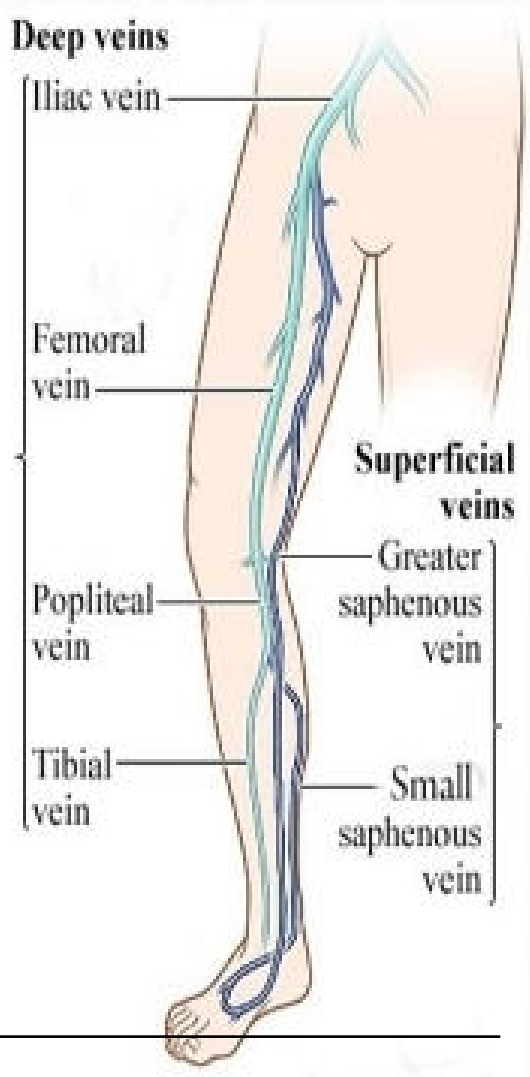
Introduction

- The venous drainage system of the lower extremity consists of three sets of veins:
- Deep veins,
- Superficial veins
- Perforating veins.
- All veins contain delicate one-way valves that normally open to allow blood to flow toward the heart and prevent blood from flowing in a retrograde fashion after the valves close .

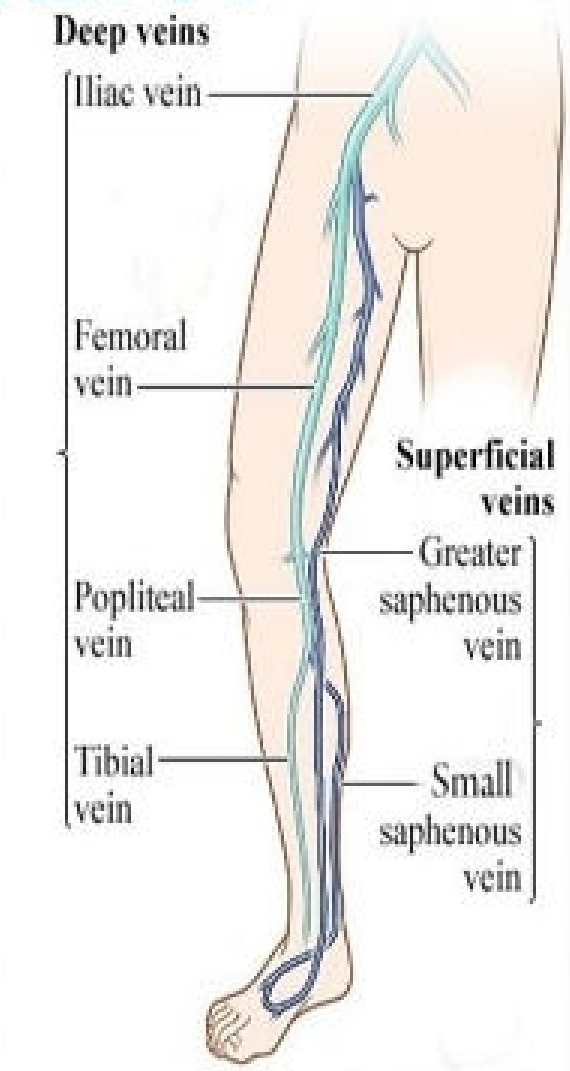
Veins of lower limb

- 1: Superficial veins:
  - Long saphenous vein
  - Short saphenous vein
- 2: Deep veins :
  - Anterior & Posterior Tibial vein
  - Peroneal vein
  - Popliteal vein
  - Femoral vein
- 3: Perforator veins



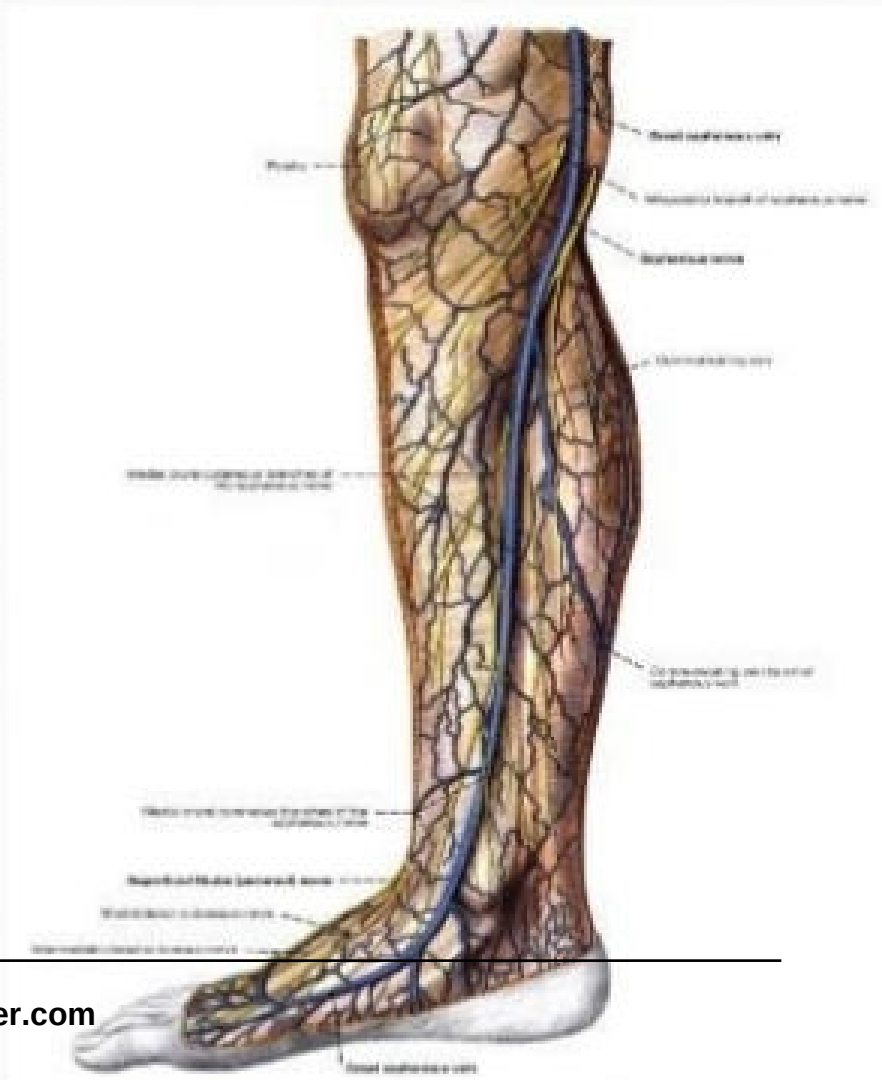
Long saphenous vein (LSV)

