



# CLINICAL SURGERY PEARLS

THIRD EDITION

**R Dayananda Babu**



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## Case

# 13

## Varicose Veins

### Case Capsule

Middle-aged **multiparous female** patient presents with **dilated tortuous veins on both lower limbs** of **10 years** duration. She complains of **dull ache felt in the calves** and lower leg that **get worse through the day** especially during standing. It is relieved by **lying down** for 30 minutes. She also complains of **mild swelling of the ankle** by the end of the day. She does not give history of previous accidents, major operations or prolonged illness. Her mother and elder sister had similar complaints.

On inspection, large tortuous visible veins are noted in the **distribution of long saphenous vein**. Skin of the lower third of the medial side of the right leg shows **brown pigmentation** and there is an **ulcer situated just above the medial malleolus** of the size of **7.5 × 5 cm**. On palpation there is **pitting edema of the right ankle region**. The skin and subcutaneous tissue are thickened over the area. Palpation along the course of the long saphenous vein behind the medial border of the tibia revealed **three defects in the deep fascia 5, 10 and 15 cm** above the medial malleolus. There is a palpable **cough impulse in the groin** at the saphenous opening region. The veins collapse when the patient lies down and the limb is elevated. **Trendelenburg test I and II are positive** on the right side and test I positive on left side. **Modified Perthes test**

**is negative** on both sides. Multiple tourniquet test shows **perforator incompetence** in the right leg corresponding to the fascial defects mentioned above. Schwartz test is positive **on right side**. There is no bruit heard over the veins.

The ulcer is of the size of **7.5 × 5 cm** with a **sloping edge** and the surrounding skin is purple blue in color. The floor of the ulcer is covered with pink granulation tissue. The base of the ulcer is fixed to the deeper tissues. There is **serous discharge** from the ulcer. **Equinus deformity** is present at the ankle joint. Regional lymph nodes are enlarged, firm in consistency and mobile (the **vertical group of inguinal nodes on right side**). On abdominal examination there is no vein seen crossing the abdomen and there is **no mass lesions**. Per rectal and per vaginal examination shows no pelvic cause for the dilated tortuous veins. Examination of the **peripheral vascular system is normal**.

#### Checklist for history

##### History of:

- Major surgery
- Major illness necessitating prolonged recumbency
- Recent long air travel (economy class syndrome)—deep vein thrombosis
- Sudden undue strain
- Drug intake—hormone containing pills (like contraceptives)

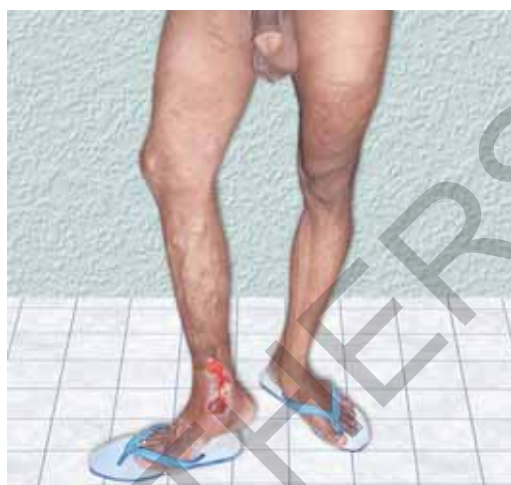
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Contd...

- Computer professionals requiring long hours in a sitting posture—E thrombosis
- Occupation demanding prolonged standing
- Family history of varicose veins

