Venous reflux disease

Venous reflux disease, also known as venous insufficiency, is a medical condition affecting the circulation of blood in the lower extremities. The tiny valves that normally force blood back up towards the heart no longer function, causing blood to pool up in the legs, and the veins of the legs become distended.

Venous reflux disease commonly produces varicose veins, the abnormally swollen and discolored superficial leg veins that affect millions of people around the world. Varicose veins can range from small, thin purple lines just under the skin (known as ‘spider veins’) to thick, bulging veins that can protrude well beyond the skin surface. In any form, varicose veins serve as indicators of venous reflux, a progressive disease that can cause significant circulatory problems as it worsens.

Ten times more patients suffer from venous insufficiency than peripheral arterial disease. Although often mistaken as a cosmetic problem, venous insufficiency can produce a number of clinical problems for the patient.

Venous insufficiency can significantly impact a person’s lifestyle, especially when the person’s job requires extended standing.

Of the patients with venous insufficiency, approximately 40% exhibit serious symptoms such as edema, skin changes and venous ulcers. It is estimated that 40% of women and 20% of men will experience varicose veins by the time they are in their 60s worldwide. Prevalence is highly correlated to age and gender.

Venous System Anatomy
The veins in the lower limbs are classified into two systems:

- Superficial Veins (including saphenous)
- Deep Veins

The two systems are connected by perforating veins that pass through the deep fascia.

Three factors influence the return of blood back to the heart:

- Respiration - the movement of the diaphragm creates a negative pressure that assists the return of blood from the legs to the heart.
- Vein Valves - healthy valves close, preventing blood from refluxing or pooling.
- Calf Muscle Pump - action of the calf muscle helps to force blood upward.

**Common Symptoms**

In the absence of other symptoms, patients with cosmetic concerns due to the presence of varicose veins might be evaluated with only a physical examination. However, patients presenting with other symptoms of venous insufficiency, such as those listed below, should also undergo an in-depth evaluation, including a duplex ultrasound study.
- Leg pain, aching, tired or weak legs, especially after long periods of standing or sitting
- Varicose veins
- Burning or itching of the skin
- Swollen legs and/or swollen ankles (edema)
- Color and texture changes of the skin
- Open wounds (skin ulcers)

*Varicose Veins*

Varicose veins are abnormally and irregularly swollen veins (the blood vessels that return blood to the heart from the body tissues).

Varicose veins develop slowly, but once they start they progress. They do not get better on their own.

The most common form of varicose veins progresses downward in either or both of two large veins near the surface of the leg.

Varicose veins are typically found in the superficial venous system and often involve the main trunk veins - the great and small saphenous veins - as well as tributaries. They are superficial veins that have expanded in response to increased pressure caused by incompetent or absent valves. Progressive vein dilation eventually
prevents the valve cusps from closing properly resulting in reflux. Alternatively, a lack of competent valves can also cause dilation of the vein. As one valve fails, increasing pressure is exerted on each more distal valve until it, too, becomes incompetent. Diameters of varicose veins can range from 3 mm to > 8 mm.

Edema and leg or ankle swelling with and without skin changes

Edema and swollen ankles are the next progressive states of venous insufficiency and occur as the result of venous hypertension forcing fluid into the lymphatic and interstitial spaces.
This can cause leg or ankle swelling and changes in skin pigmentation. Severe pain and discomfort are typical of these conditions, particularly in the lower leg (calf and ankle) where proximity of nerves exacerbates the situation. In addition to superficial involvement, these stages often include some portion of the perforating or deep vein systems.

Active and healed Venous Ulcers

Venous ulcers indicate the most severe forms of venous insufficiency and typically involve both the deep (including perforators) and superficial vein systems. Extreme reflux and venous hypertension result in changes in the microcirculation of the skin eventually leading to severe ulceration.

Anatomic involvement at these stages generally involves the saphenous system, the perforators (typically the Cockett perforators), and the deep system (typically the femoral, superficial femoral and/or the profunda). Why do we mention deep system and list superficial femoral? A smaller subset of the population has deep system-only involvement (<5%) and an even smaller portion perforator-only incompetence.

