Venous Insufficiency

Venous Stasis Ulcer

Venous Stasis Ulcers

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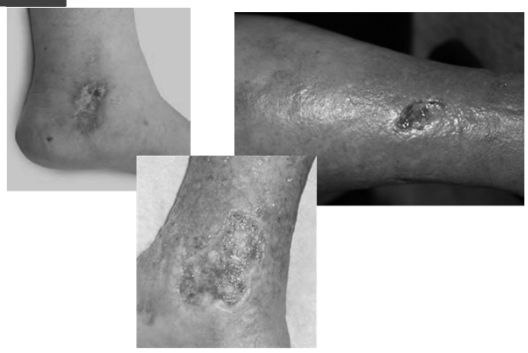
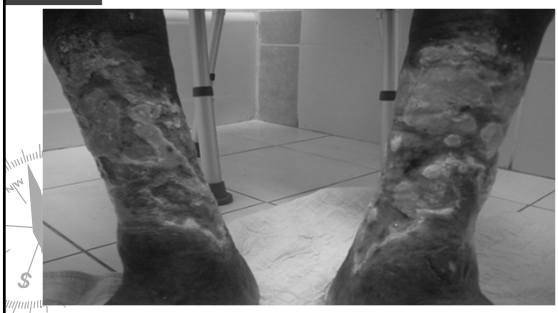


Venous Stasis Ulcers

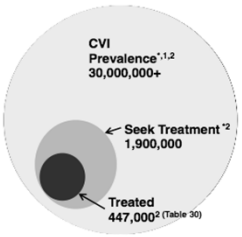


Epidemiology: Prevalence

More than 30 million Americans suffer from varicose veins or a more serious form of venous disease called Chronic Venous Insufficiency (CVI).[1]

Of the over 30 million Americans affected:

- Only 1.9 million seek treatment annually[1,2]
- While the vast majority remain undiagnosed and untreated



*Statistics based on individuals over the age of 40

ki P, et al. The care of patients with varicose veins and associated chronic diseases: clinical practice guidelines of the Vascular Surgery and the American Venous Forum. JVS: May 2011

Epidemiology: Risk Factors

Many factors contribute to the presence of venous disease and CVI including[1,2,3,4,5]:

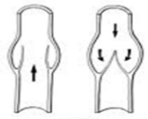
- Gender
- Age
- Family history
- Multiple pregnancy
- Standing occupation
- Obesity
- Prior injury or surgery

Onset

- Peak occurrence at 60-80 years
- >70% have first ulcer by 60 years
- 35% have ulceration for > 5 years
- Recurrence ~75%

Anatomy & Pathophysiology

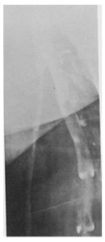
- All leg veins have valves that only allow flow in the cephalic direction
- In diseased state with valvular incompetence, venous pressure in deep system remains high
- Venous HTN transmitted to superficial system -> edema

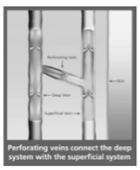


Anatomy: Perforators

- Perforator valves maintain one-way flow from superficial to deep veins
- Perforator valve failure causes:
  - Higher venous pressure and GSV/branch dilation
  - Increasing pressure results in GSV valve failure
  - Additional vein branches become varicose
  - Further GSV incompetence and dilation

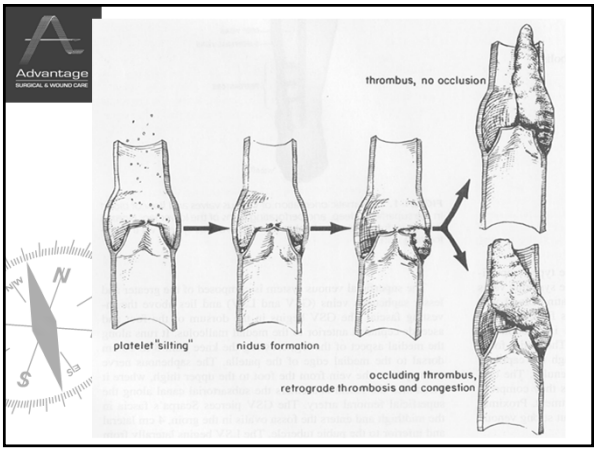
NOTE: The SVS/AVF Guideline Committee definition of "pathologic veins includes those with outward flow of ≥ 500 ms, with a diameter of ≥ 3.5 mm, located beneath a healed or open venous ulcer[1]





