

Chronic Ulcers

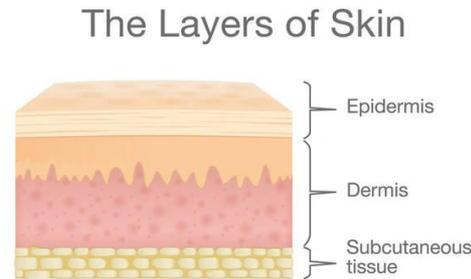
Hala Hindiyeh
Haya Hindiyeh
Ali Shahin
Amr El-Mousa

Definition and Etiology

Ulcer: Destruction of the epidermis that extends into the dermis and may reach subcutaneous fat or deeper tissues.

Common causes:

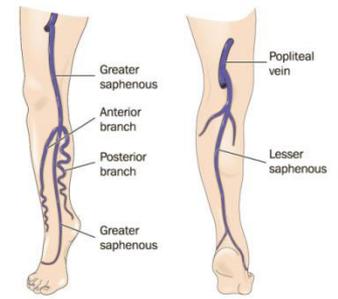
- Venous.
- Arterial.
- Neuropathic.



(These three account for up to 90% of leg ulcers)

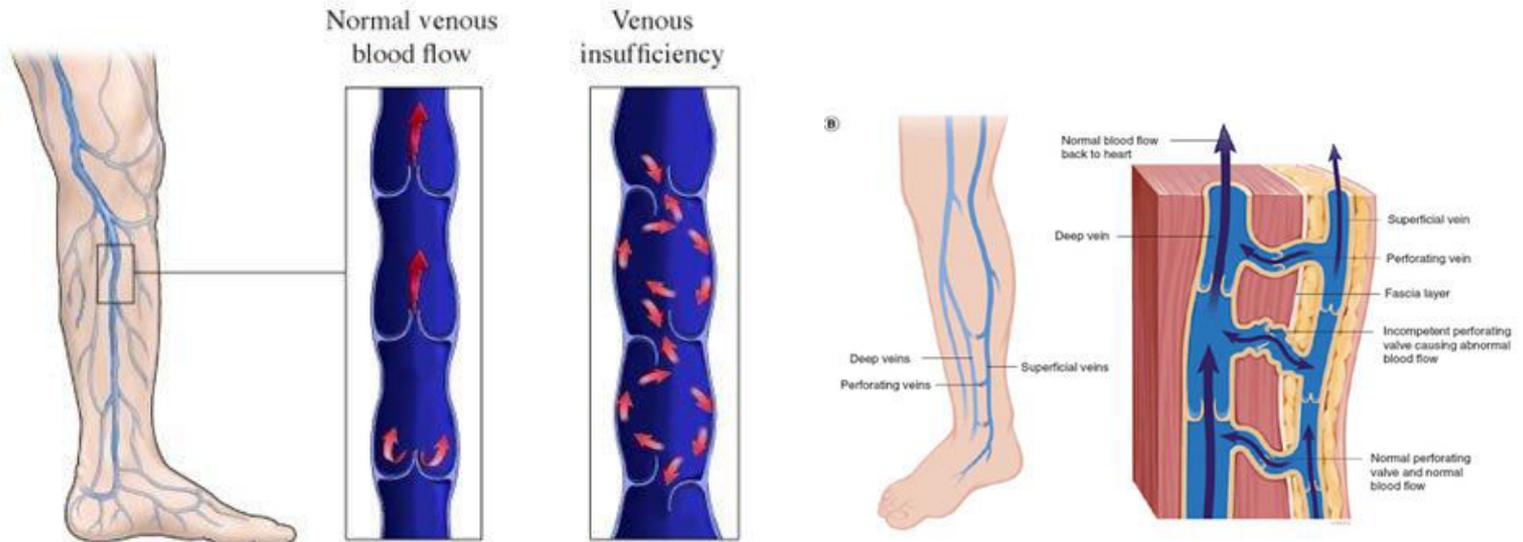
Less common causes: Physical injury, infection (cellulitis, tuberculosis), vasculopathy, pyoderma gangrenosum, panniculitis, malignancy, and medications.

Venous Insufficiency



Chronic venous disease is the most common cause of leg ulcers.

CVI: A condition that occurs when the venous wall and/or valves in the leg are not working efficiently, because of aging or extended sitting or standing, making it difficult for blood to return to the heart; this causes blood to pool or collect in the veins, cause stasis and long standing venous HTN.



