Lower extremity venous insufficiency MUST be evaluated and treated as a part of ‘Infra-diaphragmatic venous disease’. 

‘A FIVE PART SERIES’

By Sanjiv Lakhanpal, MD, FACS

Summary: Our venous system from toes to the right atrium is one continuous system of fancy pipes with anatomic and physiological enhancements to facilitate venous return to the heart. Compartmentalizing the evaluation of this one single system of veins only makes sense for lower grades (CEAP 0-1) of venous insufficiency in the legs. For higher grades (CEAP 2-6) of venous insufficiency it is essential to evaluate the entire infra-diaphragmatic venous system.

In this five part review I will lay out the compelling case for such clinical evaluation and for appropriate treatment tailored to the needs of the individual patient if the need is substantiated by a more detailed diagnostic workup.

This review will be broken down into the following parts:

Part I: The anatomic logic for evaluation of the entire infra-diaphragmatic venous system in patients with advanced lower extremity venous disease.

Part II: The physiologic logic for evaluation of the entire infra-diaphragmatic venous system in patients with advanced lower extremity venous disease.

Part III: Pathologic conditions leading to post-ambulatory venous hypertension in the lower extremities.

Part IV: Diagnosis of Infra-diaphragmatic venous insufficiency, venous diseases of the lower extremity and Pelvic Congestion syndrome.

Part V: Treatment of Infra-diaphragmatic venous insufficiency, venous diseases of the lower extremity and Pelvic Congestion syndrome.

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PART I: THE ANATOMIC LOGIC.

Superficial venous system of the lower extremity: The skin and the subcutaneous tissues are drained by the great and the small saphenous veins. Both the GSV and the SSV start from the medial and lateral extensions of the dorsal venous arch respectively.

The Great Saphenous Vein (GSV) begins just anterior to the medial ankle, ascends medial to the knee ascending along the medial side of the thigh and enters the fossa ovalis 3 cms. inferior and three cms. lateral to the pubic tubercle. It is duplicated in the calf in 25% and in the thigh in 8%. Tributaries of the GSV include: Posterior accessory GSV of the leg (>75%)—joins the GSV distal to the knee, begins posterior to the medial malleolus, anterior accessory GSV of the leg, Posterior accessory GSV of the thigh and anterior accessory GSV of the thigh. GSV usually has at least 6 valves (14-25), with a constant valve between 2-3 cms from the SFJ(85%). The frequency of valves is greater below the knee.

Like the rest of our body, the lower extremity is drained by a system of superficial and deep veins. ‘Classic’ superficial veins lie superficial to the deep (muscular) fascia. The perforator veins, as the name implies, perforate the deep fascia to connect the superficial veins to the deep veins. Varicosities invariably lie superficial to the superficial (saphenous fascia - GSV, membranous layer - SSV) fascia, free of any fascial restraints. Reticular veins lie in the sub-dermal connective tissue and the so-called pin veins or spider veins are caused by the dilatation of the dermal plexus of veins. Saphenous fascia is an additional layer of fascia which encapsulates the great saphenous vein. The great and the small saphenous veins are interfascial veins.

The Small Saphenous Vein (SSV) begins as the lateral continuation of the dorsal venous arch. It may drain completely into the popliteal vein, have a small extension that continues cranially as the cranial extension, or the entire SSV may continue cranially to drain into the femoral vein or the GSV. The intersaphenous vein starts below the facia and then penetrates the fascia to come superficial to it, the intersaphenous vein is seen in 2/3rds of the limbs with venous disease. SSV valves; More numerous (median 7-10) Range 4-13. Highest valve is close to the termination of the SSV. Valves in a SSV GSV connections directs flow from from SSV to GSV.

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The deep veins in general follow the corresponding arteries. The deep planar venous arch from around the heads of the metatarsals continues as the medial and lateral planter veins, which both become the posterior tibial veins behind the medial ankle. In over 80% of the samples they are paired and in about 10% they are triplicate. They perforate the soleus muscle close to its bony arcade and continue as the popliteal vein. The peroneal veins originate in the distal third of the calf. The peroneal receives the large soleal veins. The peroneal and the posterior tibial have constant connections in the distal leg. The peroneal and the posterior tibial form the TP trunk which then joins the popliteal. On the dorsum of the foot the major deep veins continue as the dorsalis pedis veins. The anterior tibial veins ascend in the anterior compartment. The popliteal vein is formed by the confluence of the calf veins. The popliteal and the femoral veins run around the arteries of the same name. The femoral vein is the continuation of the popliteal vein. The deep femoral vein usually communicates with the popliteal vein either directly or through tributaries.

