



Venous Disorders

Varicose veins + DVT

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VENOUS INCOMPETENCE - VARICOSE VEINS

Definition

- a superficial vein of lower limb which has permanently lost its **valvular efficiency**, &
- due to resultant **venous hypertension** in standing position become **dilated, tortuous & thickened**.

CEAP Classification

1. *Clinical*

- | | | |
|----|---------|---|
| 1. | Class 0 | No visible or palpable signs |
| 2. | Class 1 | Telangiectasia /reticular veins (1-3 mm) |
| 3. | Class 2 | Varicose veins (5-15mm) |
| 4. | Class 3 | Edema |
| 5. | Class 4 | Skin changes (lipodermatosclerosis, atrophie blanche, eczema) |
| 6. | Class 5 | Healed ulceration |
| 7. | Class 6 | Active ulceration |

2. *Etiological*

- | | | |
|----|----|------------|
| 1. | EC | Congenital |
| 2. | EP | Primary |
| 3. | ES | Secondary |

3. *Anatomical*

- | | | |
|----|----|-------------------|
| 1. | AS | Superficial |
| 2. | AD | Deep veins |
| 3. | AP | Perforating veins |

4. *Pathophysiological*

- | | | |
|----|-----|-------------|
| 1. | PR | Reflux |
| 2. | PO | Obstruction |
| 3. | PRO | Both |

Etiology

Primary Varicose Veins

- failure of vein valves leads to reflux into superficial veins.
 - Congenital paucity of valves.
 - Increased hydrostatic pressure, eg prolong standing.
 - Pregnancy (estrogen & progesterone).
- **Mechanism**
 - First a small gap appears b/w valve cusps at commissure
This gap widens & venous reflux occurred
Valve cusps degenerate & holes develop in them
Eventually they disappear completely
Vein below the valve responds by dilating.

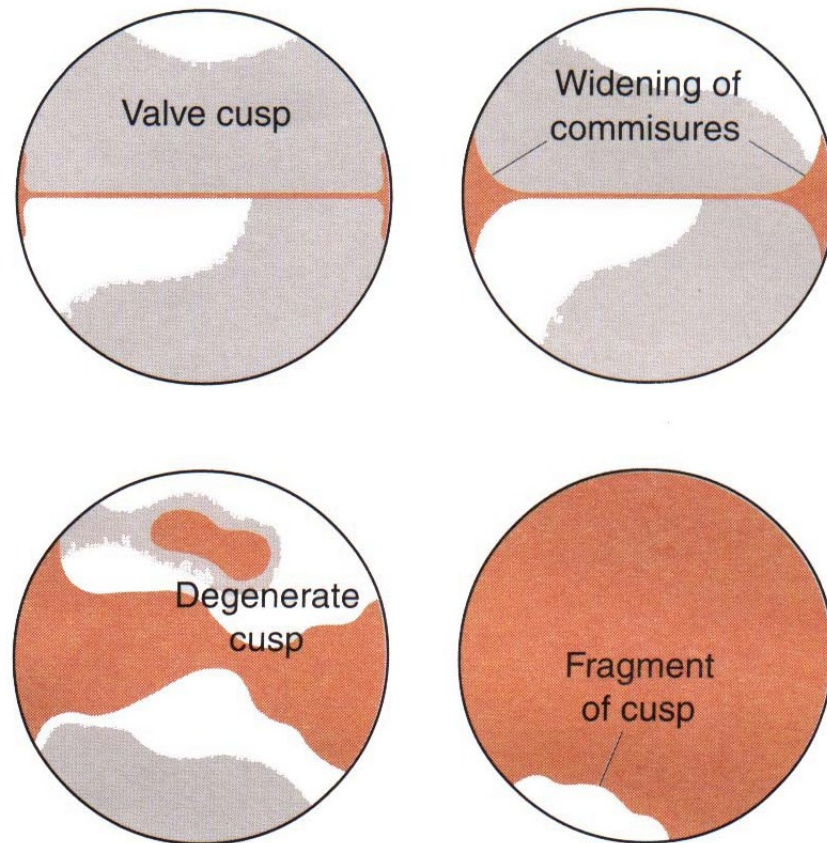


Fig. 16.7 Stages of development of venous valvular incompetence.

