

Vascular Ultrasound Vocabulary Reference

Part 4: Peripheral Venous | Chapters 14–17

Kupinski, *Diagnostic Medical Sonography: The Vascular System*, 3rd Ed.

An In-Depth Review by Dr. Alice Matthews

amatthews@concorde.edu

Chapter 14: Duplex Imaging of the Lower Extremity Venous System

Term	Definition	Analogy / Example
Acute Thrombus	A newly formed blood clot, generally less than 14 days old. Appears echolucent (dark) on ultrasound, may be free-floating, and the vein may be dilated.	Like fresh Jell-O that hasn't fully set--acute clot is soft, dark on ultrasound, and may be loosely attached to the vein wall.
Augmentation	An increase in venous flow velocity caused by compressing the calf or foot. Normal augmentation confirms patency of the venous pathway; absent augmentation suggests proximal obstruction.	Like squeezing a tube of toothpaste--if the pathway is open, you see flow increase; if blocked, nothing happens.
Chronic Thrombus	An older blood clot that has been present for weeks to months. Appears echogenic (bright), the vein may be contracted (smaller), and collateral vessels may develop.	Like old, dried rubber cement--chronic clot is firm, bright on ultrasound, and firmly stuck to the vein wall.
D-dimer	A fibrin degradation product in the blood. Elevated levels suggest active clot breakdown and may indicate DVT or PE, but many conditions can cause elevation.	Like debris from a demolished building--when clots break down, they leave behind D-dimer fragments in the blood.
Deep Vein Thrombosis (DVT)	Formation of a blood clot (thrombus) within the deep veins, typically in the leg. It is a serious condition because clots can break loose and travel to the lungs (pulmonary embolism).	Like a traffic jam in the main highway--the clot blocks blood flow in the deep veins, and pieces can break off and travel to dangerous destinations.
Floating (Free-Floating) Thrombus	A thrombus with a proximal segment not attached to the vein wall, appearing to wave or float in the lumen. Higher risk of embolization.	Like a flag waving in the breeze--the unattached portion can easily break off and travel to the lungs.
Hypercoagulability	An abnormal tendency for blood to clot, either inherited (e.g., Factor V Leiden) or acquired (e.g., cancer, pregnancy, oral contraceptives).	Like blood that's too "thick" or "sticky"--the clotting system is overactive, forming clots too easily.
May-Thurner Syndrome	Compression of the left common iliac vein by the overlying right common iliac artery, increasing risk of left leg DVT.	Like a heavy pipe resting on a softer one--the artery crushes the vein underneath, making clots more likely.
Non-compressibility	The primary ultrasound sign of DVT. Normal veins collapse completely with transducer pressure; thrombosed veins remain partially or fully open.	Like trying to squeeze a water balloon versus a rock--a normal vein squishes flat; a clot-filled vein won't compress.
Phasicity	Normal variation in venous flow velocity with respiration. Flow increases during expiration (when abdominal pressure decreases) and decreases during inspiration.	Like breathing affecting a trumpet--venous flow has a natural rhythm tied to breathing, not the heartbeat.
Post-Thrombotic Syndrome (PTS)	A chronic complication of DVT causing leg pain, swelling, skin changes, and sometimes ulcers. Results from valve damage and chronic venous insufficiency.	Like long-term damage after a flood--the clot may be gone, but the valves are broken, leaving permanent problems.

Term	Definition	Analogy / Example
Pulmonary Embolism (PE)	Blockage of pulmonary arteries by a blood clot that has traveled (embolized) from elsewhere, usually deep leg veins. A life-threatening complication of DVT.	Like debris from a clogged pipe getting stuck downstream--the clot travels from the leg to the lungs, blocking blood flow to lung tissue.
Recanalization	The process by which a thrombosed vein reopens, often partially, as the clot organizes and channels form through it.	Like water carving new channels through a beaver dam--over time, flow may partially return through the clotted vein.
Spontaneous Flow	Venous flow that occurs without external compression. Present in proximal veins; absent in distal veins may suggest distal obstruction.	Like water flowing without a push--blood moves on its own through patent veins due to pressure gradients.
Superficial Thrombophlebitis	Inflammation and clot formation in a superficial vein. Less dangerous than DVT but can be painful and may extend into deep veins.	Like a clogged surface drain--not as dangerous as deep blockage, but still needs attention, especially if it's spreading toward the deep system.
Venous Collaterals	Enlarged superficial or deep veins that develop to bypass an obstructed segment. Seen as alternative pathways around chronic DVT.	Like detour routes around road construction--when the main highway is blocked, traffic finds alternate paths.
Venous Stasis	Slowing or stagnation of blood flow in the veins, often due to immobility, compression, or valve dysfunction. One component of Virchow's triad.	Like water sitting stagnant in a pond--when blood stops moving, it's more likely to clot.
Virchow's Triad	Three factors that contribute to venous thrombosis: venous stasis (slow flow), vessel wall injury, and hypercoagulability (increased clotting tendency).	Like the three ingredients needed for a fire--remove any one, and thrombosis is less likely. Stasis (fuel), injury (spark), and hypercoagulability (oxygen).
Wells Criteria	A clinical scoring system used to estimate the pretest probability of DVT based on signs, symptoms, and risk factors. Scores range from -2 to +7 points.	Like a checklist that predicts your risk--the more boxes you check (swelling, tenderness, cancer history), the higher the chance you have a DVT.