The sapheno femoral junction and communications with the superficial veins of the lower extremity and the pelvic/abdominal veins:

The tributaries of the GSV, namely the superficial circumflex iliac vein, the superficial external pudendal vein and the superficial epigastric vein, communicate freely with the deep veins with similar names that drain into the External iliac vein.

Image 005

The deep veins of the lower extremity: Tibial veins (deep venous system) form by the confluence of the medial and lateral planter veins while on the dorsum of the foot the major deep veins continue as the dorsalis pedis vein.

Image 006

Deep plantar venous arch

Lateral plantar vein

Medial plantar vein

Metatarsal veins

Posterior tibial vein

Image 008

Interior tibia v.

External iliac v.

Common femoral v.

Deep femoral v.

Saphenofemoral junction

Femoral v.

Adductor canal

Popliteal v.

Anterior tibial v.

Posterior tibial v.

Image 009

AL – Anterolateral
FM – Postero medial
SEP – Superficial external pudendal
SE – Superficial epigastric
SCI – Superficial circumflex iliac
What is Pelvic Congestion Syndrome?

By: Vinay Satwah DO, FACOI, RPVI

Pelvic Congestion Syndrome is an under-diagnosed condition which is associated with venous disease in the pelvic area, lower abdomen and thighs. Often accompanied by chronic pelvic pain and/or pressure, it is estimated that this condition affects more than one third of all women. Sometimes suffering with this condition for years, many of these women are told the problem is not due to a specific medical cause and may be “all in their head.” However, recent advancements have allowed physicians at Center for Vein Restoration to show that the pelvic pain may be due to varicose vein reflux causing pelvic venous insufficiency.

PAINFUL SYMPTOMS CAN INTERRUPT DAILY ACTIVITIES

The symptoms related to Pelvic Congestion Syndrome include pelvic pain associated with standing and sitting, which worsens throughout the day. This chronic pain is typically dull and aching in nature. Patients often experience relief from pain when lying flat and when legs are elevated. The symptoms may worsen following intercourse, during menstrual periods, and during pregnancy. Associated symptoms include heaviness/fatigue/aching of the legs with varicose veins on the vulva and/or buttocks.

Similar to varicose veins in the legs, the valves in the pelvic veins that help return blood to the heart against gravity become weakened and don’t close properly. This allows blood to flow backwards and pool in the vein causing pressure and bulging veins. In the pelvis, varicose veins can cause pain, heaviness and affect the drainage of the uterus, ovaries and vulvar region.

MULTIPLE PREGNANCIES CAN MEAN HIGHER RISK

Pelvic Congestion Syndrome typically affects women in their child bearing years. As the uterus expands during pregnancy, there is increased pressure exerted on the pelvic floor and veins. Post-partum, the uterus eventually contracts and although the pressure on the pelvic floor is relieved, there is residual damage to the pelvic veins. Therefore, the ovarian veins increase in size related to previous pregnancies. Women who’ve had two or more pregnancies and hormonal increases are at particular risk.

VENOGRAM: THE MOST ACCURATE TEST FOR DIAGNOSIS

Many women with Pelvic Congestion Syndrome spend years trying to get an answer as to why they have this chronic pelvic pain. Living with chronic pelvic pain is difficult and affects not only the woman directly, but also her interactions with her family, friends, and her general outlook on life. Our patients will undergo a thorough history and physical. Those with a high suspicion may undergo pelvic ultrasound and venography. Thought to be the most accurate method for diagnosis, a venogram is performed by injecting contrast dye in the veins of the pelvic organs to make them visible during an X-ray.

Once a diagnosis is made by a Center for Vein Restoration physician, if the patient is symptomatic, a pelvic venogram with embolization should be done. Embolization is a minimally invasive procedure performed by the interventional team using imaging for guidance. During the outpatient procedure, the faulty, enlarged veins are sealed in order to relieve the painful pressure. After treatment, patients should expect a low level of pain and to spend a couple of days off their feet.

