

# 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

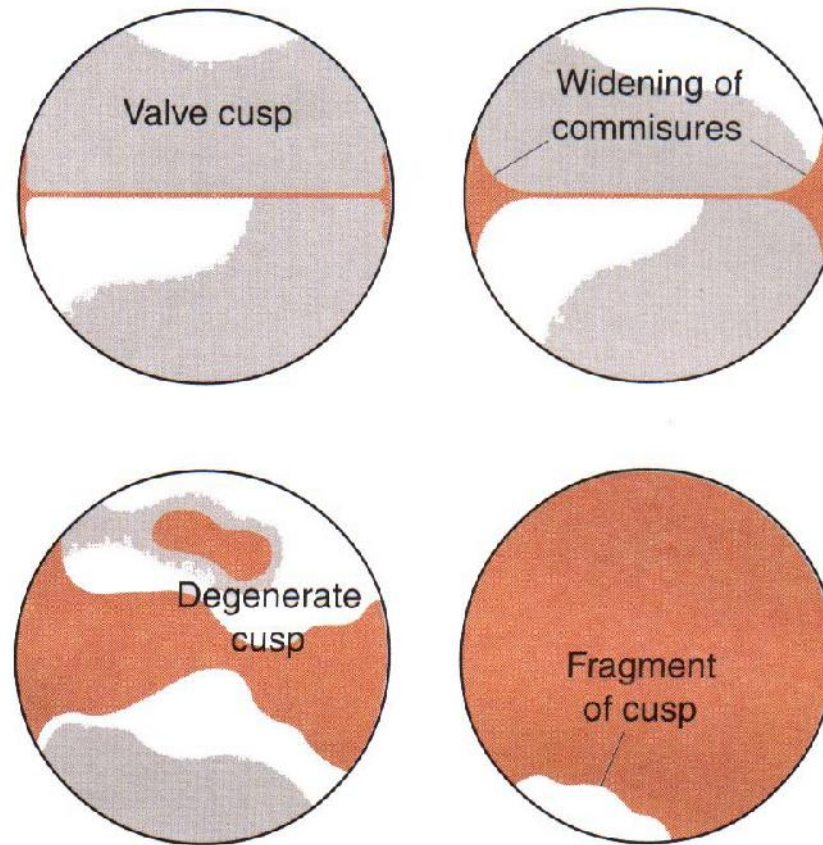
## 4. Pathophysiological

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.

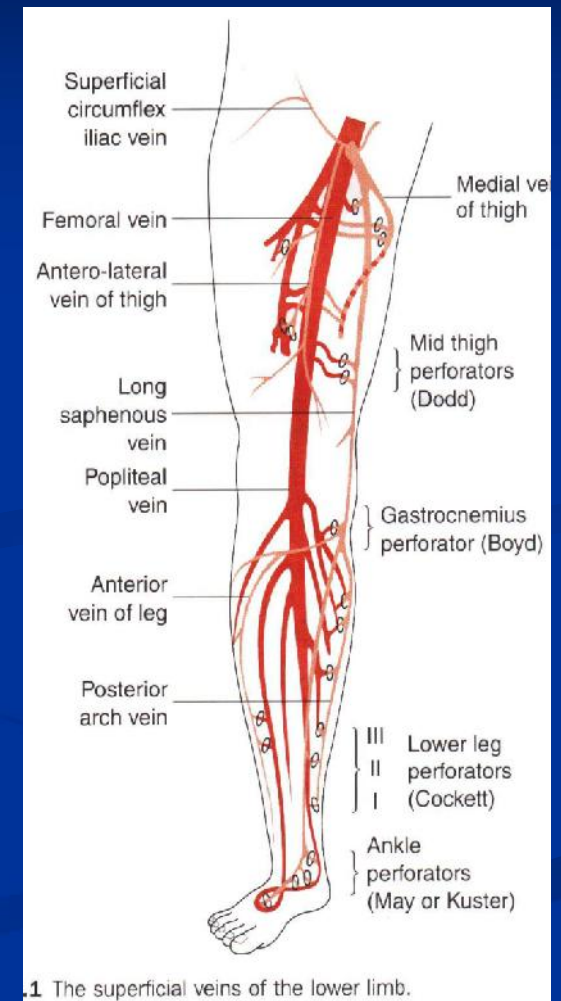
## (2) Any obstruction which hampers venous return, eg tumors, pregnancy.

