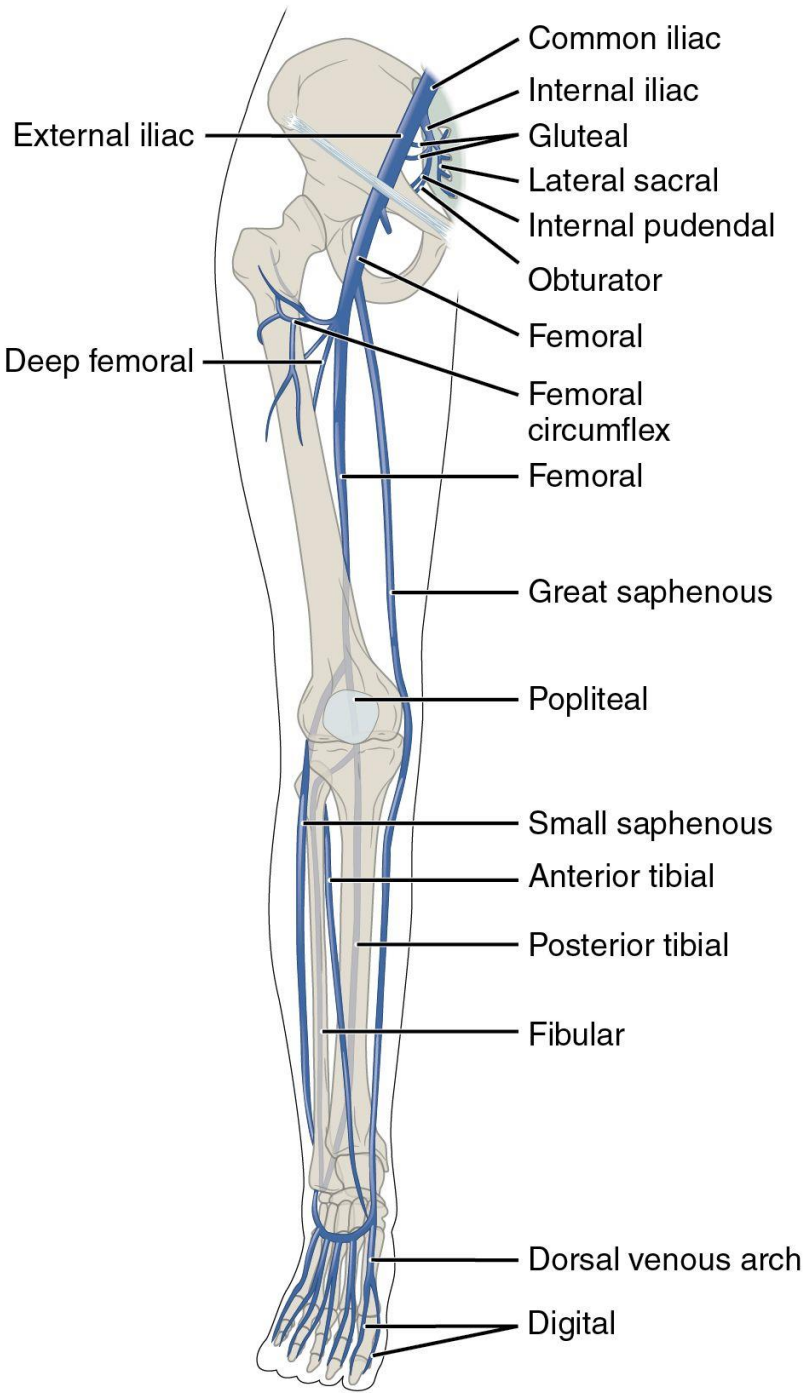


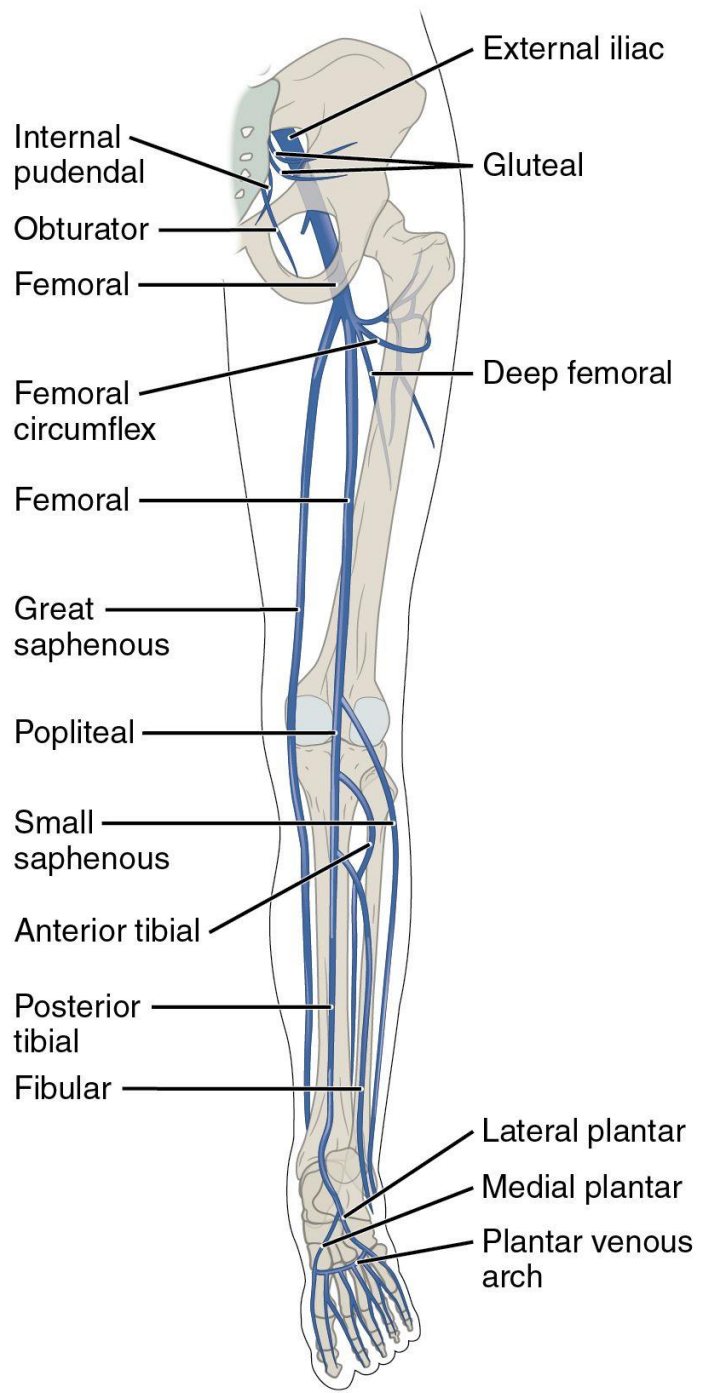
Inferior vena cava

- * **N.B:** Look for this picture and tell me varicose veins & DVT are more common on the left or right side and why ?

