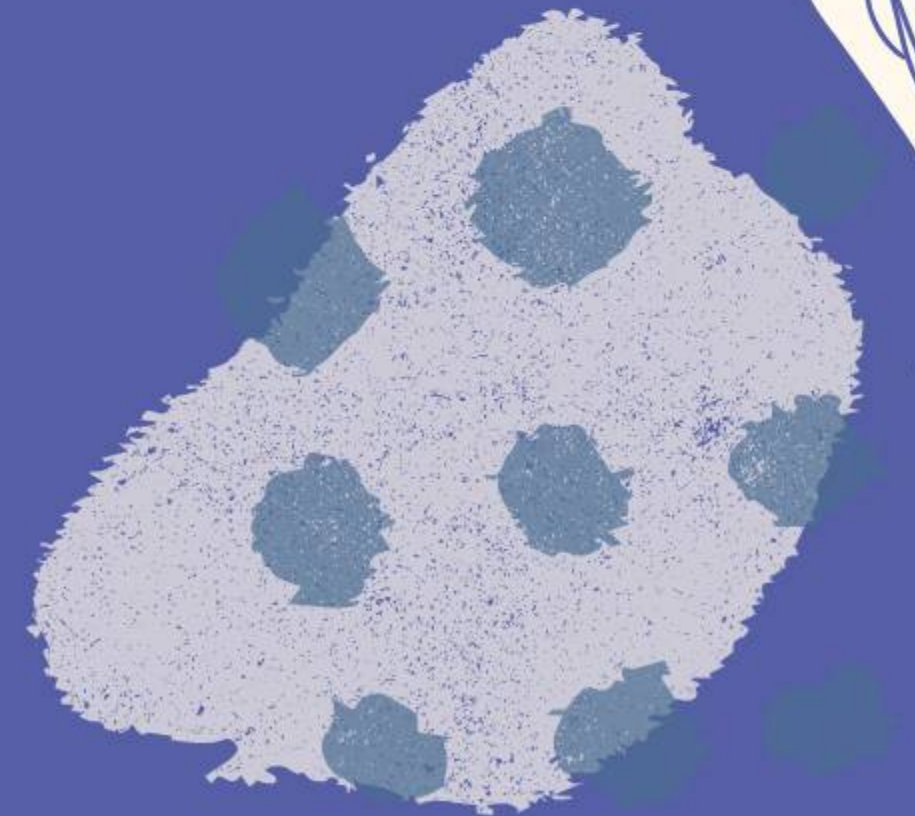


THE VENOUS DISORDER

Introductory
Varicose Vein
Deep Vein Thrombosis



INTRODUCTORY



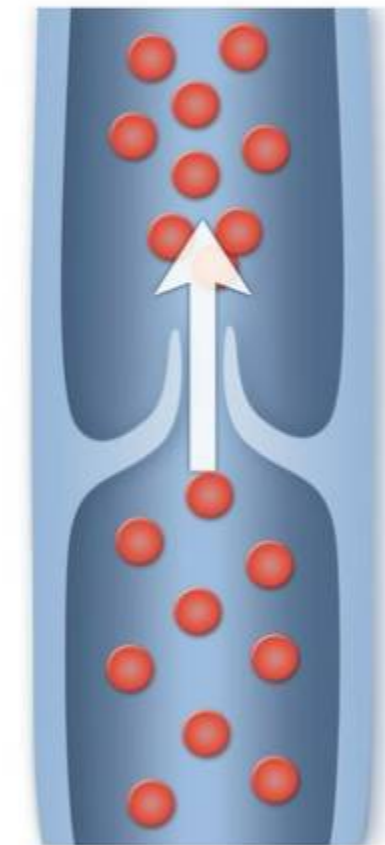
Veins are less muscular and stretchy than an artery, all veins of lower limbs have **bicuspid unidirectional valves** which allow blood to pass from distal to proximal and from superficial to deep the only **exception** is the **Inferior vena cava** as they have no valves.

Types of vein :

- 1- deep vein :
- 2- superficial vein
- 3- communicators vein
- 4- perforators vein



Healthy Vein Valve



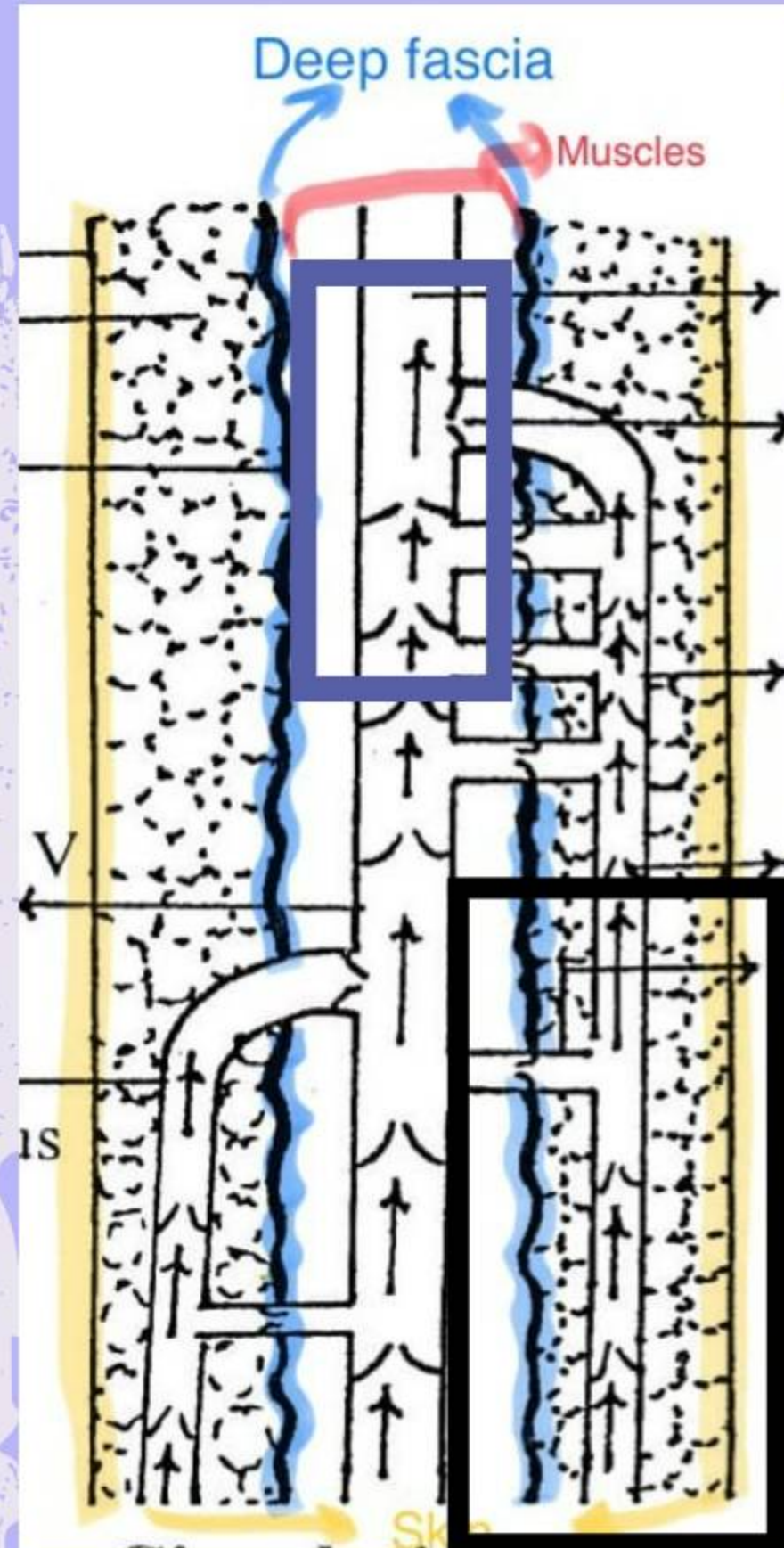
Healthy valves keep blood moving in one direction

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TYPES OF VEIN

1- Deep vein

Lie deep to the deep fascia & they including the intra and inter- muscular veins as well as the vena comitants which above the knee one vein for each artery such as femoral vein but below it , 2 vein for each artery like anterior and posterior tibial vein
These veins drain the structures deep to the deep fascia & receive blood from the superficial veins

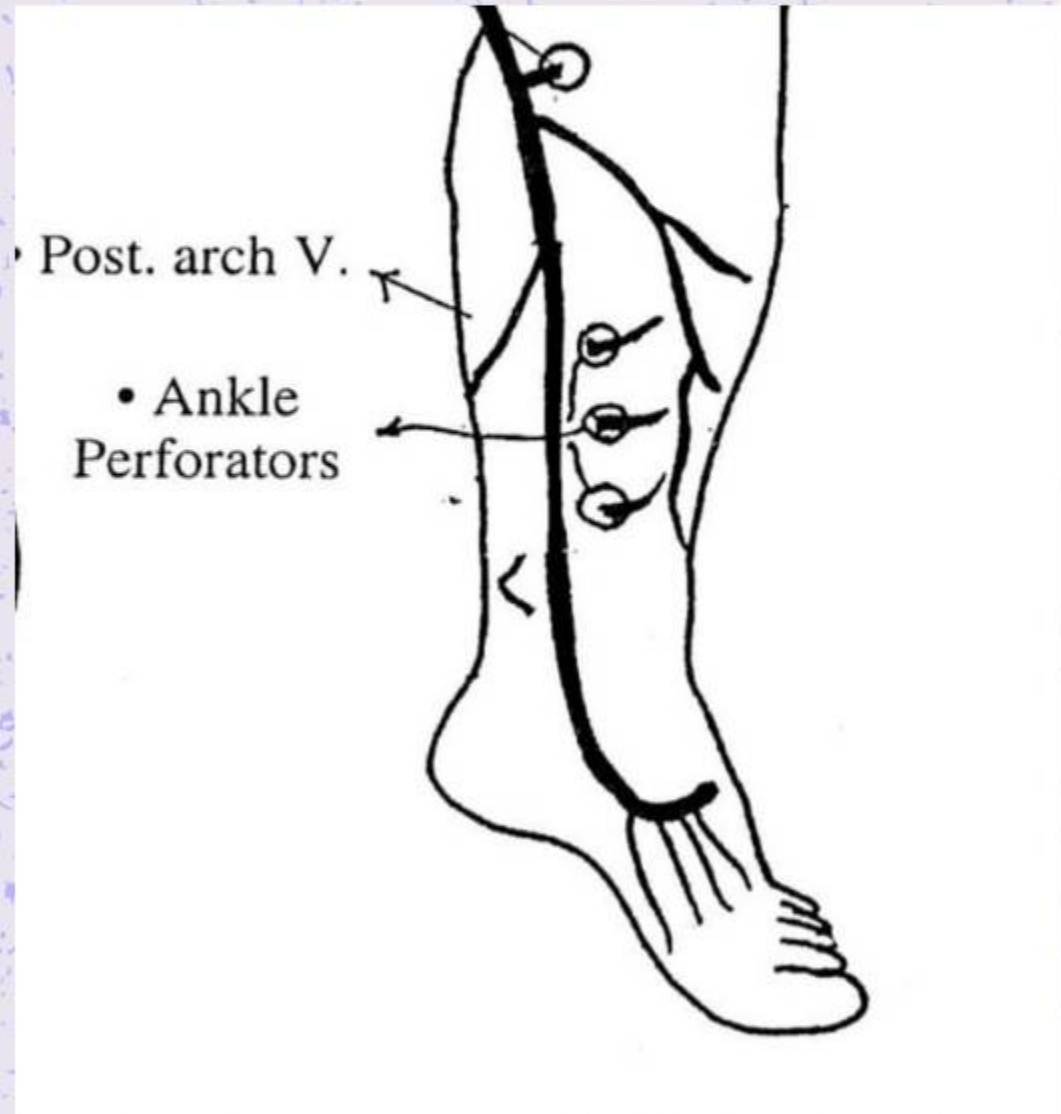


2-superficial vein

Lie superficial to the deep fascia
site for dilatation , elongation & tortousity i.e varicose veins due to the vein being in an unsupported loose S.C. tissue
Superficial veins include:
1.Long (great) saphenous vein
2. Short (Lesser) Saphenous
3.Conncting veins : Tributaries of long and short saphenous veins

TYPES OF VEIN

2-superficial vein cont.