## (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

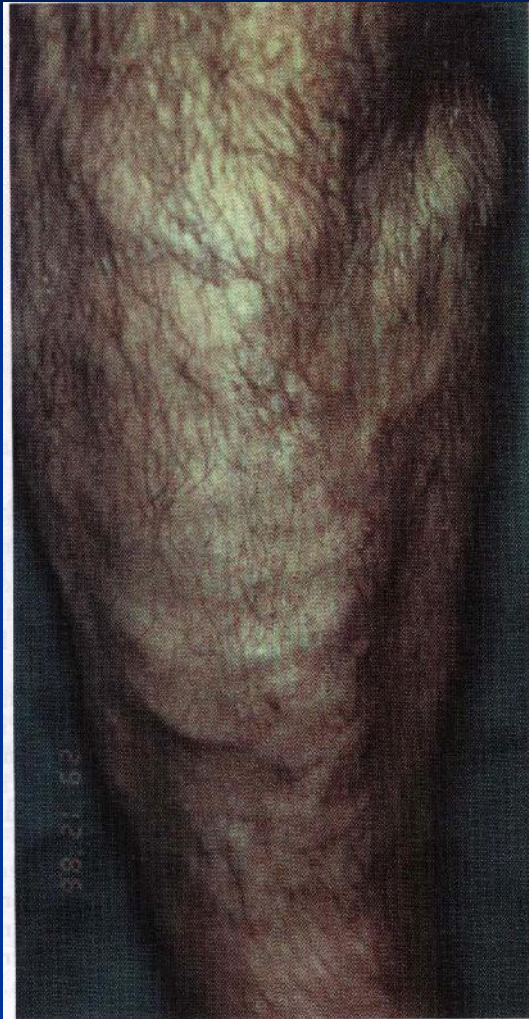
## Symptoms

- 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 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 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.

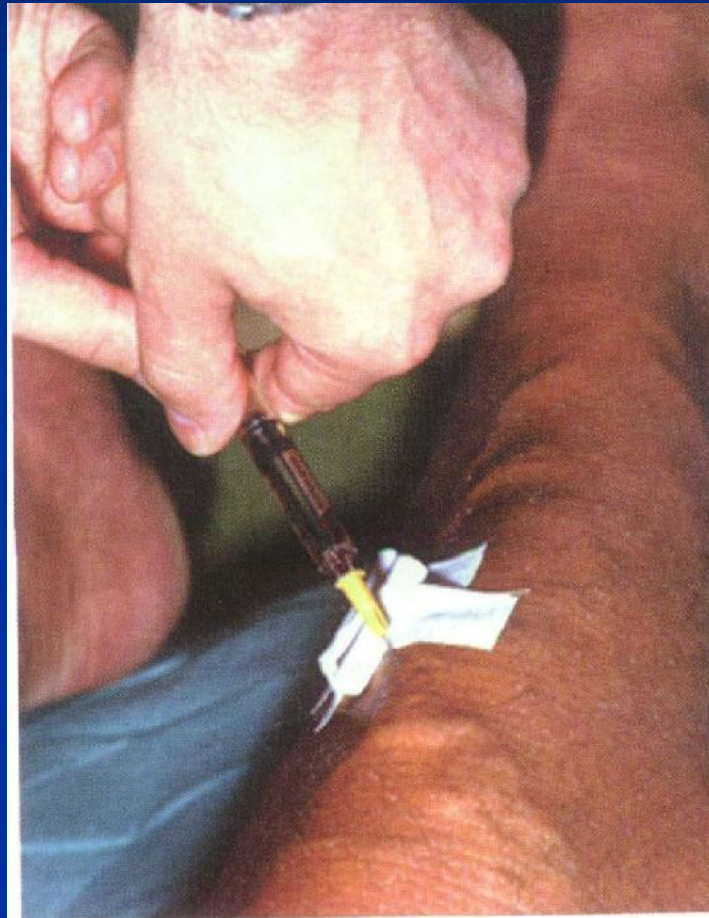


Fig. 16.21 Sclerotherapy for varicose veins.