A venogram may be performed, involving the injection of dye in the veins of the pelvic organs.
This issue’s guest Q & A Editors are

Theresa M. Soto, MD FACS, RPVI
Michelle Nguyen, MD

Questions & Answers
In each issue of Venous Review, our medical team answers questions we’ve received from referring physicians.

Q: If I send you a STAT DVT rule-out, and it is positive, what do you do? What if it is negative?

A: If the patient’s duplex scan is positive for DVT. A full patient history and examination is completed in order to evaluate for pulmonary embolism (PE), venous thromboembolism (VTE) risk factors and possible contraindications to the use of blood thinners. We notify the referring physician with the positive result and give the provider the option of treating/managing the thrombus.

If the patient’s scan is negative for DVT, the CVR physician will elicit a history from the patient and complete a limited physical examination. A full venous duplex scan may be recommended at this time in order to evaluate for venous insufficiency as a cause of the patient’s leg pain. Pending the results, the physician may recommend additional follow up with another specialist to further investigate the patient’s source of pain. The CVR physician will again notify the referring physician of the findings and recommendations; final disposition of the patient’s follow up will be coordinated with the referring physician in every case.

Should the referring physician prefer, the CVR physician will start the patient on a blood thinner, typically Xarelto or Lovenox and prescription grade compression stockings. The CVR physician thoroughly counsels the patient on the diagnosis of DVT; risk and symptoms of PE; risks, benefits and side effects of the medication prescribed and emergency symptoms that require urgent evaluation in an emergency room. The patient is typically followed up in the office in one week to assess for compliance with and side effects of the medication. A repeat scan is completed to assess for progression/stability of the thrombus at this time as well.

Thereafter follow up will be completed as needed and at 4-6 months to evaluate for any residual or chronic venous changes. The patient is co-managed with the primary care physician and a hematologist in order to determine the ideal length of anticoagulant treatment. Testing for an underlying clotting disorder may be completed after completion of anticoagulant therapy pending the patient’s risk profile and history. In the rare event of an acute extensive thrombus involving a large segment of the deep vein, the patient will be referred to the emergency room for intravenous anticoagulation and possible thrombolytic therapy.

Q: Why don’t you need to use any anesthesia for procedures — aren’t the patients in pain?

A: At CVR, all our procedures are completely ambulatory. This means that your patients can drive themselves to their procedure and then drive themselves home. For endovenous ablations, only local anesthesia is used to numb the skin. Then, once we have accessed the vein, we will also instill tumescent anesthesia, which is a mixture of lidocaine, saline and bicarbonate around the vein. Patients are awake the entire time, conversing with us. If any discomfort is felt, we can add more tumescent anesthesia until the patient is comfortable. After the procedure, patients are able to immediately ambulate, and they experience minimal residual effects of the local anesthetic.

Our goal is to improve your patient’s quality of life without causing any major interruptions in their everyday life.
In April of this year, Center for Vein Restoration was proud to announce its expansion to Grand Rapids, Michigan through the acquisition of Grand Rapids Vein Clinic. The expansion marks an exciting milestone for CVR, which already serves western Michigan patients in Kalamazoo/Portage, along with 36 other clinical locations in Connecticut, the District of Columbia, Maryland, New Jersey, New York, Pennsylvania and Virginia.

The Grand Rapids Vein Clinic was founded by Joseph Marogil, MD, a leader in the treatment of venous insufficiency in the Grand Rapids Community for over 20 years. His partner, Laura Kelsey, MD, joined the practice in 2005, and has made the treatment of this disease her sole focus. “Venous insufficiency is a condition that affects more than 30 million Americans and we believe that treating this potentially serious problem is a right, not a privilege,” said CVR President and CEO Sanjiv Lakhanpal, MD. “That’s why we’re proud to expand our practice to serve more patients than ever and bring them genuine relief.

“CVR is able to bring world-class support services to this new partnership, managing billing, staffing and all the tasks that often take a physician’s focus away from treating patients. Local patients will have access to an expanded suite of advanced treatments for venous insufficiency, and access to a large Patient Services call center offering person-to-person assistance to discuss treatment options, answer insurance questions, and make appointments,” he said. “This is a perfect example how our practices can be stronger together.”