#### Checklist for examination of varicose veins

- Examine the patient in standing position
- Expose the patient from umbilicus to the toes
- Examine the front and back of the limb
- Examine the limbs for inequality of circumference
- Know the anatomy of long saphenous and short saphenous veins with its named tributaries
- Identify the anatomical distribution of the varicose veins
- Feel the veins—tender/fibrous/thrombosed
- Examine the ankle—congestion, prominent veins, pigmentation, eczema, ulcer
- Pelvic examination to rule out secondary causes of varicose veins—intrapelvic neoplasms (uterus, ovary and rectum)
- Examine the abdomen for dilated veins that will be secondary to obstruction of inferior vena cava (commonest cause—intra-abdominal malignant disease)—suprapubic veins for iliac vein occlusion and lateral chest wall vein in inferior vena cava (IVC) obstruction
- Always do abdominal examination—for intrapelvic tumor such as ovarian cysts, fibroid, cancer cervix, abdominal lymphadenopathy
- Look for large suprapubic veins and abdominal varices which are present in cases of patients with chronic iliac vein occlusion
- Digital rectal examination
- Auscultate the veins to rule out continuous murmur (for arteriovenous fistula)
- Always examine the peripheral pulses—venous and arterial disease often coexist



Venous ulcer



Varicosity of long saphenous system with lipodermatosclerosis



Abdominal varices in iliac vein occlusion



Varicosity of long saphenous system with lipodermatosclerosis





Pigmentation in gaiter area



Venous ulcer with Marjolin's



Arteriovenous malformation (left side of chest and trunks with area of pigmentation)



Arteriovenous malformation (same patient extending to forearm and hand)

### Q 1. What are varicose veins?

Defined as dilated, usually tortuous subcutaneous veins  $>3$  mm in diameter measured in the upright position with demonstrable reflux.

### Q 2. What are the causes for varicose veins?

- *Congenital*—rare (congenital absence of valves)
- Primary varicose veins (cause not known, often familial)—wall theory (weakness of walls) and valve theory
- *Secondary varicose veins*:
  - Post-thrombotic (destruction of valves)
  - Post-traumatic
  - Pregnancy
  - Fibroids and ovarian cysts
  - Abdominal lymphadenopathy
  - Pelvic tumors
  - Retroperitoneal fibrosis
  - Ascites
  - Iliac vein thrombosis
  - High flow and pressure states, e.g. arteriovenous (AV) fistula.

**Q 3. How can you distinguish primary varicose veins associated with a normal deep venous system from varicose veins secondary to a diseased deep venous system (the postphlebitic syndrome)?**

Primary varicose veins	Secondary varicose veins
Seen in early adolescence	Older age group
Positive family history	No family history
Saphenous distribution alone is involved	In addition to the saphenous, the perforators and the deep veins are involved
Positive Trendelenburg—1—test	Trendelenburg—1 and 2 positive
No stasis sequelae (dermatitis and ulceration)	Stasis sequelae present
No morning ankle edema	Ankle edema present
Patent deep veins in Doppler and duplex	Deep veins and perforators are abnormal in Doppler and duplex
History of varicose veins of long duration without any previous acute event like edema	The limb is normal until swelling begins as a sudden event. Varicose veins develop later

**Note:** Primary varicose veins can ultimately lead to stasis sequelae, even ulceration because with time, retrograde flow down the superficial system and back into the deep system can produce sustained venous hypertension. At this end-stage the appearance may be indistinguishable from postphlebitic syndrome, but the history is very different.

**Q 4. What is the incidence of varicose vein?**

About 25–30% women and 15% of men.

- More common in left side.

**Q 5. How much blood is there in the venous system?**

About 70% of the body's blood is in the venous system at any one time and there are at least three times as many veins as arteries in the limbs.

**Q 6. What percentage venous blood is carried by the superficial system?**

About 10%.

**Q 7. What is the anatomy of veins in the lower limb?**

The venous system in the lower limb has three portions.

- Superficial veins:* Long saphenous system and short saphenous system with

their tributaries (they terminate at the saphenofemoral and saphenopopliteal junctions respectively).

- Deep veins:* Three pairs below the knee each with its associated artery—anterior tibial, posterior tibial, and peroneal. In the upper third of calf they join to form the popliteal vein which proximally becomes the superficial femoral vein.
- Perforating veins:* In the case of long saphenous vein four sets:
  - Dodd's perforator in relation to the subsartorial canal.
  - Boyd's perforator in relation to the calf muscles just below the knee.
  - Cockett's perforators just above the ankle—5, 10, and 15 cm above the malleolus.
  - Ankle perforators of May or Kuster.