- Largest and longest superficial vein of the limb.
- Begins on the dorsum of foot from medial end of dorsal venous arch.
- Run 1 to 1.5 inch anterior to the medial malleolus ,along the medial side of the leg , and behind knee .

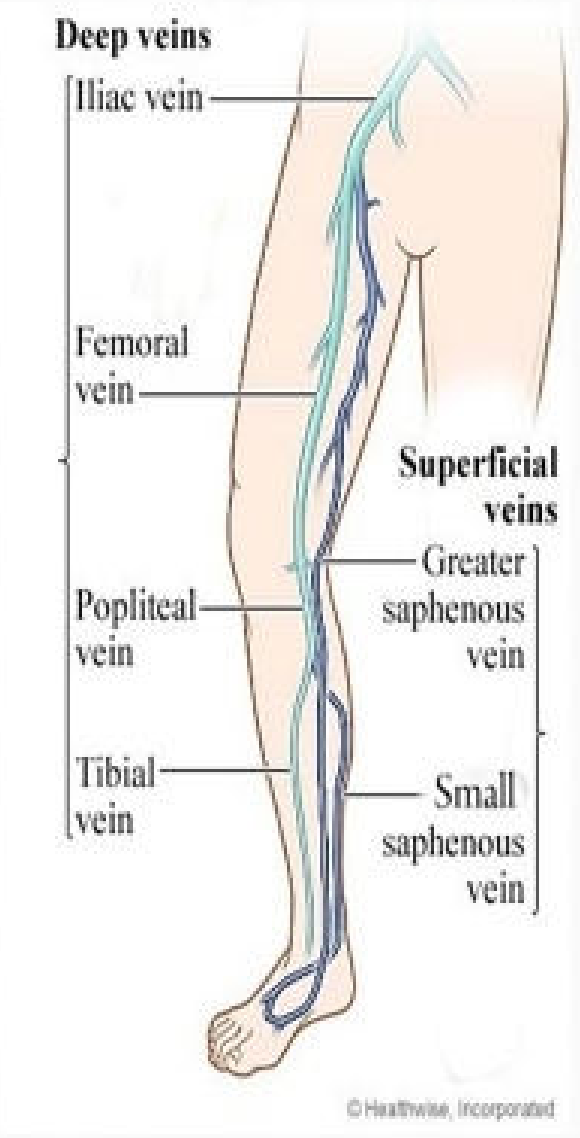


The long saphenous vein and deep fascia

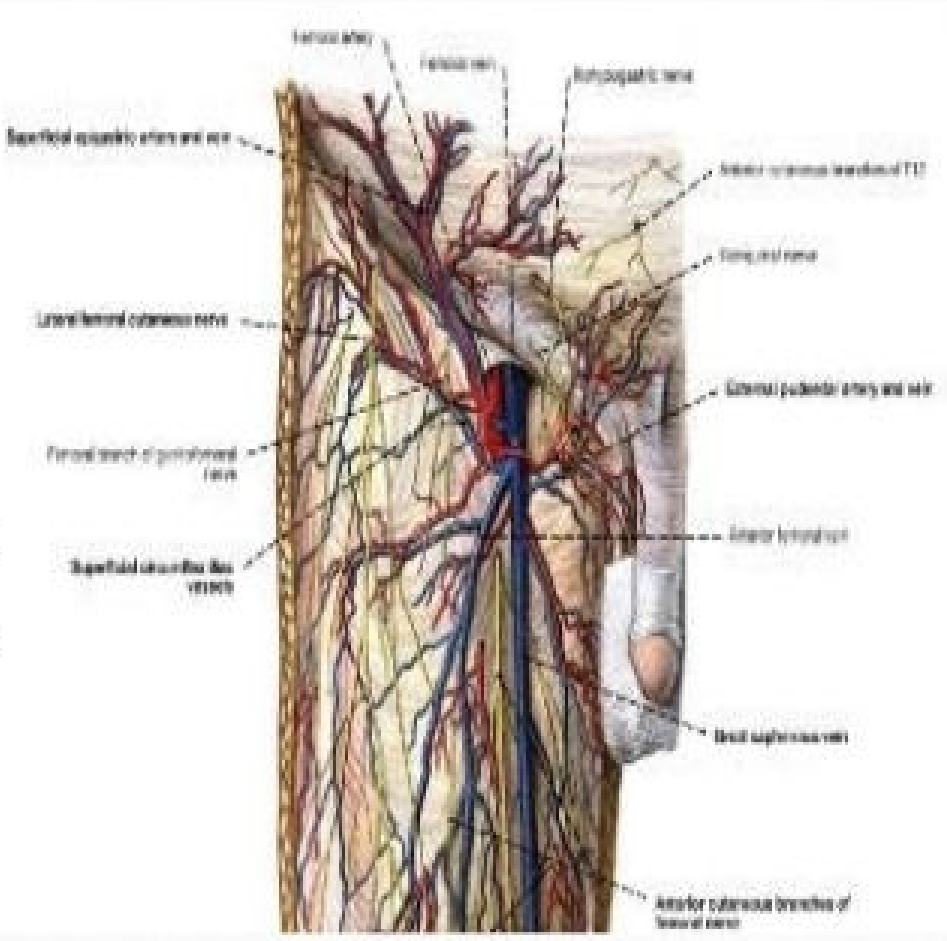
- In the lower 2/3 of leg and in upper 2/3 of the thigh vein lie on deep fascia .
- Where the vein crosses the knee joint it become more superficial and often subcuticular .



- At the ankle the position of the LSV is constant , lying in the groove b/w the anterior border of the medial malleolus and tendon of tibialis anterior.



- In the thigh it inclines forwards to reach the saphenous opening where it pierces the cribriform fascia and opens into the femoral vein 3-4 cm below and lateral to the pubic tubercle.