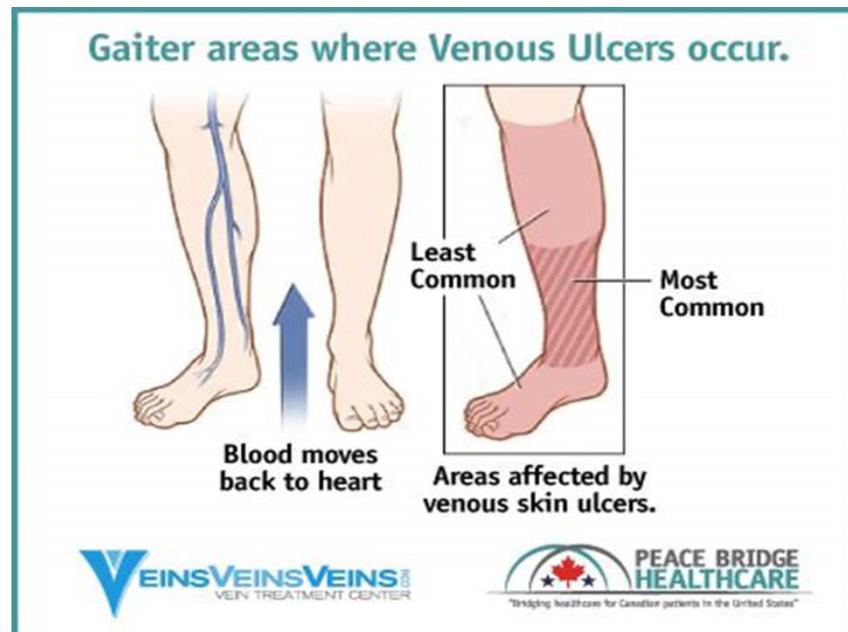


Risk factors for venous insufficiency:

- Advancing age.
- Female sex.
- Obesity.
- Pregnancy.
- Prolonged standing.
- History of DVT.

Clinical features

Venous insufficiency ulcers frequently affect the **gaiter area** of the leg (extends from the mid-calf to the ankle). The skin immediately above the medial or lateral malleolus is the most common site, with the medial aspect affected most frequently.



Clinical Features

- Ulcers are typically shallow.
- Irregular borders.
- With yellow, fibrinous exudate overlying the wound bed.
- Pain is mild to moderate.
- Arterial pulses are normal unless there is concomitant arterial insufficiency.



Additional clinical findings:

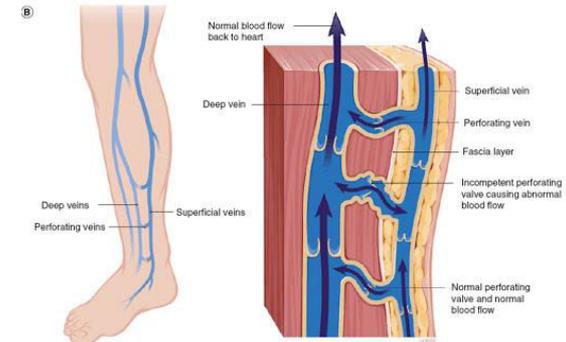
- Telangiectasia of the feet and ankles.
- Peripheral edema.
- Venous varicosities.
- Brown discoloration of the lower leg & feet (due to hemosiderin deposition in tissue macrophages).
- Venous stasis dermatitis.



Diagnosis

Venous ulcers are diagnosed **clinically**.

Non-invasive venous imaging US assesses **reflux and obstruction** in the superficial and perforating veins and is indicated if the diagnosis is not clear or if surgical intervention is being considered.

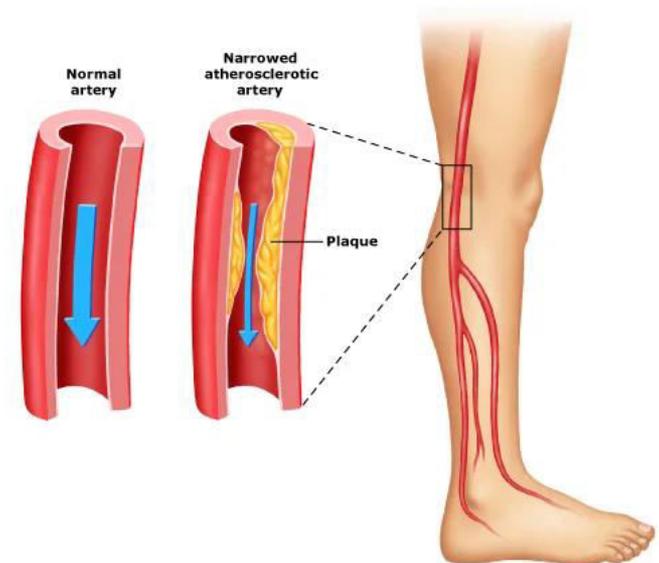


Arterial Insufficiency

Peripheral artery disease (PAD), a manifestation of atherosclerosis leads to reduced blood flow to the extremities and may result in tissue necrosis and leg ulcers.