# 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.

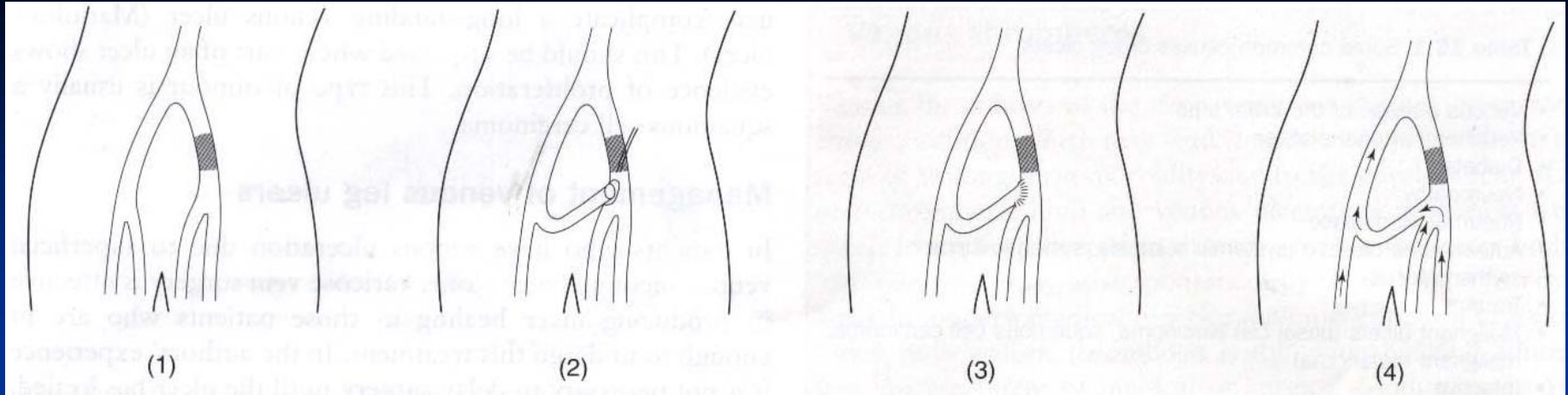
## Venous reconstructive surgery

for venous occlusion & deep venous insufficiency

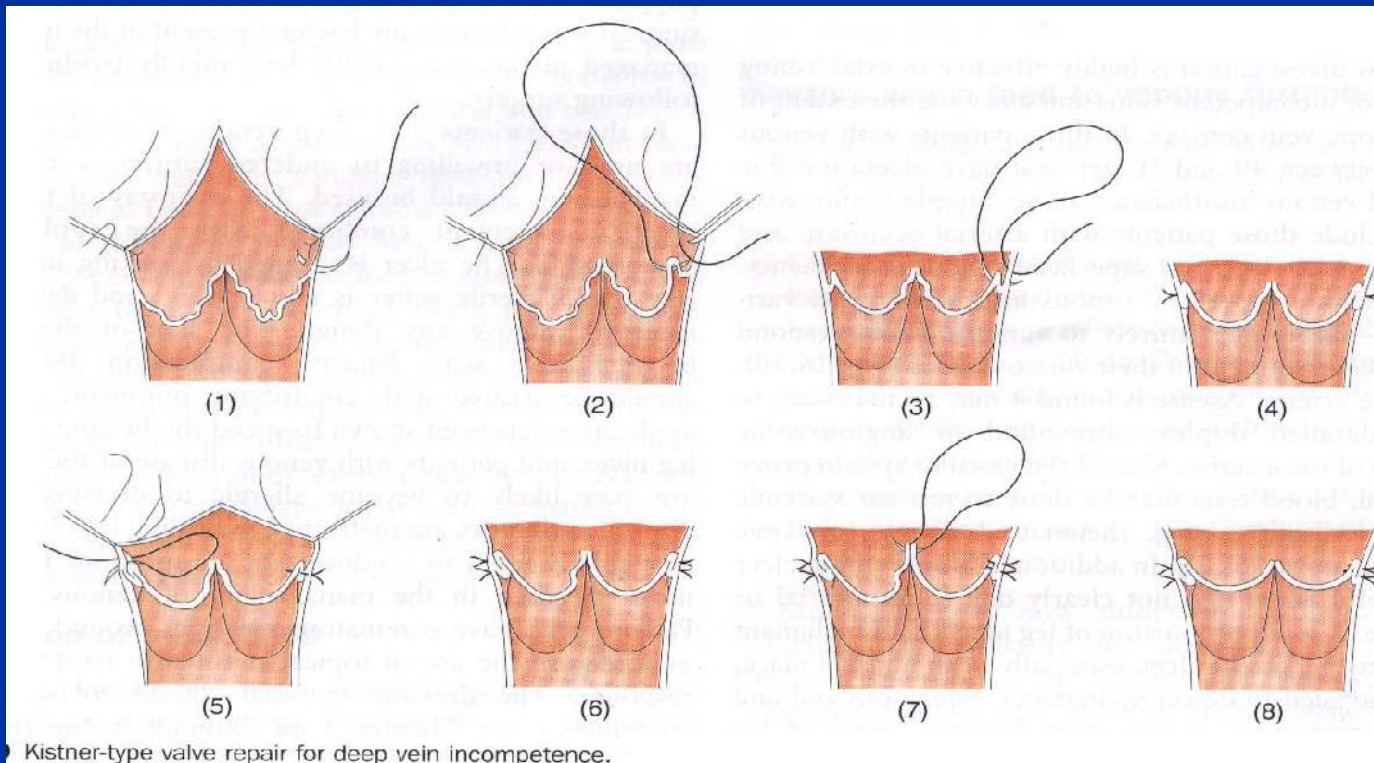
### ■ for venous obstruction, venous bypass procedures