Venous Disorders 2



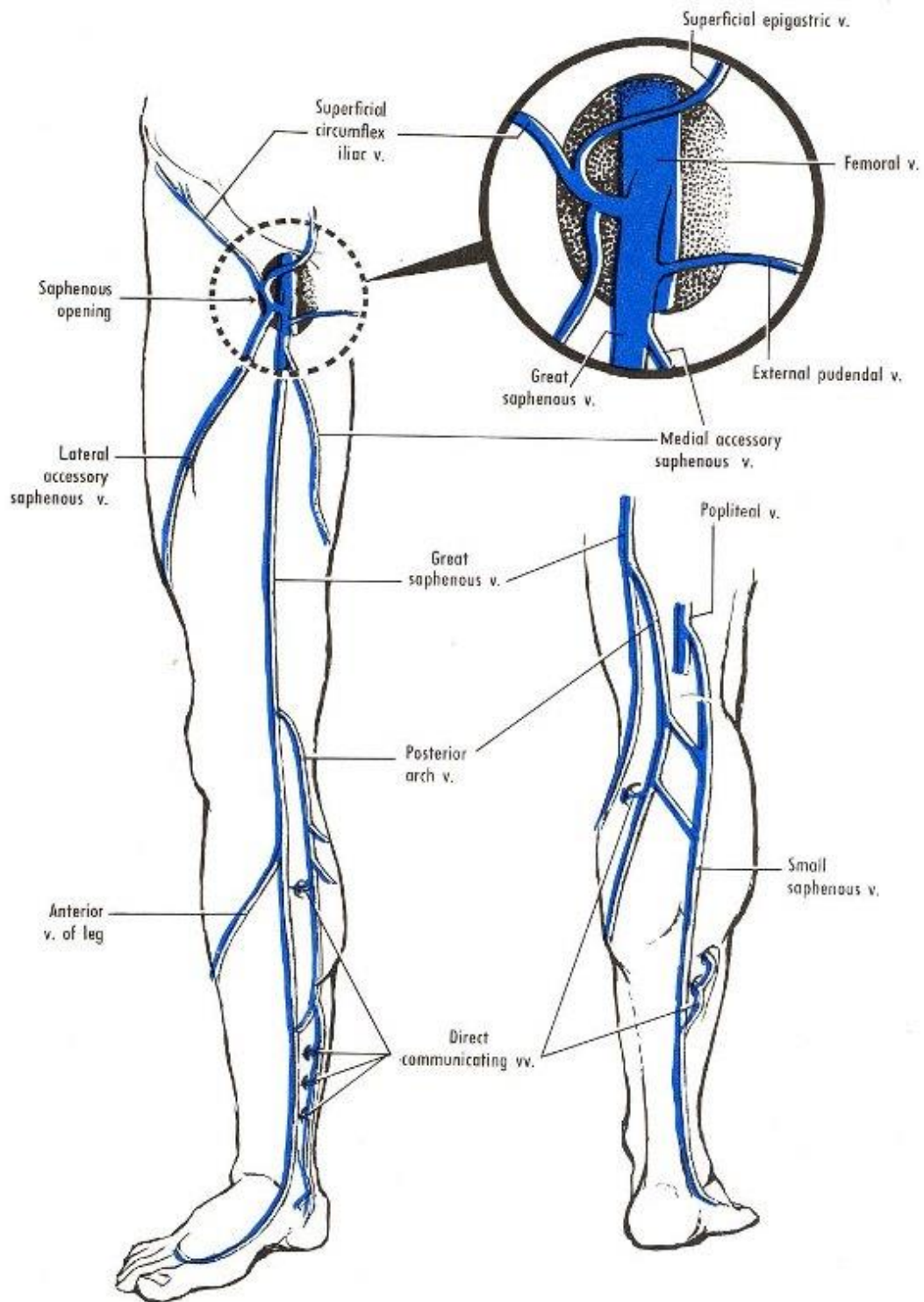
Anterior view



Posterior view

Veins of lower limb

Venous Disorders 2



VARICOSE VEINS

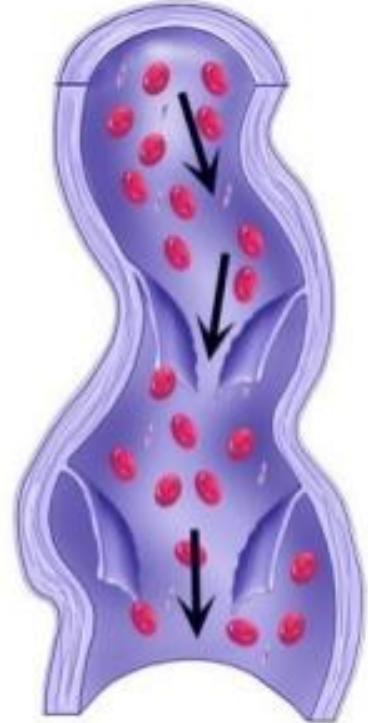
When valves don't work properly



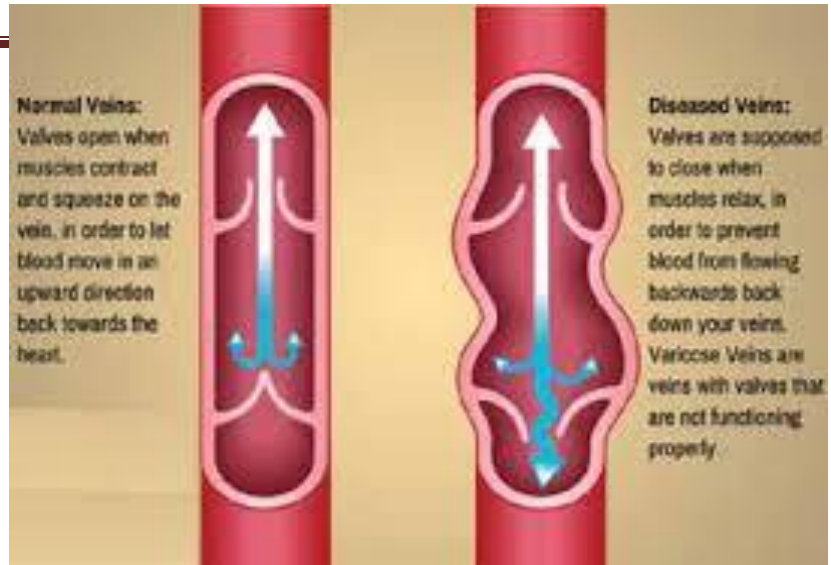
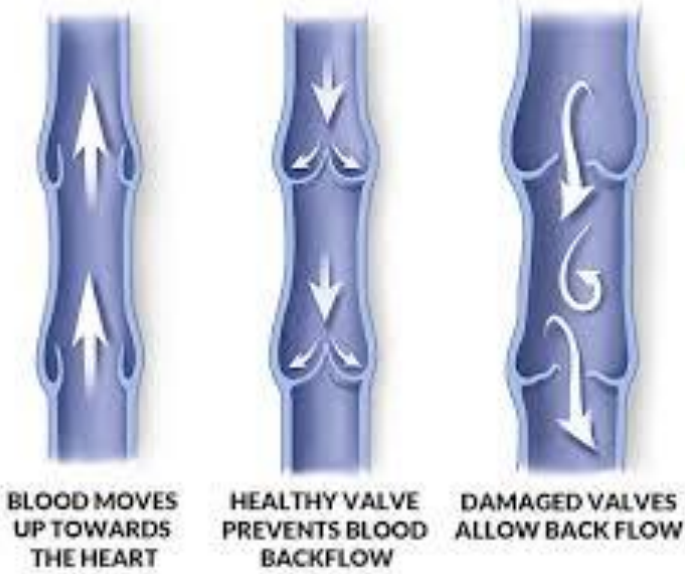
Normal Vein