Risk factors of PAD:

Diabetes, smoking, HTN, hyperlipidemia, a history of MI, angina or stroke.



Clinical Features

- Typically occur distally: on the toe or on pressure areas (heel, malleolus and shin).
- Well demarcated edges (giving punched out appearance).
- Unlike venous ulcers, arterial ulcers are very painful.
- Patient with PAD: may complain of intermittent claudication.
- On exam: decreased hair density, shiny and thin skin, and diminished or absent peripheral pulses.



Clinical Features

- Peripheral dry gangrene may occur with disease progression.
- Positive Buerger's test (prolonged pallor with leg elevation to 45 degrees for one minute).



Staging of PAD

| Rutherford stage | Fontaine stage | Description/definition |
|------------------|----------------|---|
| 0 | I | Asymptomatic |
| 1 | IIa | Mild claudication |
| 2 | IIb | Moderate claudication |
| 3 | IIb | Severe claudication |
| 4 | III | Rest pain |
| 5 | IV | Ischemic ulcers of the digits of the foot (minor tissue loss) |
| 6 | IV | Severe ischemic ulcers or gangrene (major tissue loss) |

Neuropathy

- In peripheral neuropathy, there is a loss of protective sensation, which leads to repetitive stress and unnoticed injuries forming, resulting in painless ulcers forming on the pressure points on the limb.
- Diabetic neuropathy is responsible for the vast majority of neuropathic ulcers.
- Diabetic patients may have up to **25%** lifetime risk of developing a foot ulcer.
- Other causes of peripheral neuropathy: spinal cord disorders, tabes dorsalis, alcohol abuse, nutritional deficiencies, and autoimmune diseases.
- Foot and ankle ulcers take time to develop.
- Usually noticed due to pain (interference with life), discharge or bleeding.

Clinical Features

- They are painless.
- Occur over pressure points on the foot or heel.
- Punched out morphology and typically occur within a thick callus.
- Associated clinical findings of diabetic neuropathy: claw toe, neuropathic arthropathy (Charcot foot), reduced sweating resulting in dry scaly feet.

Diabetic Foot Ulcer



Normal Foot



Charcot Foot

Clinical Features

- Sensory exam confirms decreased sensation in involved area.
- History of diabetes or other involved neurological pathology.
- Grading:

| Grade | Lesion |
|----------|--|
| 0 | Intact skin |
| 1 | Superficial ulcer of skin or subcutaneous tissue |
| 2 | Ulcer extend into tendon, bone, or capsule |
| 3 | Deep ulcer with osteomyelitis or abscess |
| 4 | Gangrene of toes or forefoot |
| 5 | Midfoot or hindfoot gangrene |

4.28 Clinical features of venous and arterial ulceration

| Clinical feature | Venous ulceration | Arterial ulceration | Neuropathic ulceration |
|------------------|--|--|--|
| Sex | More common in women | More common in men | Equal in men and women |
| Risk factors | Thrombophilia, family history, previous deep vein thrombosis, varicose veins | Known peripheral vascular disease or risk factors for atherosclerotic disease, e.g. smoking, diabetes, dyslipidaemia, hypertension | Diabetes or other peripheral neuropathy (loss of sensation, loss of intrinsic foot muscle function, autonomic dysregulation) |
| Pain | Often painless but some patients have some pain that improves with elevating the leg | Severe pain, except in diabetics with neuropathy; improves on dependency | Painless or neuropathic pain |
| Site | Gaiter areas; 80% medial (long saphenous vein), 20% lateral (short saphenous vein) | Pressure areas (malleoli, heel, fifth metatarsal base, metatarsal heads and toes) | Pressure areas, sole of foot, tips of toes |
| Appearance | Shallow, irregular margin Slough on granulating base | Regular, 'punched out' Sloughy or necrotic base | Macerated, moist white skin surrounded by callus, often on load-bearing aspects (motor neuropathy) |
| Surrounding skin | Lipodermatosclerosis always present Oedema | Shiny, hairless, trophic changes | Dry due to reduced sweating (autonomic neuropathy) |
| Veins | Full and usually varicose | Empty with 'guttering' on elevation | Normal |
| Temperature | Warm Palpable pulses | Cold Absent pulses | Warm or cold due to autonomic neuropathy Palpable pulses |

History

- **The history of an ulcer**

- Duration:

When was it first noticed?