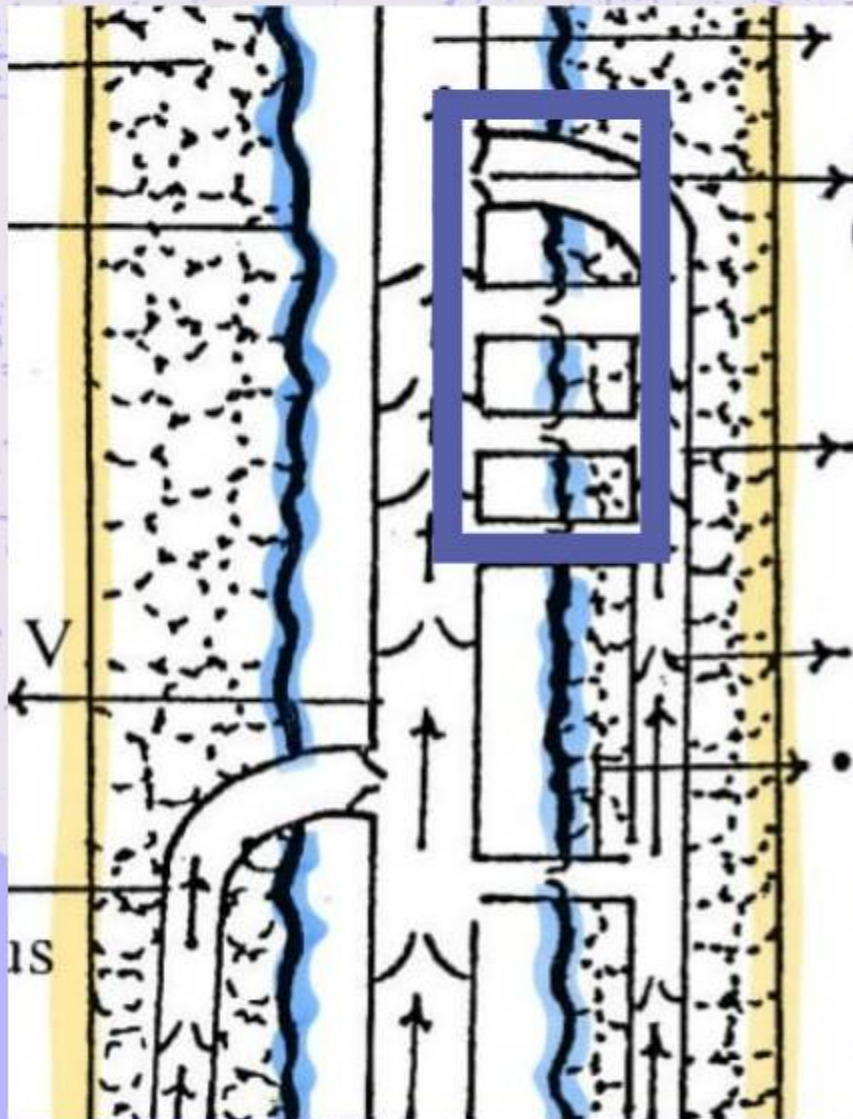


Drain the skin & S.C. tissues of lower limb except the skin of lower $\frac{1}{3}$ of medial aspect of the leg (ulcer bearing area) is an exception as it is drained by the ankle perforators which pierce the deep fascia to ends directly in the deep veins . These Perforators veins are the fourth type of veins.

TYPES OF VEIN

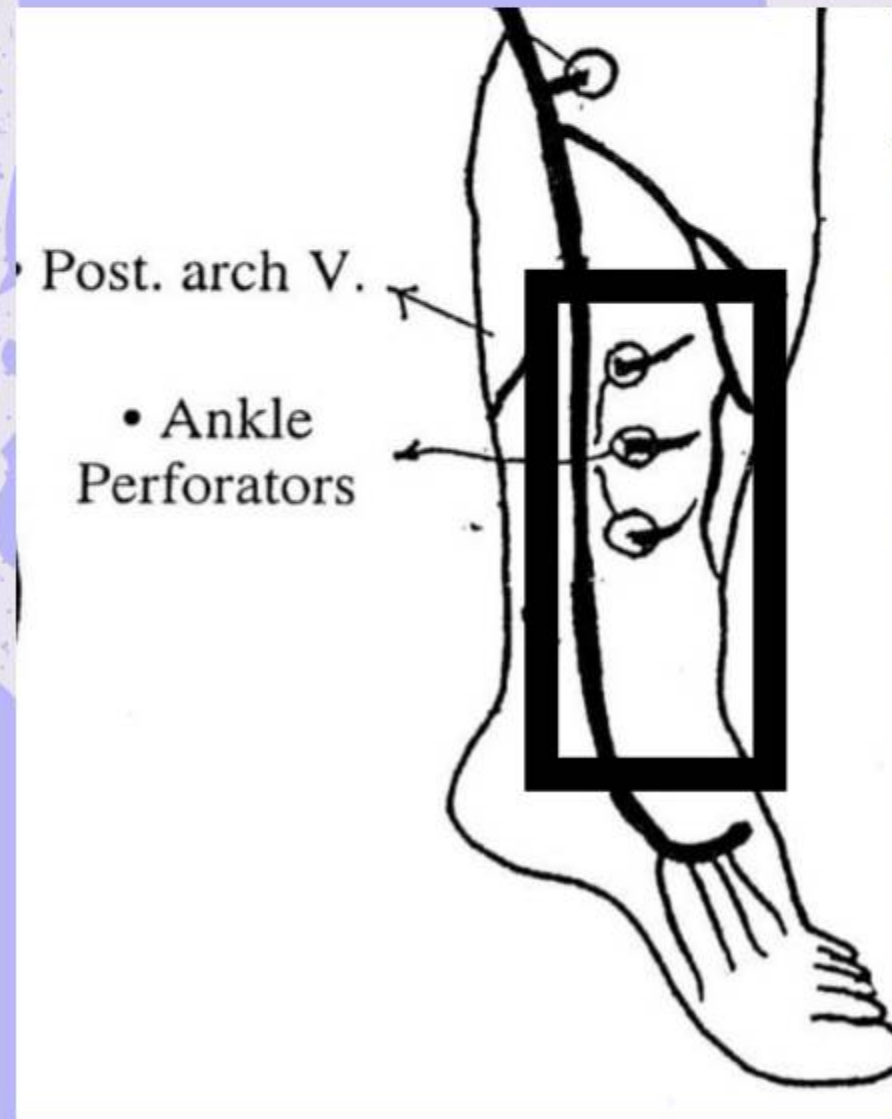
3-Communicators

These are veins piercing the deep fascia and connecting the superficial & deep veins



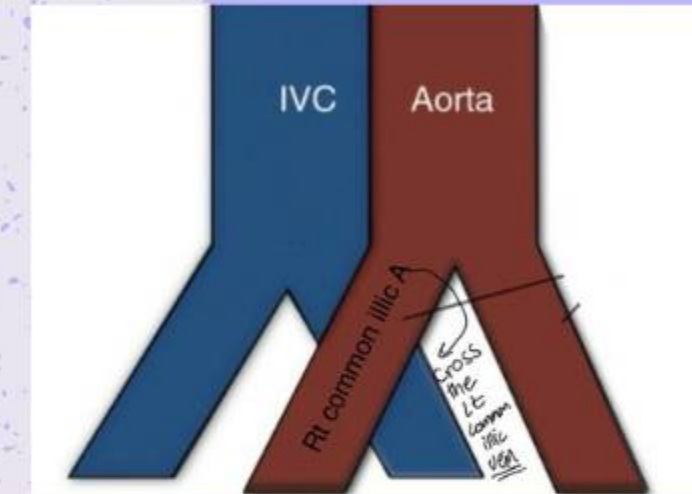
4- Perforators

These veins drain the skin above the medial malleolus (ulcer bearing area) directly to the deep veins (posterior tibial veins) they include 3 Medial leg perforators (ankle perforators), 2, 4, 6 inches above the medial Malleolus



WHERE DOES THE DVT / VV HAPPENS THE MOST ? WHY ?

It happens more commonly on the left side due to passage of right common iliac artery in front of left common iliac vein.



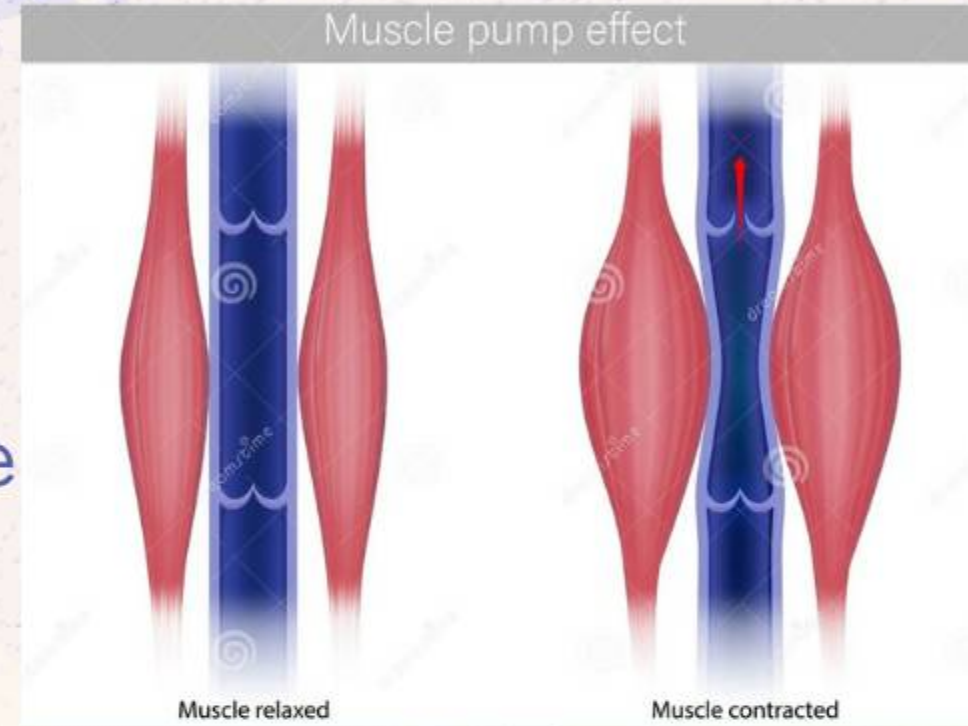
HOW DOES THE BLOOD MOVES AGAINST GRAVITY IN THE VEIN ?

- 1-Muscular pump mechanism : Contraction of calf muscles , within tight deep fascia .
- 2-Unidirectional bicuspid valve .
- 3-Transmitted arterial pulsation to the neighboring veins .
- 4- Negative intra-thoracic pressure

VENOUS DRAINAGE OF LOWER LIMBS AGAINST GRAVITY DEPENDS ON :

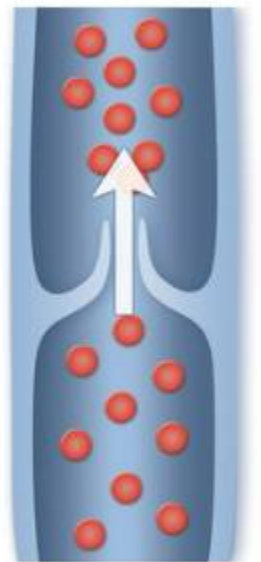
1-Muscular pump mechanism :

Contraction of calf muscles which work as a peripheral heart contracting to push the blood to the heart and the tight deep fascia to increase the contraction force



2-Unidirectional bicuspid valve .

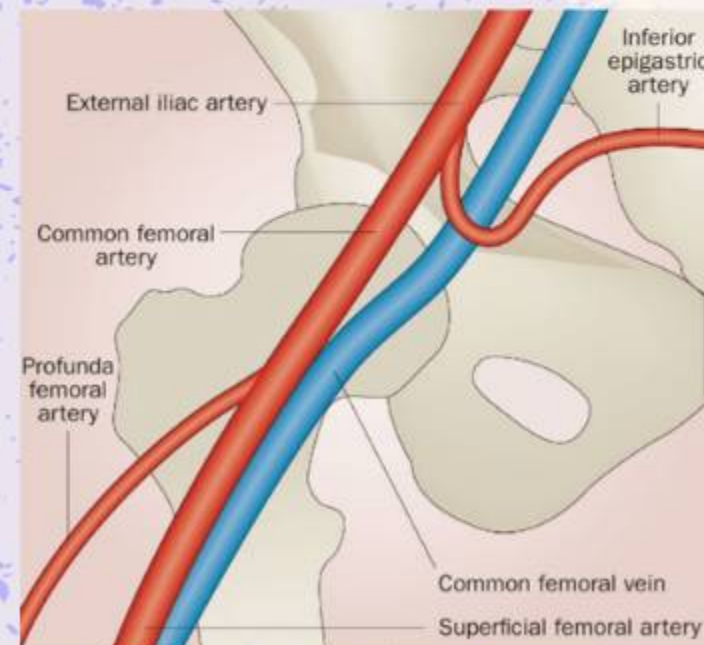
Healthy Vein Valve



Healthy valves keep blood moving in one direction

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3-Transmitted arterial pulsation to the neighboring veins due to the proximity of vein to artery . It is effected by the pulses of artery

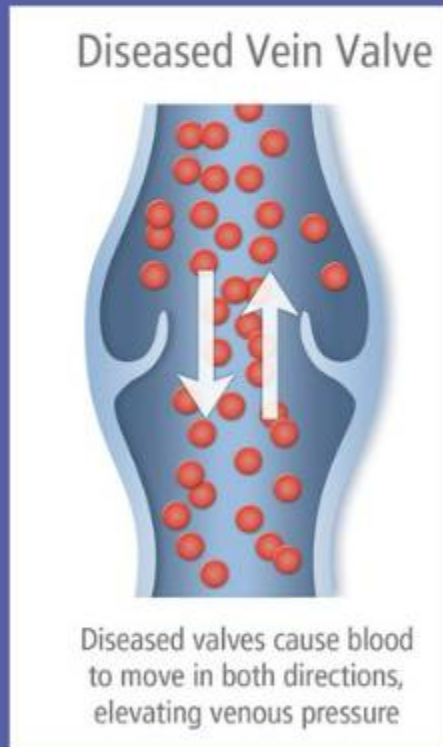


4- Negative intra-thoracic pressure :
The chest cavity is like a vacuum that pulls everything towards it

THE IMPORTANT CYCLE FOR THE PATHOLOGY OF VENOUS DISEASE

venous hypertension
due to any cause like
standing up for a
long period of time

so the unidirectional
flow is incompetent
and the reflux of
blood back to the
vein occurs



cause distension
of veins

The bicuspid of the
valve gets apart
leading to valve
dysfunction

this cycle leads to :