Perforator Veins
In a number of places in the leg, the superficial and deep veins are linked by perforating veins ('perforators'). They are called perforators because they perforate the leathery fascial layer surrounding the muscles of the legs.

Perforator veins serve as connections between the two networks of veins in the extremities, the superficial venous system and the deep venous system. Perforators connect the two parallel systems, somewhat like the rungs of a ladder connect the side rails, and normally drain blood from the superficial veins to the deep veins as part of the process of returning oxygen-depleted blood to the heart.

Perforator veins have one-way valves designed to prevent backflow of blood down towards the superficial veins. When those valves no longer function properly and reflux occurs, the buildup of blood and pressure can cause not only the superficial veins but the perforators themselves to become incompetent. Perforator veins in the lower leg and ankle are particularly vulnerable to distention and incompetence, and the resultant circulatory problems create an increased likelihood of edema, skin discoloration, and dermatitis and skin ulcers in the immediate area.

Normally their valves should allow blood to flow only inwards – from the superficial veins to the deep veins. If the valves stop working properly, then blood is pushed out into the superficial veins when the muscles contract: this is one of the reasons for high
pressure in the superficial veins, and can be a cause of varicose veins. Like primary superficial veins that become incompetent, perforator veins can be treated.

*Great Saphenous Vein*

The greater saphenous vein is a large superficial leg vein running from the foot to the groin, roughly in parallel with the short or lesser saphenous vein, which runs up the back of the leg from the ankle to the knee. These are the principal vessels of the superficial venous system in the leg.

The greater saphenous vein delivers oxygen-depleted blood from the ankle, lower leg and thigh vessels to the femoral vein, the primary deep vein in the leg. The propulsion of blood up such a significant length of the body is heavily dependent on the function of the one-way valves that prevent backflow down the vein. When those valves fail, the resultant venous reflux causes blood to back up into the smaller veins closer to the skin, distending them and initiating the condition known as varicose veins.

Venous insufficiency, also known medically as venous reflux disease, in the greater saphenous vein is a primary underlying cause of varicose veins. The great saphenous is also therefore the superficial
The vein most frequently treated with radiofrequency ablation to restore healthy circulation and eliminate varicose veins.

The deep and superficial veins of the legs

The veins of the legs are divided into two systems – the deep veins (which run deep to the leathery layer of fascia surrounding the muscles) and the superficial veins (which run in the layer of fat just beneath the skin). The superficial veins are the ones that you can see on your foot or around the ankle and they are the ones that can become varicose veins.

Valves in the veins

There are delicate valves located at half to one centimeter distance throughout the length of veins which helps to pump the venous blood towards the heart against the gravitational force just like the ‘Foot Valve’ of the water pump. They are unidirectional valves which prevent the back flow. The incompetence of these valves is the basic pathology of varicose veins.
**The muscle pump**

The Calf muscle acts as the booster central pump to lift forcibly the venous blood from the deep veins to the heart. It is a *Peripheral Heart.*

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<thead>
<tr>
<th>Calf muscle is relaxed</th>
<th>Venous Valves remain closed</th>
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<tbody>
<tr>
<td>Calf muscle is contracted</td>
<td>Venous Valves open up and blood is pumped up</td>
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**Other affected areas due to venous reflux**

*Hemorrhoids*: Piles) are the commonest cause of rectal bleeding is also a kind of venous reflux.

*Esophageal Varices*: Varicosity of the lower end of the esophagus or the upper end of stomach produces vomiting of blood in chronic (alcoholic) liver diseases, which may become fatal.

*Varicocele*: There may be swelling of the scrotum and the spermatic cord with a feel of a bunch of round worms in the scrotum, Varicocele, is one of the causes of sub fertility in the male.

*Vesiculitis*: There can be bleeding from the urethra in prostatic disease due to Vesiculitis.
Vaginal Varices: Dilated tortuous veins of the vaginal wall are called Vaginal Varices which is one of the causes of severe vaginal bleeding after delivery.