- First symptom:

What brought it to the patient's notice?

- Other symptoms:

What symptoms does it cause?

- Progression:

How has it changed since it was first noticed?

- Persistence:

Has it ever disappeared or healed?

- Multiplicity:

Has (or had) the patient any other lumps or ulcers?

- Cause:

What does the patient think caused it?

Ask patient about:

Intermittent claudication.

Rest pain.

History of trauma.

Severe pain (arterial).

Rapid ulcer development.

Underlying thrombosis or coagulopathy (venous).

Autoimmune diseases.

Other chronic disease (atherosclerosis, DM...).

Medication exposure.

Poor mobility (pressure).

Smoking.

A patient not responding to treatment might be due to incorrect diagnosis (example: malignancy).

Physical Examination

Local examination

- Site.
- Size.
- Shape.
- Surface.
- Depth.
- Color.
- Temperature.
- Tenderness.
- Edge.
- Regional lymph glands.
- State of local tissues:
 - Arteries
 - Nerves
 - Bones and joints
- General examination.



Sloping
(a healing ulcer)



Punched-out
(syphilis, trophic)



Undermined
(tuberculosis)



Rolled
(basal cell carcinoma)



Everted
(squamous cell carcinoma)

FIG 1.15 The varieties of ulcer edge.

Arterial assessment :

Inspection:

- Color: is the most notable feature in ischemic limb, first in lower limb and toes.
- Vascular angle: Angle at which leg becomes pale.
- Venous filling: collapsed veins called *guttering*.
- Pressure area: thick skin, purple discoloration..

Palpation:

- Temperature: cold mostly, and might be red.
- Capillary refill.
- Pulses: femoral, popliteal, posterior tibial and dorsalis pedis.
- Muscles and nerves: numb limbs.





Auscultation:

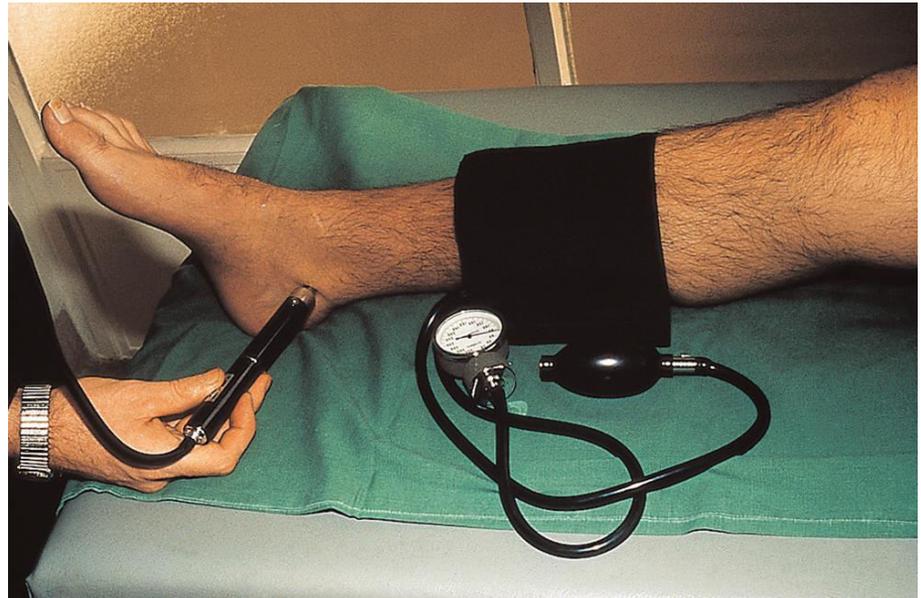
- Listen along the course of the major arteries.
- Also, arteries of neck, abdomen, groin and adductor canal.
- Listen to bruits (indicates turbulence).
- Take blood pressure.

Assess severity of ischemia

Pressure index:

- Normal (1:1)
- >1 : calcified limb vessels and stiff (diabetic).
- <1 : occlusive disease of foot vessel.

Doppler flow Detector.



Principles of Management

- Determine the etiology.
- Accurate assessment of the ulcers.
- Identify and correct co-morbid factors.
- Treat any underlying causes.
- Adequate drainage and debridement if necessary.
- Avoid any adherent dressings.