Elevated venous hypertension
causing :

oedema

distension
of veins

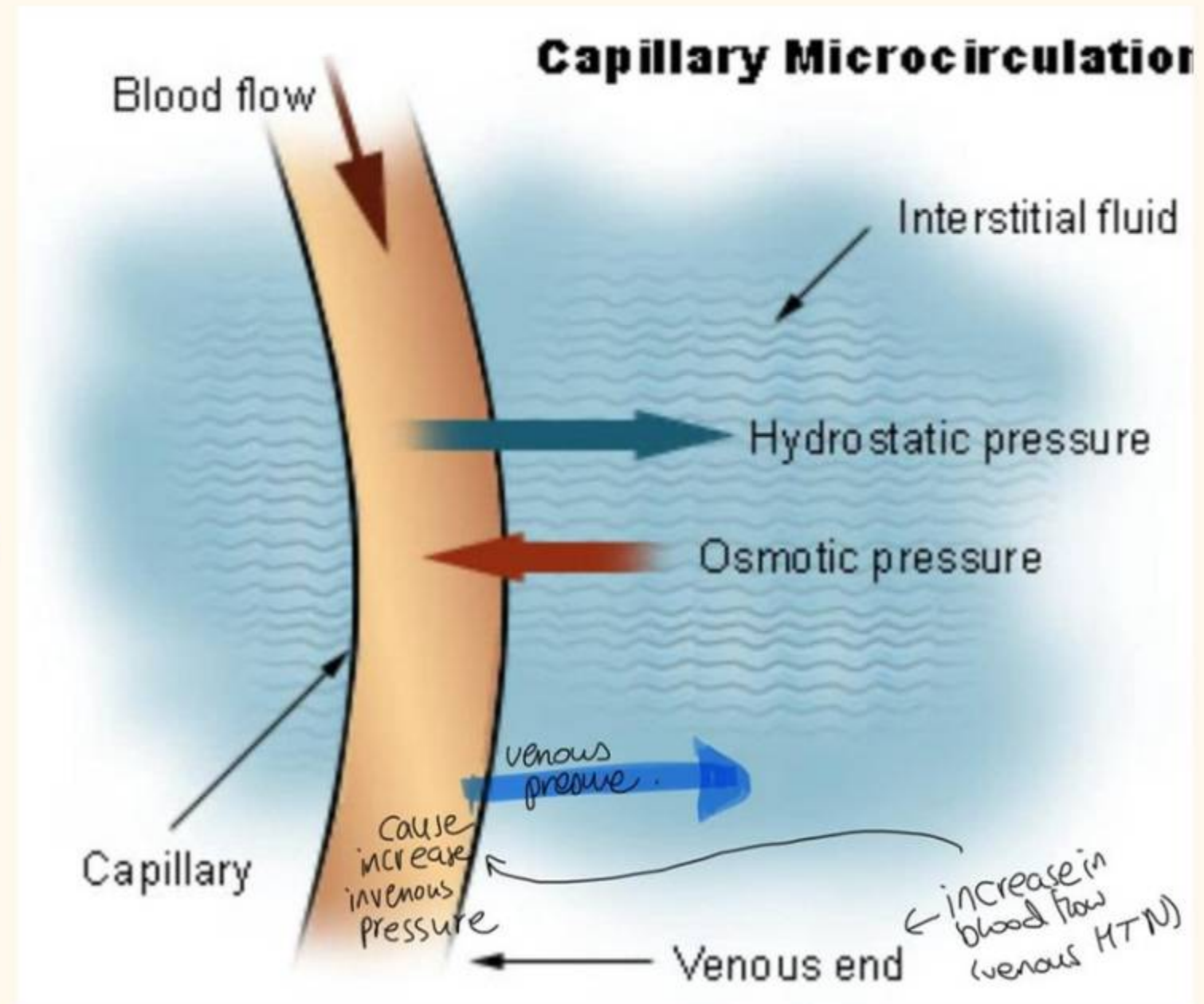
venous
pain

Quick explanation of how the oedema has formed:

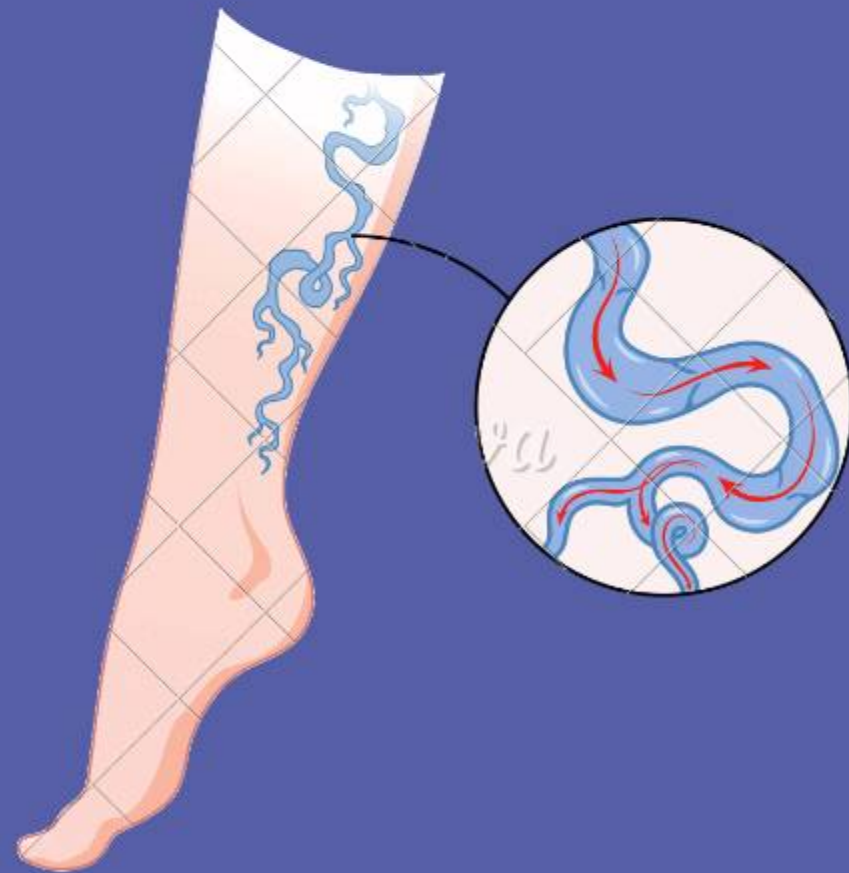
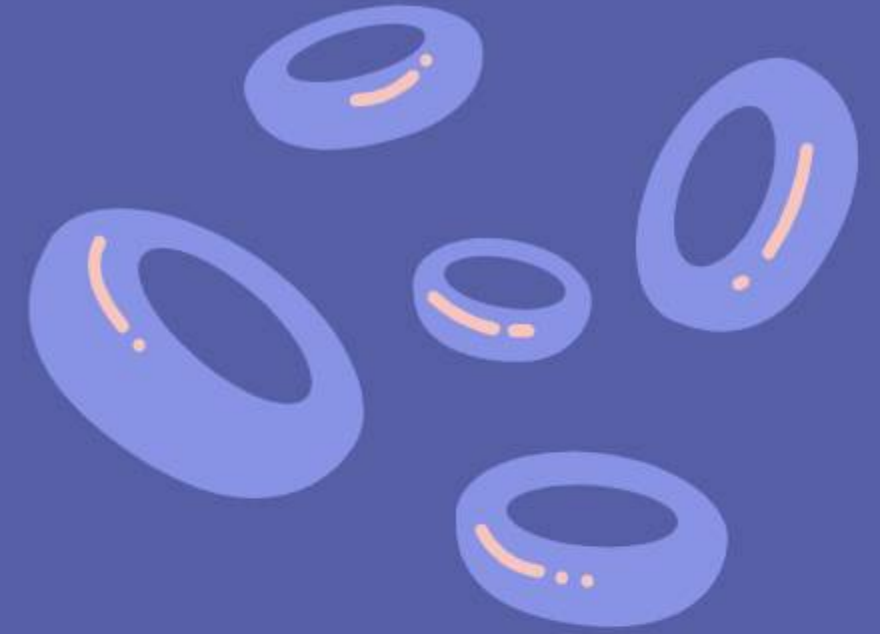
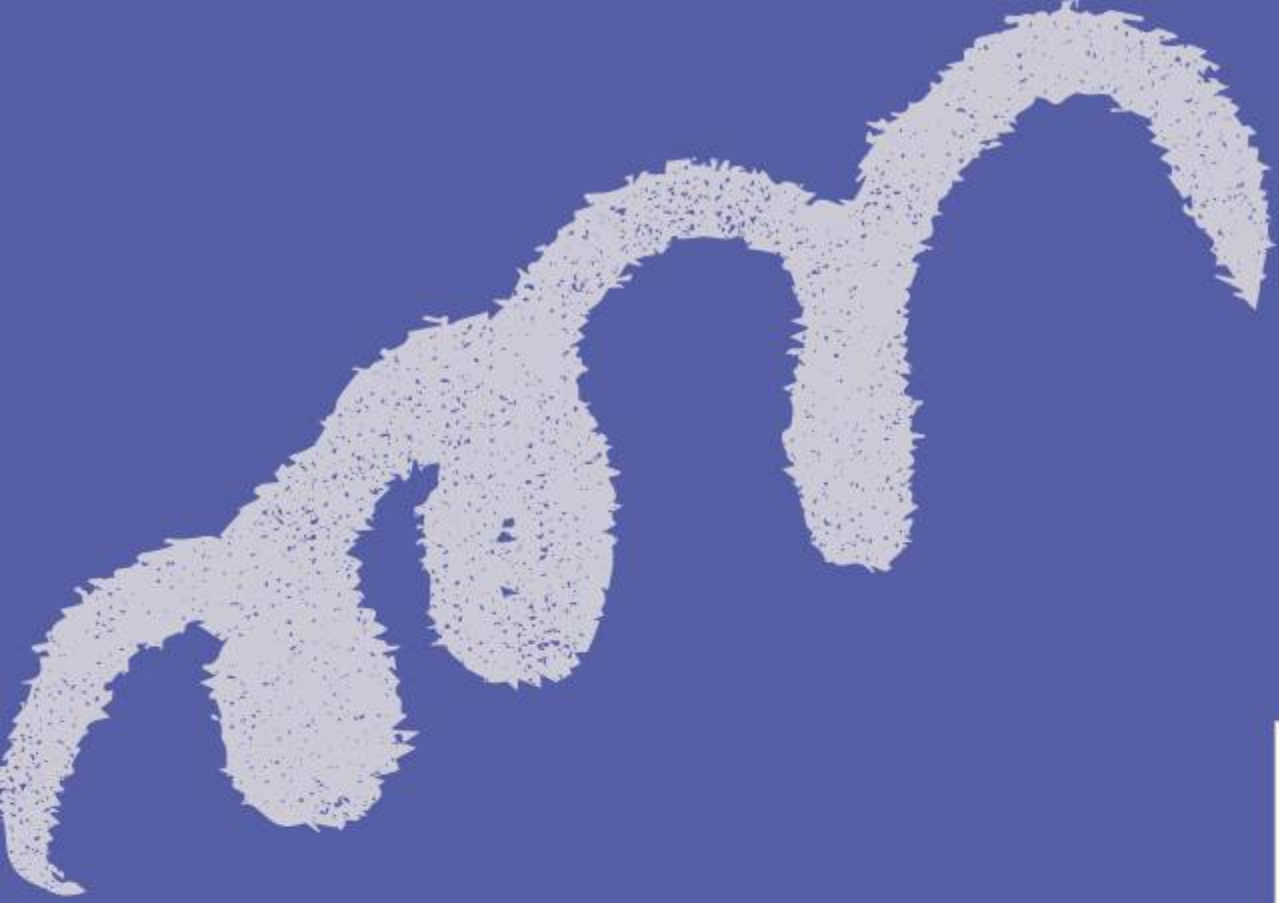
In normal people we have a balance between hydrostatic (with push the fluid outside the vein) and osmotic pressure (pull the fluid back into the vessel ———> so no oedema

we have in the venous side a pressure called venous pressure that is against the osmotic pressure but it does not have any effect on it in normal people

In patients with venous hypertension: The venous pressure increases and it will be able to inhibit the effect of osmotic pressure so the interstitial fluid will accumulate and won't be able to return back to the venous side