In the case of short saphenous vein:

- Bassi's perforator—5 cm above the calcaneum
- Soleus point perforator
- Gastrocnemius point perforator.

**Q 8. What is the anatomy of long saphenous system?**

This is the biggest vein in the body, arises in front of the medial malleolus. It ascends behind the medial femoral condyle along the medial aspect of the thigh and terminates in the common femoral vein through the saphenous opening in the groin. The important tributaries are:

- The posterior arch vein (Leonardo's vein) (Fig. 13.1)—starts behind the medial malleolus and runs upwards to the long saphenous vein joining it at the knee level. This vein is important because it has 3–4 constant perforators (the Cockett's perforators) joining it at the posterior border of the tibia linking the superficial with the posterior tibial vein of the deep system. This vein has a tendency to become varicose rather than the long saphenous vein.
- Anterior superficial tibial vein—ascend along the shin and joins the long saphenous system again at knee level (Fig. 13.2).





Fig. 13.1: Posterior arch vein

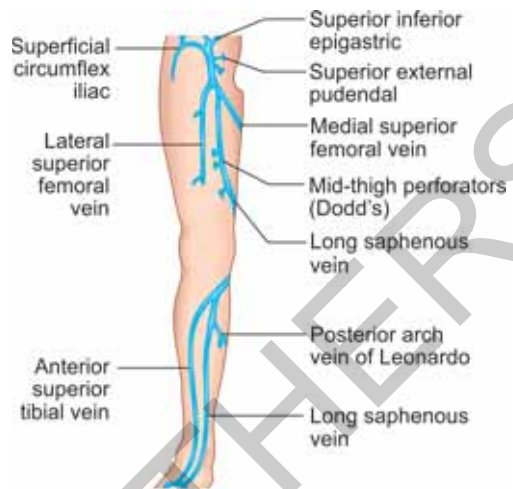


Fig. 13.2: Long saphenous vein

- The medial and lateral accessory saphenous vein (posteromedial and anterolateral) in the thigh joining of the long saphenous vein at variable levels near to the saphenofemoral junction.
- The saphenofemoral junction tributaries—superficial inferior epigastric, superficial circumflex iliac and superficial external pudendal (Fig. 13.2).

#### Q 9. What is the anatomy of the short saphenous system?

The vein starts behind the lateral malleolus and ascends superficially through the posterior aspect of the calf to terminate in the popliteal vein after piercing the deep fascia. In about 50% of individuals the short saphenous vein terminates above the popliteal fossa (Fig. 13.3).

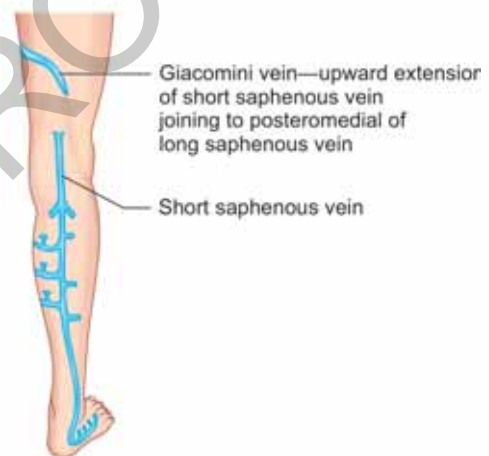


Fig. 13.3: Short saphenous vein

#### Q 10. What is 'blowout syndrome'? (PG)

This was described by Cockett. When the valves of the perforating veins become incompetent, contraction of the muscle will result in retrograde flow of venous blood from the deep to the superficial veins. The resultant high pressure reflux is called venous hypertension (described by Cockett as blowout syndrome).

#### Q 11. What are the functions of veins?

There are three principal functions.

- Return of blood to the heart
- Blood storage
- Thermoregulation.