- 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

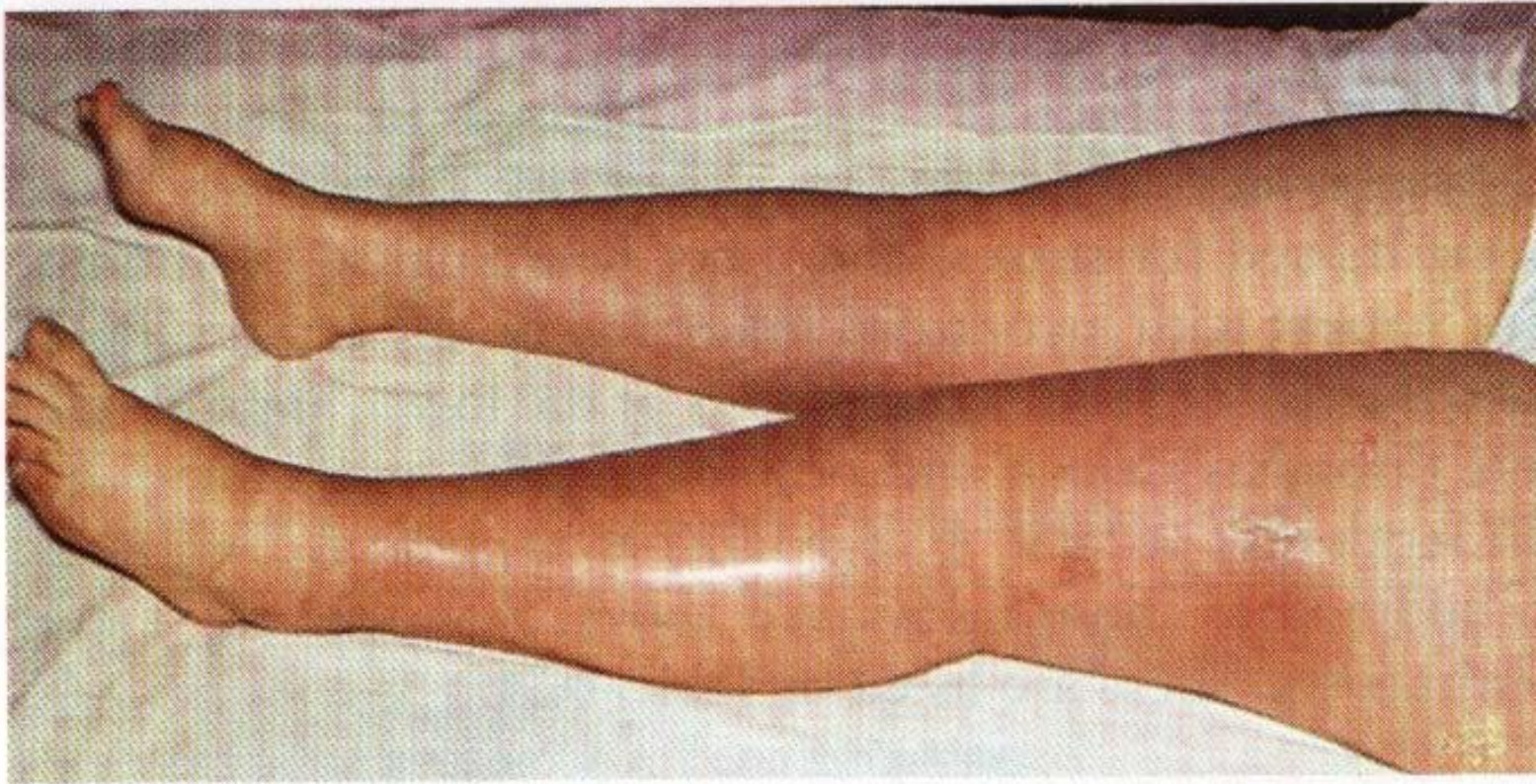
1. Just around the ankle, or upto groin.
2. *Phlegmasia alba dolens* (white or milk leg).
3. *Phlegmasia cerulea dolens* (congested & blue leg, with ulceration & gangrene in cases of extensive thrombosis of iliac & pelvic veins).

