Chronic Venous Insufficiency: Diagnosis and Medical Management
Disclosures

- None
Learning Objectives

- Make the clinical diagnosis of chronic venous insufficiency
- Recognize common complications of chronic venous insufficiency
- Manage chronic venous insufficiency and its early complications
Introduction

- CVI is the most common vascular disorder
- Associated with chronic disability, diminished quality of life, and high health care costs
- Varicose veins in the absence of skin changes are not indicative of CVI

Risk Factors

- Increased age
- Increased BMI
- Female gender
- Prior deep venous thrombosis (may not be recalled)
- Family history of venous disease
- Smoking
- History of lower extremity trauma
- Pregnancy

Co-Morbid Conditions

- Comorbid conditions can contribute to diagnostic difficulty and management complexity
  - PAD
  - Coronary artery disease
  - Heart failure
  - Diabetes
  - Arthritis

Symptoms

- **Limb discomfort**
  - Worse with standing or with feet dependent
  - Improves with leg elevation or walking

- **Itching**

- **Numbness and tingling**

Clinical Findings

- Vein abnormalities
- Edema
- Skin discoloration
- Lipodermatosclerosis
- Ulcers
- Stasis dermatitis

Venous Findings

- **Telangiectasias**
  - Confluence of dilated intradermal venules <1 mm in diameter

- **Reticular veins**
  - Dilated, bluish subdermal veins, 1-3 mm in diameter, tortuous

- **Varicose veins**
  - Subcutaneous dilated, tortuous veins >3 mm in diameter

Edema

- Dependent ankle edema
  - Progress over time to include the calf region
  - May be present only at the end of the day but eventually is persistent
  - Often unilateral (particularly early)
CVI-Related Edema

- Venous abnormalities present
- Hyperpigmentation present
- Subsides with recumbency (chronic lymphatic obstruction does not)
- Normal CVP
- Poor or adverse response to diuretics
Skin Discoloration

- Hemosiderin deposition
- Most prominent at the medial ankle
- Can evolve to involve foot and lower leg
- May predispose to lipodermatosclerosis
**Lipodermatosclerosis**

- Fibrosing panniculitis of the subcutaneous tissue
- Firm area of induration at medial ankle
- Entire leg can become circumferentially involved
- May impede venous and lymphatic flow
- Prone to repeated bouts of cellulitis

Venous ulceration

- CVI is the most common cause of leg ulcers
- Medial ankle
- Multiple or single
- Painful, shallow, exudative with a granulation base
- Can extend circumferentially around the leg

Other Ulcers

- **Arterial ulcers**
  - Painful, punched out or stellate
  - Pale or black or yellow eschar
  - Surrounding skin is red and taut
  - Common on the foot over pressure points
  - Other signs of arterial insufficiency

- **Neuropathic foot ulcers**
  - Areas of increased pressure at sites of bony prominences
  - Surrounded by a thick hyperkeratosis with undermined borders
  - Ulcer is usually insensate
Stasis Dermatitis

- Common and early complication of CVI
- Inflammatory process causing an eczematous rash
  - Itching, erythema, inflammatory papules, scaling, weeping, erosions, and crusting
- Excoriations from itching
- Acute stasis dermatitis often mistaken for cellulitis
Contact Dermatitis

- Common in CVI and difficult to diagnosis
  - Redness, pruritus, and vesicle or bullae formation
  - Mimics stasis dermatitis and cellulitis
- Most commonly characterized by failure to improve on appropriate therapy
- May be associated with eczematous rashes on other parts of the body

Pathophysiology

- **Venous hypertension**
  - Obstruction to venous flow
  - Dysfunction of venous valves
  - Failure of the "venous pump"

- Increased venous pressure is directed to the superficial system

Effects of Venous Hypertension

- Pressures can reach 60 to 90 mm Hg
  - Endothelial damage
  - Altered vessel anatomy
  - Valvular damage

- Microcirculation abnormalities
  - Tissue hypoxia
  - Leaky capillaries
  - Fibrin deposition
  - Leukocyte activation

Leukocyte Activation

- Leukocytes aggregate and adhere to the damaged endothelium and become activated
  - Abnormal vascular permeability and edema
  - Proteolytic enzymes facilitate the formation cutaneous ulcers
  - TGF-β1 fibrogenic cytokine release increases production of collagen
- Extravasated and degraded erythrocytes produce characteristic brown hyperpigmentation

Indications for Duplex Ultrasonography

- If a clinical diagnosis cannot be established but symptoms are suggestive
- Signs of CVI but symptoms are questionably related
- Venous ulceration
- CVI not responding to standard therapy

Ankle-Brachial Index

- Perform ABI to exclude PAD in patients compatible PAD symptoms
- Perform ABI in patients with weak or absent pulses
- An ABI ≤0.9 is diagnostic for PAD
- An abnormal ABI may influence therapy for CVI

Treatment Goals

- Improvement of symptoms
- Reduction of edema
- Treatment of lipodermatosclerosis
- Healing of ulcers

Treatment Strategy: Reduce Venous Hypertension

- Leg elevation
- Leg exercises
- Compression therapy
- Venous surgery
Leg Elevation

- **Heart level** for 30 minutes 3-4 times per day
- Improves cutaneous microcirculation
- Reduces edema
- Promotes healing of venous ulcers


Exercise

- Daily walking
- Ankle flexion exercises
  - Improvement in venous flow
  - Impact on preventing or healing venous ulcers is unknown