#### Q 12. What is the normal hemodynamics of venous system in the lower limb? What is ambulatory venous hypertension?

Normally the venous blood flow is from the superficial to the deep system through the perforators if the valves are competent. On standing the venous pressure in the foot vein is equivalent to the height of the column of

blood extending from the heart to the foot. Normally the pressure in the superficial veins of the foot and ankle is around 80–100 mm of Hg. The venous blood is pumped to the heart from the limb by the series of muscle pumps in the calf and thigh. They are called peripheral hearts. In addition there is a foot pump that ejects blood from the plantar veins during walking (there are three pumps altogether—the foot pump, the calf pump and thigh pump). During walking the pressure within the calf compartment rises to 200–300 mm of Hg and the blood is pushed up from the deep system. During the relaxation of the calf muscle the pressure within the calf falls to a low level and the blood from the superficial veins flows through the perforators to the deep veins. The pressure in the superficial system will then automatically fall to about 20 mm of Hg. When the perforators are incompetent, the pressure in the superficial system will not fall and eczema, skin damage and leg ulceration develops. The failure of superficial venous pressure to fall during exercise is called ambulatory venous hypertension and is the main cause of venous leg ulceration. Incompetence of the deep veins has a more severe effect on the venous physiology than superficial venous incompetence because the deep veins are much larger than the superficial veins. Persistently raised venous pressure tracks back to the microcirculation of the skin and causes skin damage, resulting in venous ulceration.

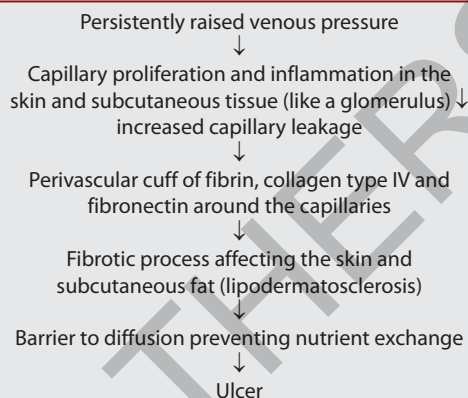
### Q 13. What are the causes for venous ulcer?

Venous ulcers occur in the following situations:

- In patients with deep vein thrombosis (DVT)—post-thrombotic limb
- Ankle perforator incompetence
- Sometimes long-standing superficial varicose veins.

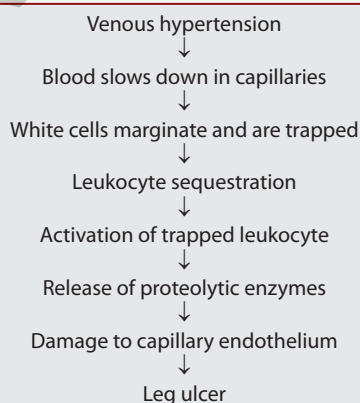
### Q 14. What is the pathophysiology of venous ulcer?

- The fibrin-cuff theory of Browse:



**Note:** This theory is no more accepted because it has been found that there is no physical barrier to the diffusion.

- White cell trapping theory (Dormandy)—presently accepted theory:



### Q 15. What is venous claudication?

After deep vein thrombosis recanalization will usually occur. When recanalization fails to occur after iliofemoral venous thrombosis, venous collaterals develop to bypass the obstruction to the venous outflow. These

collaterals usually suffice while the patient is at rest. However, any leg exercise induces increased arterial inflow to the lower extremities along with a commensurate increase in venous outflow requirements. This may exceed the capacity of the venous collateral bed resulting in venous hypertension. The pressure built up is manifested as tight or bursting pain. Relief is obtained with rest but not as prompt as in arterial claudication. This pain is seen after walking and towards the evening.

#### Q 16. What are thread veins (dermal flares)?

Intradermal venules of <1 mm:

- They may be mild or severe.
- Synonyms—Telangiectasia/spider vein/hyphen webs

#### Q 17. What are reticular veins?

Dilated subdermal veins of 1–3 mm in diameter. They may present as small varices. These tiny varices are associated with superficial venous incompetence in about 30% of cases.

#### Q 18. What is corona phlebectasia?

Fan-shaped patterns of small intradermal veins on the medial or the lateral aspect of ankle or foot (**malleolar of ankle flare**).