VARICOSE VEINS

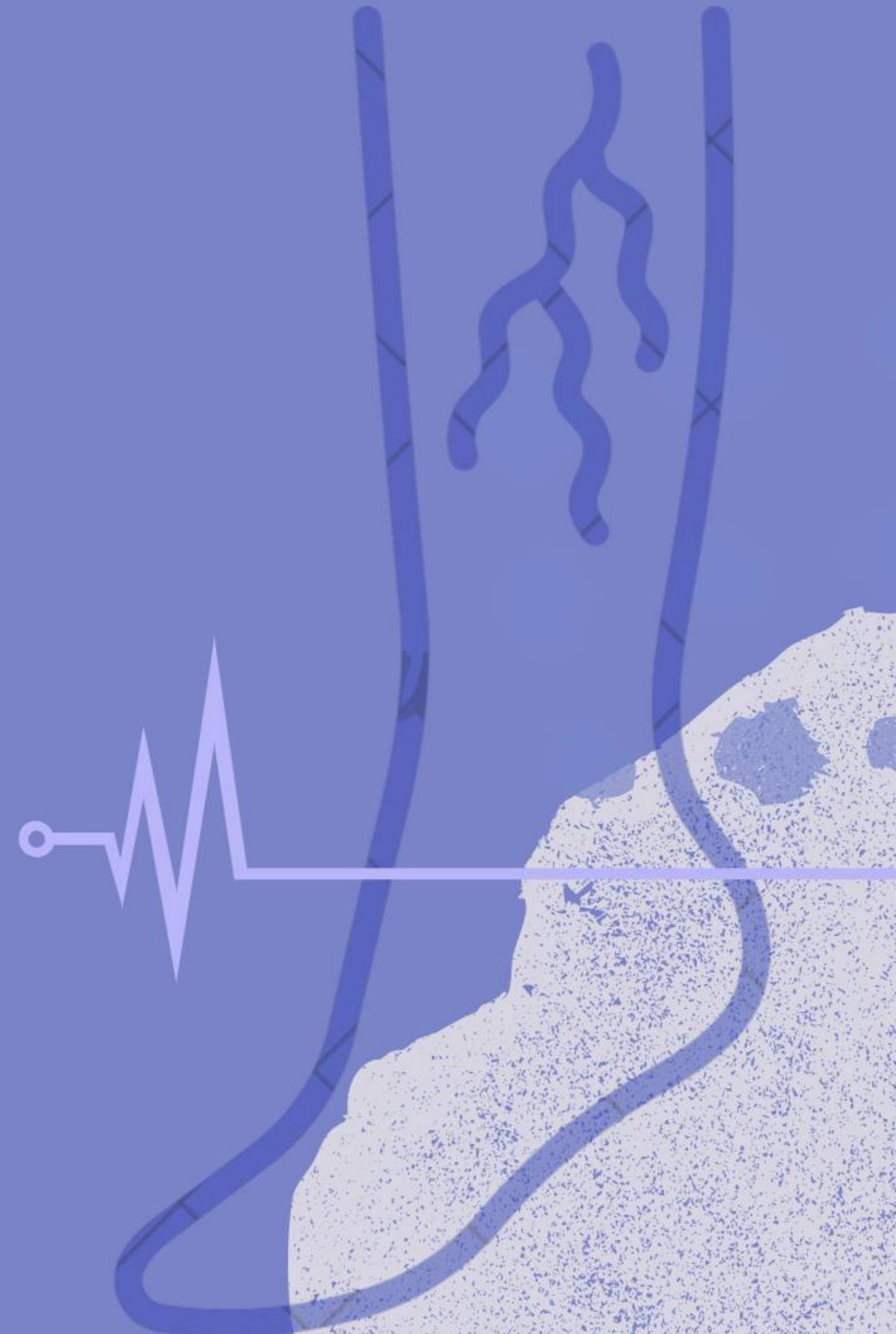


DEFINITION :

Dilated, elongated, tortuous superficial veins of the lower limb ($> 3\text{mm}$ in diameter measured in upright position with demonstrable reflux).

Not deep veins which are well supported by bulky muscle .

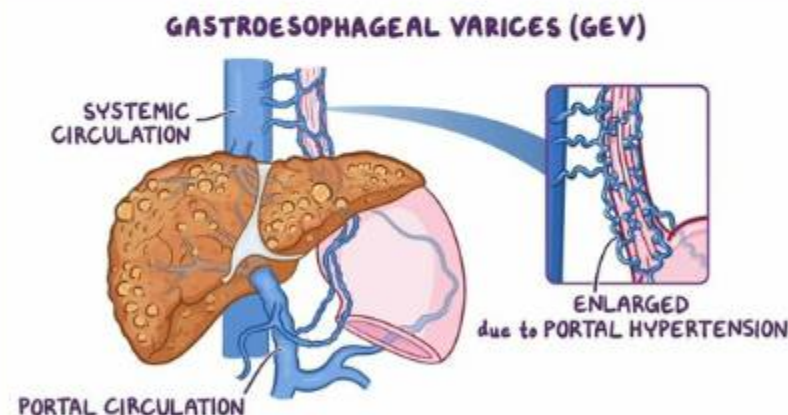
More common in the left lower limb .



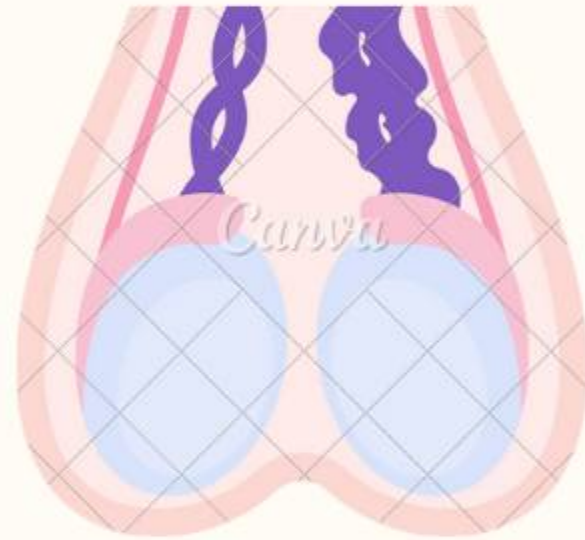
VARICOSE VEINS MAY OCCUR ON OTHER SITES BUT HAVE SPECIAL NAME

Esophgeal & Gastric varices

Esophgeal and Gstric varices



varicocele



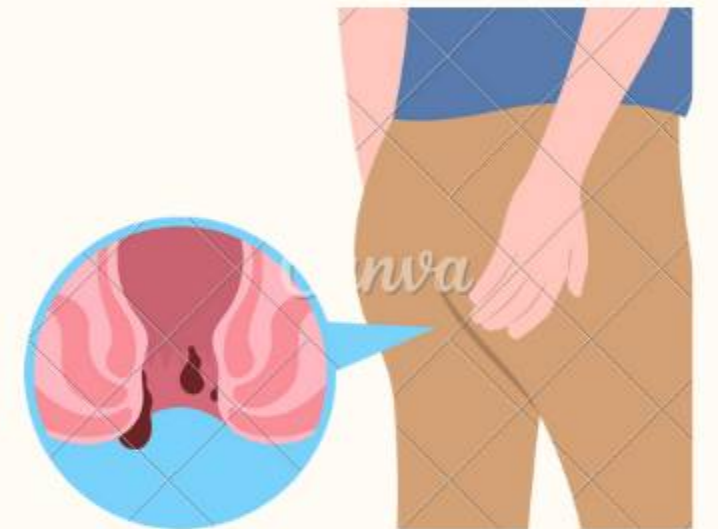
Varicocele

Caput Medusa

Caput Medusa



Haemorrhoids (piles)



Haemorrhoids (Piles)

The association of varicose veins with varioccele, piles, hernia & flat foot → positive Family history of Congenital hereditary Mesenchymal weakness .

TYPES AND ETIOLOGY

```
graph TD; A[TYPES AND ETIOLOGY] --> B[Primary VV<br/>85%]; A --> C[Secondary VV<br/>15%]; B --> D[Without demonstrable obstruction & the cause is Unknown]; C --> E[Usually the deep veins are occluded (High venous pressure)];
```

Primary VV

85%

Without demonstrable obstruction & the cause is Unknown

Secondary VV

15%

Usually the deep veins are occluded (High venous pressure)



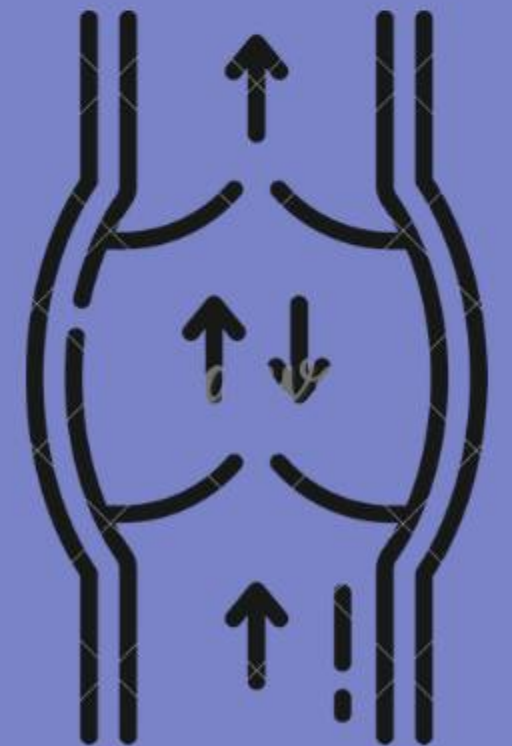
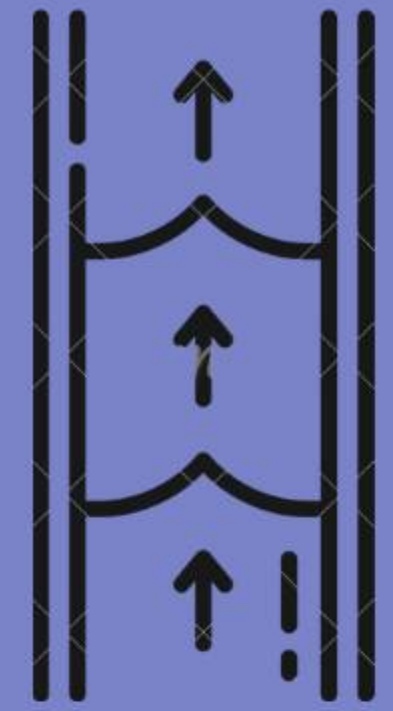
PRIMARY VW

**Congenital
hereditary
weakness of
veins wall**

**Valvular
incompetence**

Normal or slight increase in venous pressure

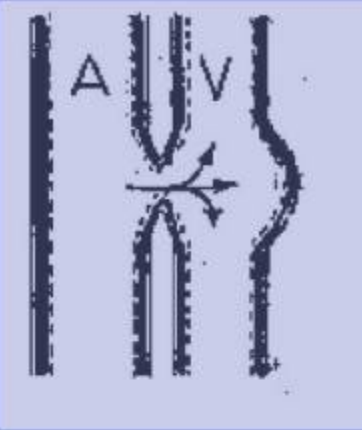
Positive family history is found in 50% of cases



SECONDARY VV

Occluded deep veins

Arterio-Venous
Fistula



DVT

Compression of
deep veins

Congenital

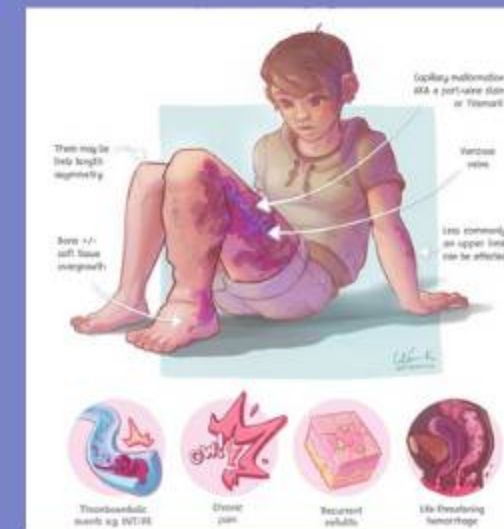
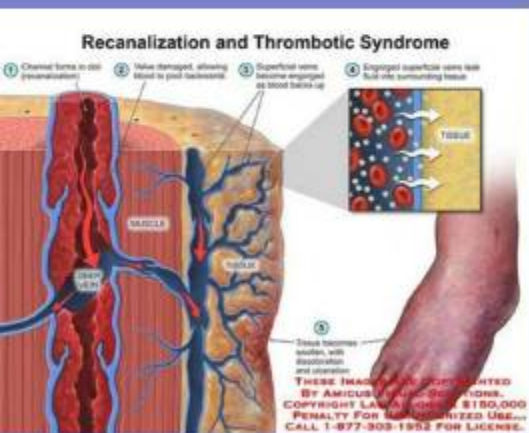
Acquired

pregnancy

Abdominal or
pelvic Tumor

Klippel-trenaunay
syndrome

Truma



During pregnancy → Secondary
Between repeated pregnancies → primary



Risk Factors



Age

As we get older, the risk of varicose veins developing increases, especially past the age of 60. Gradual wear and tear on the body means that veins do not function as effectively as they used to, and varicose develops much easier.



Weight

If you are obese or excessively overweight, the pressure on your veins is greatly increased, meaning that the valves have to work harder to push blood up the legs.



Extended periods of sitting or standing

Whether it is working at a desk all day, sitting on a long flight, or standing for an extended period of time, remaining motionless slows down the blood flow in your legs, as your muscles are not moving enough to pump blood.



Gender

Women are twice as likely to develop varicose veins as men are. This is because the hormones which are released during pregnancy, menopause and pre-menstruation tend to relax the vein walls in your blood vessels. For the same reason, birth control pills and hormone replacement therapy may also increase your risk of developing varicose veins.



Pregnancy

It is not only the hormones released during pregnancy that increase your chances. During the term of your pregnancy, the amount of blood in your body increases to support the growing child. This can also lead to enlarged veins in your legs and pelvis, which often means the valves are not as effective.



Genetics

Varicose veins are much more likely to develop if you have a family history. If your parents, grandparents, or other relatives have varicose veins then it is advised to act proactively and take steps to support healthy veins.



CLINICAL PICTURE

PRIMARY

dull Aching pain , tiredness ,
minimal edema & skin
changes , usually bilateral,
the veins
usually tubular or sacular ,
slight foot& ankle swelling.

COSMETIC
DISFIGUREMENT

SECONDARY

bursting pain
Marked edema& skin
changes , usually
unilateral, bursting pain , the
veins usually
spider , marked diffuse
swelling of the Lower limbs.