Chapter 15: Duplex Imaging of the Upper Extremity Venous System

Term	Definition	Analogy / Example
Catheter-Related Thrombosis	DVT associated with indwelling venous catheters (PICC lines, dialysis catheters, pacemaker leads). The foreign body irritates the vein wall.	Like a rock in a stream causing debris to accumulate--the catheter irritates the vein wall, triggering clot formation.
Central Venous Stenosis	Narrowing of the central veins (subclavian, innominate, SVC) often caused by dialysis catheters, pacemaker leads, or prior DVT.	Like a kink in the main supply line--narrowing of the big central veins affects all downstream flow.
External Compression	Venous compression by adjacent structures (tumors, lymph nodes, arteries, hematomas) causing impaired flow or thrombosis.	Like something heavy sitting on a hose--outside pressure pinches the vein shut.
Internal Jugular Vein Thrombosis	Clot formation in the internal jugular vein, often associated with central venous catheters, infection, or malignancy.	Like a blocked main drainage pipe in the neck--can cause swelling and may be a source of septic emboli.
Paget-Schroetter Syndrome (Effort Thrombosis)	Spontaneous axillary-subclavian vein thrombosis caused by repetitive overhead arm activities, often in athletes. A form of thoracic outlet syndrome.	Like a hose getting pinched during exercise--repetitive arm motion compresses the vein, leading to clot formation.

Term	Definition	Analogy / Example
Superior Vena Cava (SVC) Syndrome	Obstruction of the SVC causing facial swelling, distended neck veins, and headache. Usually caused by malignancy or thrombosis.	Like a dam blocking the main river--blood backs up into the head and arms because it can't return to the heart.
Thoracic Outlet Syndrome (Venous TOS)	Compression of the subclavian vein at the thoracic outlet, typically between the clavicle and first rib. May cause thrombosis or chronic swelling.	Like a hose kinked where it passes through a tight space--the vein gets squeezed between bones and muscles.
Upper Extremity DVT	Thrombosis of the deep veins of the arm (axillary, subclavian, brachial). Less common than lower extremity DVT but increasing due to catheter use.	Like a traffic jam in the arm's main highways--clots in the deep arm veins can still cause PE.