#### Q 19. What are the symptoms of varicose veins?

##### Symptoms of venous insufficiency

- Asymptomatic
- Cosmetic problems
- Aching
- Heaviness and cramps
- Itching—especially on standing (the whole lower leg may itch)
- Venous claudication
- Ankle swelling—towards the end of the day
- Pigmentation on the medial aspect of lower leg
- Eczema
- Ulcer—on the medial aspect of lower leg (gaiter area)

##### Note:

- Aching, swelling, cramps, heaviness, itching are absent in the morning and become evident and aggravates as the day goes by
- The severity of the symptoms is unrelated to the size of the veins and is often more severe during the early stages of the development of varices.

Based on symptoms patients may be classified into three groups:

Group I (Cosmetic only)	Group II (Symptomatic)	Group III (Complications)
• Venous telangiectasia	• Ache/cramps/tenderness	• Bleeding from trauma
• Thread veins (0.5 mm)	• Heaviness/swelling	• Superficial phlebitis
• Reticular varices (1–3 mm)	• Champagne bottle leg	• Ankle venous flare/edema
• Visible varicose veins	• Itch/restless legs/paresthesia	• Atrophie blanche
		• Venous eczema
		• Lipodermatosclerosis
		• Venous ulcers

#### Q 20. What is the cause for ankle edema?

Ankle edema is a feature of persistent venous obstruction. In some patients veins remain permanently blocked following a deep vein thrombosis. This causes symptoms which are worse than venous valvular incompetence. The passage of time will allow recanalization and the ankle edema may become less. The recanalized veins are likely to be incompetent and the features of venous hypertension may then predominate.

#### Q 21. From the location of varicose veins can you identify the system affected?

- Varicosities of the medial calf and thigh → originate from great saphenous vein.
- Varicosities on the posterior and lateral calf and popliteal fossa → short saphenous system.
- Varicosities in the groin and along the anterior abdominal wall → iliac vein obstruction.

**Q 22. What is Klippel-Trenaunay syndrome?**

In this condition you get prominent veins along the lateral aspect of thigh mostly present from very young age, with dysplastic deep veins. The classical clinical triad consists of:

- Hemangiomas
- Hypertrophy of soft tissue and over growth of extremity
- Varicose vein.

**Q 23. What is postphlebitic syndrome?**

It includes a chronically swollen limb with hyperpigmentation, lipodermatosclerosis and nonhealing ulcers with or without varicose veins around the ankle. One of the common presentations is a patient with chronic ulcer around the ankle. A definite history of deep vein thrombosis (DVT) may not be present in most of these patients. Almost all of them will have destroyed deep veins due to the previous DVT.

**Q 24. What are the clinical tests to be done in a patient suspected with varicose veins?****Tests for varicose veins**

- Morrissey's cough impulse test
- Brodie-Trendelenburg test—1 and 2
- Modified Perthes' test
- Multiple tourniquet test
- Schwartz's test—tap sign
- Pratt's test
- Fegan's test
- Assessment of the short saphenous vein

**Q 25. What is Raju's test?****(PG)**

This is a useful test for venous obstruction. With patient lying supine, pressure is measured in the veins of hand and foot. Normally the foot pressure is equal to or slightly higher (by 5 mm of Hg) than the hand pressure. In venous obstruction this difference is more (10–15 mm of Hg).

**Note:** The venous pressure is measured by inserting a cannula to the dorsal vein of foot and measuring the pressure by a saline manometer with the help of a three way.

**Q 26. What is Morrissey's cough impulse test?**

In this test the patient is recumbent. The lower limb is elevated and the veins are emptied. The limb is elevated to about 30° and then the patient is asked to cough. If there is saphenofemoral incompetence expansile impulse is seen and felt at the saphenous opening. One can also see retrograde filling of the proximal part of the long saphenous vein.



**Fig. 13.4:** Saphenofemoral junction with saphena varix. Differential diagnosis of femoral hernia

**Q 27. What is Brodie-Trendelenburg test?**

The patient lies down on a couch and the limb is raised to allow the blood to drain out of the veins. The saphenous vein at the upper 3rd of the thigh is then compressed with a tourniquet (the saphenofemoral junction may be occluded with the thumb). The patient is then asked to stand up. The varices are observed for 30 seconds. Normally the venous filling occurs from the periphery slowly when the patient gets up and takes more than 20 seconds. When the tourniquet is released if the veins fill rapidly from above, it indicates valvular incompetence of the saphenofemoral junction. This is a positive Trendelenburg-1 test.