Investigations

- **General investigations:**
 - Complete Blood Count (CBC).
 - Urinalysis (UA).
 - Liver Function Tests (LFT).
 - Glucose assessment (FBG, HbA1C).
 - Lipid Profile.
 - C-reactive protein (CRP).
 - Others: X-rays, ECG, culture and sensitivity.

Investigations

- **Arterial:**
 - Ankle-Brachial Index (ABI).
 - Doppler US/ Duplex US.
 - Arteriography.
 - CT Angiogram, MR angiogram and Digital Subtraction Angiogram (DSA).

Investigations

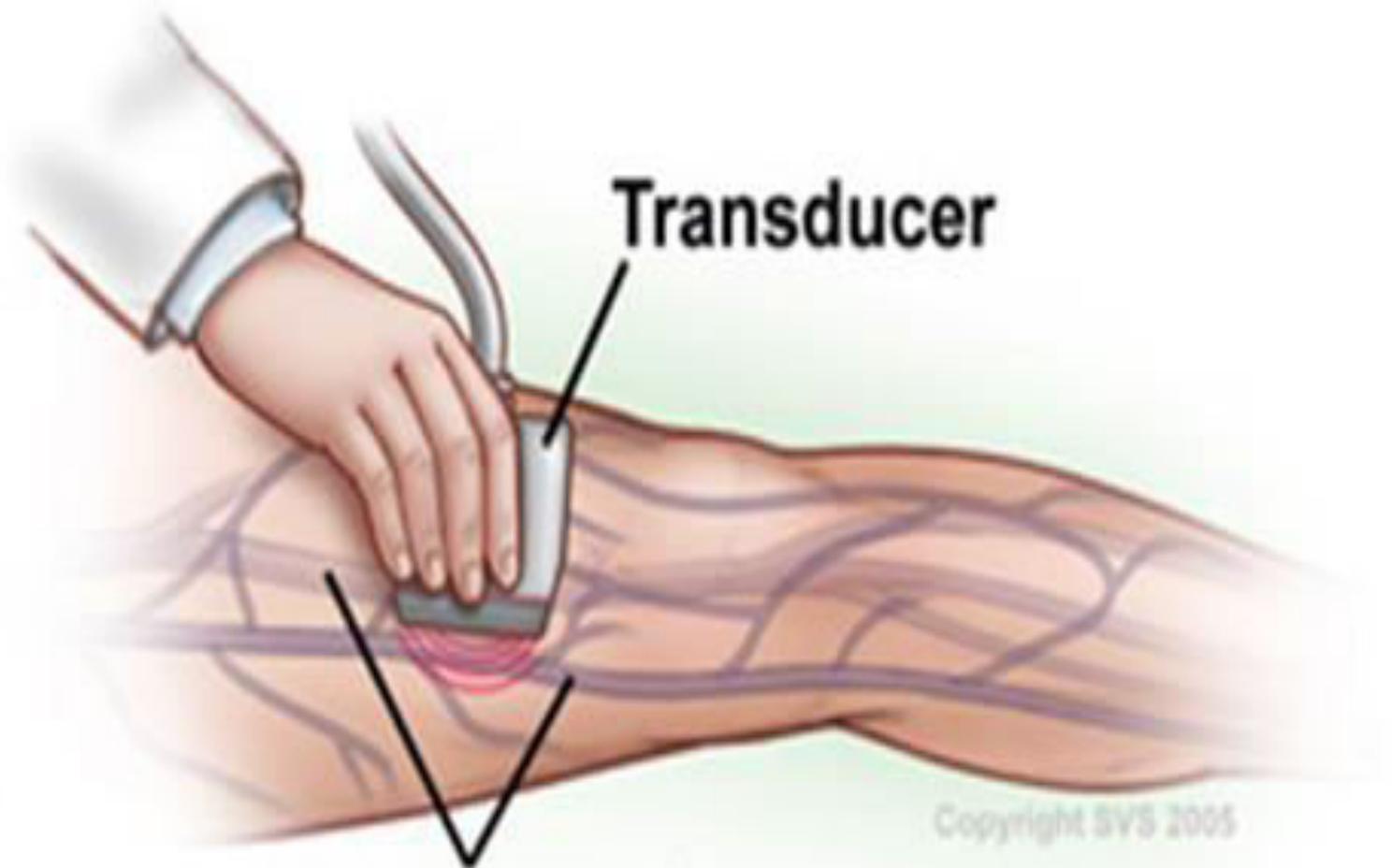
- Venous:
 - Doppler US/ Duplex US.
 - Ambulatory Venous Pressure (AVP).
 - Phlebography (ascending/ descending).
 - CT Venography and MR Venography.