The long saphenous vein and deep fascia

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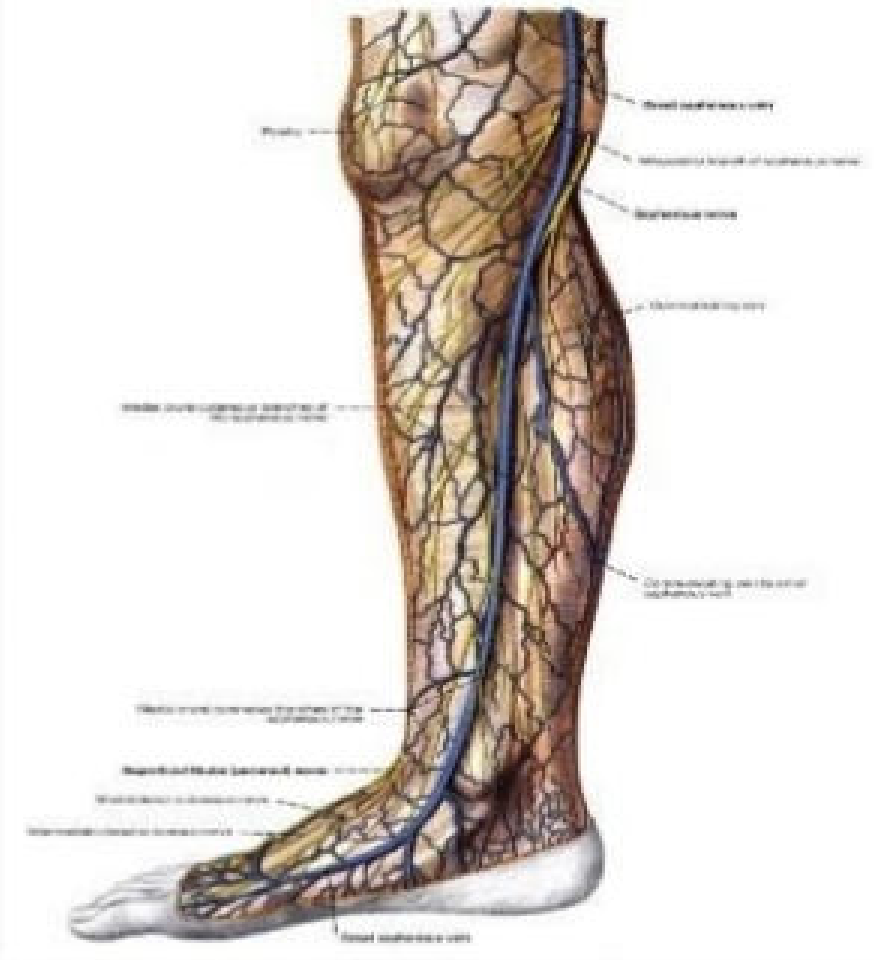


The structures accompanying the LSV

- In the leg **saphenous nerve** lies in close relation with the LSV.
- The nerve is very closely applied to the vein in lower 2/3 of leg and **often injured in exploring** or **stripping** the saphenous vein .
- In the thigh medial femoral cutaneous nerve run in close relation with vein .

Tributaries of LSV and communication

- Just below knee LSV receive **posterior arch vein (Leonardo's vein)** which collect the blood from post-medial aspect of calf .
- **Anterior veins of leg(stocking vein)** ascend across the shin and join either LSV or posterior arch vein .
- There is a free anastomosis b/w tributaries of short saphenous vein and venous arch connecting medial ankle perforating vein and this medial ankle perforating veins are connected with LSV in lower third of leg .

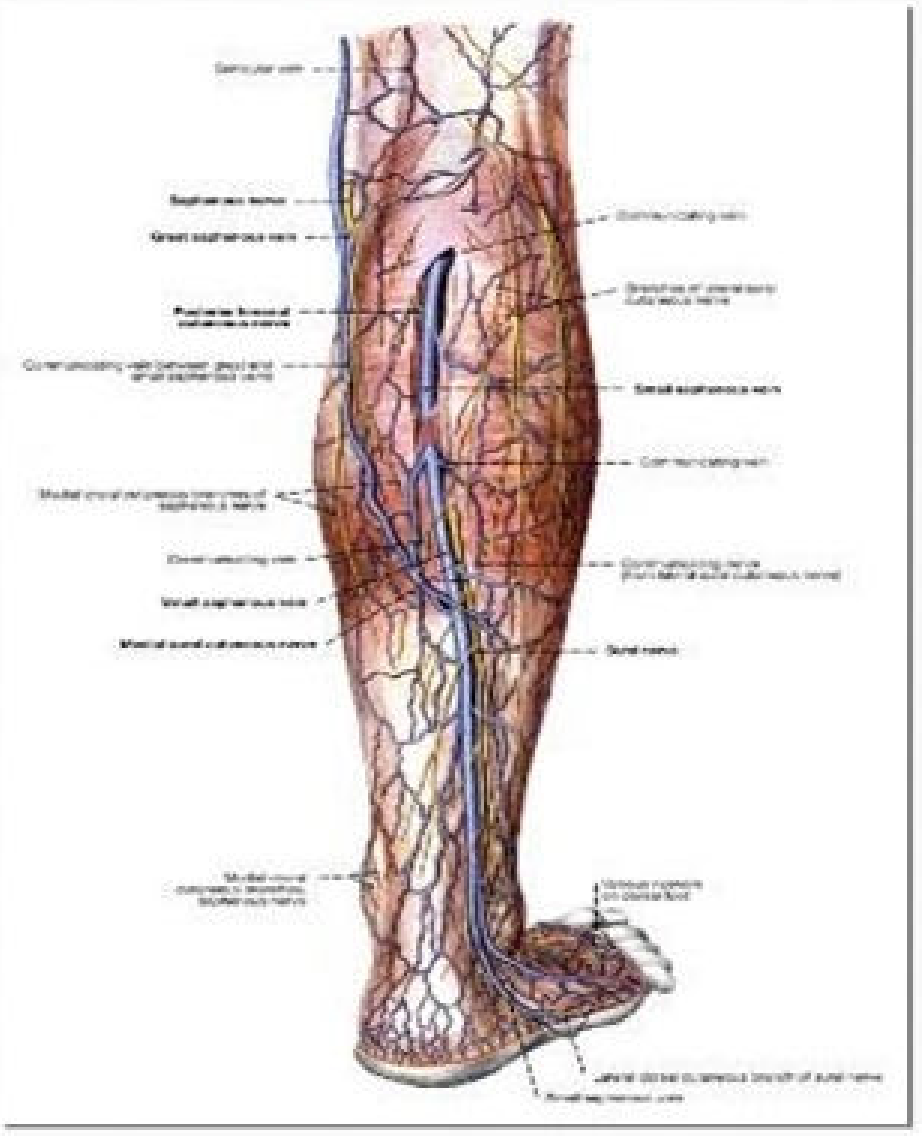
In the thigh before entering in the saphenous opening it recieves

1. Anterolateral vein
2. Posteromedial vein of thigh
3. Superficial external pudendal vein
4. Superficial epigastric vein
5. Superficial circumflex iliac vein
6. Deep External Pudendal Vein

- In the lower third of thigh long saphenous vein connect with femoral vein in hunter's canal by long perforating vein (hunterian perforator)

Short saphenous vein(SSV)

- It begins by the fusion of number of small veins below and behind the lateral malleolus . Here vein runs with the large sural nerve up to lower third of leg.
- SSV is runs upward up to the middle of the popliteal space, where it passes deep to fascia to enter into popliteal vein .