EVOLUTION OF THE DISEASE

1.	Spider veins	(1-1.15 mm) Red, purple or pink Not raised nor swollen
2.	Reticular veins	(2-3 mm) Green blue or purple Don't usually rise above skin
3.	Varicose veins	(>3 mm, elevated above the level of skin) Dark blue or purple



Stage 1

Spider veins

Stage 2

**Reticular
varicose veins**

Stage 3

Venous nodes

Types of varicose veins



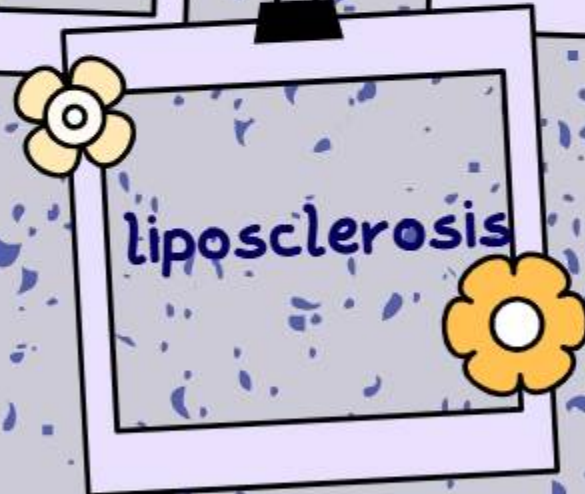
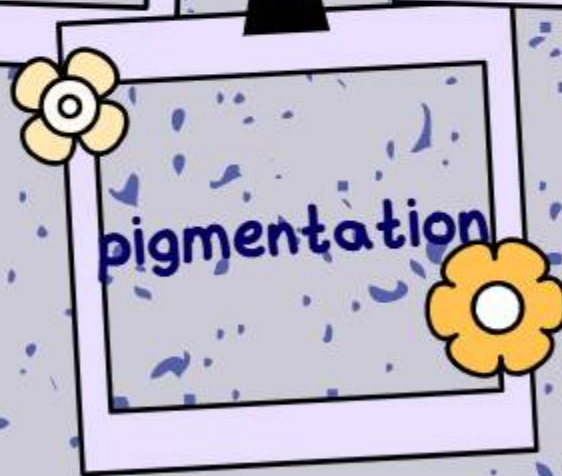
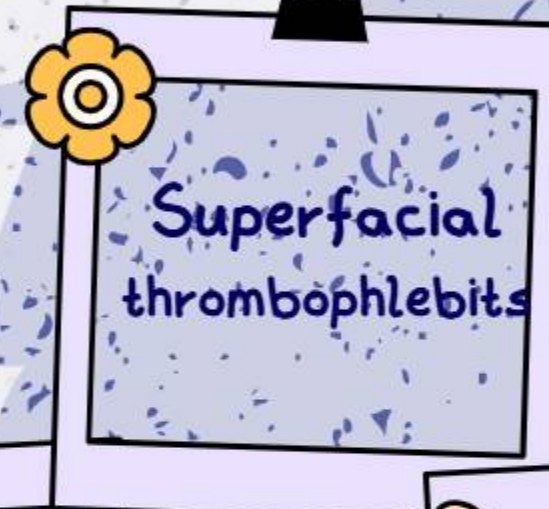
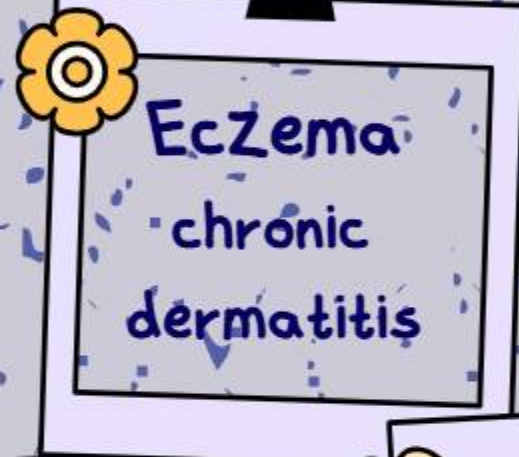
Spider veins

Reticular varices

*Varicose
vein trunk*

COMPLICATION

MUCH MORE COMMON WITH SECONDARY VARICOSE VEINS



Edema

accumulation of extracellular fluid in S.C



pigmentation & Eczema

due to haemosiderin in the s.c. tissue irritation, itching & eczema.



Liposclerosis

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.

superficial Thrombophlebitis



Hemorrhage

maybe spontaneous or after trauma & ulceration



calcification

in long standing cases.

Veinous Ulcer



Incidence : It represent about 70% - 90% of chronic leg ulcers.

The ulcer is due to:

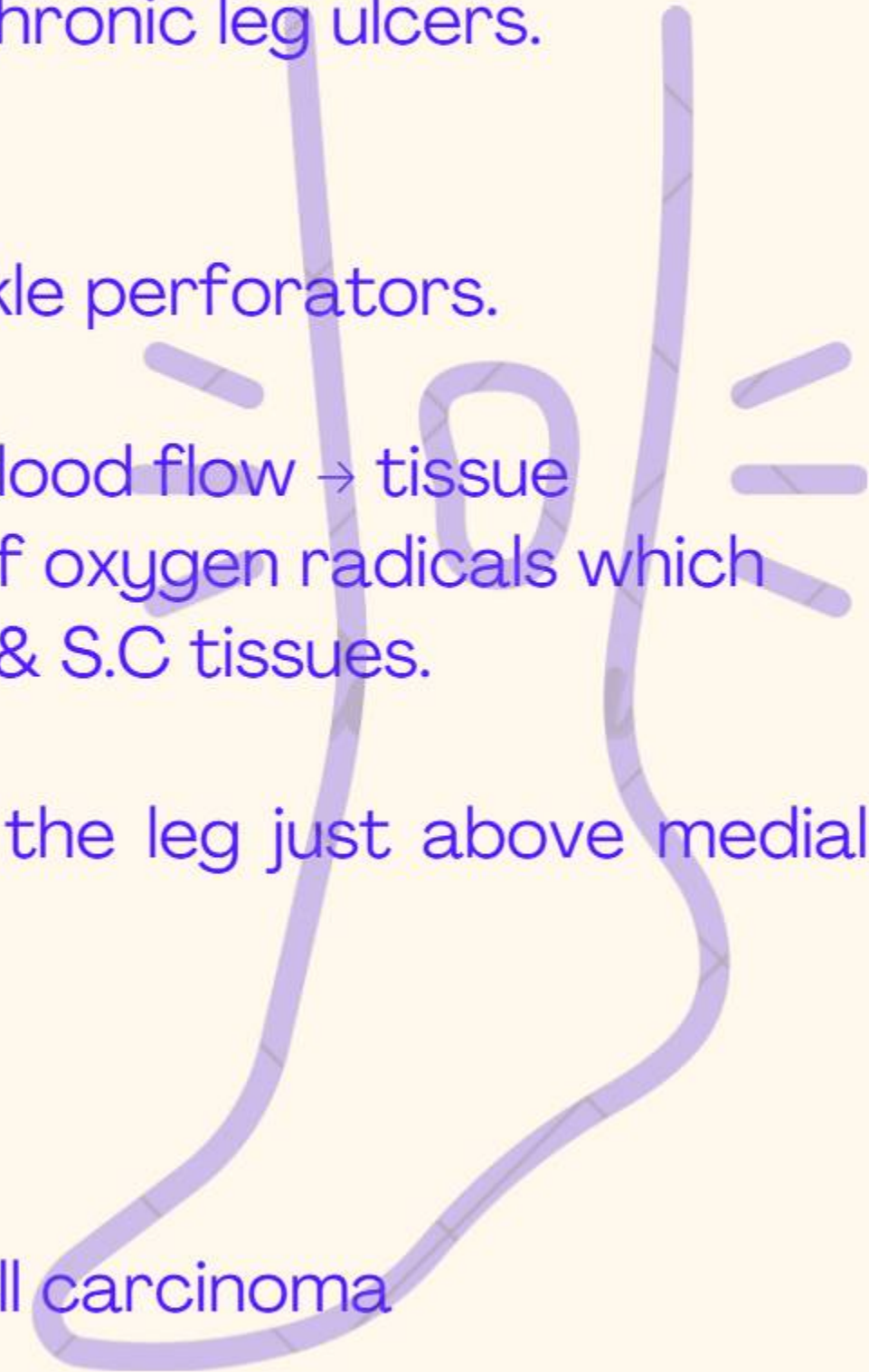
1. Post-phlebotic limb with incompetence of ankle perforators.
2. Eczema → itching → ulcer.
3. Venous hypertension → decrease capillary blood flow → tissue hypoxia , impairment of nutrition & liberation of oxygen radicals which are toxic to the tissues → devitalization of skin & S.C tissues.

Skin of the medial aspect of lower part of the leg just above medial malleolus (ULCER BEARING AREA)

Complications :

Infection , periostitis , chronicity .

➤ Malignant transformation and squamous cell carcinoma
(Marjolin's ulcer)

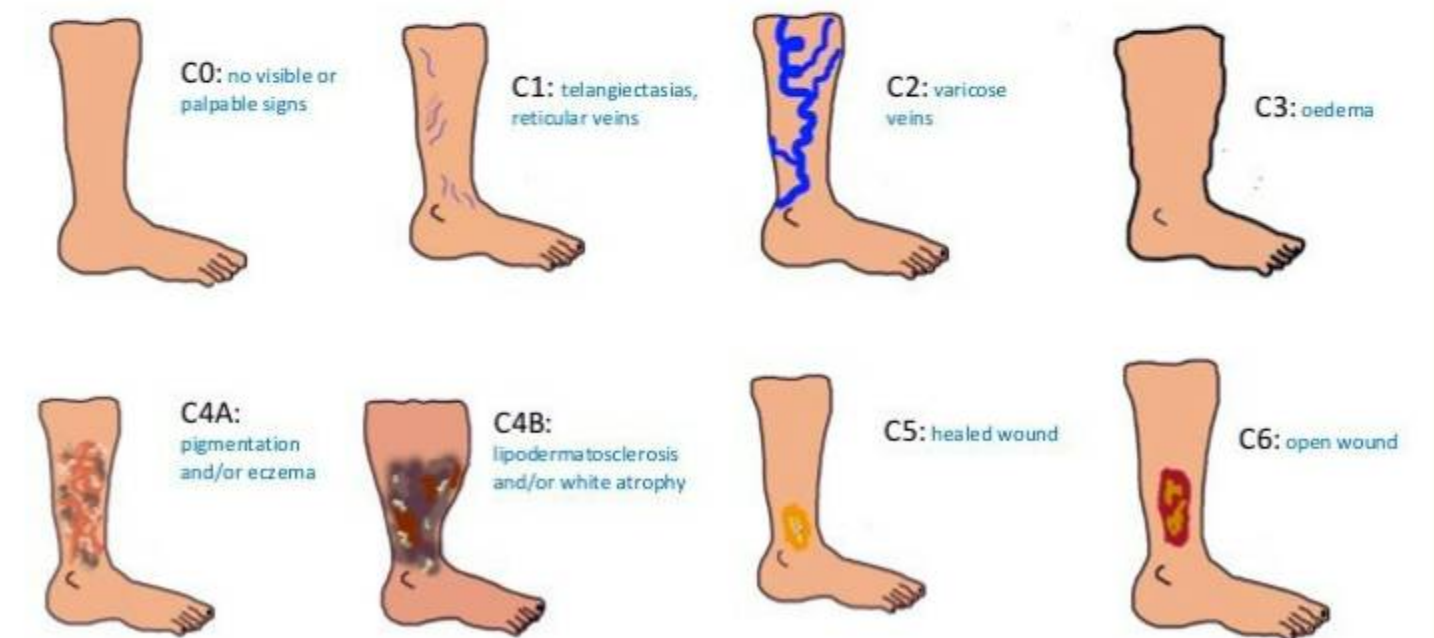


CEAP

CLINICAL(C) / ETIOLOGICAL(E) / ANATOMICAL(A) / PATHOPHYSIOLOGY(P)



The problem of chronic venous disease. **CEAP Classification**



PHYSICAL EXAMINATION:

By inspection: ulcer on medial side , swelling in ankle , spider veins, micro dermatosclerosis (pigmentation and thickening of the skin of the medial side of the leg).

By Palpation: Assess the texture of the skin and subcutaneous tissue of the lower leg by palpation. There may be pitting oedema or thickening, redness and tenderness and Feel for a cough impulse and thrill in the groin and in a dilated trunk of the short saphenous vein behind the knee. This is easier if the fascia is relaxed by slightly flexing the knee.

—



PHYSICAL EXAMINATION:

Percussion: Test whether a percussion impulse is conducted up or, more significantly, down the main superficial veins.

Auscultation: Listen over any large bunch of varicosities, especially if the veins do not collapse when the patient lies down.



SPECIAL TEST

```
graph TD; A[SPECIAL TEST] --> B[1. Localization of incompetent valves:]; A --> C[2. To differentiate between occluded and patent deep veins:]; B --> D[A. Trendelenburg's Test]; B --> E[B. Schwartz's test]; B --> F[C. Multiple tourniquet test]; C --> G[A. Perthe's test]; C --> H[B. Modified Perthe's test];
```

1. Localization of incompetent valves:

- A. Trendelenburg's Test**
- B. Schwartz's test**
- C. Multiple tourniquet test**

2. To differentiate between occluded and patent deep veins:

- A. Perthe's test**
- B. Modified Perthe's test**

I. Localization of incompetent communicators & valves:

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** from above with the tourniquet in place → incompetent communicator in the thigh, leg.

3. **Rapid filling** from above after removal of the tourniquet → incompetent saphenofemoral junction.

I. Localization of incompetent communicators & valves:

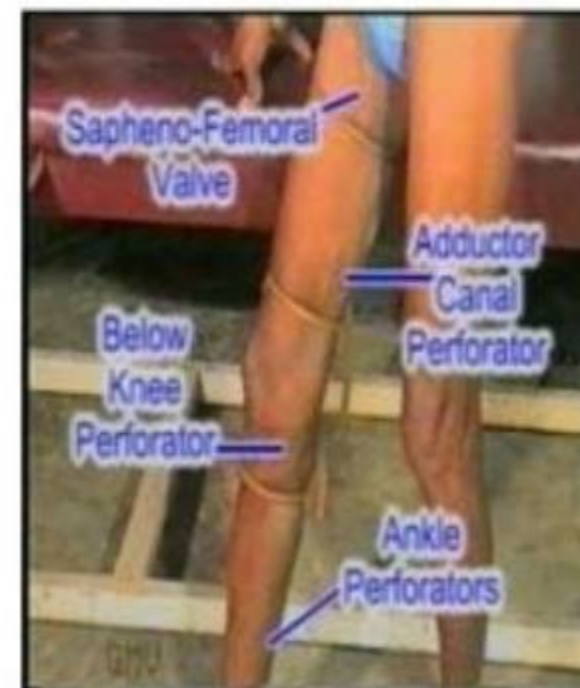
b. Multiple tourniquet test

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.