**ABOUT DR. MAROGIL AND DR. KELSEY**

Founder of Grand Rapids Vein Clinic, Dr. Marogil brings 20 years of experience in the minimally invasive treatment of varicose veins. A Board Certified general surgeon, Dr. Marogil was trained at Butterworth Hospital (currently Spectrum Health). Dr. Marogil started his practice in general surgery in Grand Rapids in 1971. In 1986, he joined the American college of Phlebology and started the Grand Rapids Vein Clinic soon after. Gradually Dr. Marogil focused his practice on the exclusive treatment of varicose and spider veins.

Dr. Kelsey brings extensive experience in the minimally invasive treatment of varicose veins. Board Certified in General Surgery, she was educated at the University of Michigan and Michigan State University’s College of Human Medicine, and completed her residence training in Grand Rapids. She joined the Grand Rapids Vein Clinic in 2005 to focus exclusively on the treatment of venous disease, excelling in the treatment of venous insufficiency. She is passionate about education and has presented at international meetings on the subject of blood coagulation, deep venous thrombosis, prophylaxis, and the treatment of other venous disease. She is a member of the American College of Phlebology, and serves as president of the alumni board of the M.S.U. College of Human Medicine.

The Center for Vein Restoration clinic in Grand Rapids is located at 1720 Michigan Street N.E. Contact the team there at (616) 454-8442 or (800) FIX-LEGS.

If you are a practice looking to partner with a larger organization, or if you’re a physician looking to join one of the most dynamic practices in the country, please feel free to contact us at (240) 965-3900 or e-mail us at strongertogether@centerforvein.com.
COMMUNITY Outreach

Center for Vein Restoration’s Team has continued its momentum of reaching local residents at events and providing free screenings.

Along with White Plains Hospital, CVR sponsored the “Indulge: Fashion + Fun for Moms” event at the Westchester Mall in White Plains, NY. The May 7 event provided local moms with a much-needed opportunity to treat themselves to a night out to celebrate motherhood through a fun, fashionable and informative shopping experience. CVR staff pictured: Nicole Pabon, Community Outreach Specialist, Nimsi Gonzalez, Community Outreach Coordinator, and Bella Rivera, Community Outreach Specialist.

Our New York CVR team was proud to provide vein health education to customers at the Hudson Square Pharmacy in Midtown Manhattan. This event was held in conjunction with WCBS 880 AM radio. Pictured is Community Outreach Coordinator Nimsi Gonzalez.

Our Virginia team was out in force at the Southern Women’s Show, April 17-19 at the Richmond Raceway Complex. Along with health education, the event featured fashion, and cooking demonstrations. Celebrity appearances included GRAMMY and Stellar-nominated vocalist Cynthia Jones. Pictured greeting visitors is Meron Hagos, CVR Community Outreach Specialist.

CVR was proud to sponsor the WYCB 1340AM and WPRS 104.1FM 13th Annual Prayer Breakfast. The March event honoring 20 local pastors was held in Martins Crosswinds in Greenbelt, Maryland. Stephanie Jones, Community Outreach Manager and Marsha Withers, Clinical Coordinator represented CVR at the event attended by 1,500 guests.
The Inferior Venae Cava: is the largest venous trunk in the body. It is formed by the union of the two common iliac veins in front of the right side of the body of the fifth lumbar vertebra about two and a half centimeters (one inch) to the right of the median plane. In its ascent, it lies upon the bodies of the lower three lumbar vertebrae, the right lumbar and renal arteries, and the right crus of the diaphragm, by which it is separated from the aorta. It passes through the caval opening in the diaphragm opposite the eighth thoracic vertebra, pierces the pericardium and immediately enters the right atrium of the heart. In its upward course it receives the lumbar, the right testicular or ovarian, the renal, the right phrenic, the right suprarenal, and the hepatic veins. The veins tributary to the inferior vena cava generally follows the same course as the corresponding arteries. Because of the position of the inferior vena cava to the right of the median line, the veins entering it from the left are longer than those from the right side.