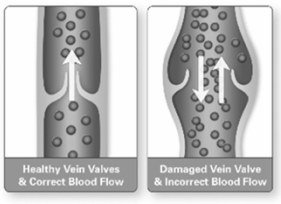
Perforating veins connect the deep system with the superficial system

1. Gloviczki P, et al. The care of patients with varicose veins and associated chronic diseases: clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. JVS; May 64:1

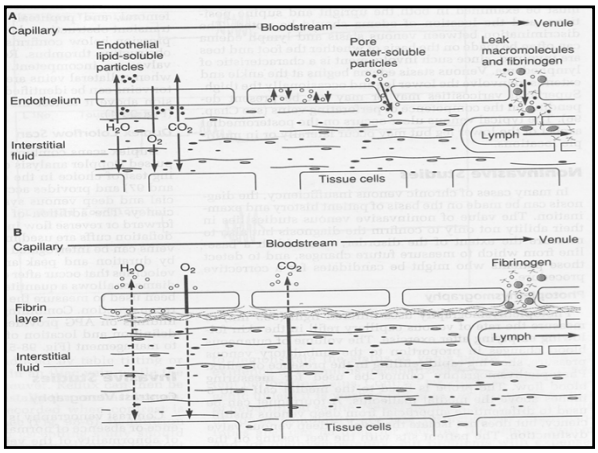


Etiology & Pathophysiology

Healthy veins, with competent vein valves, keep blood moving in one direction back to the heart



Diseased veins, with damaged vein valves, cause blood to move in both directions, elevating venous pressure



Etiology & Pathophysiology: Symptoms

Patients who suffer from venous disease or CVI may present symptoms of[1]:

• Varicose veins	• Burning or itching of the skin
• Leg pain, aching, or cramping	• Leg or ankle swelling
• Leg heaviness and fatigue	• Skin changes
• Restless legs	• Lower leg ulcers

1. Gloviczki P, et al. The care of patients with varicose veins and associated chronic diseases: clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. JVS; May 2011.

Etiology & Pathophysiology: CEAP

C_0: Asymptomatic. No visible or palpable signs of venous disease

C_1: Spider veins, reticular veins, telangiectasias

C_2: Varicose Veins

C_3: Edema

C_4: Pigmentation, Lipodermatosclerosis

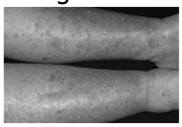
C_6: Open Skin Ulcers
C_5: Healed Skin Ulcers

Increased Pain and Reduced Quality of Life

Photos courtesy of Rajabrata Sarkar, MD PhD

What is Hemosiderin?

- Hemosiderin deposits form after hemorrhage. When blood leaves a ruptured blood vessel, the cell dies and the hemoglobin of the red blood cells is released into the extracellular space. White blood cells called macrophages engulf the hemoglobin to degrade it, producing hemosiderin (and porphyrin).



Hemosiderin

Hemosiderin

Hemosiderin

Patient Assessment & Diagnosis

Patient Assessment

- Current general health condition
- Past medical history
- Symptoms
- Physical exam

Ultrasound Diagnostic Study

- Required in order to determine the source of reflux
- Evaluate for venous occlusion or thrombus
- Map the course of the incompetent superficial veins

Diagnostic Studies

- The **Trendelenburg Test determines the competency of the valves in the superficial and deep veins of the leg. With the patient in the supine position the leg is flexed at the hip and raised above heart level until the veins become empty. A tourniquet is then applied around the upper thigh to compress the superficial veins but not too tight as to occlude the deeper veins. The leg is then lowered by asking the patient to stand. Normally the superficial saphenous vein will fill from below within 35 seconds as blood from the capillary beds reaches the veins; if the superficial veins fill more rapidly with the tourniquet in place there is valvular incompetence below the level of the tourniquet in the "deep" or "communicating" veins. After 20 seconds, if there has been no rapid filling, the tourniquet is released. If there is sudden filling at this point it indicates that the communicating veins are competent but the superficial veins are incompetent. [1] The test is reported in two parts, the initial standing up of the patient (positive or negative based on rapid filling) and the second phase once the tourniquet is removed (positive or negative based upon rapid filling). For example, a possible outcome of the test would be negative-positive meaning that the initial phase of the test was negative indicating competence in the communicating veins and the second phase of the test was positive meaning that there is superficial vein incompetence.**

