm or dramatic vasodilatation. At any given moment, approximately 65% of a person's blood volume is in the venous system. The pump is effective when a person is walking and the leg muscles are contracting. But when a person sits or stands, blood pressure in leg veins can build because of gravity. Deep veins and perforating veins are usually able to withstand short periods of increased pressures, but because the walls of veins are elastic, extended periods of increased pressure can stretch and weaken the walls of these veins. The presence of one-way valves, which close as the muscles relax, results in unidirectional flow back to the heart.

The lower extremity venous system is comprised of three systems of veins. The superficial and deep systems course longitudinally, while the perforating veins run horizontally between the superficial and deep systems. Perforating veins have one-way valves that ensure that blood flows from superficial veins to deep veins. The deep veins also have one-way valves, allowing blood to flow into the vena cava, the body's largest vein, and back into the heart. When veins are blocked, or the valves leaky, the condition is called chronic venous insufficiency (CVI).

While the perception of the cause of venous insufficiency is fairly simple, the reality of the pathophysiology remains both complex and poorly defined. It necessitates determining whether this is the result of obstruction or reflux (valvular insufficiency) in each

of the three venous systems: superficial, deep and perforating veins. This can all be determined by duplex ultrasound, which is the main diagnostic tool in the understanding of chronic venous insufficiency.

The Arteriovenous Malformation Center

Over the past seven years, most likely as a result of our interest in endovascular therapies, venous and arterial disease, we have developed a significant patient cohort with arteriovenous malformations (AVMs). Arteriovenous malformations are developmental anomalies, which can affect any part of the anatomy. Their course is unpredictable. Some are static, but others are rapidly progressive, can be very disfiguring, symptomatic and not curable. Patients with AVMs frequently consult with multiple physicians in their quest for appropriate therapy. This is a disease entity which demands a multidisciplinary approach: vascular surgeons, radiologists, wound specialists, plastic surgeons and orthopedic surgeons. We have modeled the AVM center after our multidisciplinary limb salvage center. These patients need a home base of physicians interested in the long-term, multi procedure involvement frequently necessary for their optimal care. Our approach to the management of arteriovenous malformations is outlined in this issue's article by Drs. Mark Davies and Jean Bismuth (pages 41-45).

Total Endovascular Series: Venous Intervention Symposium

We recently conducted a 3-day symposium in Houston which focused on emerging technologies for venous disease diagnosis and intervention. Participants included most of the world's leading national and international experts on venous disease. As a result of this convocation we have compiled a textbook to be published later this year entitled *Venous Diseases: Contemporary Clinical Management*.

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