- In the lower third of the calf it lies on the deep fascia and cover by skin and superficial fascia .
- In the middle third of leg it enters in the intrafascia compartment in the aponeurotic investment of the gastrocnemius muscle .

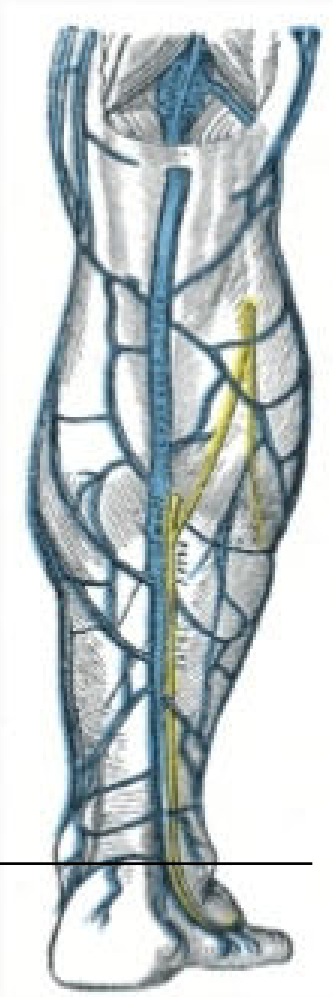
- Upper third of leg it penetrates the deep fascia and enter popliteal space and lie b/w head of two gastrocnemius muscle which lies 1.25cm below the transvers skin crease behind knee .

- Here SSV join popliteal vein .

Structures accompanying the SSV

- Sural nerve in lower third of leg

- Lymphatic trunk which drains lateral aspect of foot and drain in the popliteal lymph nodes.



Deep veins

- This veins lie in deep fascial plane and are supported by powerful muscles of leg.
- These are

  1: Anterior and posterior Tibial veins

  2: Peroneal vein

  3: Popliteal vein

  4: Femoral vein

These veins accompany with Arteries.

Perforating veins

- These are communicating veins b/w superficial and deep veins .

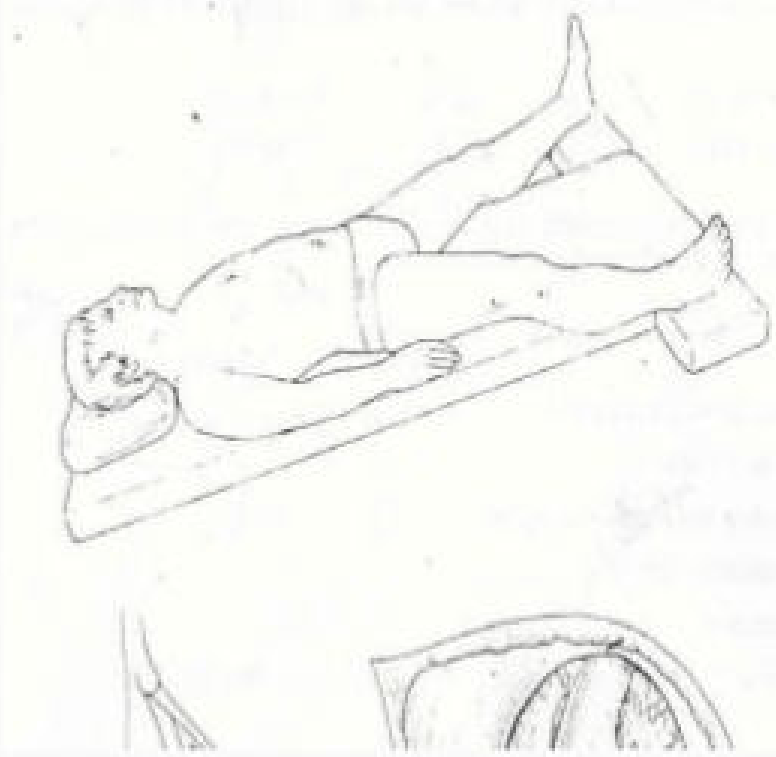
- Two type:

  1 Indirect veins

  2 Direct veins

Steps of surgery for LSV

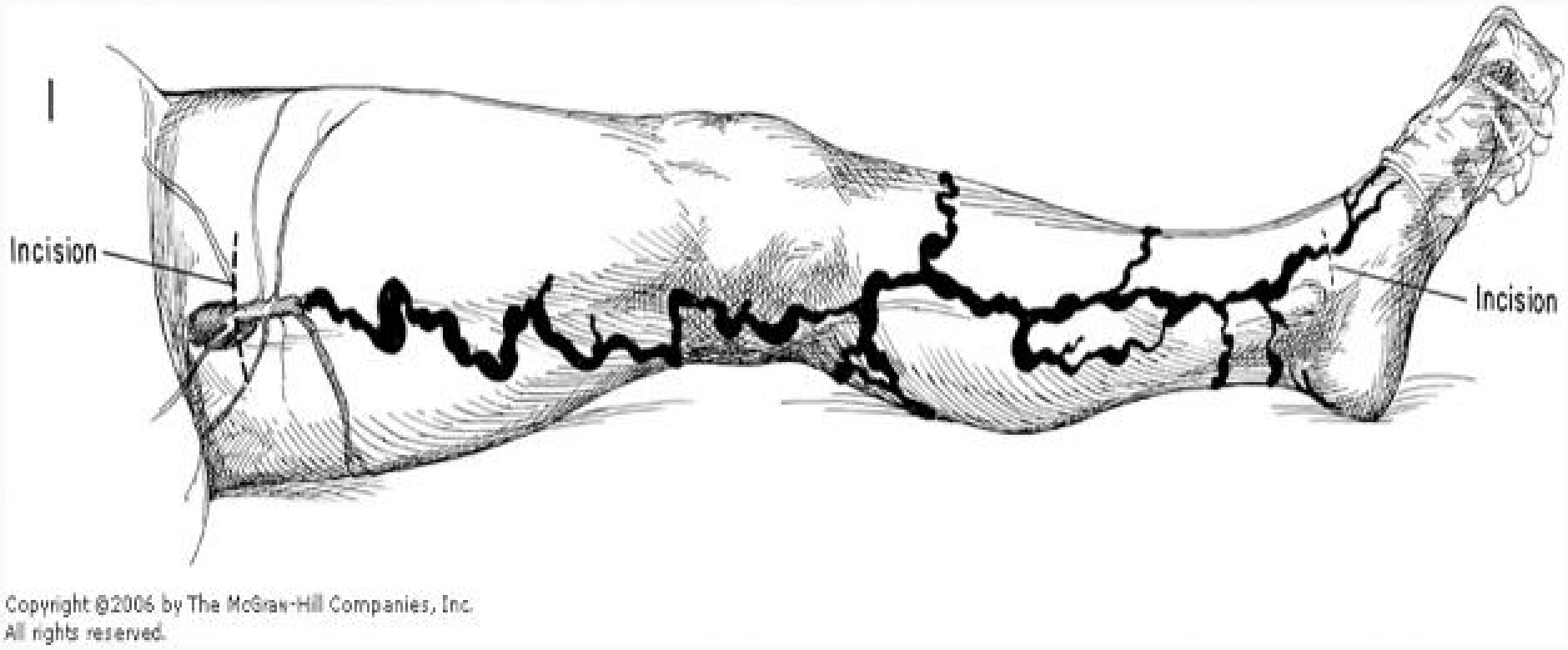
- After anesthesia proper position is given.
- The whole table is tilted head down to an angle of about 10 degree. (trendlenberg position)