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

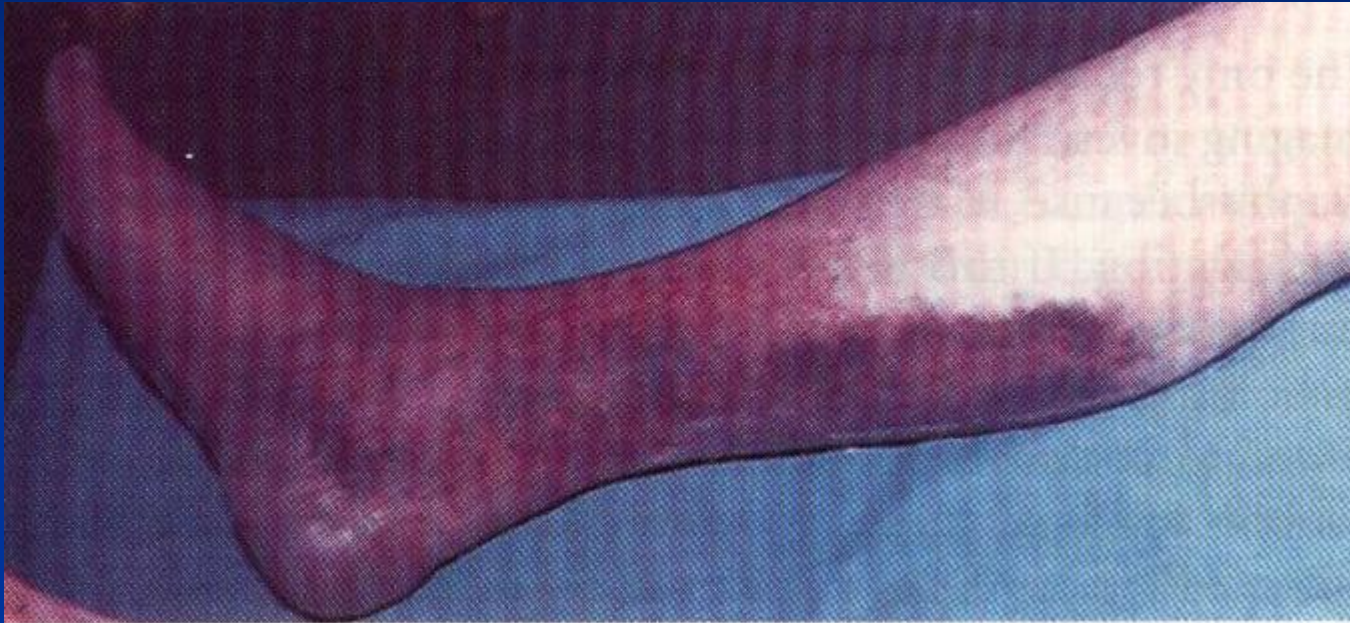
3. Homan's sign.