Secondary Varicose Veins

(1) Deep vein thrombosis;

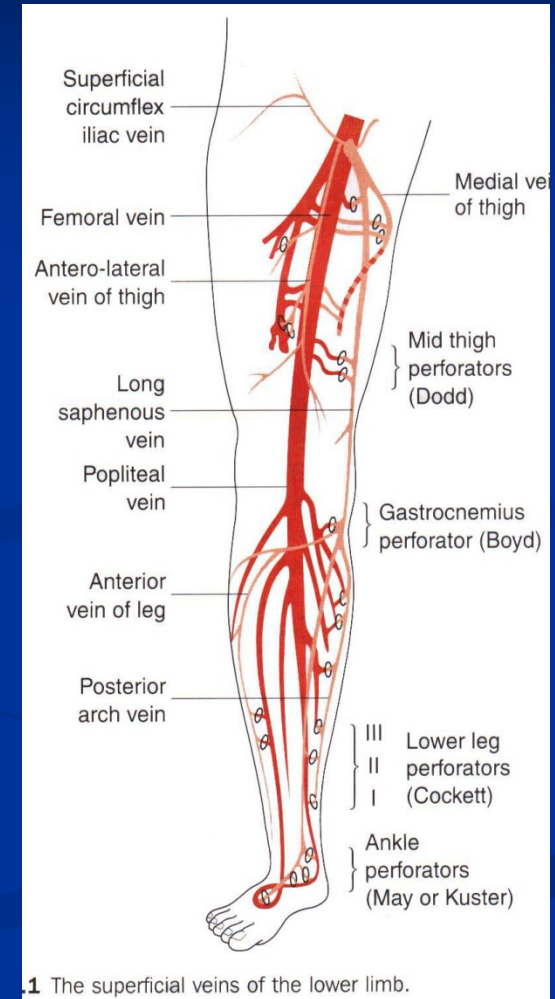
- Initially, occlusion of deep veins lead to varicosities.
- Later, deep veins recanalize, but with damaged valves, resulting in reflux & incompetence with varicosities.
- Occasionally veins fail to recanalize at all.

(2) Any obstruction which hampers venous return, eg tumors, pregnancy.

(3) Arteriovenous fistula.

Pathology

- Venous reflux in lower limb may occur at;
 - Saphenofemoral junction.
 - Mid-thigh perforators(Dodd).
 - Saphenopopliteal junction.
 - Gastrocnemius perforators (Boyd).
 - Lower leg perforators (Cockett).
 - Ankle perforators (May or Kuster).



- Ambulatory venous hypertension (about 150 mm Hg).
- Persistently raised venous pressure tracks back to the microcirculation of the skin & causes skin damage that eventually result in venous ulceration.

Clinical features

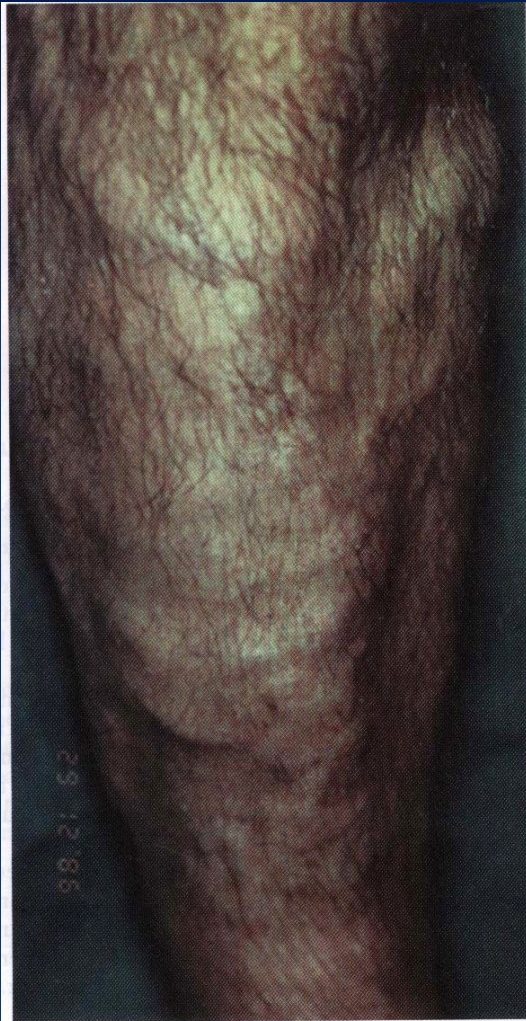
Symptoms

- A tired & aching sensation in whole of lower leg, & esp. in calf, towards the end of day.
- Sharp pains in grossly dilated thigh veins.
- Swelling of ankle towards evening.
- Itching of skin over varicosities.
- Restless legs.
- Unsatisfactory cosmetic appearance.