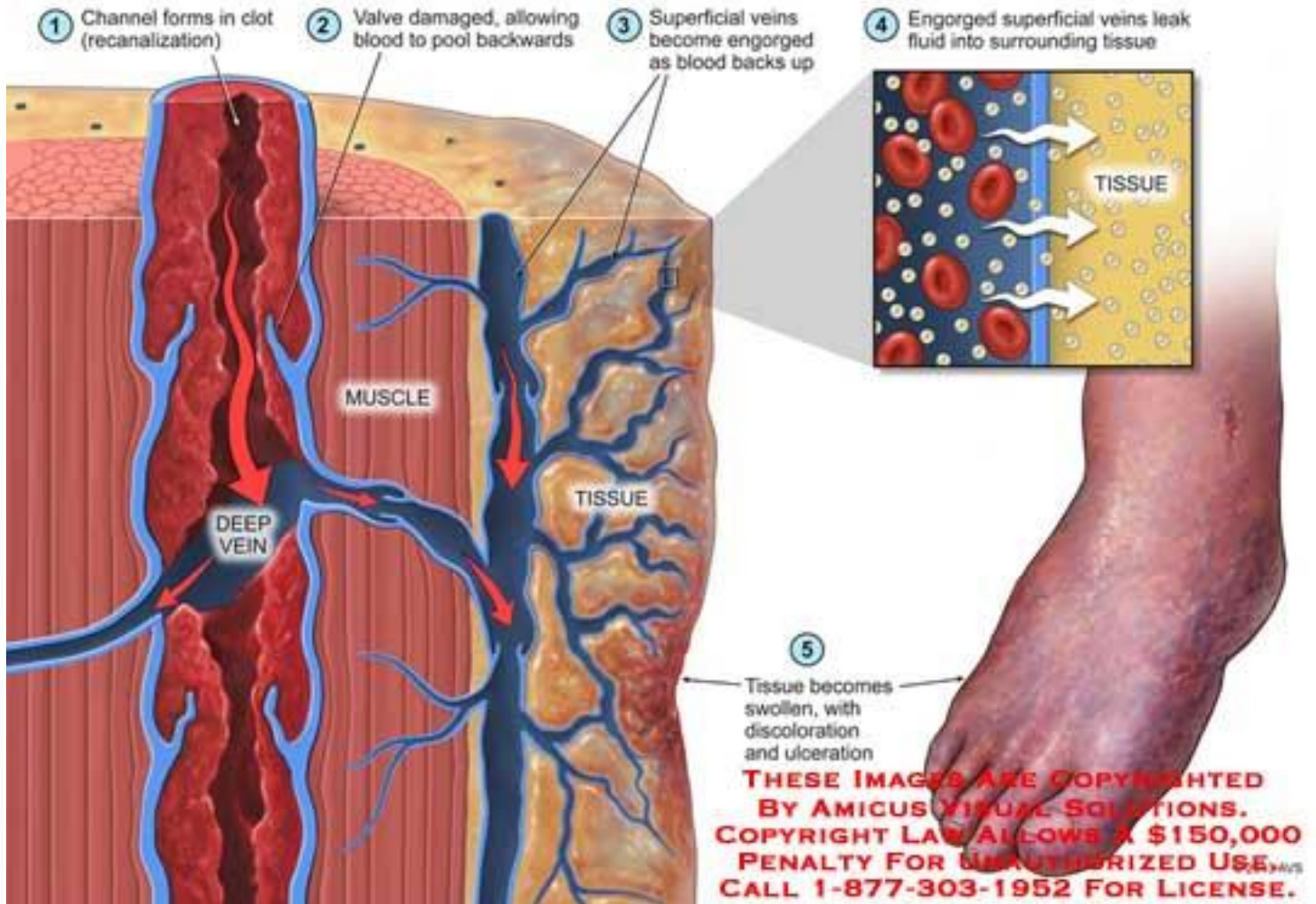
Varicose Vein



Venous Disorders 2



Recanalization and Thrombotic Syndrome



Venous Disorders 2

Varicose Veins of Lower Limbs.

★ **Definition:** Dilated, elongated, tortuous superficial veins of the lower limb (not in the deep veins which are well supported by bulky muscles).

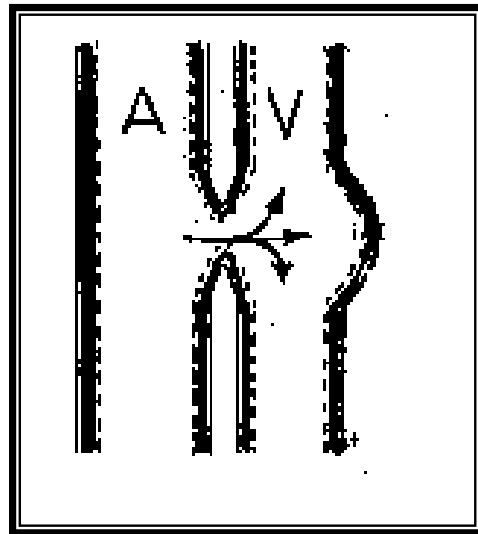
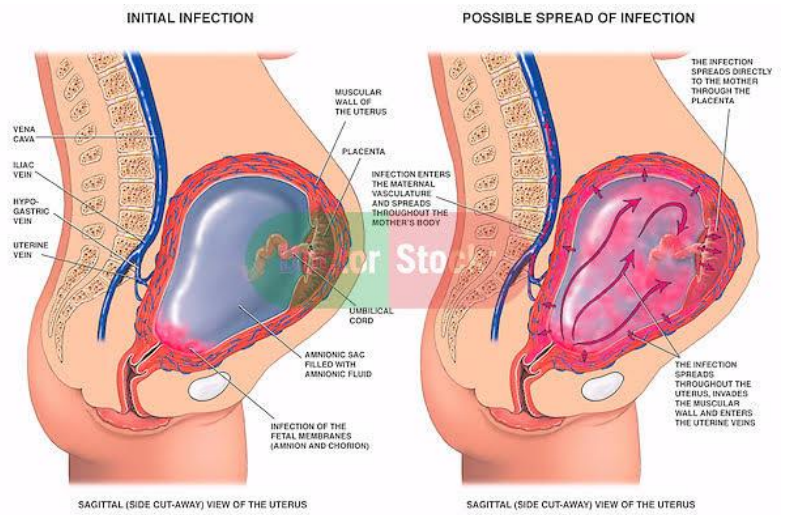
★ **Incidence:** Frequent condition , More in females, increases with age.

★ **Aetiology & Types:**

1 - Primary V.Vs. (85%)	2 - Secondary V.Vs. (15%)
<ul style="list-style-type: none">• Without demonstrable obstruction & the cause is unknown but there are theories: <ol style="list-style-type: none">1. Congenital hereditary weakness of wall of veins → venous dilatation even with normal or slight increase in the venous pressure → secondary valvular incompetence . A positive family history is found in 50% of cases .2. Valvular incompetence in the veins of the lower limbs . <ul style="list-style-type: none">• Aggravating factors are occupations with prolonged standing , females, high parity , marked obesity, constricting clothes , intake of hormones eg. contraceptive pills .	<p>I) Usually the deep veins are occluded (→high venous pressure) due to:</p> <ol style="list-style-type: none">a. Deep vein thrombosis → chronic venous insufficiency i.e. chronic venous hypertension (postphlebotic syndrome) is the commonest cause (narrowing of deep veins & dysfunction of valves due to recanalization of thrombosed veins).b. Compression of the deep veins by abdominal or pelvic tumors.c. Pregnancy → action of relaxin & compression of abdominal or pelvic veins by the pregnant uterus. <p>II) Arterio-venous fistula which may be congenital (Klippel-trenaunay syndrome) or acquired due to trauma → high venous pressure.</p>



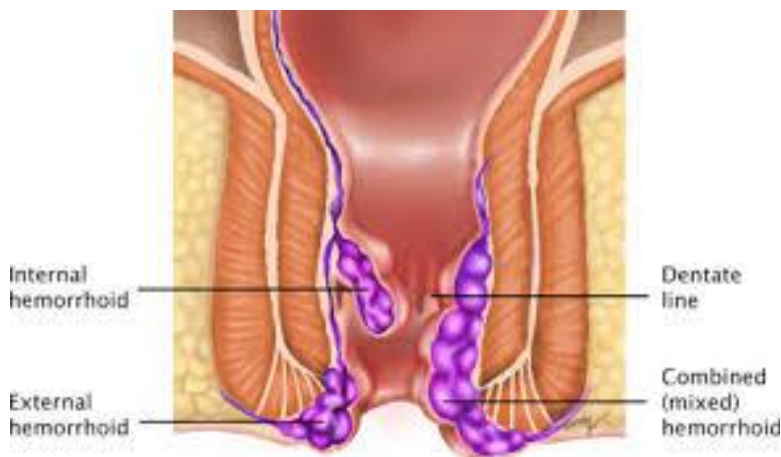
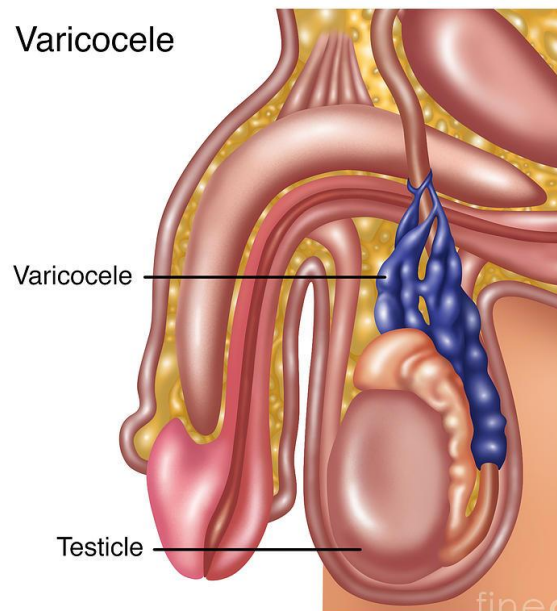
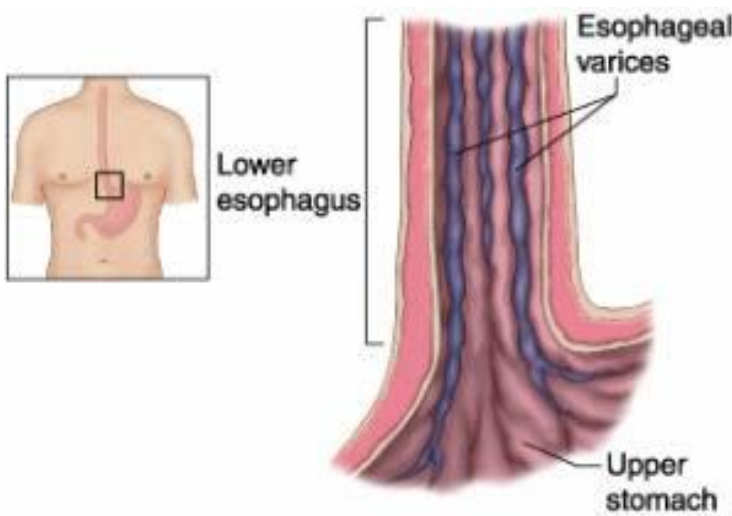
Venous Disorders 2