Chapter 16: Ultrasound Evaluation and Mapping of the Superficial Venous System

Term	Definition	Analogy / Example
Accessory Saphenous Vein	A tributary of the great saphenous vein that runs parallel to it in the thigh (anterior or posterior accessory).	Like a parallel service road--runs alongside the main GSV but is a separate branch.
Cranial Extension of SSV	Continuation of the small saphenous vein above the popliteal fossa, present in about 20% of people.	Like the SSV deciding to keep going past its usual endpoint--the vein extends further up the thigh.
Cutaneous Tributaries	Small superficial veins that drain the skin and connect to the main saphenous trunks. Usually ligated during bypass surgery.	Like tiny side streets feeding into the main road--small veins from the skin joining the saphenous system.
Deep Perforating Veins	Veins that penetrate the muscular fascia to connect the superficial and deep venous systems. Must be identified and ligated during bypass surgery.	Like tunnels connecting two highway systems--they bridge the superficial and deep veins through the fascia.
Great Saphenous Vein (GSV)	The longest superficial vein in the body, running from the medial ankle to the groin. The most commonly used vein for bypass grafts.	Like the main surface highway from ankle to groin--the go-to choice when surgeons need a bypass conduit.
Internal Vein Diameter	The measurement of vein width from inner wall to inner wall. Used to determine if a vein is large enough for bypass (typically >3 mm).	Like measuring the inside of a pipe--how wide the channel is, not including the wall thickness.
Reverse Trendelenburg Position	Patient position with the feet lower than the head, used to maximize venous filling in superficial veins during mapping.	Like propping the bed so the feet are lowest--gravity fills the veins, making them easier to see.
Saphenofemoral Junction (SFJ)	The point where the great saphenous vein joins the common femoral vein in the groin. An important landmark for both DVT and insufficiency exams.	Like where a tributary meets the main river--the confluence of the GSV and deep system.
Saphenopopliteal Junction (SPJ)	The point where the small saphenous vein typically joins the popliteal vein behind the knee. Variable in location.	Like where a side stream joins the river behind the knee--the connection point for the SSV.
Saphenous Compartment	The fascial compartment containing the great saphenous vein, visible on ultrasound as an "Egyptian eye" or saphenous eye.	Like a tunnel within the tissues--the GSV travels in its own fascial compartment, helping identify it on ultrasound.
Small Saphenous Vein (SSV)	A superficial vein running along the posterior calf from the lateral ankle to the popliteal fossa. Alternative bypass conduit.	Like the back road up the calf--the smaller cousin of the GSV, running up the back of the leg.

Term	Definition	Analogy / Example
Vein Mapping	Preoperative ultrasound evaluation of superficial veins to assess their suitability for use as bypass grafts or dialysis access.	Like surveying roads before building a detour--you're checking which veins are good enough to repurpose.
Vein of Giacomini	An intersaphenous vein connecting the small saphenous vein to the great saphenous vein in the thigh.	Like a connecting road between two parallel highways--a communication channel between the GSV and SSV.
Vein Wall Assessment	Evaluation of the vein wall for calcification, sclerosis, or other abnormalities that might make it unsuitable for bypass.	Like inspecting a pipe for rust or damage--the wall needs to be healthy enough to handle arterial pressure.

Chapter 17: Venous Valvular Insufficiency Testing

Term	Definition	Analogy / Example
Air Plethysmography (APG)	A quantitative test using an air-filled cuff around the calf to measure venous volume, reflux, and calf muscle pump function.	Like a blood pressure cuff that measures volume instead of pressure--quantifies how much blood pools and how well the calf pump works.
Ambulatory Venous Pressure	Pressure in the veins during walking. Elevated pressures indicate venous dysfunction.	Like measuring water pressure in the pipes while the system is running--high pressure during walking means the system isn't draining well.
Atrophie Blanche	White, atrophic scars with telangiectasias at the ankle, indicating previous venous ulceration or severe insufficiency.	Like white scar tissue where the skin has been damaged--tells a story of past venous problems.
Calf Muscle Pump (Venous Pump)	The mechanism by which calf muscle contraction compresses deep veins, propelling blood toward the heart.	Like squeezing toothpaste from the tube--calf muscles compress the veins, pushing blood upward.
CEAP Classification	A standardized system for classifying chronic venous disease: Clinical class, Etiology, Anatomy, and Pathophysiology.	Like a universal language for describing vein problems--C (what you see), E (why it happened), A (where it is), P (what's wrong).
CEAP Clinical Classes	C0: No visible signs; C1: Spider veins; C2: Varicose veins; C3: Edema; C4: Skin changes; C5: Healed ulcer; C6: Active ulcer.	Like a severity scale from 0-6--ranging from "can't see anything wrong" to "open wound."
Chronic Venous Valvular Insufficiency (CVVI)	Failure of venous valves to prevent retrograde blood flow, leading to venous hypertension, varicose veins, edema, and skin changes.	Like one-way doors that won't close properly--blood flows backward instead of moving toward the heart.
Distal Compression Maneuver	Squeezing the calf or foot to push blood proximally, then releasing to observe if valves prevent backflow.	Like squeezing a tube and watching which way the contents flow when you release--tests valve competence.
Lipodermatosclerosis	Thickening and hardening of the skin and subcutaneous tissue in chronic venous insufficiency, typically near the medial ankle.	Like the skin turning to leather--chronic venous pressure damages the tissues, making them thick and hard.
Perforator Incompetence	Failure of valves in perforating veins, allowing blood to flow from deep to superficial system. Contributes to venous ulcers.	Like one-way valves failing in the connecting tunnels--blood goes the wrong direction, from deep to superficial.