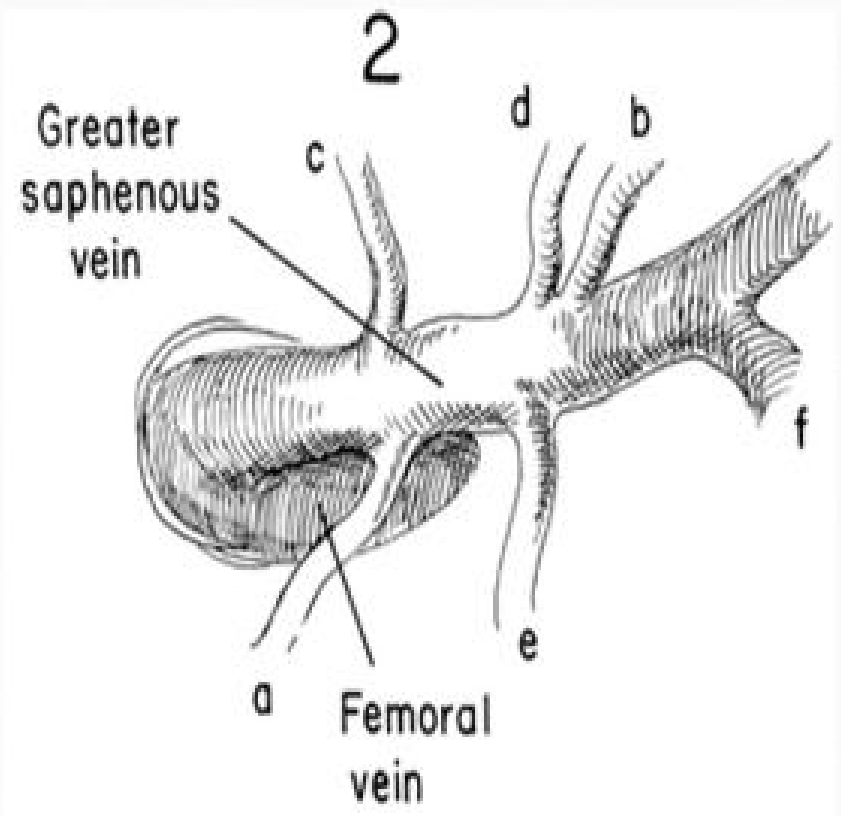
- Incisions :

1. Hockey stick incision
2. Oblique incision

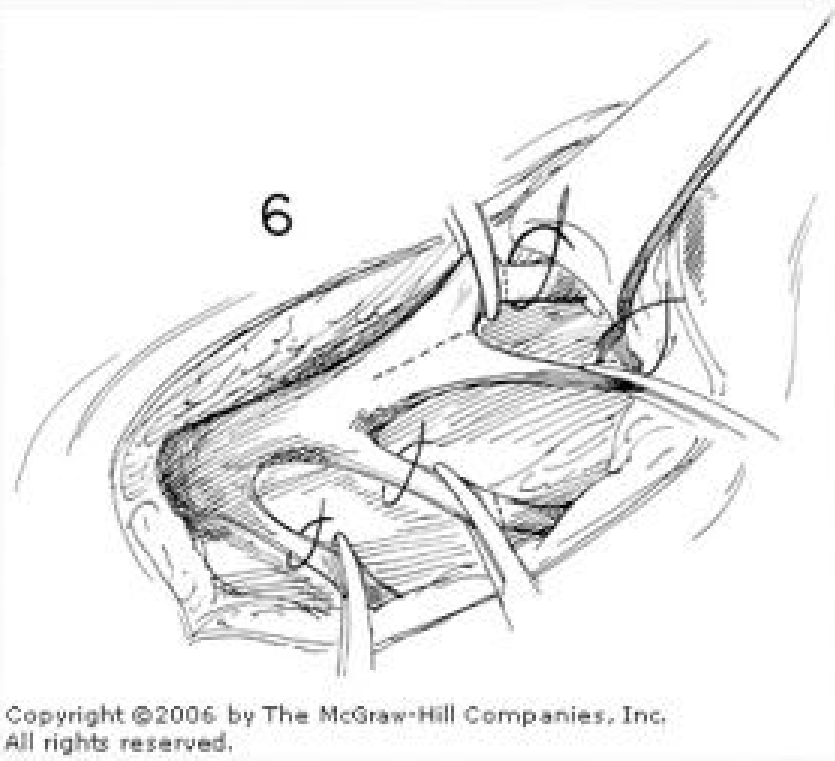
Incision is kept at groin at Saphenous opening 3-4 cm below and lateral to pubic tubercle.