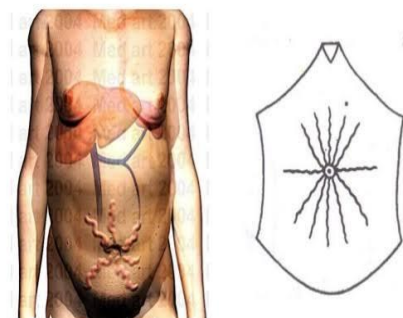
★ **N.B :**

I) Varicose veins may occur in other sites but have special name :

- 1) Esophageal & gastric varices** in the lower part of esophagus & upper part of stomach .
- 2) Haemorrhoids (piles)** in the lower part of rectum & anal canal .
- 3) Varicocele :** in the papiniform plexus .
- 4) Caput medusa :** around the umbilicus .



Caput Medusae

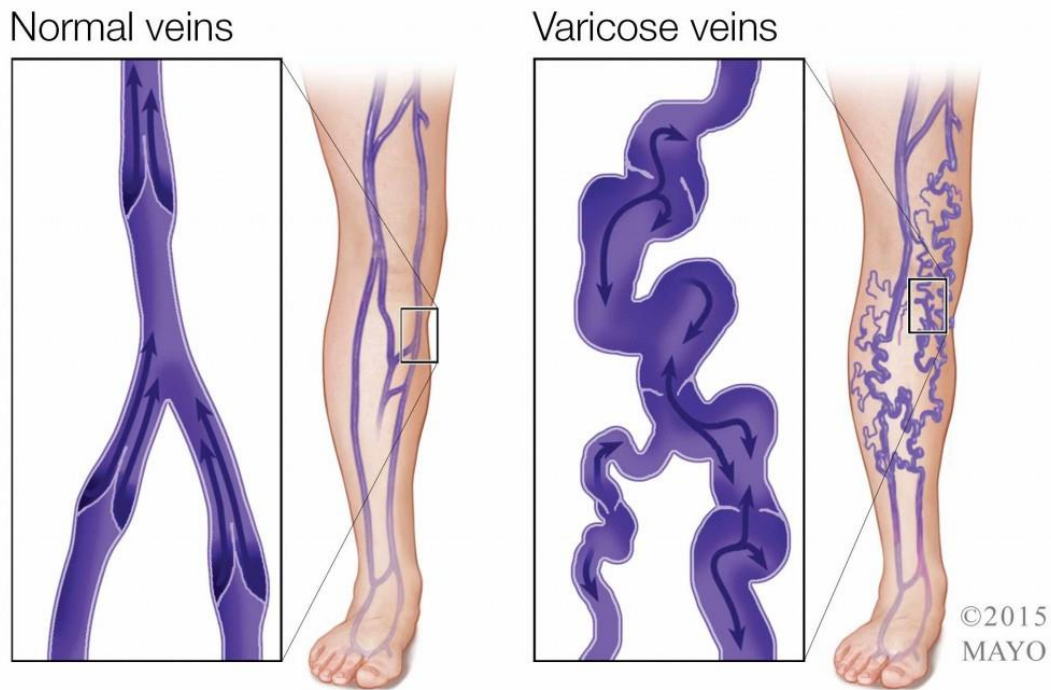


- II) **Superficial veins are unsupported** because it is surrounded by loose subcutaneous fat .In the other hand the deep veins are supported by the surrounding bulky muscles .
- III) If the onset of varicose veins occurs **during pregnancy** , it is secondary type but if it appears in between repeated pregnancy , it is primary type .
- IV) There is frequent association of varicose veins with varicocele , piles , hernias & flat foot , and positive family history which suggesting congenital hereditary **mesenchymal weakness** .
- V) **Varicose veins are more common in the left lower limb** due to crossing of right common iliac artery to the left common iliac vein .

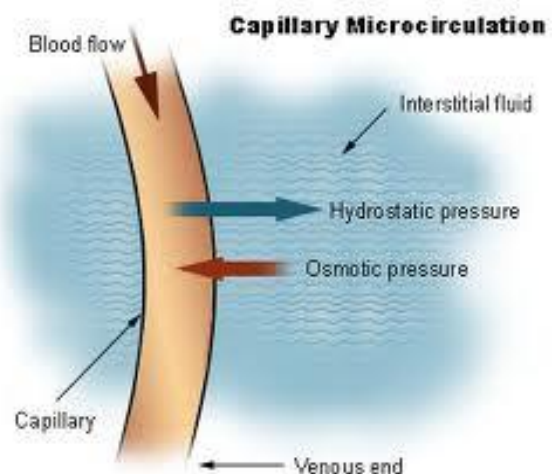
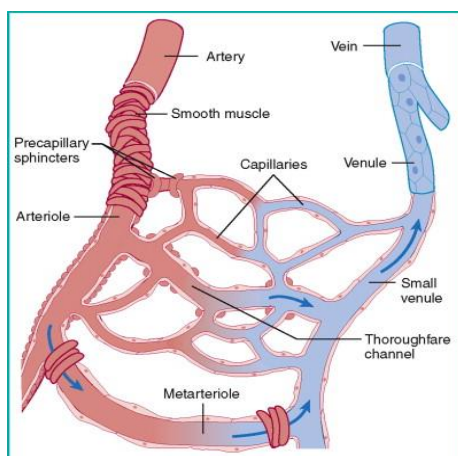
★Pathology :

- ◆ Increase venous pressure (**venous hypertension**) due to any cause leads to **distension of veins** →
- ◆ Separation of cusps of the valves leading to secondary **valve incompetence & valve dysfunction** in the deep veins , communicator & perforators →
- ◆ **Reflux** (back flow) of blood into the veins →more dilatation of veins → progressive incompetence & progressive dysfunction of venous valves i.e **vicious circle** .
- ◆ Reflux of blood from deep system & communicator to the superficial veins → chronic venous hypertension in the superficial veins → **dilatation elongation & tortousity** of these veins .

Venous Disorders 2



- ◆ Venous hypertenion → impairment of absorbtion of extracellular fluid → **oedema** .
- ◆ Venous hypertenion → decrease capillary blood flow → **tissue hypoxia** → accumulation of metabolites → **dilatation & rupture** of small venules → RBCs in the subcutaneous tissues → formation of **haemosidrin** → **pigmentation , itching & eczema** especially in the lower 1/3 of the leg .



◆ Stages of varicose veins :

- **Stage 1** : spider veins (1-1.5 mm , red , purple or pink)
- **Stage 2** : reticular veins (2 mm , green blue or purple)
- **Stage 3** : varicose veins.(more than 2.5 mm , elevated above the level of skin , dark blue or purple)
- **Stage 4** : oedema
- **Stage 5** :pigmentation or eczema & liposclerosis .
- **Stage 6** : active venous ulcer

Types of varicose veins



★ **Complications:** (*Much more common with secondary V.Vs*).