Term	Definition	Analogy / Example
Photoplethysmograph (PPG)	An indirect test using infrared light to measure skin blood volume changes, used to screen for venous reflux.	Like a light sensor watching blood pool in the skin--infrared detects how fast blood returns after you pump it out.
Reflux	Retrograde (backward) flow of blood in veins due to incompetent valves. The hallmark of chronic venous insufficiency.	Like water flowing uphill the wrong way--instead of blood moving toward the heart, it falls backward.
Reflux Time	The duration of retrograde flow after a provocative maneuver (e.g., Valsalva, distal compression). >500 ms in saphenous veins is abnormal.	Like timing how long a door stays open--if it doesn't close within half a second, the valve is broken.
Residual Volume	The volume remaining in the calf after pumping, expressed as a percentage. >35% suggests poor calf pump function.	Like how much water is left after you try to pump it out--too much remaining means the pump isn't working well.
Reticular Veins	Dilated bluish subcutaneous veins 1-3 mm in diameter, smaller than varicose veins but larger than telangiectasias.	Like medium-sized feeder roads--not as dramatic as varicose veins, but still abnormal.
Telangiectasia (Spider Veins)	Tiny dilated intradermal veins <1 mm, appearing as red or purple web-like patterns on the skin.	Like tiny cracks in a painting--the smallest visible veins, cosmetic rather than medical concern.
Valsalva Maneuver	Forced expiration against a closed glottis (bearing down), used to provoke reflux at the saphenofemoral junction.	Like straining on the toilet--increases abdominal pressure to test if valves can hold against the push.
Varicose Veins	Dilated, tortuous superficial veins ≥ 3 mm in diameter caused by venous insufficiency.	Like old, stretched-out hoses that have lost their shape--veins that have become twisted and enlarged from chronic pressure.
Venous Claudication	Leg pain during walking caused by venous outflow obstruction, relieved by elevation. Different from arterial claudication.	Like your legs aching because they can't drain properly--not from lack of blood flow, but from blood backing up.
Venous Eczema (Stasis Dermatitis)	Inflammatory skin changes in chronic venous insufficiency, appearing as red, itchy, scaly patches.	Like a rash caused by poor drainage--blood backing up irritates the skin.
Venous Filling Rate	Rate of blood accumulation in the calf when standing, measured by APG. >2 mL/s indicates significant reflux.	Like measuring gallons per minute filling the tank--too fast means the valves can't hold back the flow.
Venous Filling Time	Time to fill the calf veins to 90% capacity when standing, measured by APG. <25 seconds suggests reflux.	Like timing how fast a tank fills--if the valves leak, it fills too fast.
Venous Recovery Time (VRT)	Time for venous refilling after exercise, measured by photoplethysmography. <20 seconds suggests significant reflux.	Like how fast a sink refills after you drain it--if it fills too fast, valves aren't doing their job.

Treatment-Related Terms

Term	Definition	Analogy / Example
Compression Therapy	Use of graduated compression stockings (20-50 mmHg) to improve venous return and reduce symptoms.	Like gently squeezing the leg from outside--external pressure helps push blood upward and prevents pooling.

Term	Definition	Analogy / Example
Endovenous Ablation	Minimally invasive treatment using heat (laser or radiofrequency) to close incompetent saphenous veins.	Like welding a pipe shut from the inside--heat damages the vein wall, causing it to scar closed.
Endovenous Laser Ablation (EVLA / EVLT)	Endovenous technique using laser energy to heat and close the vein. Laser fiber is pulled through the vein.	Like using a laser beam to seal the vein--the light energy generates heat that destroys the vein wall.
Foam Sclerotherapy	Sclerotherapy using a foam mixture of sclerosant and air, allowing treatment of larger veins with less medication.	Like shaving cream that fills the vein--the foam displaces blood and contacts more vein wall surface.
Phlebectomy	Surgical removal of varicose veins through small skin incisions. Also called stab avulsion or microphlebectomy.	Like pulling weeds out by their roots--making tiny cuts and physically removing the diseased veins.
Radiofrequency Ablation (RFA)	Endovenous technique using radiofrequency energy to heat and close the vein. Temperature-controlled to ~120°C.	Like using radio waves to cook the vein from inside--controlled heating seals it shut.
Sclerotherapy	Injection of a chemical solution (sclerosant) into veins to cause inflammation and closure. Used for spider and varicose veins.	Like pouring cement down a drain--the chemical irritates the vein wall, causing it to scar shut.
Vein Stripping	Traditional surgical removal of the saphenous vein through groin and ankle incisions. Largely replaced by endovenous ablation.	Like pulling a rope out of a tunnel--surgically removing the entire vein from groin to ankle.