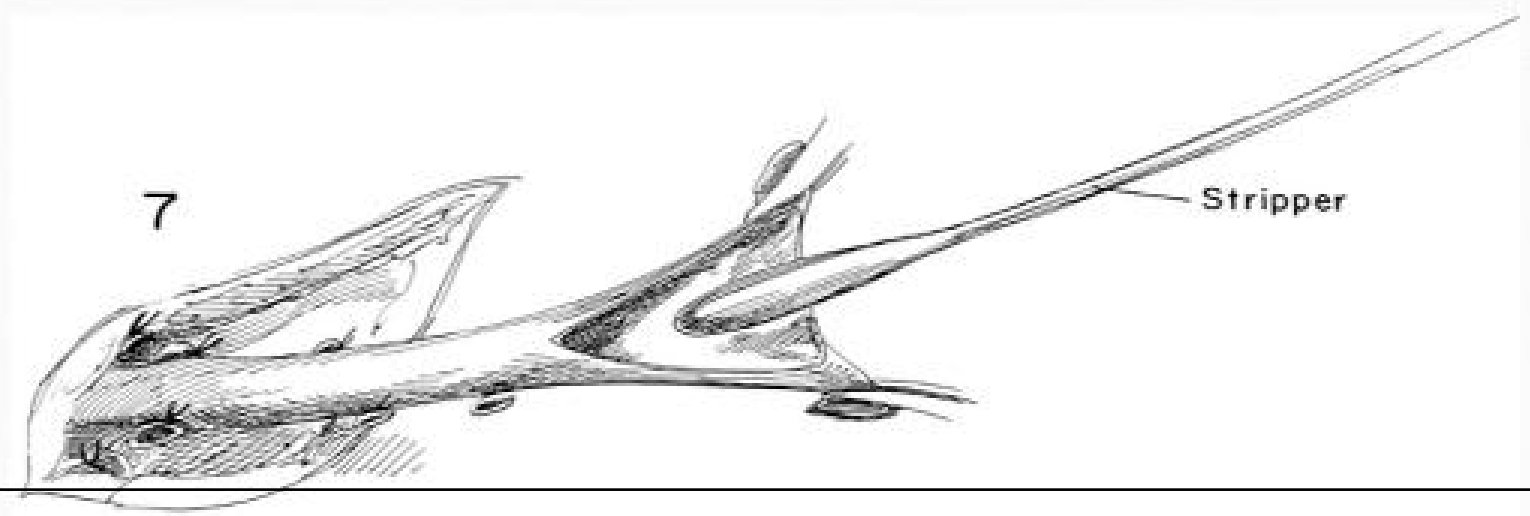
- After division of deep layer of fascia , saphenofemoral junction is exposed.

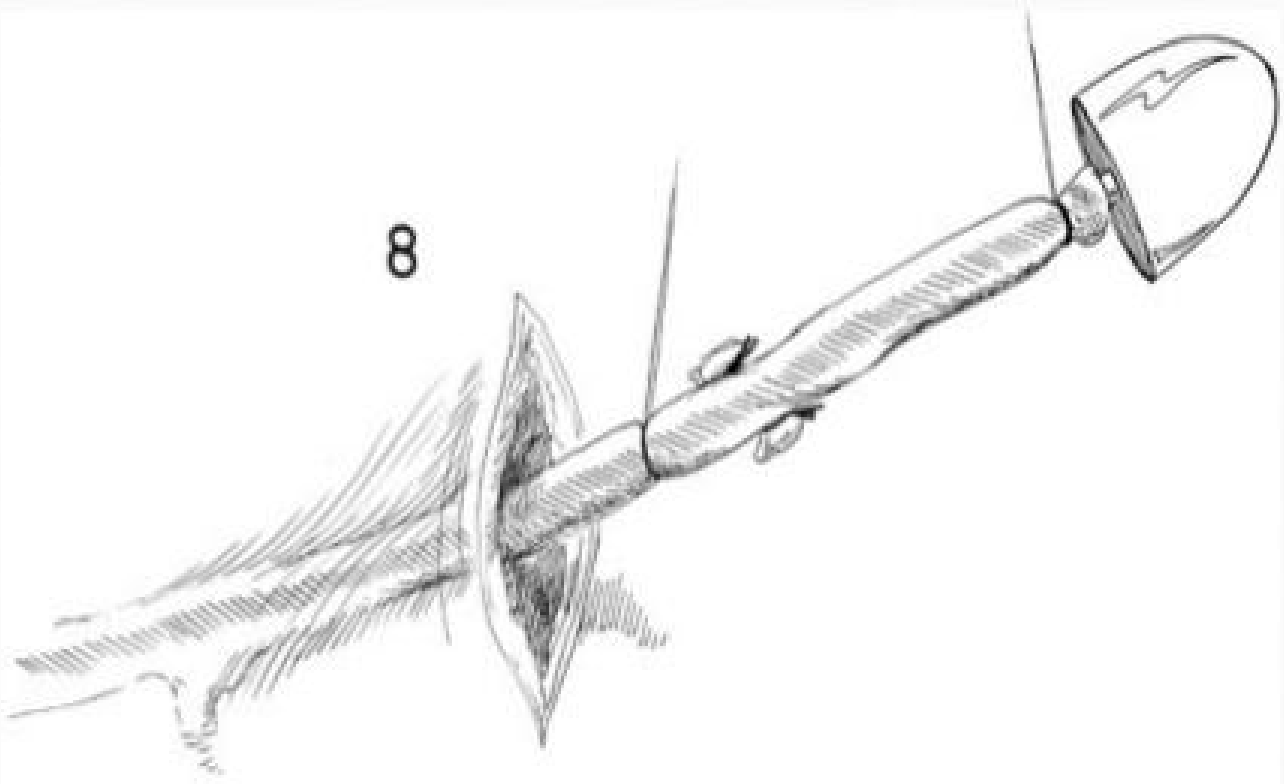


- Then flush saphenofemoral ligation (& tranfixation) done with ligation of all tributaries of long SV .



- Then stripper is passed down the saphenous vein and directed downward by finger .





- Vein is tied with stripper and then stripper is slowly and steadily pulled out through lower wound.

- The 'vein bolus' is withdrawn slowly from the lower wound.

INTRA- OPERATIVE COMPLICATIONS OF THE SURGERY

- BLEEDING FROM A TORN SAPHENA VARIX
- INJURY TO COMMON FEMORAL VEIN
- INJURY TOCOMMON FEMORAL ARTERY
- INJURY TO SAPHANEOUS NERVE
- INJURY TO SURAL NERVE

IMMEDIATE POST-OP CARE

- Three factors to be kept in mind in the first week :

- 1 Maintenance of firm elastic pressure over whole limb.
- 2 Regular movement and exercise of the legs
- 3 Elevation of the foot of the bed 6 to 9 inches so that the legs are just above the heart level when the patient is in bed.

- **POSITION :**
- The foot of the bed is raised 6 to 9 inches
- Patient is not allowed more than 2 pillows.