Doppler Ultrasonography

- A standard doppler probe emits a sound when blood flows past the transmitting and receiving crystals.
- It could be uniphasic or biphasic.
- Advantages: Quick, cheap, easy and non-invasive.

Doppler Ultrasonography

- **Uses:**
 - To assess the patency of veins.
 - Venous reflux.
 - To exclude arterial disease.
 - To assess blood velocity and valve closure time.
 - Presence of acute or chronic DVT.
 - To assess for any varicose veins.



Transducer

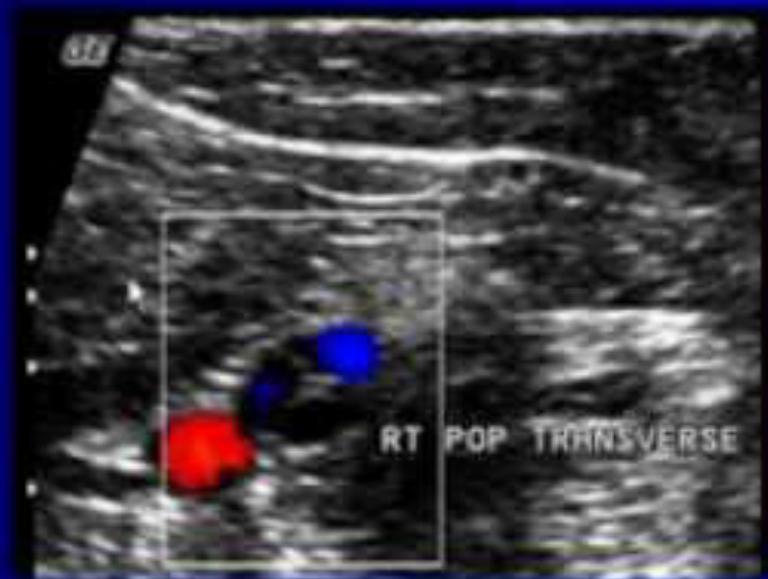
Blood vessels

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VENOUS INSUFFICIENCY

Duplex Ultrasound

- The deep venous system



Phlebography

- Not really used as it has been mainly replaced by duplex US.
- Gives us an anatomy of the deep venous system.
- Used to assess for the presence of a residual thrombus, extent of recanalization and the distribution of collaterals.



CT and MR Venography

- Ideal for imaging large central veins and not really used for small peripheral veins.