Static Compression Therapy

- Essential component
- Rapid symptomatic improvement (observational data)
- Evidence-based effectiveness for venous ulcers
  - Improved ulcer healing rates
  - Improve rates of secondary prevention
- Hosiery or bandages


Compression Therapy Indications

- Edema
- Lipodermatosclerosis
- Venous ulceration

Compression Therapy
Cautions/Contraindications

- Peripheral artery disease
  - Contraindicated ABI \( \leq 0.6 \)
  - Caution 0.6 – 0.9
- Acute stasis dermatitis
- Acute cellulitis

Mechanics of Compression Therapy

- Creates pressure gradient from distal to proximal
- Increases deep venous flow velocity and venous return
- Improves lymphatic flow and cutaneous microcirculation
- Decreases ambulatory venous pressure

Compression Hosiery

- Prescription
  - The grade of compression, stocking length and type of stocking
  - Five pressure gradients (<20, 20 to 30, 30 to 40, 40 to 50, and >50 mm Hg)
  - Minimum pressure 20 to 30 mm Hg for CVI

- Lengths
  - Knee-high (appropriate for most patients)
  - Thigh-high
  - Chaps (unilateral waist high)
  - Pantyhose
Tips for Compliance

- Silk liner
- Stockings with a zipper
- Leggings with Velcro fastening bands
- Donning devices
- Lower grade compression stockings (<20 mm Hg) are more beneficial than nothing
- Compression stockings can be worn over a simple dressing covering an ulcer
Inelastic Compression Bandages

- Must be applied by trained personnel
- Frequency of changing dependent on degree of drainage
- Unna boot
  - Single component bandage impregnated with zinc oxide that hardens after application
  - Relatively inexpensive
  - Easy to apply
  - Improves healing rates compared with placebo
Dynamic Compression Therapy

- For those who cannot tolerate static compression
- Plastic air cylinder that encases the lower leg
  - Periodically inflates to a preset pressure and then deflates
  - Single chamber or multi-chamber
- They may increase ulcer healing when compared with no compression
  - Impact on healing when used instead of or added to compression stockings/bandages is unclear

Venoactive Drugs

- Escin (horse chestnut seed extract)
  - HCE reduces leg volume and edema
  - Equivalent to compression reducing leg volume and edema
  - Improves symptoms related compared with placebo
  - Available as a dietary supplement
  - Safe, well tolerated

Rheologic Agents

- **Aspirin**
  - Improved ulcer healing rates
  

- **Stanozolol**
  - Reduced area of lipodermatosclerosis
  
Rheologic Agents

- Pentoxifylline
  - Improve ulcer healing rates with or without compression

Emollients and Barriers

- Emollients maintain a skin barrier and lubricate the skin
  - Limits dryness, itching, and fissuring
- Common emollients are petrolatum, mineral oil and dimethicone silicon oil
  - Vaseline, Aquaphor, Lubriderm, Cetaphil, and Aveeno
- Ammonium lactate used when scaling is present
  - Lac-Hydrin, AmLactin
- Topical barriers are used to protect the skin from exudative ulcer drainage
  - Petrolatum, zinc oxide
Topical corticosteroids

- Stasis dermatitis
  - Erythema, inflammation, pruritus, and vesicle formation
- Group III or IV topical corticosteroids
  - Triamcinolone, fluocinolone, betamethasone
Systemic Antibiotics

- Systemic antibiotics for clinical infection
- Empiric treatment
  - Target Gram positive (MRSA) and negative organisms, including Pseudomonas

Topical Therapy

- Little or no evidence for topical therapies
  - Antibiotics
  - Cadexomer iodine
  - Silver sulfadiazine
  - Povidone iodine
  - Acetic acid
  - Hydrogen peroxide
  - Enzymatic agents
  - Honey
Ulcer Dressing

- Ulcer dressings
  - Control exudate, maintain moisture, control odor, and help control pain
  - Facilitate epithelialization and speeds healing
- Options
  - Semipermeable adhesive films
  - Simple nonadherent dressings
  - Paraffin gauze
  - Hydrogels, hydrocolloids, alginites,
  - Silver impregnated dressings or foams
Ulcer Dressing

- Specific dressing does not significantly affect ulcer healing when compression therapy used

Customizing Dressings

- Dressings are characterized by their composition and properties
  - Adherence, absorbency, conformability
- Occlusive dressings
  - Speed reepithelialization, stimulate collagen synthesis, and encourage angiogenesis
  - Decrease infection rates
  - Ease of application and reduction of pain
  - Can be changed by the patient every five to seven days at home.
Customized Dressings

- Low-adherent gauze dressings
  - Daily or more frequent dressing changes
  - Drainage and odor can be problematic.
  - Inexpensive

- Hydrogels and alginate dressings
  - Highly absorbent
Venous Surgery

- Persistent ulcers
- Recurrent ulcers
- Other symptoms unresponsive to medical therapy
Summary

- CVI is a clinical diagnosis (abnormal veins, edema, hyperpigmentation, discoloration, lipodermatosclerosis)
- Duplex Doppler and ABI are performed as needed
- Leg elevation
- Lower extremity exercise
- Compression improves ulcer healing
- Dressings can be customized to meet needs of wound
- Topical drugs are not useful
- ASA, horse chestnut seed extract, pentoxifylline may be helpful
- Surgery for selected cases