Post operative complications

- **Haematoma and buising**

- normally bruise absorbed within 3-4 wks
- small haematos get reabsorbed large haematomas

more than 4 cm evacuated with sterile precaution under LA with sterile precautions

- **Lymphatoma**

-Generally occurs on 5-6 post op day

-Get absorbed within 1-2 wks

-Should not be interveined as may lead to lymphatic fistula formation

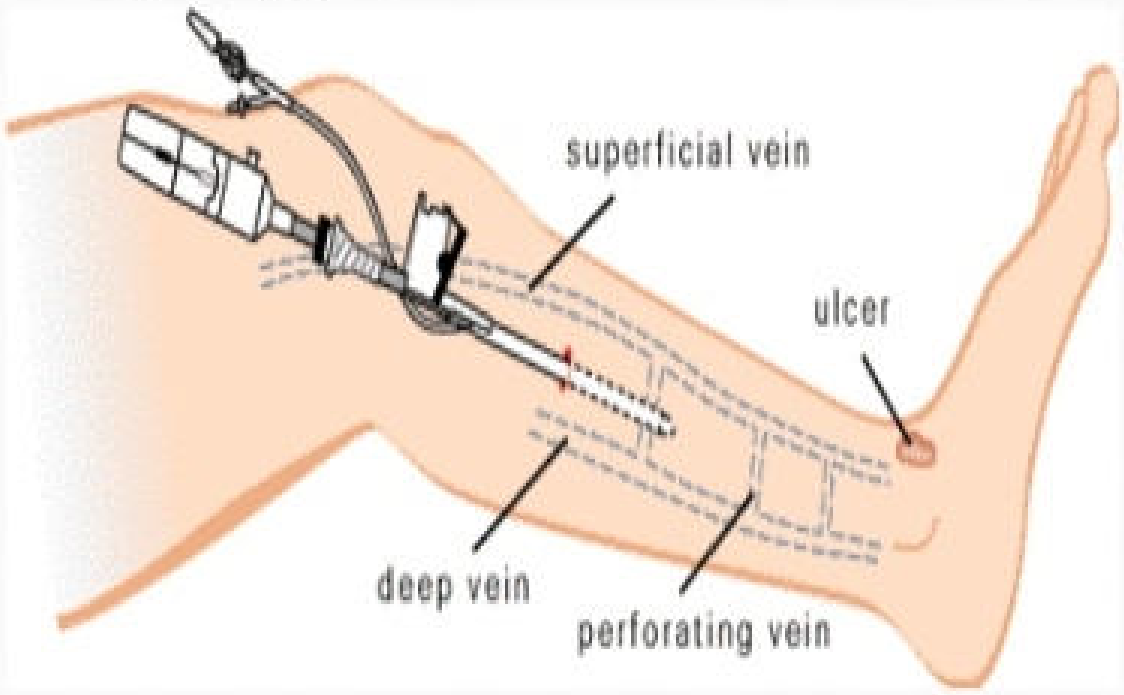
- Wound sepsis
- Post operative saphenous neuritis
- Lymphoedema of leg
- Induration of stripper tract
- DVT and embolism

Extra fascial ligation of perforators(Cocketts procedure)

- Not commonly employed
- Aim is to clear all the extrafascial veins
- More traumatic due to adherence of subcutaneous fat and connective tissue to the fascia

Subfascial Endoscopic Perforator Surgery

People who suffer with leg ulcers due to incompetent venous perforators



- Indication :
- Incompetent perforating veins in calf with no superficial venous reflux or no evidence of DVT on Doppler .
- Patient with LSV / SSV varicosity with ulcer

Procedure

- Using spinal or general anesthesia a ¾ inch incision is made on the inside of the calf.
- An instrument is inserted deep to the fascia of the leg and a large balloon is inflated with water to create a working space.
- The balloon is then emptied and the space is insufflated with air.
- The camera is inserted and the perforator veins can be seen in the space passing from superficial to deep layers.

- Another small incision is made in the calf for passage of another instrument.
- The perforator veins are carefully dissected,
- **Clips are applied** and the veins are divided if necessary.
- All trocars are then removed and the wounds are closed.
- The patient is generally sent home the same day of surgery with elastic stocking.

Obliteration of venous lumen - Methods

1. Foam Sclerotherapy
2. Laser
3. Radiofrequency Ablation

Foam Sclerotherapy

- Principal :
- By injecting sclerosant into a varicose vein, destroy its endothelium in that area , and thus induce an aseptic thrombosis which organises and closes the vein.

- **Indication :**

- Residual vein after surgery
- Large venous telangiectases.
- Isolated small dilated veins

- **Contraindication :**

- Pregnancy
- Pelvic tumor
- Sup thromboplebitis at the time of procedure
- DVT
- Previous h/o reaction to sclerosant

- **SOLUTIONS :**

  - SODIUM TETRADECYL SULPHATE
  - SOD.MORRHUATE
  - HYPERTONIC SALINE SOL.
  - POLYDOCANOL,SOTRADECOL
  - ETHANOLAMINE OLEATE
  - GLUCOSE COMBINATIONS

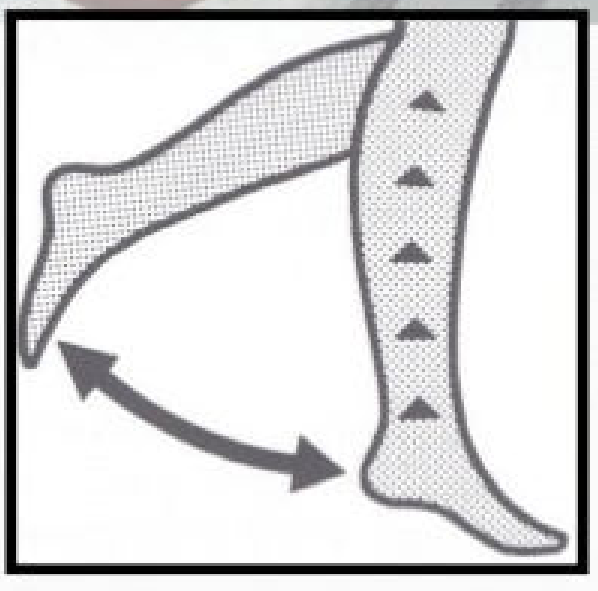
- PROCEDURE :
- Depending upon the size of vein to be occluded, sclerosant is taken in 20 ml syringe and connected to another syringe with 4 times the amount of air.

- By repeated to and fro motion of the solution and air into syringes , dense white foam is prepared .

- After giving position under USG guidance needle is inserted into the vein .
- And sclerosant is injected into the vein .
- Not more than 20 ml foam should be injected at one sitting ,
- Multiple sitting may be required for successful obliteration of vein
- The foam being dense , does not "run-away" up the vein, it require massaging the skin over varicose vein.

- Immediately after foam injection compression stocking is applied and patient is mobilized .