Ext iliac vein: Begins at the inguinal ligament, courses along the pelvic brim, ends anterior to the SI joint by joining the internal iliac vein to form the common iliac vein. Tributaries anastomose freely with the corresponding superficial veins and the obturator veins: deep inferior epigastric veins, deep external pudendal veins (pubic veins), deep circumflex iliac veins.

Internal iliac vein: Short trunk formed by the union of its extrapelvic (Gluteal [superior & inferior], internal pudendal and obturator) & intrapelvic tributaries (lateral sacral visceral [rectal, vesical, uterine and vaginal]). They drain the presacral venous plexus and the pelvic visceral plexus. These plexuses and the additional superficial plexus provide free communication across the midline.

Ovarian vein: Provide drainage to the Parametrium, cervix, mesosalpinx, pampiniform plexus. It forms a rich anastomotic venous plexus with the Paraovarian, uterine, vesical, rectal and vulvar plexus. 2-3 trunks form a single ovarian vein at L4. Left ovarian vein drains into the LRV. Right Ovarian vein drains into the IVC. The ovarian veins have an average diam. of 5mm. Valves are present mainly in the distal third. Absence of valves in 15% on the left side and 6% on the right side.
Inpatients with Pelvic Venous Hypertension, the Intrapelvic and Extrapelvic Venous Communications May Open Up (as Escape Veins) to Form Non-Saphenous Varicosities in the Lower Extremities.

These non-saphenous veins (NSV) are located in the watershed areas as; Buttock (through the gluteal veins), perineal veins, Vulvar veins, postero-lateral thigh (internal iliac system through the femoral vein), lower posterior thigh, popliteal fossa, knee (popliteal/femoral vein) and along the peripheral nerves such as the tibial and sciatic nerve (internal iliac through the gluteal veins).

Gluteal Varicosities as Escape Veins from the Pelvis

Lower extremity venous insufficiency may result from a primary pathology in the veins of the lower extremity (GSV -75%, SSV -10%) or within the veins of the pelvis (15-20%). If the pathology lies in the veins of the pelvis, the venous hypertension may be transmitted from the Pelvis to the lower extremity through the escape veins (non-saphenous varicosities) and present with venous insufficiency of the lower extremity in the absence of any pathology in the lower extremity veins. In such cases it is imperative to identify the pathology in the pelvis/abdomen and the treatment has to be focused towards the pathology in the pelvis. Up to twenty percent of the patients presenting with lower extremity venous disease have the etiology of their disease in the pelvis.

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Attention: Human Resources

Center for Vein Restoration is nationally recognized as the leader in the treatment of vein disease and venous insufficiency – the cause of varicose and spider veins.

Our commitment to our employees is strong throughout our culture which is built on our mission and values. We are a network that fuels individual growth, development and promotes from within.

Our hiring philosophy is simple: we attract and train the most qualified individuals and provide them the opportunity to demonstrate excellence while achieving career goals!
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It's been quite a busy time for us here at Center for Vein Restoration. Since January we've opened 10 new clinics, bringing our total of 38 locations across Connecticut, the District of Columbia, Maryland, Michigan, New Jersey, New York, Pennsylvania and Virginia. Such continued, vibrant growth has been a challenging and rewarding undertaking. We believe that there's a great opportunity in the community for local, specialized medicine to complement the care people traditionally receive in larger institutions and we are committed to modernizing healthcare to be a more efficient and accessible service to patients. Thanks to our physician-led business model, which emphasizes collaboration, camaraderie and support – along with your continued referrals – we're proud to report we're able to serve more patients than ever.

In this edition of Venous Review we are launching the first in a 5-part original series discussing the importance of including evaluations performed below the diaphragm as part of diagnostic work-up for venous disease.

Also in this edition, we examine an under-diagnosed condition in females, associated with venous disease: Pelvic Congestion Syndrome.

We also check in with our Community Outreach team to see what they've been up to in our local communities. Finally, we showcase the acquisition of the Grand Rapids Vein Clinic in western Michigan as an example of our Stronger Together program, which highlights our unique physician-led business model not only as a way to bring superior care to local patients but also as a great place to practice medicine.

Thank you as always for reading Venous Review. We hope you find this information is useful to you and your practice.

Yours in good health,

Sanjiv Lakhanpal, MD, FACS
Editor-in-Chief