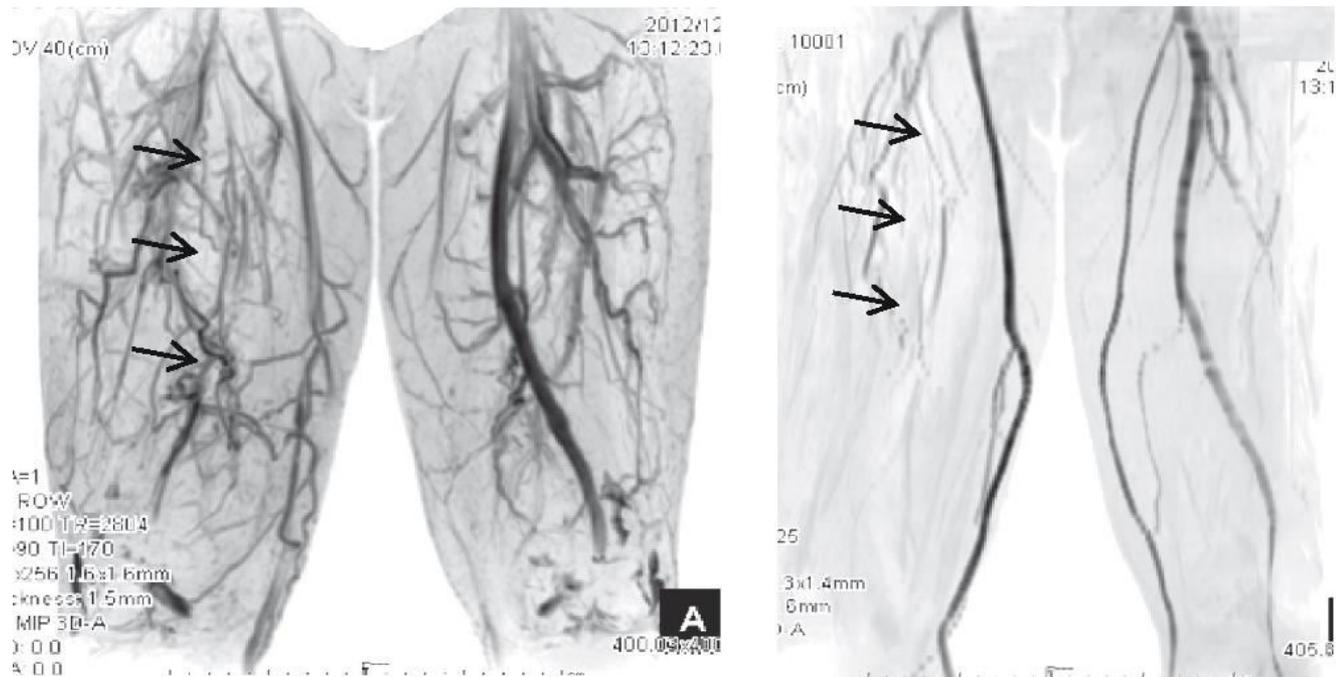
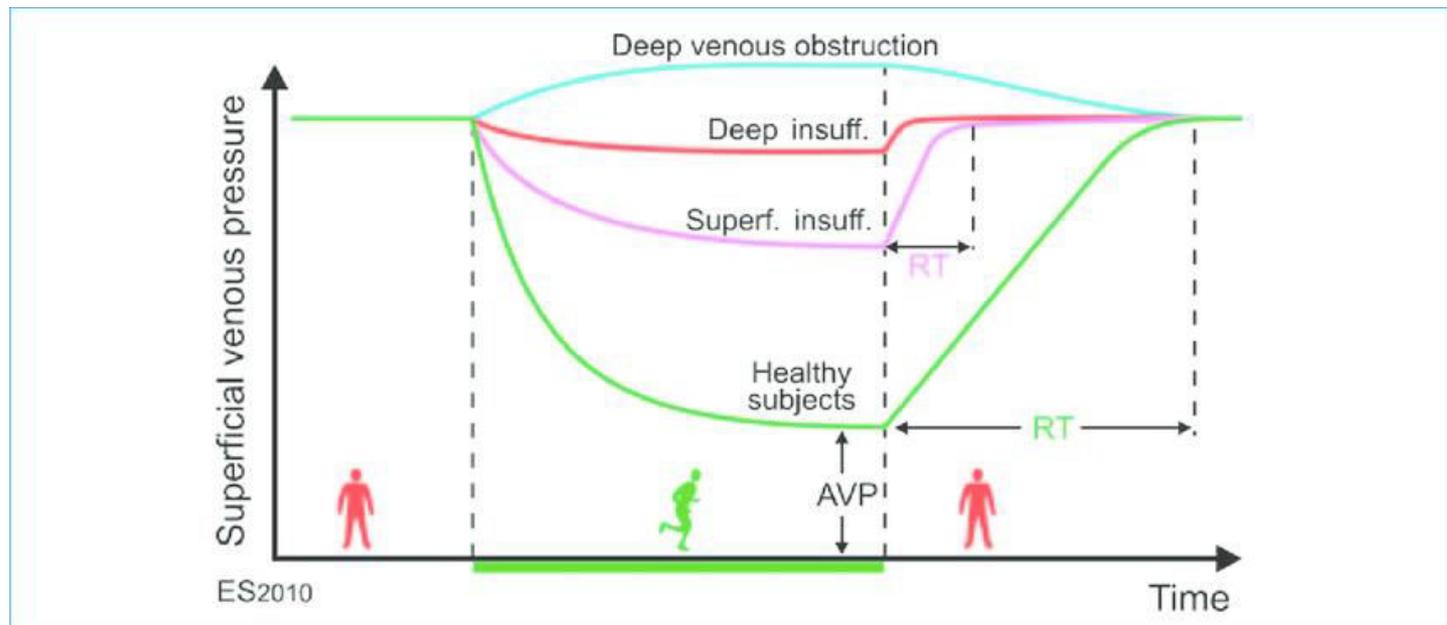


Fig. 2 MRV image with DVT in common femoral vein. MRV: magnetic resonance venography; DVT:

Ambulatory Venous Pressure

- Measurement of ankle venous pressure during walking.



Arteriography

- Gold standard for the assessment of arterial ulcers.
- Site: Could be brachial or femoral.
- Anticoagulants and oral hypoglycemics need to be stopped prior to the procedure (there should be a normal INR).