Additional Clinical Terms

Term	Definition	Analogy / Example
Arteriovenous Fistula (AVF)	A direct connection between an artery and vein, created surgically for dialysis access using the patient's own vessels.	Like connecting two pipes of different pressures--the artery's high flow expands the vein for dialysis needles.
Arteriovenous Graft (AVG)	A synthetic tube connecting an artery and vein for dialysis access when native vessels are inadequate.	Like installing a bypass bridge between artery and vein--synthetic material creates the connection.
Fistula Maturation	The process by which an AV fistula becomes large enough for dialysis use, typically taking 6-12 weeks.	Like training a vein to handle high pressure--the fistula needs time to grow large and strong enough for dialysis needles.
Hemodialysis Access	Surgically created connection between artery and vein (fistula or graft) for dialysis. Ultrasound evaluates maturation and complications.	Like creating a superhighway for dialysis--connecting artery to vein makes the vein big and strong enough for needle access.
Homan's Sign	Pain in the calf on dorsiflexion of the foot, historically associated with DVT. Now considered unreliable for diagnosis.	Like an old myth that won't die--this test was once thought to diagnose DVT, but it's not accurate.
Malignancy-Associated Thrombosis	DVT occurring in cancer patients due to tumor compression or production of clotting factors (Trousseau's syndrome).	Like cancer setting off the clotting alarm--tumors can produce substances that make blood clot too easily.
May-Thurner Anatomy	Anatomical variant where the right common iliac artery compresses the left common iliac vein against the spine.	Like a design flaw where pipes cross--one artery sits on top of the vein, squishing it.

Term	Definition	Analogy / Example
Nutcracker Syndrome	Compression of the left renal vein between the aorta and superior mesenteric artery, causing hematuria and flank pain.	Like the renal vein being squeezed in a nutcracker--caught between two major arteries.
Pelvic Congestion Syndrome	Chronic pelvic pain caused by ovarian and pelvic vein varicosities and reflux.	Like varicose veins in the pelvis--venous blood pools in the pelvic veins, causing chronic pain.
Phlegmasia Alba Dolens	Early stage of massive DVT with pale, white, swollen leg due to arterial spasm from massive venous occlusion.	Like the leg turning white and painful--early stage before it turns blue, still an emergency.
Phlegmasia Cerulea Dolens	Massive iliofemoral DVT causing severe leg swelling, cyanosis (blue color), and pain. A surgical emergency.	Like a leg turning blue from blood backing up--massive clot blocks all drainage, threatening the limb.
Septic Thrombophlebitis	Venous thrombosis associated with infection, often related to IV catheters. Requires antibiotics.	Like an infected clot--bacteria have colonized the thrombus, making it dangerous.
Venous Gangrene	Tissue death caused by massive venous occlusion, usually in advanced cancer. Rare but often fatal.	Like the tissue dying from backed-up blood--massive venous blockage prevents any drainage.

Quick Reference: DVT Ultrasound Findings

Feature	Acute DVT	Chronic DVT
Echogenicity	Echolucent (dark)	Echogenic (bright)
Vein size	Dilated	Contracted (smaller)
Compressibility	Non-compressible	May partially compress
Thrombus attachment	May be free-floating	Firmly adherent
Collaterals	Absent	Present
Valves	May be visible	Damaged/thickened

Quick Reference: Reflux Time Thresholds

Vessel	Abnormal Reflux
Saphenous veins	>500 ms (0.5 sec)
Deep femoropopliteal veins	>1,000 ms (1.0 sec)
Perforating veins	>350 ms

Quick Reference: CEAP Clinical Classification

Class	Description
C0	No visible or palpable signs of venous disease
C1	Telangiectasias or reticular veins
C2	Varicose veins
C3	Edema
C4a	Pigmentation or eczema
C4b	Lipodermatosclerosis or atrophie blanche
C5	Healed venous ulcer
C6	Active venous ulcer

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Dr. Alice Matthews · amatthews@concorde.edu · alice@deepneuro.ai · Concorde Career College Portland