Signs

1. Dilated & tortuous veins

- widespread in both legs, or restricted to a single varix eg saphena-varix;
- Varices of major tributaries of saphenous veins or saphenous veins themselves are large (5-15 mm).
- Reticular varices (1-3 mm).
- Smaller varices (0.5-1 mm), referred as thread veins or dermal flares.



16.8 Varicose veins.



Fig. 16.9 Dermal flares, commonly called 'thread veins'.

2. Leg & skin changes

1. Calf muscle increases in size
2. Ankle edema.
3. Skin complications (mild eczema to severe ulceration);
 - Initially, **brown pigmentation** due to hemosiderin deposition.
 - Later, palpable induration develops in the skin & subcutaneous tissues, referred to as **lipodermatosclerosis**.
 - Occur esp just above the malleoli.
 - **Atrophie blanche**, & finally **venous ulceration**.
4. Contraction of the skin & subcutaneous tissues occurs, & the ankle becomes narrower.
 - Combination of a narrow ankle & prominent calf is referred to as a '**champagne bottle leg**.'



Fig. 16.10 Lipodermatosclerosis (scarring) and haemosiderosis (brown pigmentation of the skin) in a patient with venous disease.



Fig. 16.11 Venous ulceration.



Fig. 16.30 Extensive venous ulceration entirely due to missed superficial venous insufficiency.

3. Detection of incompetent valves

1. Trendelenburg test

- Determine the incompetency of saphenofemoral valve.

2. Tourniquet test

- Determine the presence & site of incompetent valves at other sites.

4. On percussion

- Conduction of a percussion impulse up & down the vein (Schwartz test).

5. On auscultation

- A continuous machinery murmur may be heard in cases of arteriovenous fistula.

Complications

- Thrombosis (superficial thrombophlebitis)
- Hemorrhage
- Venous eczema & pigmentation
- Lipodermatosclerosis
- Venous ulceration

Investigations

- Doppler ultrasound
- Duplex ultrasound imaging
- Venography
 - Ascending venogram provides excellent anatomical information.
 - Descending venogram show the incompetent valves.
 - Varicogram identify the source of recurrent varicose veins.

TREATMENT

Non-surgical treatment

1. Compression Stockings

- Classes 1-3.
- Helpful in the early stages.
- Do not prevent more varices or disappearance of varices.

2. Injection Sclerotherapy (Sodium tetradecyl)

- Used in the management of small varices, in the absence of junctional incompetence or major perforating veins.