If the veins fill rapidly from below despite the applied tourniquet this indicates incompetence of the perforating veins (here the tourniquet is not released). This is a positive Trendelenburg-2 test.

**Note:** Test 1 is done first that is followed by the 2nd test.

**Q 28. How is the assessment for saphenopopliteal incompetence done (short saphenous system)?**

This can be done in the same manner applying a tourniquet around the calf below the popliteal fossa. The long saphenous vein should simultaneously be occluded at the upper thigh for accurate interpretation.

**Q 29. What is modified Perthes' test?**

This is a test for assessing the patency of the deep veins. In this test, with the patient standing, a rubber tourniquet is applied around the upper 3rd of thigh tight enough to occlude the long saphenous vein but not the deep veins (note—here the veins are not emptied before the test). Now the patient is asked to walk quickly for 5 minutes. If the patient complains of bursting pain in the lower leg, it is proof that the deep veins are occluded. The additional evidence is that the superficial varicosities, if present, will become more prominent as their exit is blocked by the tourniquet.

In original Perthes' test the affected limb is wrapped with elastic bandage and then allowed to walk.

**Q 30. Is there any alternative test for assessing the patency of deep veins ?**

Apply a tourniquet at the upper third of the calf with the patient in standing position. The patient is asked to perform 10 repeated tip toe movements. The patient will experience bursting pain.

**Q 31. How is multiple tourniquet test done and what is the purpose?**

This is done for seeking the sites of perforators.

The patient is in the supine position. Elevate the affected lower limb and empty the veins. The first tourniquet is tied at the ankle, second one below the knee, third one above the knee and the fourth one below the saphenous

opening. The purpose of fourth tourniquet is to prevent retrograde filling from above into the long saphenous vein.

Make the patient stand up, and ask the patient to stand on toes. The resultant pumping action will throw the blood from the deep system through the perforators to the superficial. Now the tourniquets are sequentially released from below upwards. Look for varicosities at the ankle after releasing the tourniquet at the ankle. Next release the tourniquet at the calf below the knee. If the veins are prominent here perforators in this region are incompetent. Lastly release the tourniquet above the knee and look for varicosities.

**Q 32. What is Schwartz's test (Tap sign)?**

In standing position a tap is made on the long saphenous varicose vein with the right middle finger in the lower part of the leg after placing the fingers of the left hand just below the saphenous opening at the groin. A thrill (impulse) will be felt in the left hand, if it is a varicosity of the long saphenous system.

**Q 33. What is Pratt's test?**

In this test Esmarch bandage is applied to the leg from below upwards followed by tourniquet below the saphenofemoral junction. Now the bandage is released slowly keeping the tourniquet in position to see the **blowouts**.

**Q 34. What is Fegan's test?**

This is done for seeking the sites of perforators. In the standing position mark the excessive bulges within the varicosities. Now the patient lies down. The affected limb is elevated to empty the varicose veins, resting the heel against the examiners upper chest. The examiner palpates along the line of the marked varicosities carefully to find out gaps or circular defects with sharp edges in the deep fascia which transmit the incompetent perforators. They are marked with an 'X'.



## Tests for varicose veins

Sl. No	Test for varicose vein	Purpose of the test
1.	Trendelenburg-1	To identify saphenofemoral incompetence
2.	Trendelenburg-2	To identify perforator incompetence
3.	Morrissey's cough impulse test	To identify saphenofemoral incompetence
4.	Modified Perthes' test	For noting the patency of the deep veins and ruling out deep vein thrombosis—clinically identified as bursting pain during walking and increase in the prominence of varicosities
5.	Multiple tourniquet test	Done to identify the segment of perforator incompetence when Trendelenburg test 2 is found positive
6.	Schwartz's test	Demonstrates incompetent saphenofemoral junction by tapping below just above the ankle region
7.	Pratt's test	To demonstrate "blowouts" at the site of perforators
8.	Fegan's test	Demonstrate deep fascial defects at the site of incompetent perforators