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.*



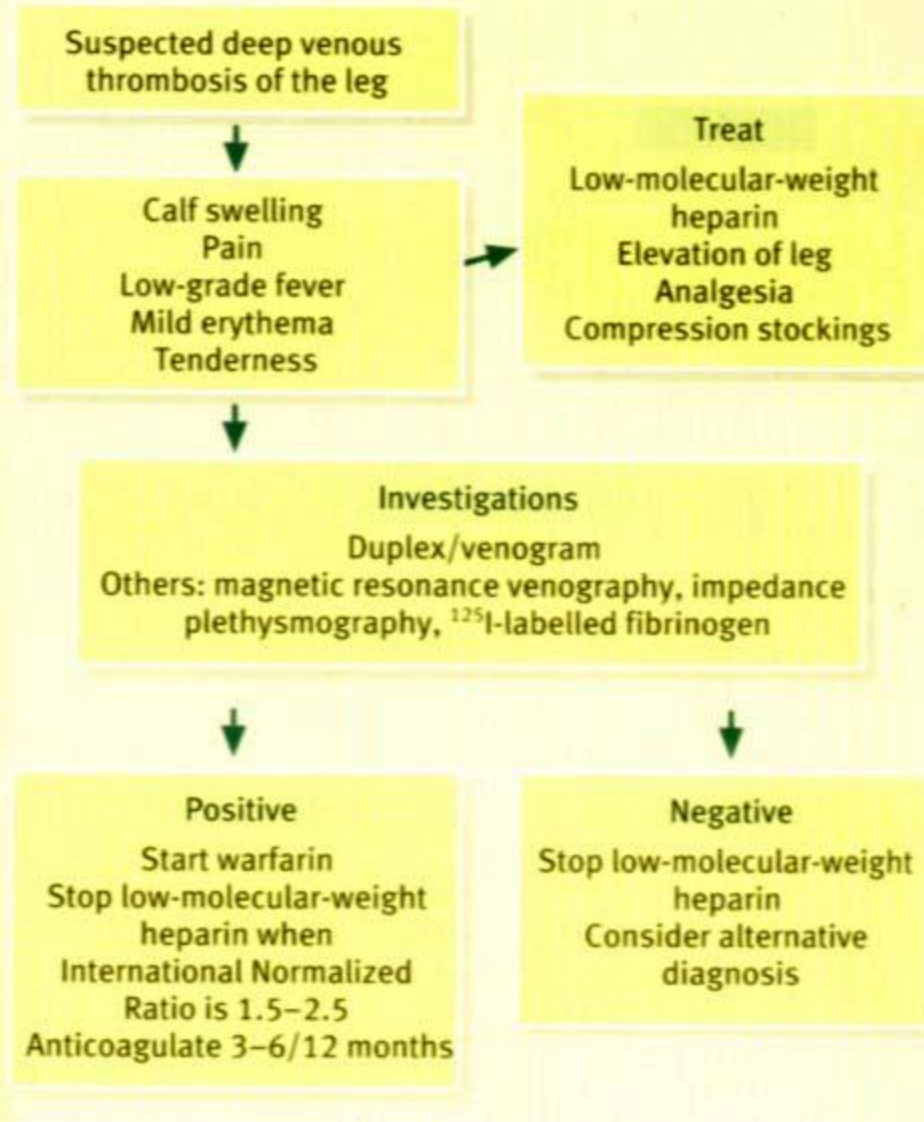
## 2. *Thrombolysis*

- *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.

- All of the following factors leads to increased risk of venous thrombosis, except
  - A. Deficiency of anti-thrombin III
  - B. Prolonged period of immobility
  - C. Anemia
  - D. Heart failure
  - E. Paraproteinemia

**Answer: C**



- On the 2nd postoperative day of abdomino-perineal resection, 65-year-old male patient develop pain & swelling of right lower limb. The treatment options includes all of the followings, except
  - A. Intravenous heparin, controlled by PT
  - B. Oral warfarin, controlled by INR
  - C. Subcutaneous low-molecular weight heparin
  - D. Intravenous streptokinase
  - E. Venous thrombectomy

**Answer: A**

**Thank you!**