Multiple Tourniquet test



I. Localization of incompetent communicators & valves:

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 .



II. TO DIFFERENTIATE BETWEEN OCCLUDED AND PATENT DEEP VEINS:

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.)



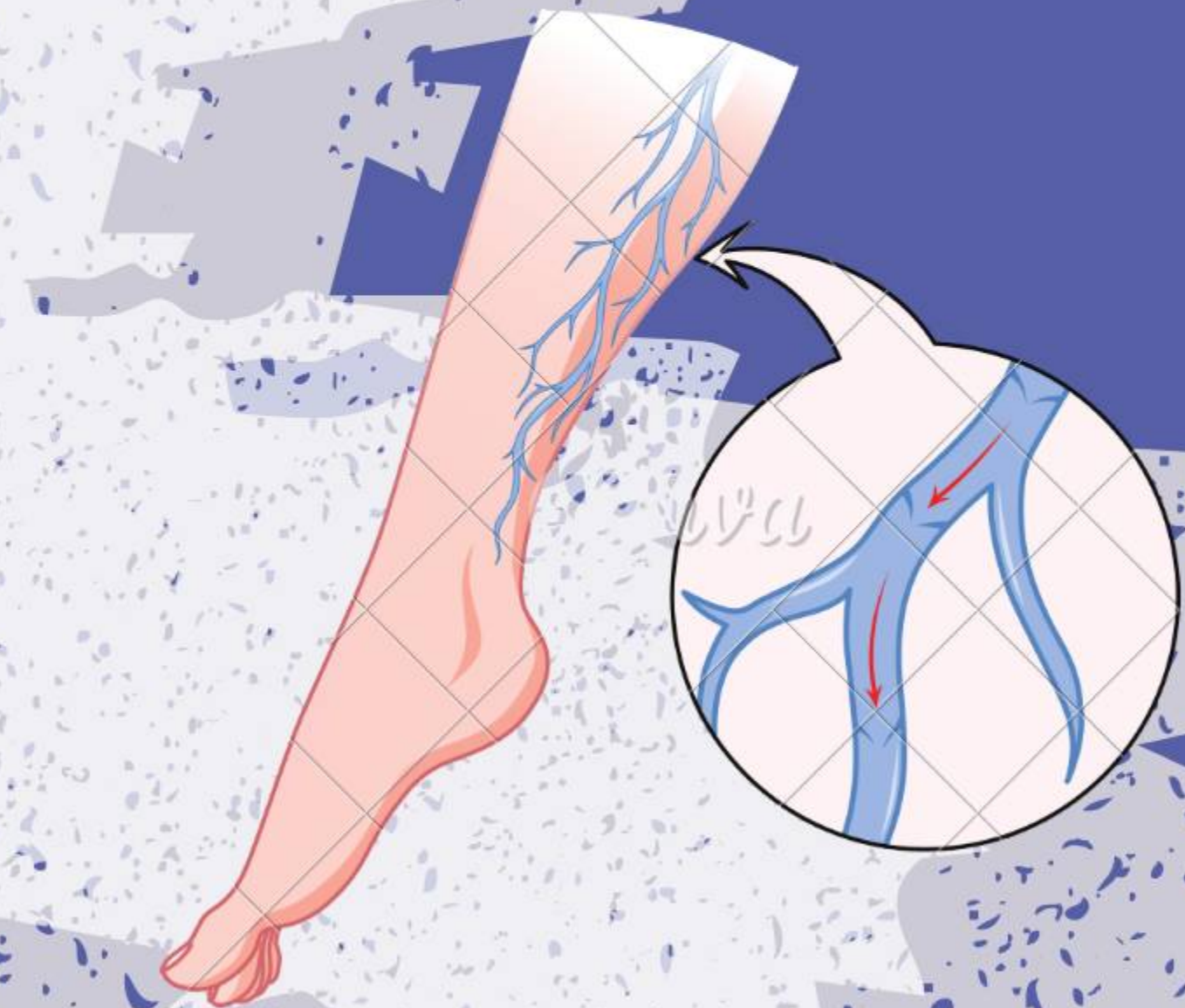
II. TO DIFFERENTIATE BETWEEN OCCLUDED AND PATENT DEEP VEINS:

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.

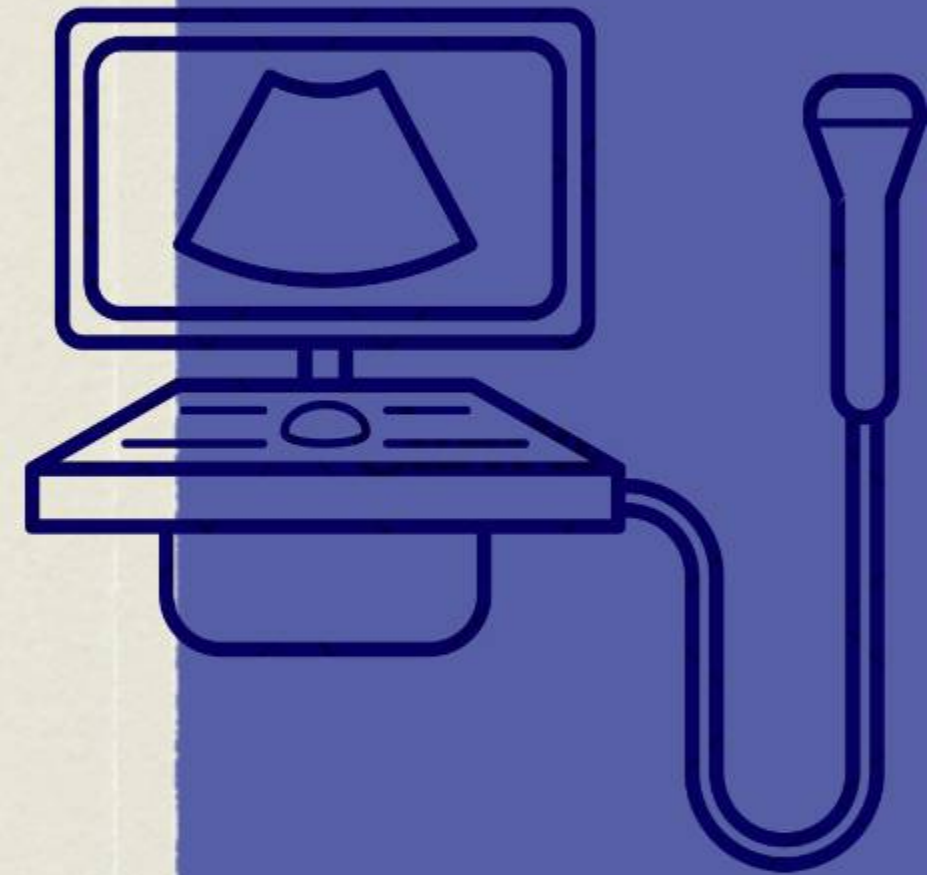
2. If V.Vs. become more prominent with bursting pain → deep system is occluded (2ry V.Vs.) or there are incompetent communicators.



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



Treatment of varicose

A. Life style modification

Aim : Relief of pain and prevent Varicose veins from getting worse

1. Avoid prolonged standing or sitting
2. walking, exercises , losing weight & leg elevation are encouraged.
3. compression stockings

B. Injection sclerotherapy

Sclerosing agents: sodium tetradecyl sulfate, hypertonic saline, polidocanol

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 Sclerosing agent , into the veins .

➤ Then a local elastic bandage is applied for 4 weeks to keep the vein collapsed.

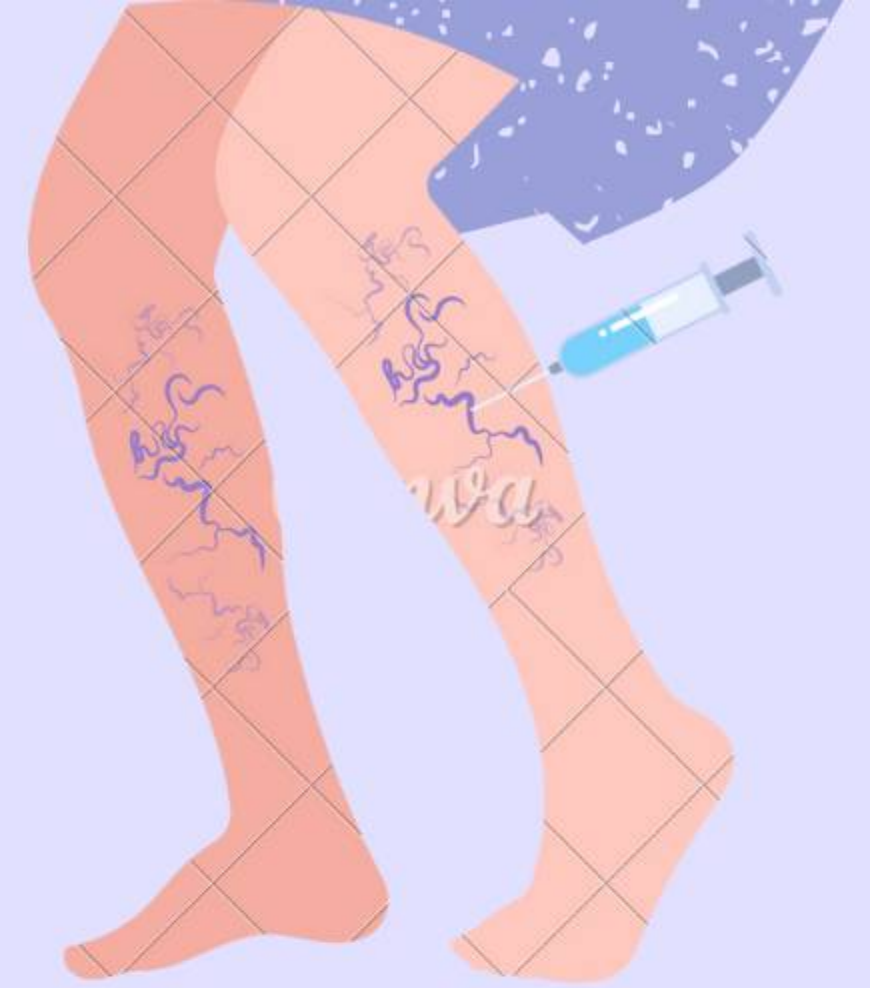
➤ Immediately, the patient is instructed to walk for a long distance.