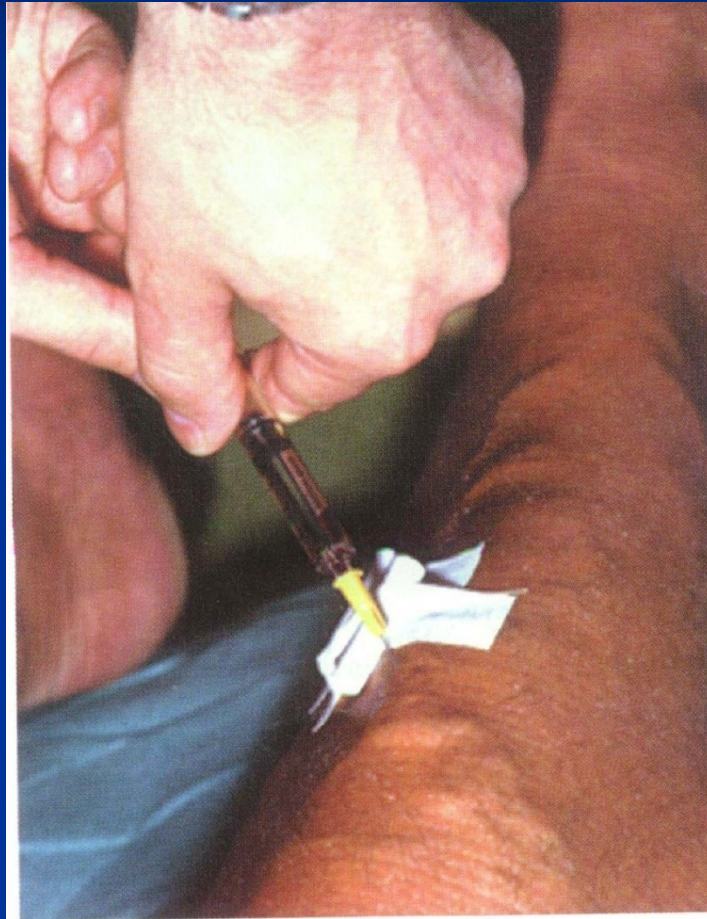


Fig. 16.21 Sclerotherapy for varicose veins.

Surgical treatment

- It is effective in removing varicose veins of the main saphenous trunks, as well as tributaries down to 3 mm.
- It is inappropriate where these form a major part of the venous drainage of the limb.

■ Operation consists of:

- Ligation of the source of the venous reflux (usually SFJ or SPJ);
 - sapheno-femoral ligation alone is referred as 'Trendelenburg procedure'.
- Removal of the incompetent saphenous trunks;
 - Babcock stripper (conventional way).
 - Oesch pin stripper (inverting or invaginating technique).
- Removal of associated varices by hook phlebectomy or multiple evulsions

■ Complications of varicose vein surgery

- Bruising & discomfort.
- Sensory nerve injury
 - Saphenous nerve & its branches accompany the long saphenous vein in calf
 - sural nerve accompanies the short saphenous vein.
- Motor nerve injury during exploration of the popliteal fossa.
- Venous thrombosis.

New surgical techniques

■ VNUS closure

- Involves intraluminal destruction of the long & short saphenous veins using a radiofrequency ablation catheter.

■ TRIVEX

- It is a percutaneous technique for removing superficial veins by suction, following injection of large quantities of fluid.

Venous reconstructive surgery

for venous occlusion & deep venous insufficiency

■ for venous obstruction, venous bypass procedures

- Simple bypass with vein or prosthetic material may be used in iliac veins & vena cava.
- **Palma operation**
 - It involves mobilizing the long saphenous vein in the opposite leg, tunneling its distal end suprapubically & inserting it into the femoral vein below the obstruction.

■ In deep venous insufficiency, venous valves in the deep veins may be repaired if their incompetence is a consequence of primary valve failure (Kistner).