Treatment Options

Conservative Therapies:

- Exercise
- Leg elevation
- Compression Stockings
- Unna Boot
- NOTE: These therapies treat the symptoms, not the **underlying cause**…

Surgical Treatments:

- Vein Stripping & Ligation

Non-Surgical Treatments:

- Endovenous thermal ablations
  - Radiofrequency ablation
  - Laser ablation

Compression Therapy

- Elevation alone ineffective for advanced disease or ulceration
- Compression increases blood flow to skin, deep and superficial veins by reducing edema
- Compliance critical for sustained wound healing
  - Poor compliance -> 70% recurrence at 2yrs & near 100% at 3yrs

Phases of Compression Therapy

- Edema reduction and ulcer treatment
  - Rigid or elastic bandages
- Maintenance phase
  - Graded compression stockings
  - Maximal pressure at ankle

Unna Boot

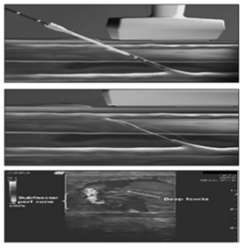
- Zinc paste bandage (introduced in 1885)
- Rigid inelastic bandage
- Supply high pressure with muscle contraction
  - Only effective in ambulatory patients

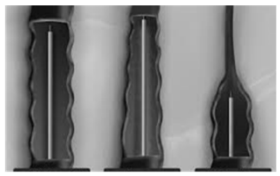
Compression Stockings

- Mainstay of treatment once ulcers are healed
- Four classes
  - I: for mild edema or fatigue
  - II: for severe varicosities and moderate edema
  - III, IV: for severe edema and CVI
- Replace every 6 months

Endovenous Ablation

- Catheter inserted into vein
- Vein heats and collapses
- Catheter withdrawn, closing vein





Rasmussen Randomized Clinical Trial[1]***

	RF Ablation (n=124*)	Endovenous Laser Ablation (n=124*)	Ultrasound-Guided Foam Sclerotherapy (n=123*)	Vein Stripping (n=123*)
Efficacy at 1 year (reflux-free rate)	95.2%	**94.2%**	83.7% (p<0.001)	95.2%
Post Intervention Pain Scores** (1 – 10)	1.21 (p<0.001)	**2.58**	1.60 (p<0.001)	2.25
Time to return to normal activities (days)	1 (p<0.001)	**2**	1 (p<0.001)	4
Time to resume work (days)	2.9 (p<0.001)	**3.6**	2.9 (p<0.001)	4.3

*n is the number of patients who returned for follow-up
**In the 10-day period post-procedure
Note: The ClosureFast™ Catheter was used in this study

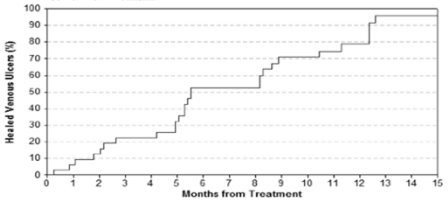
***Rasmussen Randomized Clinical Trial comparing endovenous laser ablation, foam sclerotherapy and surgical stripping for great Saphenous varicose veins

RECOVERY Trial[1]: Fewer Complications

SEQUELAE
Post-procedure adverse events
(P=0.021)

	Laser (N=41)	ClosureFast™ catheter (N=46)
Phlebitis	6 (14.6)	0
Erythema	4 (9.8%)	0
Paresthesia	2 (4.9%)	1 (2.2%)
Thrombus extension/DVT	1 (2.4%)	0
Hyperpigmentation	0	1 (2.2%)
Infection	0	0
Limbs w/ Sequealae	9 (22.0%)	2 (4.4%)

*9 laser treated limbs experienced sequelae with 14 total events



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