1. **Oedema of L.L.** due to accumulation of extracellular fluid in S.C tissues.
2. **Pigmentation** due to **haemosidrin** in the s.c. tissue → irritation, itching & eczema.
3. **Eczema:** (chronic **dermatitis**) There are redness, pigmentation, warmth itching with scales. It is due to irritation by haemosidrin.
4. **Liposclerosis** is a condition where there are thickening, fibrosis, induration, pigmentation S.C fat around the ankle. The mechanism is extravasation of fibrinogen leads to fibrous tissue formation with **replacement of S.C fat by tough fibrous tissue**. Progression to an ulcer is common.

***Pigmentation , Eczema
and Liposclerosis***



5. ***Venous (varicose) ulcer:***

- ◆ **Incidence** : It represent about **90%** of chronic leg ulcers .
- ◆ The ulcer is due to:
 - a) **Post-phlebitic limb** with incompetence of ankle perforators.
 - b) Eczema → itching → ulcer.
 - c) Venous hypertension → decrease capillary blood flow → tissue hypoxia , impairment of nutrition & liberation of oxygen radicals which are toxic to the tissues → **devitalization of skin & S.C tissues.**



- ◆ As the **skin of the medial aspect of lower part of the leg (ulcer bearing area)** is drained directly by ankle perforators which drain into the deep system, incompetence of these perforators → very high venous hypertension in the lower 1/3 of the leg (ulcer bearing area).
- ◆ The **combination** of venous hypertension, eczema & liposclerosis well eventually lead to ulceration after minor trauma.

◆ **Complications :**

- Infection , periostitis , chronicity .
- Malignant transformation and squamous cell carcinoma (**Marjolin's ulcer**).

◆ **Diagnosis:**

- It is usually in the **ulcer bearing area** , surrounded by characteristic **skin changes** & secondary V.Vs are present.
- The ulcer takes a **long time to heal** & is liable for **recurrence**

◆ **Treatment:**

a. **Conservative:** for early ulcer. (As lry V.Vs.) + followings.

- **Elevation** of lower limb in bed .
- **Elastic stocking** compression is the most important item in conservative treatment .
- Systemic **Antibiotic**.
- **Moist saline** dressings are favoured. The use of topical antibiotics preparations is discouraged as they may aggravate the condition by inducing an allergic reaction.
- Some **drugs** are said to accelerate healing as Trental , Prostaglandin E1 & Diosmin .
- Most ulcers heal within a few weeks but once the patients return to normal activity, the ulcer may **recur**.

b. **Surgical:** for resistant or recurrent ulcer

- Treatment of **incompetent perforators** by Ultrasonic guided **foam sclerotherapy** or **endovenous thermal ablation** either by laser or radiofrequency sources .

6. **Haemorrhage:** may be spontaneous or after trauma & ulceration.

- Treatment is **elevation & local compression** bandage.

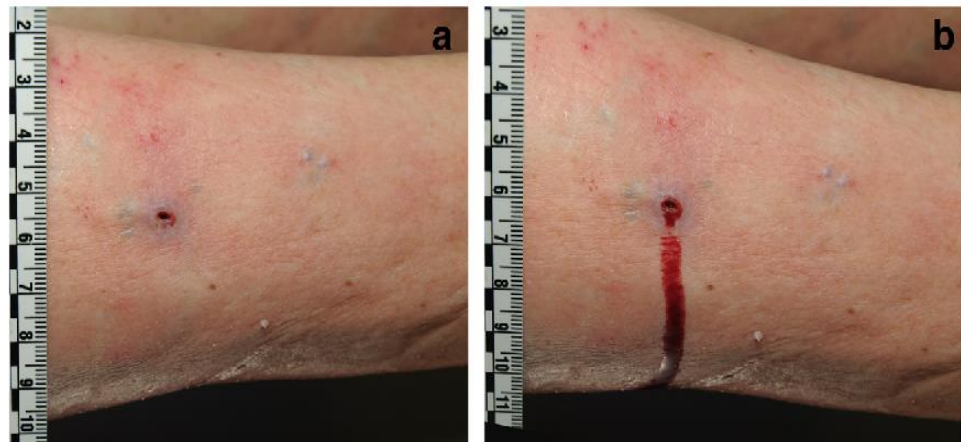
7. **Periostitis** due to infected ulcer → non healing ulcers .

8. **Malignancy** : on the top of chronic ulcer → Marjolin's ulcer (squamous cell carcinoma) .

9. **Superficial thrombophlebitis**.

10. **Calcification** of veins in long standing cases.

Haemorrhage



Marjolin's ulcer



Superficial thrombophlebitis

Primary varicose veins



FIGURE 3: Acute lipodermatosclerosis on the left, chronic lipodermatosclerosis on the right



Secondary varicose veins

★ **Clinical Picture:**

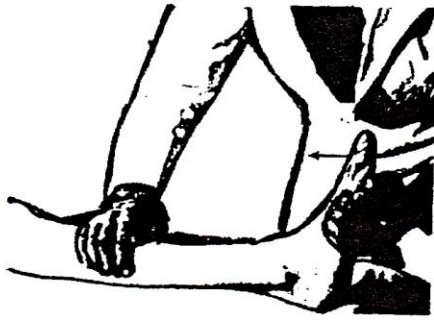
A- Primary Varicose Veins	A- Secondary Varicose Veins
* SYMPTOMS*	
1- Cosmetic disfigurement	
2- Pain (Venous Pain)	
<p>* Mild (tired, dull aching, heaviness)</p> <ul style="list-style-type: none"> It is increased by prolonged standing or sitting and relieved by elevation of the lower limb and walking. 	<p>* Marked (bursting)</p>
3-Night cramps (tissue hypoxia)	
-Mild	- Severe
4- Swelling (oedema)	
<ul style="list-style-type: none"> Slight foot & ankle swelling after prolonged standing or sitting and resolves after night sleep. 	<ul style="list-style-type: none"> Persistent, marked, diffuse swelling of the L.L., not resolved by night sleep.
5- Skin complications	
<ul style="list-style-type: none"> Less common & minimal. 	<ul style="list-style-type: none"> More common & marked.
* Signs *	
<ol style="list-style-type: none"> The V.Vs. are multiple, dilated, elongated, tortuous, bluish swellings along the course of veins of the lower limb . 	
<ol style="list-style-type: none"> Usually bilateral unequal. 	<ol style="list-style-type: none"> Usually unilateral (except in I.V.C.).
<ol style="list-style-type: none"> Affect long or short saphenous veins or the communicators. 	<ol style="list-style-type: none"> Irregular distribution and may extend to the abdomen & chest.
<ol style="list-style-type: none"> No or mild pitting ankle oedema may be present. 	<ol style="list-style-type: none"> Diffuse marked oedema with its level vary according to the level of obstruction which become hard &
	<ol style="list-style-type: none"> non-pitting later on.
<ol style="list-style-type: none"> V.Vs never cross the groin. 	<ol style="list-style-type: none"> V.Vs. cross the groin in cases of iliofemoral (unilateral) or I.V.C. (

Venous Disorders 2

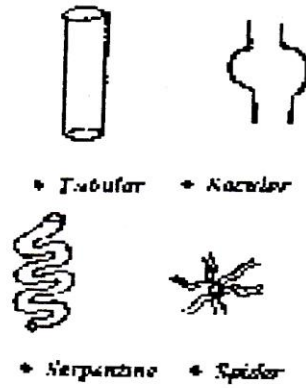
bilateral) obstruction.

6. The veins may be **tubular, Saccular, serpentine or spider**.
7. Palpate the V.Vs. for firm tender nodules (**superficial thrombophlebitis**)
8. **Incompetent sapheno-femoral junction**, show **expansile impulse and thrill on cough**.
9. **Saphena varix** is sacculle opposite an incompetent sapheno-femoral junction. It is soft, cystic, compressible swelling with impulse and thrill on cough.
10. No spontaneous pulsation, thrill, murmur or local gigantism.
10. Spontaneous **pulsations, murmur, thrill** in A-V fistula **but local gigantism** is present only in case of congenital type.