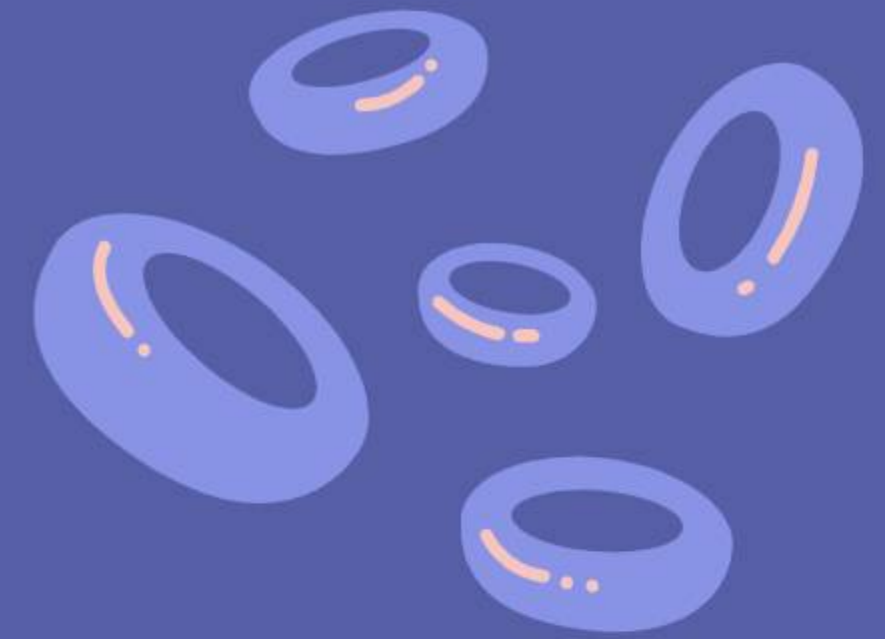
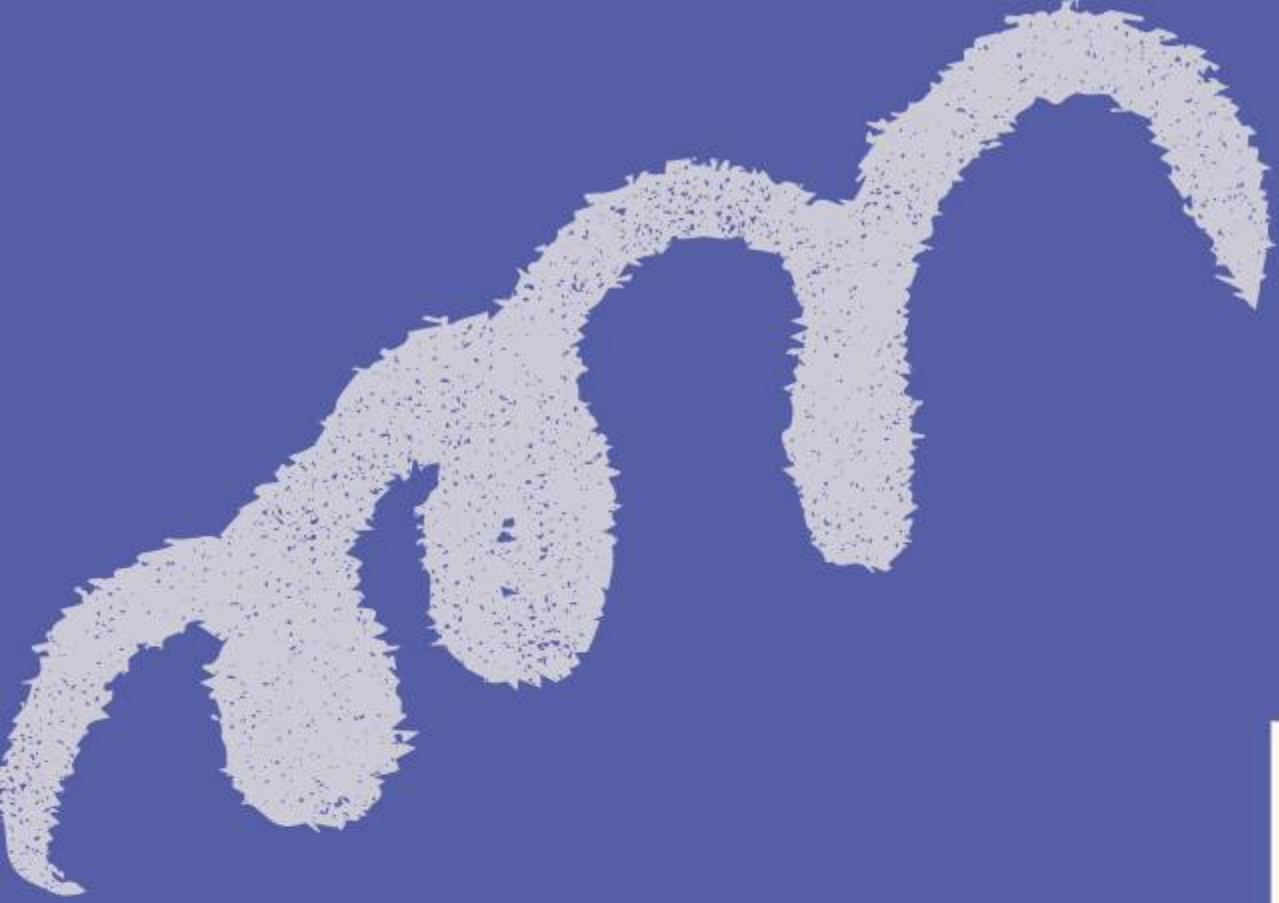
➤ Multiple sites can be injected at the same visit.

Effect: The injected material injury of the endothelium of the vein and the pressure bandage obliteration of the veins by fibrosis not by thrombosis

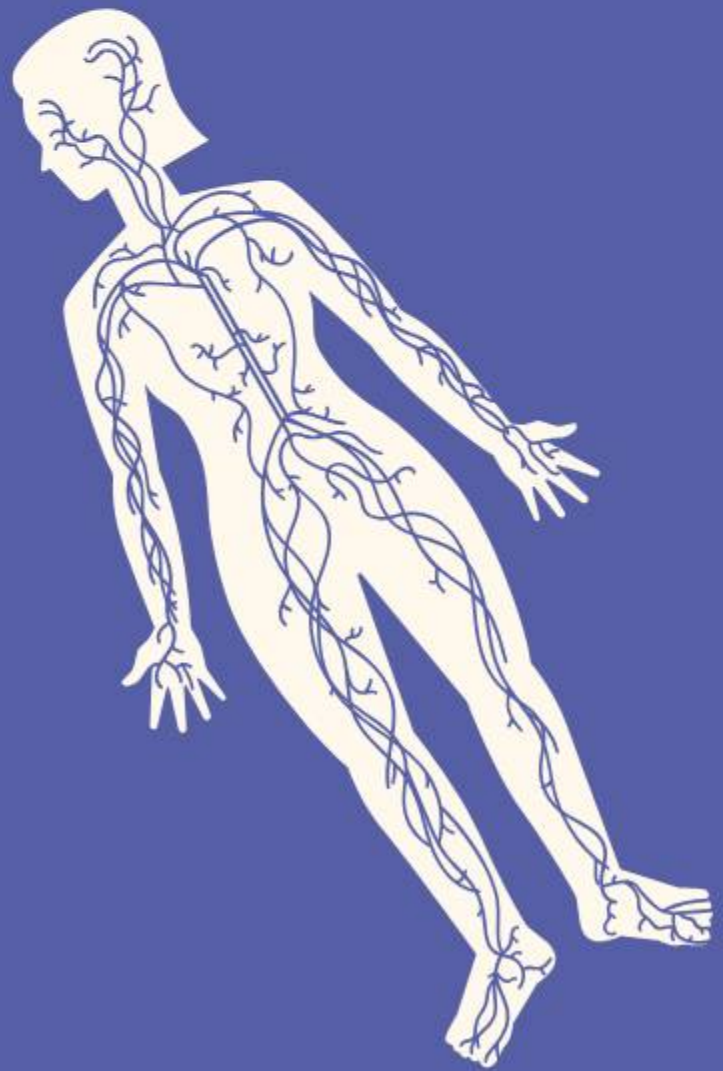
C. Surgery

1. ligation and stripping
2. endovenous thermal ablation
3. phlebectomy



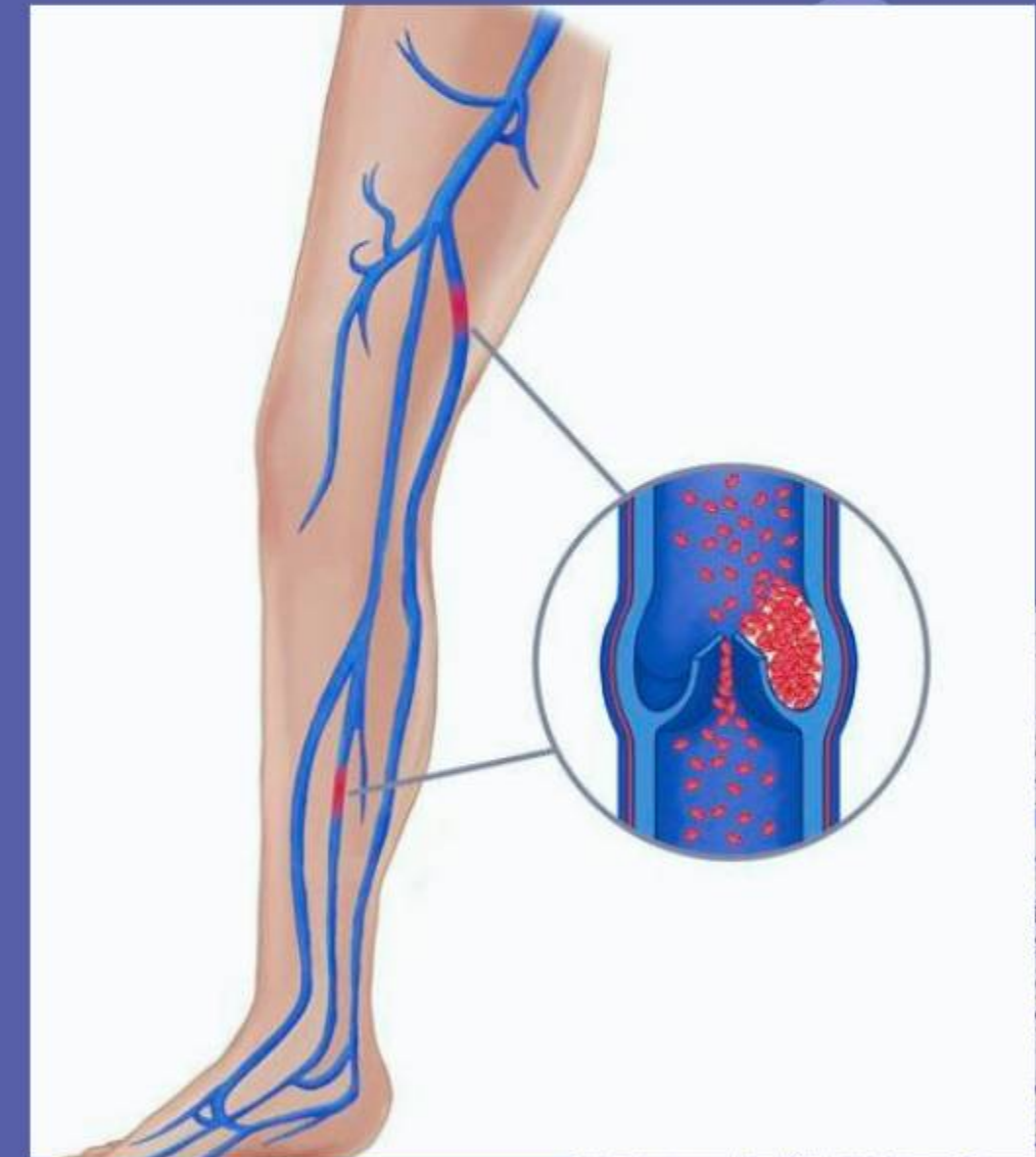


DEEP VEIN THROMBOSIS



THIRD : DEEP VENOUS THROMBOSIS

A **BLOOD CLOT** (THROMBUS) FORMS IN ONE OR MORE OF THE **DEEP VEINS** IN THE BODY, USUALLY IN THE LEGS.



Incidence & Aetiology

Incidence: The true incidence of DVT is unknown as most cases pass unnoticed.

-Aetiology : **Virchow's triad**

1. Endothelial damage: (Structural)

- Injury** of deep veins e.g. pelvic or abdominal operations
- Inflammation** of veins e.g. Pelvic sepsis

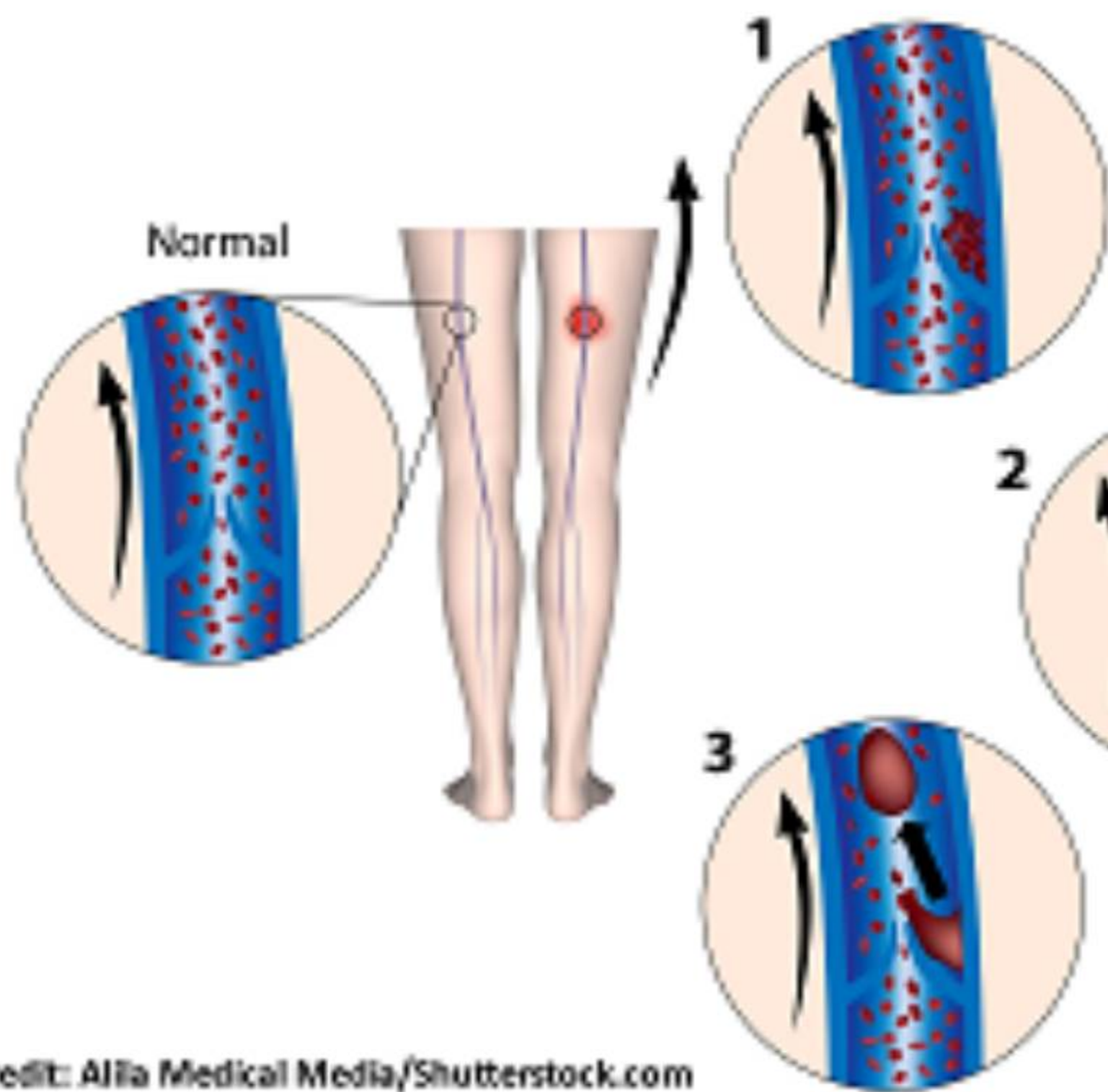
2. Stasis of blood flow: (Pooling)

- Compression** of veins by abdominal or pelvic tumour or pregnant uterus
- **Prolonged** recumbancy in bed (**bedridden**) , long trip or plaster cast
- Congestive heart failure**

3. Hypercoagulability: due to increase blood viscosity or changes in blood composition e.g. **Polycythemia** , leukemia or hyperfibrinogenaemia .