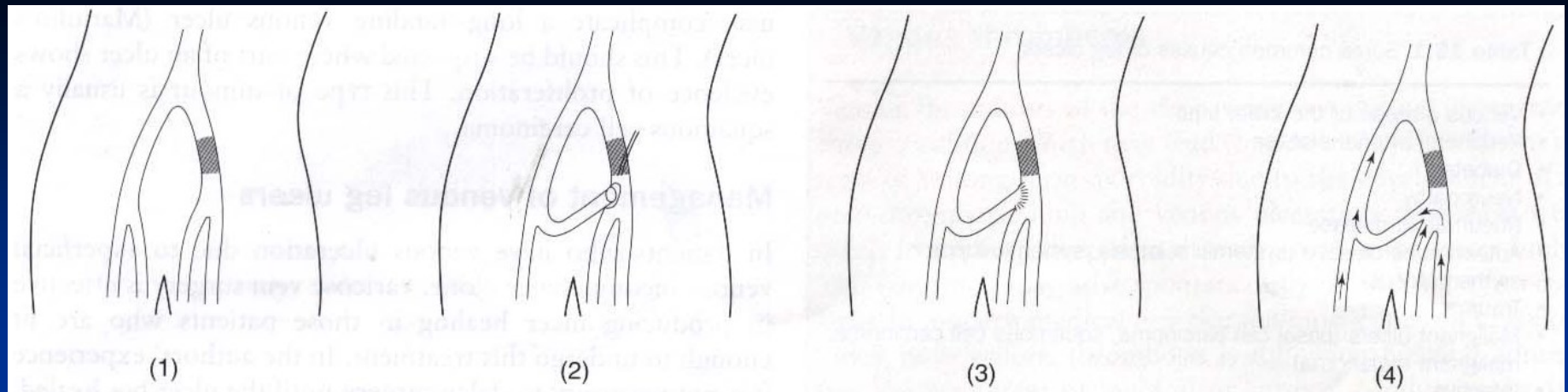
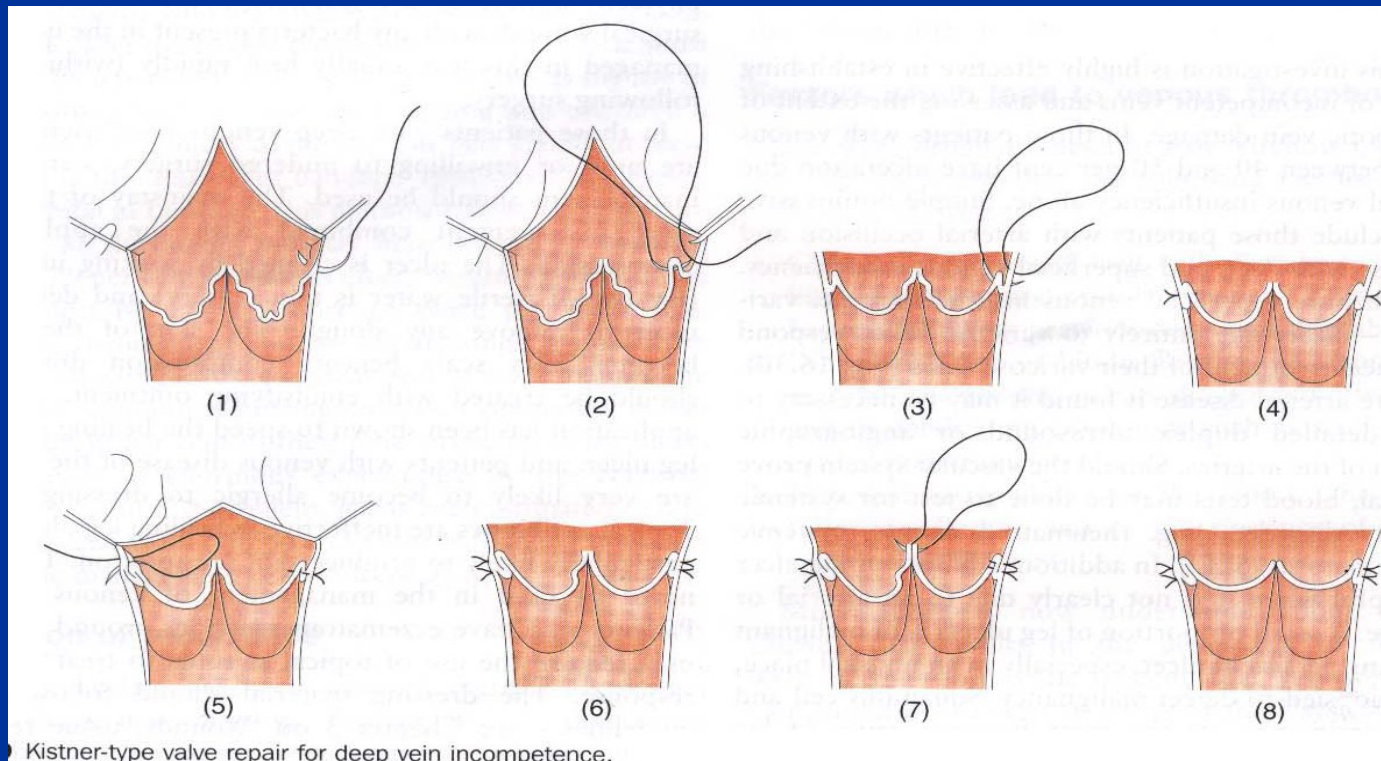


Fig. 16.28 Palma procedure – a femorofemoral vein graft constructed from the saphenous vein.



Kistner-type valve repair for deep vein incompetence.