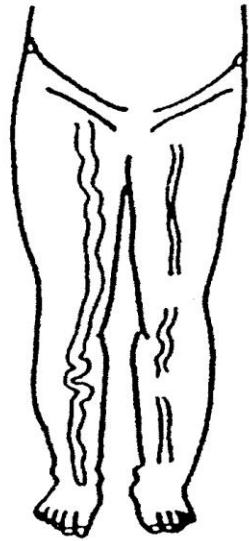




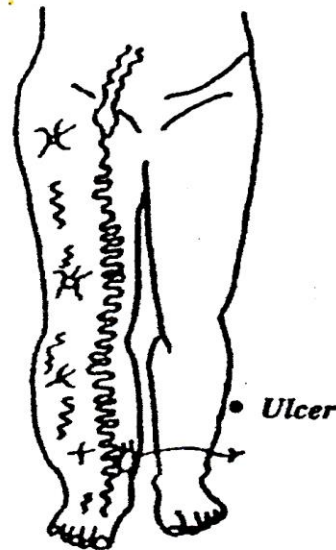
★ Homan's sign ★



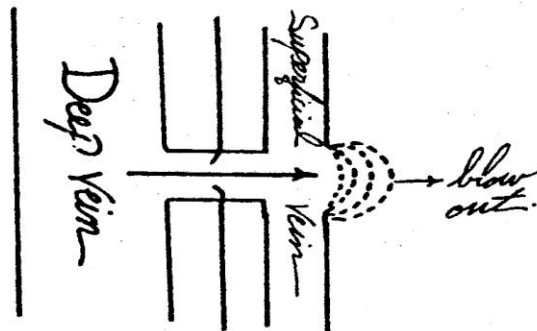
★ Shape of V.Vs. ★



★ Primary V.Vs. ★



★ Secondary V.Vs. ★



★ Saccule & incompetent communicator



★ Venous ulcer





Fig. 1 Photograph shows gigantism of the right lower limb.



Saphena varix



Source: S. Kang, M. Amagai, A.L. Bruckner, A.H. Enk, A.J. McMichael, J.S. Orringer: Fitzpatrick's Dermatology
Copyright © McGraw-Hill Education. All rights reserved



Venous Disorders 2

11. While the patient is lying down, ***a defect is felt in the deep fascia*** opposite each blow out → incompetent perforator (***Fegan's method***).



12. **Ankle flare** is area of redness & dilated vessels around the malleoli due to advanced venous disease as DVT or varicose veins



★ Special tests:

I. Localization of incompetent communicators & valves : (for upon it depends the success or failure of treatment. Accurate localization by using **duppler or duplex u/s**).

a. Trendelenburg's Test:

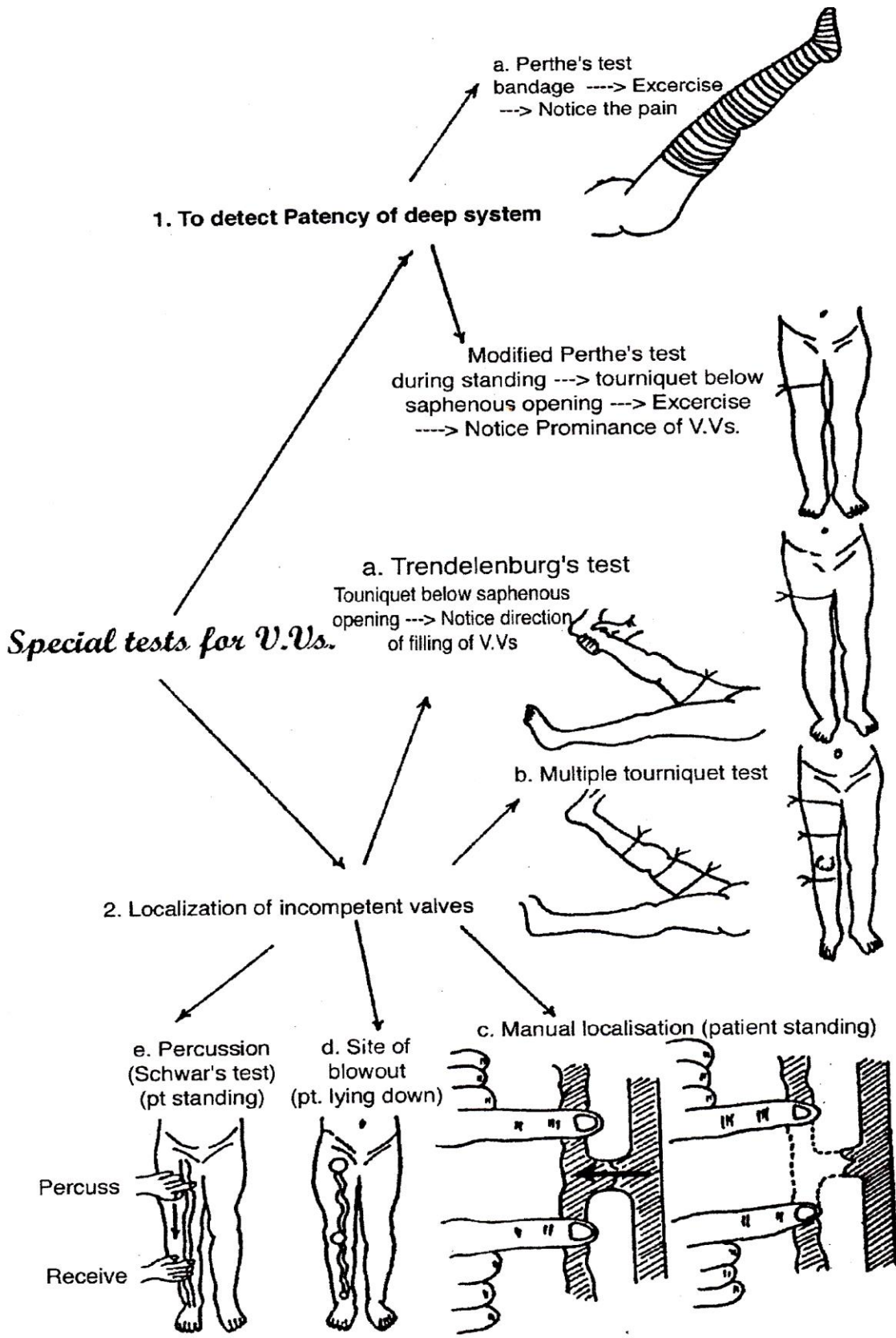
◆ **Method:** the L.L. is elevated, the veins are emptied, a tourniquet is applied just below the sapheno-femoral junction (1.5 inch below and lat. to pubic tubercle). Then ask the patient to stand and observe the direction of filling of veins. Finally remove the tourniquet after 30 seconds.

◆ **Results:**

1. **Slow filling** from below with the tourniquet in place and after removal of the tourniquet → normal.
2. **Rapid filling form above with the tourniquet in places** → incompetent communicator in the thigh, leg.
3. **Rapid filling from above after removal of the tourniquet** → incompetent saphenofemoral junction.

b. Multiple tourniquet test:

- ◆ **Indicated** if Trendelenburg's test shows incompetent communicator.
- ◆ **Method:** The limb is elevated, the veins are emptied and 3 tourniquets are applied (one just below saphenofemoral junction, one at the junction between upper 2/3 & lower 1/3 of the thigh & one just below the knee) then ask the patient to stand & observe filling of veins.
- ◆ **Results:** Immediate filling of a segment or retrograde flow occurs on releasing the tourniquet indicates the site of incompetent communicator.



c. Schwart's test : (Percussion test)

- ◆ While the patient is standing , varicose vein is percussed by one hand and palpate distally by the other hand .
- ◆ Result : If a wave is felt distally → valves are incompetent .

d. Manual localization of incompetent communicators :

- ◆ While the patient is standing , press by 2 index fingers on the veins and empty a segment of this vein .
- ◆ **Result :** If the segment between the 2 fingers fills → incompetent communicator .

II. To differentiate between occluded and patent deep viens:

a. ***Perthe's test:*** The L.L. is elevated, veins are emptied, a bandage is applied from the toes to the mid-thigh to occlude the superficial system then the patient is asked to walk in-situ for 5 minutes.

◆ ***Results:***

1. **If no pain** occurs → the deep system is patent (1ry or recanalized 2ry).
2. **If pain** occurs → the deep system is occluded (2ry V.Vs.)

b. ***Modified Perthe's test:*** While the patient standing, a tourniquet is applied below saphenous opening then the patient is asked to walk quickly for 5 minutes.