Overview of Treatment of Ulcer

- Medical Management and Lifestyle.
- Dressing and Topical Agents.
- Pharmacotherapy.
- Physical Therapies.
- Surgical Management.

SELF CARE GUIDELINES

- Keep mobile with regular walking if possible.
- Elevate legs when immobile.
- Use emollients and examine legs regularly for broken skin, blisters, swelling or redness.
- Lose weight if appropriate.
- Stop smoking.

Dressing and Topical Agents (Ideal Dressing)

- Control odor, exudates and or bleeding.
- Exclude pathogenic bacteria and minimize colonization.
- Relieve pain.
- Enhance healing.
- Protect the wound from further injury.
- Maintain the wound at body temperature.
- Reduce excessive scarring and or recurrence.

Venous Ulcer Treatment

- There is no proven role of antiseptics.
- Irrigate the wound with warm tap water or saline, then dry.
- Remove slough or necrotic tissue by gentle washing.
- Potassium permanganate 0.01% soak if the ulcer is malodorous.
- For uncomplicated, non-infected ulcers apply a simple low-adherent dressing like paraffin emollients, gauze and zinc & replace weekly.
- Other dressings may be used if needed - pain (hydrocolloid), heavy exudate (alginate) or slough (hydrogel).
- Biological dressing provide growth factors and scaffold for the ulcer healing. It is more promising this way.

Venous ulcer-treating infection

- All chronic wounds are colonized with bacteria.
- Antibiotics should be used only if there is evidence of cellulitis or active infection (e.g. pyrexia, increasing pain, enlarging ulcer).
- If there are clinical signs of infection present, clean ulcer with warm tap water or saline before taking a swab.
- Start immediate empiric treatment with an anti-staphylococcal antibiotic i.e., flucloxacillin or erythromycin 500mg qds for seven days.
- Change dressing daily or alternate days to assess if infection is improving.
- Do not use antimicrobial dressings.
- Do not start compression therapy if ulcer is infected.

Physical therapies

- Elevation and bed rest will eventually heal virtually all CVU.
- Regular exercise will improve AVP.
- Compression therapy has been the main stay of treatment for CVI.
- Elastic bandage has better healing rates.
- Multilayer has advantages over single layer – Charing cross four-layered bandage (42 at ankle and 17 below knee).
- In mixed ulcer, 3 layered compression bandage is used.
- Compression is contraindicated if the ABPI < 0.6.
- Replace every 6 months.
- Graduated compression stockings should be used for at least 5 years after ulcer healing.

Surgery- varicose ulcer

- Varicose vein – SFJ / SPJ ligation, GSV stripping, avulsion of varicosities.
- Open perforator surgery.
- Sub fascial perforator surgery.
- Deep vein reconstruction – Vein valve repair– Vein valve transplantation.
- Skin Graft.
- Amputation.

TREATMENT OF ARTERIAL ULCER

- It is not appropriate to debride arterial ulcers as this may produce further ischemia and formation of a larger ulcer.
- Compression bandaging should not be applied.
- Choice of dressing is dictated by the nature of the wound.

TREATMENT OF NEUROPATHIC ULCER

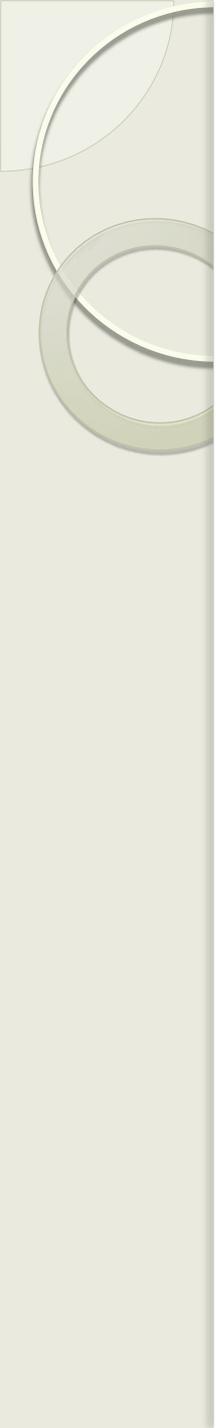
- GENERAL ISSUES:

1. Good well-fitting shoes with sufficient depth.
2. Careful toenail cutting.
3. Never attempt to trim calluses.
4. Surgery- excision of prominent bone.
5. Eradication of infection.
6. Dressing.
7. Surgical debridement and or amputation for neuroischemic or ischemic ulcer.



References:

- Uptodate
- Browse introduction to the symptoms and signs of surgical disease.



THANK YOU