DEEP VENOUS THROMBOSIS

- *Pelvic & calf veins are more often implicated than other deep veins.*

Predisposing Factors

1. *Damage to endothelium due to injury or inflammation;*
 - *Previous deep vein thrombosis*
 - *Muscular violence*
 - *Local trauma of any kind*

2. *Diminished rate of venous blood flow;*

- *During & after operations*
- *Debilitating conditions eg strokes & myocardial infarction.*
- *Immobility (bed rest > 4 days)*

3. *Increased coagulability of the blood;*

- *Following surgery*
- *Infection or systemic malignancy*
- *Congenital abnormality of clotting system, eg deficiency of antithrombin III, protein C, & protein S*
- *Antiphospholipid antibody or lupus anticoagulant*
- *Activated protein C resistance*
- *Other risk factors include increasing age, obesity, pregnancy, puerperium, high-dose estrogen therapy, & varicose veins.*

Clinical Features

Symptoms

- *Sudden pain & swelling in calf or whole leg.*
- *Pleuritic pain, breathlessness & hemoptysis, or even collapse (if pulmonary embolism occur).*

Signs

1. Swelling of leg

1. Just around the ankle, or upto groin.
2. *Phlegmasia alba dolens* (white or milk leg).
3. *Phlegmasia cerulea dolens* (congested & blue leg, with ulceration & gangrene in cases of extensive thrombosis of iliac & pelvic veins).

2. Muscle containing thrombosed veins may become hard & tender .

3. Homan's sign.

4. Dilated superficial veins

5. Hot limb



Fig. 16.32 Clinical deep vein thrombosis. Other conditions can simulate these signs

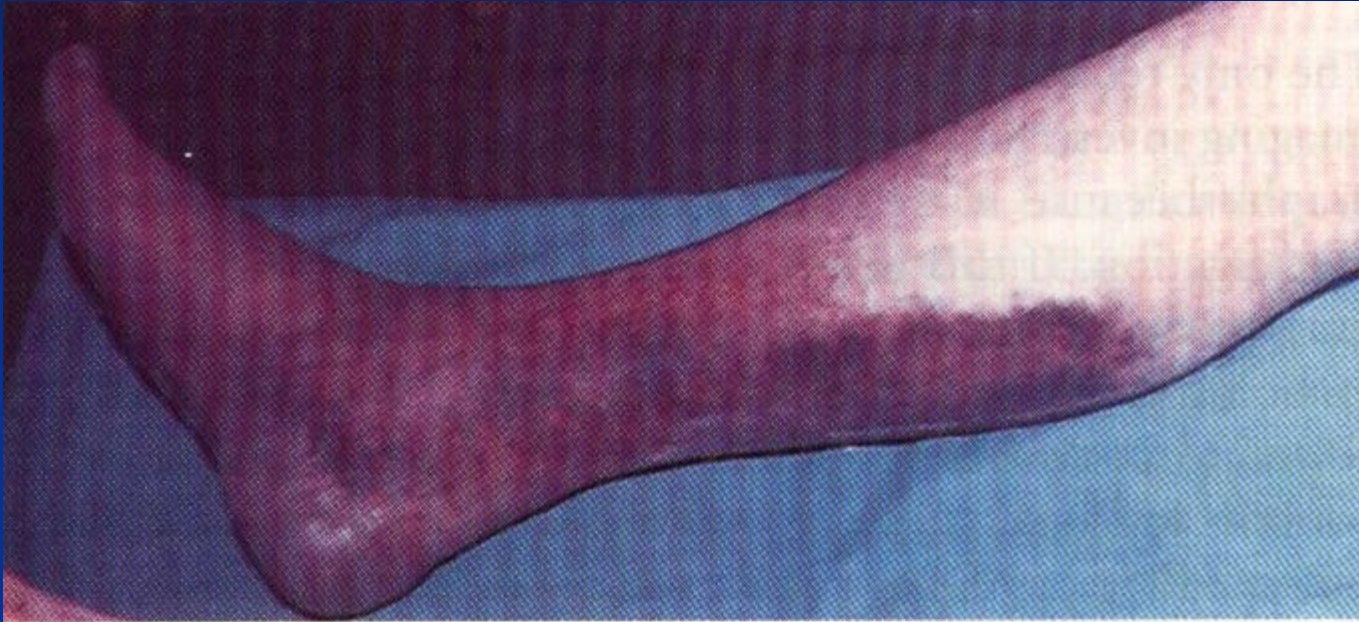


Fig. 16.34 Venous gangrene. Deep vein thrombosis.