◆ ***Results:***

1. **If V.Vs. become less prominent with no pain** → the deep system is patent (1ry or recanalized 2ry) & competent with efficient muscular pump.
2. **If V.Vs. become more prominent with bursting pain** → the

deep system is occluded (2ry V.Vs.) or there are incompetent communicators.

★ Investigations:

- ◆ The aim is to detect the ***site of incompetent perforators*** & to detect ***patency of the deep system***. It should be noted that most cases of 1ry V.Vs. require no investigations because clinical exam. provides enough informations.
- ◆ ***Doppler & Duplex ultrasound***: show patency of veins & the direction of flow.



★ **D.D.:** Other causes of leg ***pain, swelling or ulcers***.

★ Treatment:

A. Management of primary varicose vein:

I. Conservative treatment:

- **Indications: Early uncomplicated** Iry Varicose veins. or spider Varicose veins. without cosmetic upset , pregnancy or patient unfit or refusing operation.
- **Aim :** Relief of pain and prevent Varicose veins from getting worse .
- **Methods :**
 - a) Avoid any **predisposing** factors & reassurance .
 - b) Below or above knee **elastic stoking** (according to extent of Varicose veins) to support & compress the superficial veins.
 - c) **Avoid** prolonged standing or sitting while walking, exercises , losing weight & leg elevation are encouraged.

II) Fluid Sclerotherapy :

- **Indications:**
 - a) Spider varicose veins with cosmetic upset or small localized Iry Varicose veins (1-2mm).
 - b) Residual small Varicose veins after operation.
- **Method:**
 - ◆ During **standing**, the sites of injections are marked on the skin
 - ◆ Ask the patient to lie flat , elevate the limb and through a fine needle inject 1 ml polidocanol , into the veins .
 - ◆ Then a local **elastic bandage** is applied for 4 weeks to keep the vein collapsed.

Venous Disorders 2

- ◆ Immediately, the patient is instructed to **walk for a long distance**.
- ◆ **Multiple sites** can be injected at the same visit .
- **Effect:** The injected material → injury of the endothelium of the vein and the pressure bandage → **obliteration of the veins by fibrosis** not by thrombosis.

Result of fluid sclerotherapy



- **Complications of sclerotherapy :**
 1. **Extravasion** of sclerosant material in S.C tissue → sloughing of skin.
 2. If injection in **vein full** of blood → **thrombosis** → **recanalization** → **recurrence**.
 3. **DVT** may occur if a large amount of sclerosant material reaches the deep system.
- **Contraindications** : Septic thrombo-phlebitis , patient predisposed to DVT (contraceptive pills) or occlusion of deep system eg. pregnancy, pelvic or abdominal tumours & active D.V.T.

III) Surface laser treatment :

- **Indication** : spider varicose veins .
- **Effect** : veins are targeted with a high-intensity laser light →laser heats up, the veins are constricted , destroyed and absorbed .



IV) Ultrasonic guided foam sclerotherapy :

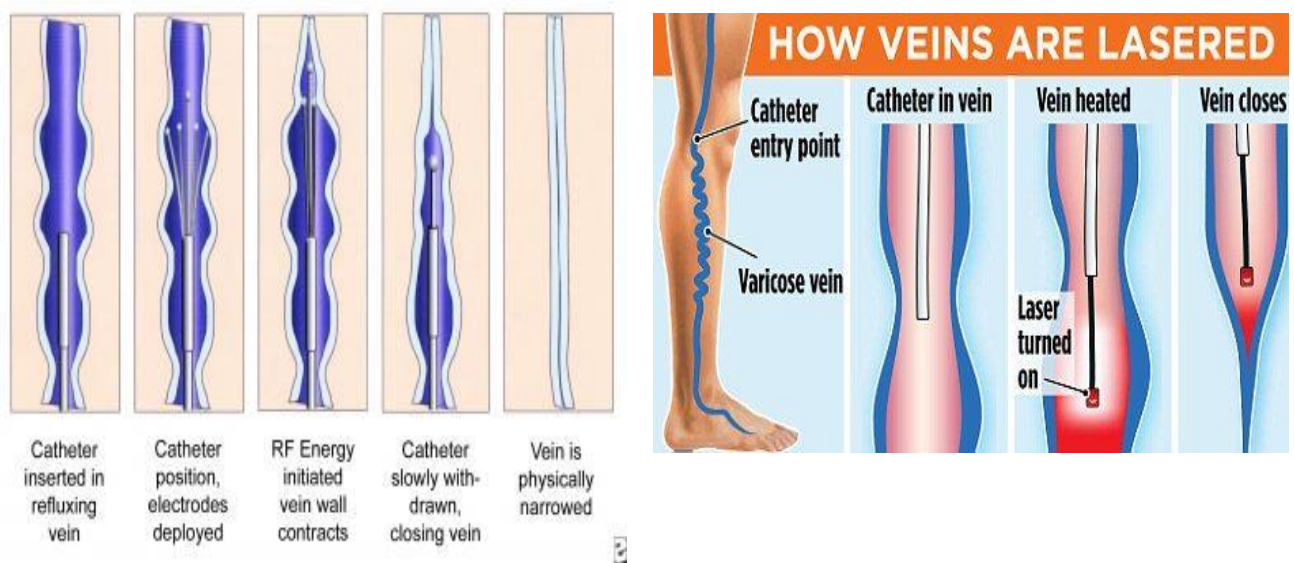
- **Indications** : Recent highly effective treatment for varicose veins up to 4 mm.

- **Result of foam sclerotherapy**



V) Minimal invasive surgery by endovenous thermal ablation :

- **Indications :** This the preferred treatment nowadays for large varicose veins , incompetent sapheo-femoral junction , incompetent communicators & perforators .
- **Method :** Under local anesthesia & U/S guided , heating the vein from inside its lumen (via radiofrequency or laser catheters), causing immediate irreversible damage and closure of the vein.

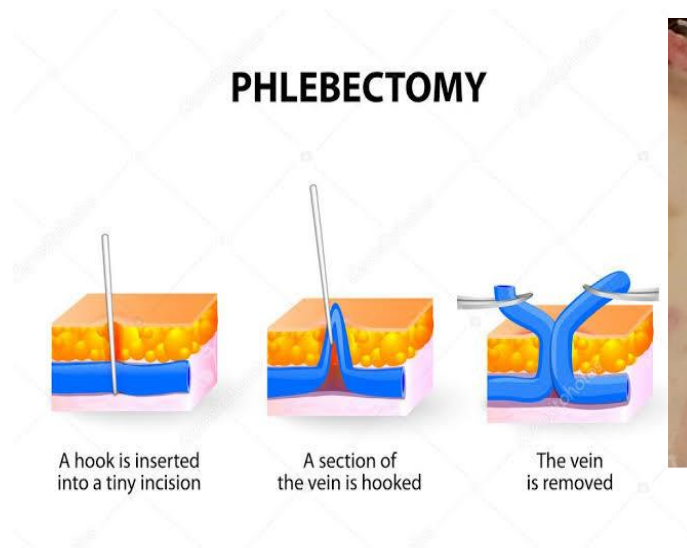


Result of endovenous thermal ablation



VI) Ambulatory phlebectomy :

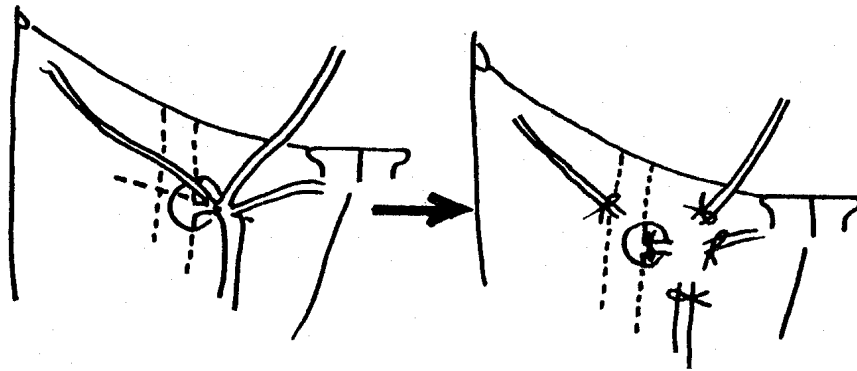
- **Indications** : large varicose veins .
- **Method** : Removal of small varicose veins through multiple tiny skin punctures .