- Deficiency of antithrombin III , protein S & C , macroglobulins or antitrypsin.
- Factor V Leiden : is a genetic mutation of one of the clotting factors in the blood.

Virchow's Triad



★ *Stasis* of Venous Circulation

★ *Hypercoagulability*

★ *Endothelial* Damage



Incidence & Aetiology

High risk group: remember major surgery, female , ICU & past history

1. Stasis.
2. Major surgery as abdominal, pelvic, gynaecological or hip op.
3. Dehydration
4. Pregnancy
5. Elderly patient , myocardial infarction, H.F., smoking.

PATHOLOGY:

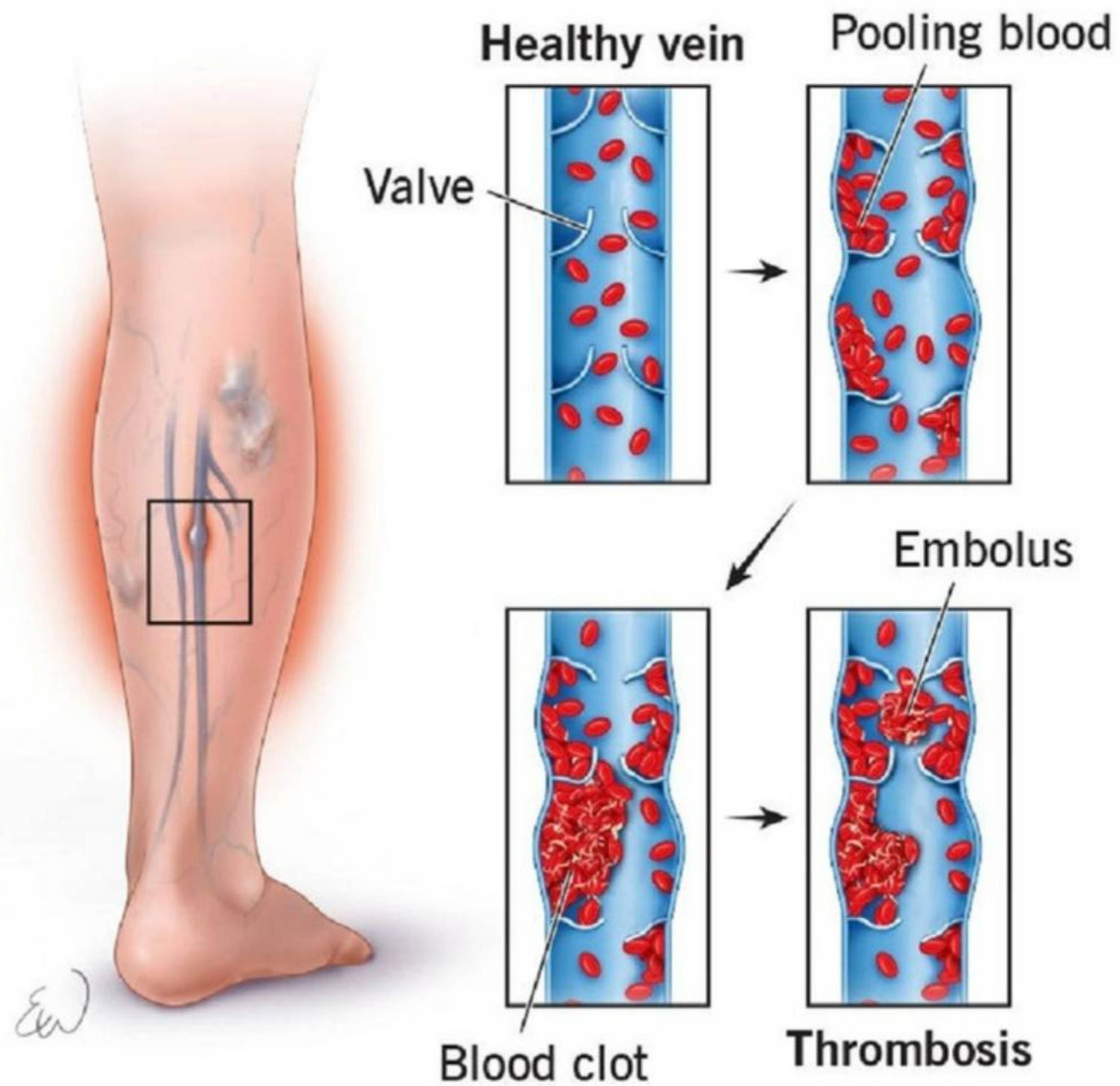
1. Site:

- D.V.T usually begins on the **valve cusps** (areas of relative stasis).
- D.V.T usually occurs in the venous sinuses in the **calf muscles** or iliofemoral veins & rarely IVC , subclavian , axillary or portal veins .

2. Pathogenesis:

- A. *Pale thrombus*: the initial thrombus is composed of **platelets** which stick to the vascular wall & to each other.
- B. *Mixed thrombus*: **fibrin** & **RBCs** becoming deposited between layers of platelet (laminated appearance known as the **lines of Zahn**).
- C. *Propagating thrombus*: non-adherent, jelly-like, red clot spreads into the vein as far as the next major tributary.

Deep Vein Thrombosis



EFFECTS & COMPLICATIONS:

1. **General:** Pulmonary embolism due to detachment of **early non-adherent thrombus**.

2. **Local:**

A) On the affected veins :

1- **Recanalization:** within 3-6 months by fibrinolysis and phagocytosis leads to gradual partial opening of the lumen but the **valves are destroyed** with valve **dysfunction** leads to **chronic venous insufficiency** & post- phlebitic limb.

2- **Organization** → fibrosis → **permanent occlusion** of the lumen .

3- **Calcification** of the thrombus → phlebolith → permanent occlusion of the lumen .

B) Effect on the part of the limb distal to the thrombus :

1- Early : oedema .

2- Late : **secondary varicose veins** & post-phlebitic limb

CLINICAL PICTURE:

1. **History of the predisposing factors** e.g. post-operative

2. **Asymptomatic group**: common

-There are no local manifestations and the patient may present later with either **pulmonary embolism** or **post-phlebitic limb**.

-It is suspected by the presence of unexplained **post-operative fever** or **tachycardia**.

3. **The classical picture: triad of**

1. **Pain**

2. **Tenderness** on compressing the muscles. **Homan's sign**, sudden dorsiflexion of the foot → pain and spasm in the **calf** due to stretch of thrombosed veins.

It should be avoided as it is unreliable test & it may be complicated by pulmonary embolism

CLINICAL PICTURE:

3. **Swelling** (oedema) is the **most reliable sign**.

– It is evidenced by measuring the **difference in the circumference** of the limb on both sides.

The level of oedema is diagnostic for the level of venous occlusion :

- **In calf veins thrombosis** : oedema affects the **foot** and **ankle** .
- **In femoro-popliteal thrombosis** : oedema reaches up to the level of **lower 1/3 of the thigh** .
- **In ilio-femoral thrombosis** : There is massive oedema affecting the **whole lower limb**.
- **In IVC thrombosis** : oedema affects **both lower limbs**

LEG PAIN: 90%
TENDERNESS: 85%
ANKLE OEDEMA: 76%
CALF SWELLING: 42%
DILATED VEINS: 33%
HOMAN'S SIGN : 33%



**SECONDARY VARICOSE
VEINS TO DVT**

**HOMAN'S SIGN: (SHARP PAIN IN THE CALF ON
DORSIFLEXION OF THE FOOT)**

CLINICAL PICTURE:

Picture of complications:

1. **Venous gangrene** : It is moist massive gangrene of the **whole affected limb**.
2. **Pulmonary embolism**.
3. **Post-phlebitic syndrome** : Chronic **leg pain**, oedema, **skin complications** & **secondary varicose** veins.
- 4-Phlegmasia alba dolens, Phlegmasia cerulae dolens

INVESTIGATIONS:

As the clinical picture is not reliable, investigations should be done before starting treatment

1. **Duplex ultrasound:** (The most important)

- It determines partial occlusion, turbulence, flow direction & incompetent valves and communicators.
- It is accurate in >90 % of cases

2. Doppler ultrasound:

- In femoral or popliteal Vs. thrombosis, the normal venous hum does not change into a roar.
- It is accurate in 80% of cases but insensitive in calf veins thrombosis.

Prophylactic:

I – Measures to reduce venous stasis:

1. Avoid compression of calf veins during operation by Elevating the heel.
2. Graduated compression Elastic stockings: exerting pressure from below upwards .
3. Intermittent External pneumatic compression of legs by special device.
4. Correct any dehydration or shock.
5. Leg Elevation for 20 degrees.
6. Breathing and limb Exercises , massage & mobilization as soon as possible.
7. The calves and feet should be Examined daily for local signs of DVT.

II- Prophylactic Anticoagulants:

- Indications :In high risk patients.
- Contraindications : It should be avoided where an operation is likely to leave raw areas or where a post-operative hge is suspected
- Methods :
 - a)Low dose heparin: 5000 units S.C., 2 hours before operation and continued twice-daily until the patient is fully mobilized.
 - b)Low molecular weight heparin is more popular because it is given once daily and has lower risk of bleeding .

B – CURATIVE:

I- **Conservative:** (the main line of treatment)

- Aim: Prevention of new thrombi , thrombus propagation & embolization.
- Method:

1) Anticoagulants: **Heparin** should be started as soon as possible.

2) Patient care :

Complete rest in bed with the limb is elevated for 20 degrees , for at least 7-10 days which is the time needed for the thrombus to become adherent.

-After this period of rest, gradual mobilization with elastic stocking .

-Avoid prolonged standing or sitting

3) THROMBOLYTIC (FIBRINOLYTIC) THERAPY :

-Indications :

Severe early diagnose cases of DVT .

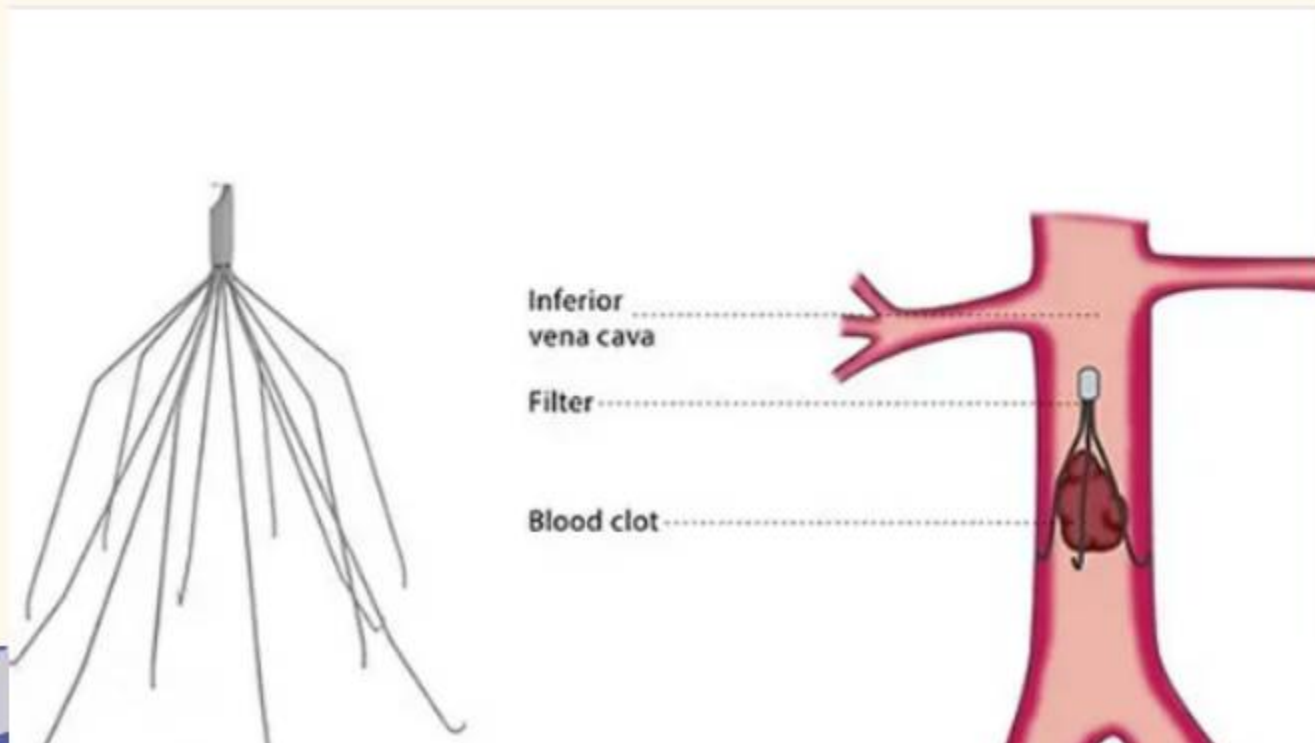
-Contraindications : History of **bleeding tendency** , old age , hypertension or peptic ulcer .

II- Surgical:

a) Introduction of intraluminal device (**filter**) into **I.V.C.** to trap large emboli .

b) **Venous thrombectomy**: In case of affection of a big vein.

c) **Pulmonary embolectomy**: (Trendelenburg's operation) in massive pulmonary embolism.



Thank you for Listening .

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QUIZ TIME