Differential diagnosis

1. *Ruptured Baker's cyst*
2. *Ruptured plantaris tendon*
3. *Calf muscle hematoma*
4. *Superficial thrombophlebitis*

Diagnostic Investigations

1. *Duplex ultrasonography.*
2. *Ascending venography.*
3. *Enhanced helical CT scan (for pulmonary embolism).*

Treatment

Treatment of DVT

1. Anticoagulation

■ Standard method

- *IV heparin, bolus of 5000-10000 units followed by 10-15 units/kg/hour for 5 days, & controlled by APTT.*
- *Oral warfarin 2-5 mg/day in 1st week, then 5-7 mg/day, & is given for 3-6 months; dosage is controlled by INR.*

■ Alternative method

- *Low molecular-weight heparin, SC; dose is 20-40 mg preoperatively, then 20-40mg for 7-10 days.*
- *Oral warfarin.*

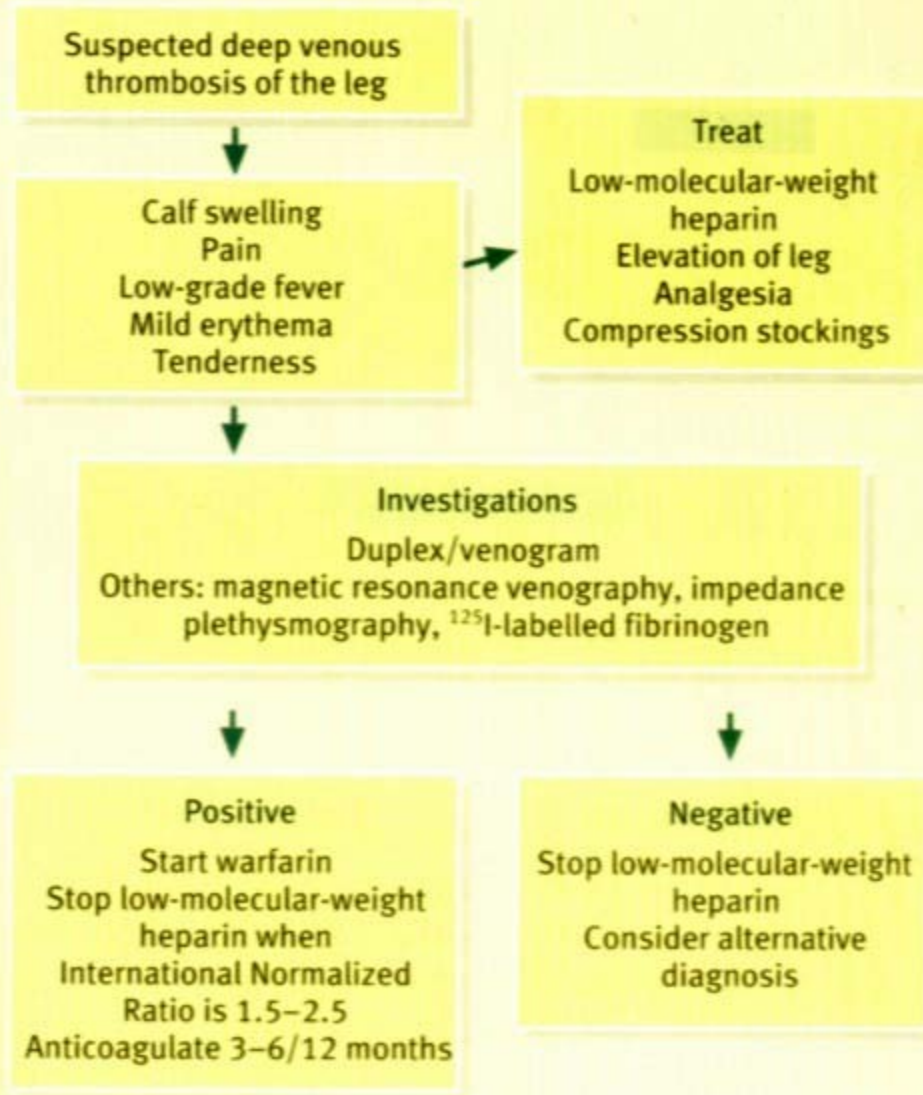
2. *Thrombolysis*

- *A catheter is passed into the affected vein, & a fibrinolytic drug eg streptokinase, urokinase or TPA, is infused directly into the clot to dissolve it.*