VII) Classical Surgical treatment: It is rarely performed nowadays and is largely replaced by endovenous thermal ablation.

- **Indications:** It is performed **only if other measures fails** for
 - a) Large I ry Varicose veins.
 - b) Severe symptoms
 - d) Incompetent valves of long saphenous or short saphenous.
 - e) Presence of complications (hge, ulcer...etc).
- **Methods:**
 - 1) **Trendelenburg's operation:** (Sapheno-femoral disconnection).
 - ♥ **Indication:** for saphenofemoral incompetence .
 - ♥ **Method:**
 - ◆ The saphenofemoral junction is exposed by an oblique incision below and parallel to the inguinal ligament.

- ◆ Ligation & division of *all tributaries* near termination of long saphenous to avoid recurrence .
- ◆ The long saphenous vein is **ligated and divided flush** with the femoral vein (other wise recurrence occurs) then dissect it down and excise its upper 2 inches.



★ *Trendelenburg's Operation*

2) *Subcutaneous stripping:*

♥ **Indication:** severe Varicose veins or there are multiple incompetent communicators.

♥ **Method:**

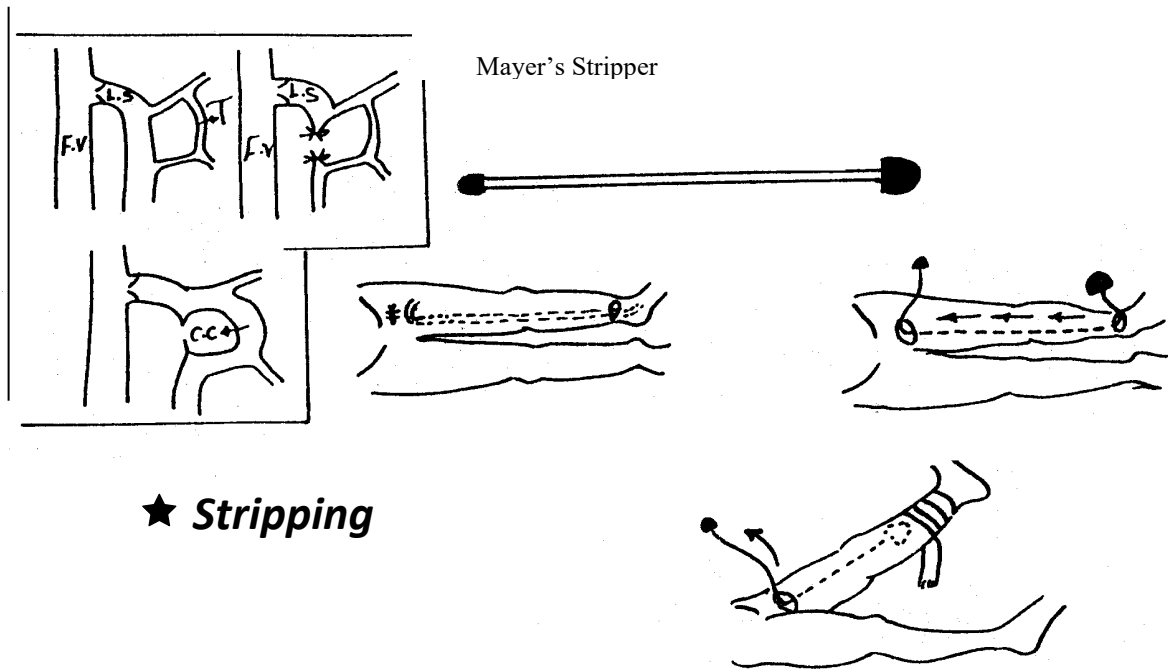
a- ***S.C. stripping of long saphenous vein:***

- ◆ **Trendelenburg's operation** is done (as before).
- ◆ The **lower end** of long saphenous vein is exposed by a small transverse incision just above the medial malleolus & protect the saphenous nerve .
- ◆ The lower end of the vein is **divided** and **stripper is pushed** from below until it appears in the upper incision.
- ◆ The **stripper is pulled** from its upper end stripping the long

Venous Disorders 2

saphenous vein while immediate pressure bandage is applied to prevent haematoma formation.

- ◆ **N.B.:** If long saphenous is relatively normal, it must be left alone as it may be needed for **arterial by pass graft**.



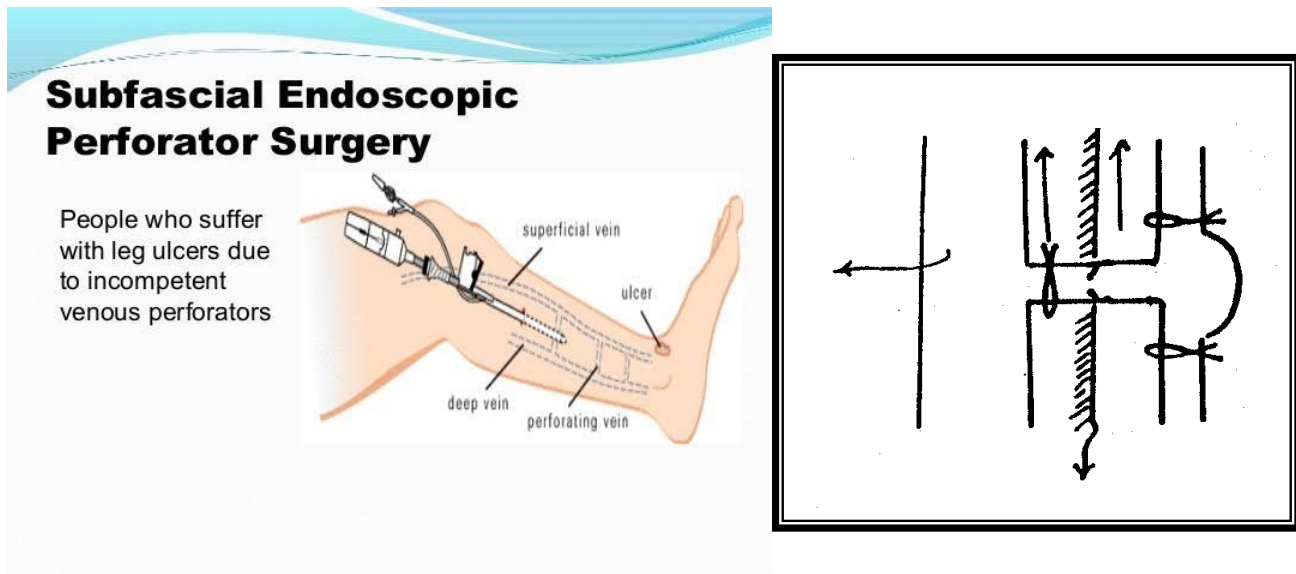
★ Stripping

b- Stripping of short saphenous vein:

- ◆ The sapheno-popliteal junction is exposed through a transverse incision in **popliteal fossa** then ligate the short saphenous vein flush with the popliteal vein. (Sapheno-popliteal disconnection).
- ◆ The lower end of short saphenous vein is exposed by transverse incision behind the **lateral malleolus** then stripping is performed (as before).

3) Endoscopic subfascial ligation of incompetent perforators :

♥ **Indication:** chronic venous ulcer due to incompetent perforators.



II. Management of Secondary Varicose veins.:

A. Post-phlebitic limb:

- 1. Before recanalization of deep veins:** Conservative treatment only (the same as treatment of D.V.T.) The Varicose veins. should not be attacked as they represent collaterals for the occluded deep veins.
- 2. After recanalization of deep veins:** Once recanalization & patency of deep system is detected clinically & by Duplex ultrasound , treat the condition as primary varicose veins .

B. Varicose veins due to A.V fistula: Surgical treatment of the fistula followed by regression of Varicose veins. & any residual veins are treated as 1 ry Varicose veins.

C. Varicose veins during pregnancy: A complete elastic stocking from the toes up to the groin is applied during pregnancy. After labour, residual veins are treated as 1ry Varicose veins.