- Patient can go home on the same day of procedure.
- After 48 hr of procedure USG is done to R/o DVT



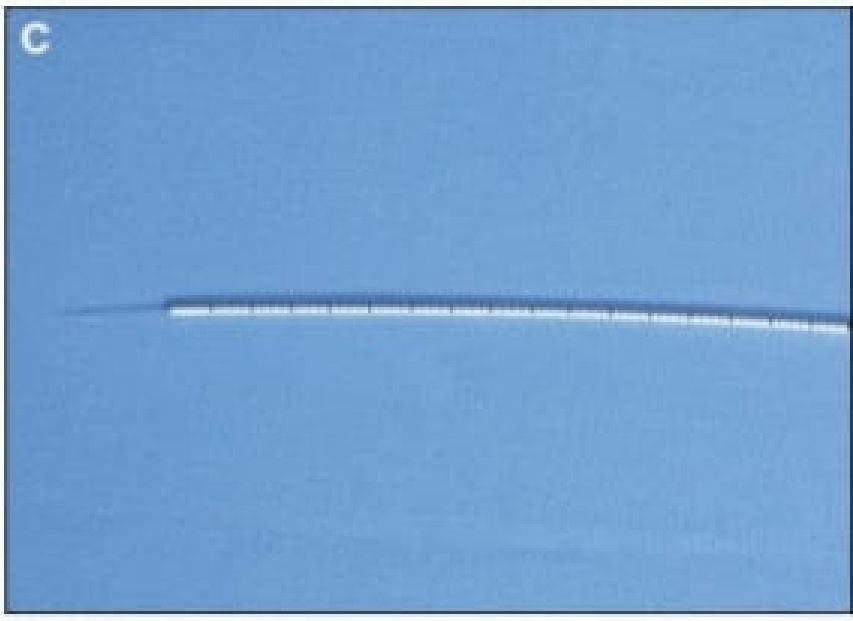
- ***Advantage***
- Cheap
- Easy to learn
- Truly an OPD procedure
- Can be repeated many times
- No anesthesia required

- ***Disadvantage***
- Not suitable for SFJ/SPJ obliteration
- Thrombophebitis
- Pigmentation over skin
- More than 3 wks compression is required

Endovenous Laser Treatment (EVLT)

- Principal :

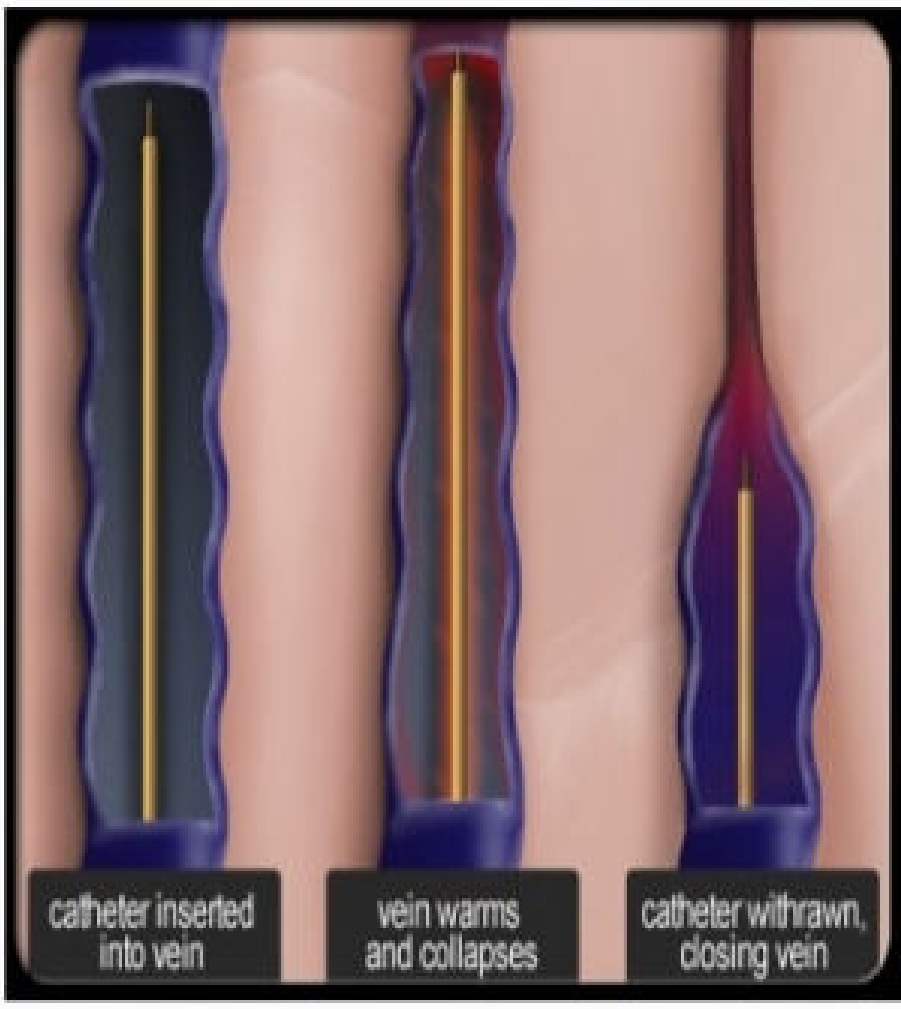
- EVLT initiate a nonthrombotic occlusion by direct thermal injury to vein wall, causing endothelial denudation , collagen contraction and later fibrosis.



Procedure

- EVLT is done under local anesthesia under USG guidance.
- Varicose vein is marked preoperatively
- Supine position is given
- Vein is canulated with 0.035" J guide-wire via 19G needle.
- The Laser fiber is then introduce over it under USG guidance upto 2-3 cm distal to SF junction.

- Fiber is withdrawn at the rate 1-3mm / sec under USG guidance .
- This laser fiber causes thermal damage to the venous endothelium(1000 c) and occlusion of lumen by fibrosis.
- Immediately after procedure compression stockings are given.
- Patient can be discharge on same day with good analgesics and with compression stockings.



- ***ADVANTAGE***
- Minimal invasive procedure
- No post op scar
- Done with local anesthesia
- Minimal post-op pain
- Recurrence rate (at 2 year f/u only 3%

- ***DISADVANTAGE***
- Costly procedure
- High technical skills req
- Color Doppler and Radiologist is req
- Skin burns
- Thrombophebitis
- Paresthesia

Radiofrequency Ablation

- This technique based on same principal of EVLT
- Here instead of laser fiber , special heater probe is inserted which work at 85 -120 c
- Probe directly comes in contact with vein wall & causes tissue damage .
- A 45 cm of vein segment takes only 3-5 min
- Patient can directly go to home after procedure.

Thank You