3. *Venous thrombectomy*

- *Performed if there is evidence of venous gangrene.*
- *Femoral vein is opened surgically via an incision in the groin, & all the clots are removed from the deep veins of leg & pelvis.*

Management of deep venous thrombosis of the leg



Treatment of pulmonary embolism

1. Acute minor embolus

Do not require specific treatment, but preventive measures are needed to prevent further episodes;

- *Systemic heparinisation & then oral warfarin.*
- *Inferior vena caval filter*

2. Acute massive embolus

- 1. Resuscitate the patient;*
 - 1. IV fluids.*
 - 2. Oxygen (100%).*
 - 3. IV heparin.*
- 2. Thrombolytic agents eg streptokinase & TPA may be given directly into the pulmonary artery to ensure high conc. at the appropriate site.*
- 3. Pulmonary embolectomy with or without cardiopulmonary bypass.*

Prevention of DVT

1. *Mechanical methods*

1. *Graduated compression stockings.*
2. *Sequential pneumatic compression devices.*

2. *Pharmacological methods*

1. *Low-dose heparin, 5000 units SC 2-3 times a day, for at least 5 days & extended into postdischarge period.*
2. *Low-molecular-weight heparin.*
3. *Dextran 70*
4. *Adjusted dose warfarin*



Fig. 16.33 Intermittent pneumatic compression device commonly used for the prevention of deep vein thrombosis.

Prevention of PE

■ *Greenfield filter*

- *inserted in inferior vena cava, radiologically via femoral or jugular vein*
- *it traps large thrombi in its wires & prevents them from occluding the pulmonary arteries.*

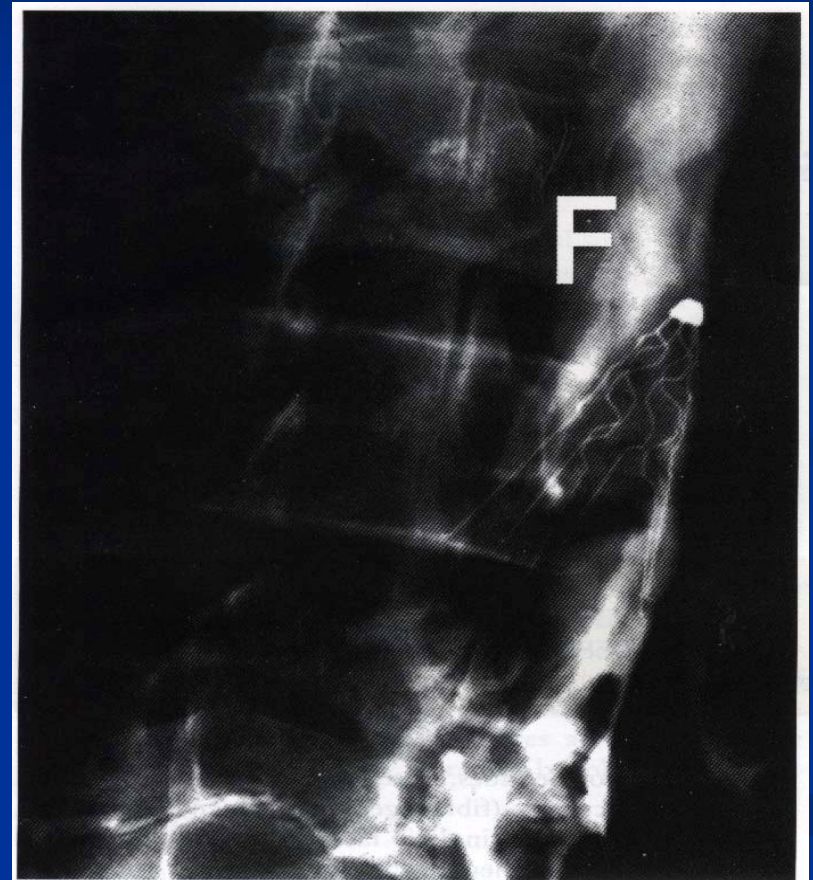


Fig. 16.35 Greenfield inferior vena cava filter, used to prevent pulmonary embolism from the lower limb veins.

Thank you!