### Q 35. What is CEAP (American Venous Forum 1994) classification? (PG)

This acronym **CEAP** stands for:

- **C**—Clinical classification
- **E**—Etiological classification
- **A**—Anatomic classification
- **P**—Pathophysiological classification

**C—Clinical classification**—7 clinical grades have been identified

Class 0—No visible or palpable sign of venous disease

Class 1—Telangiectasis or reticular veins

Class 2—Varicose veins

Class 3—Edema

Class 4—Skin changes (pigmentation, eczema or lipodermatosclerosis)

Class 4a—Pigmentation or eczema

Class 4b—Lipodermatosclerosis or atrophie blanche

Class 5—Skin changes defined above with healed ulceration

Class 6—Skin changes defined above with active ulceration

**E—Etiological classification**—3 etiologies

Ec—Congenital

Ep—Primary (undetermined cause)

Es—Secondary (post-thrombotic, post-traumatic, other causes)

En—No venous cause identified

**A—Anatomic classification**—18 anatomic segments have been described in 3 anatomic regions

As—Superficial veins

Ad—Deep veins

Ap—Perforating veins

An—No venous location identified

**P—Pathophysiological classification**—3 pathologic mechanisms

Pr—Reflux

Po—Obstruction

Pro—Reflux and obstruction

Pn—No venous pathophysiology identified

### Q 36. What is gaiter area?

This is an area immediately above the medial malleolus and less commonly above the lateral malleolus where the changes of chronic venous hypertension (venous stasis) are seen in the form of lipodermatosclerosis, dermatitis, eczema, pigmentation and ulceration.

Gaiter is a type of protective clothing for a person's ankles and legs below the knees. Gaiter area is the area of lower extremity over which a gaiter fits roughly from ankle to the proximal calf.



### Q 37. What is champagne bottle leg (inverted beer bottle) appearance?

The lipodermatosclerosis will present as palpable induration in the gaiter area. Contraction of the skin and subcutaneous tissue in this region will result in narrowing of the ankle area. The combination of a narrow ankle and prominent calf is referred to as the champagne bottle.

### Q 38. What is atrophie blanche?

In this condition the superficial veins are lost from the skin and white patches develop. This is called atrophie blanche. This indicates that the skin has been severely damaged by the venous valvular incompetence. Venous ulceration may develop in these areas.

### Q 39. What are the investigations for diagnosis?

#### Investigations for varicose veins

- Duplex ultrasound imaging
- Doppler ultrasound
- Photoplethysmography
- Venography (phlebography)—invasive
- Ambulatory venous pressure studies
- Raju's test—arm-foot venous pressure study
- Ultrasound of the abdomen.

1. **Duplex ultrasound imaging:** The examination is performed with the patient in standing position. The examiner steadily work his way from the groin to the ankle. This is the most important noninvasive investigation for practically all venous disorders. It produces high quality pictures using a combination of B mode imaging and Doppler ultrasound. Anatomical, physiological and functional details can be obtained. Venous lumen, flow, direction and reflux of blood can be visualized. The site of perforator incompetence can be located with accuracy. **It has replaced the venography.** All patients with recurrent varices, history of previous DVT and patients with skin changes should

be fully investigated by using duplex ultrasonography or venography.

2. **Doppler ultrasound:** This investigation is also done in the standing position. A bidirectional flow probe will identify venous reflux. The Doppler probe is first placed over the saphenofemoral junction. With one hand the examiner squeezes the calf to produce an acceleration of blood flow in the veins. This is heard as a 'whoosh' from the speaker of the Doppler machine. The calf compression is released and look for any reverse flow in the veins. This procedure is repeated over the saphenopopliteal junction and over other areas. The saphenopopliteal junction is inconstant. It can be identified and marked with Doppler. Doppler assessment is the minimum investigation required before treating a patient with venous disease. The arterial disease can also be excluded.

- Four characteristics descriptions are **patent, augmented, spontaneous and phasic.**

- |           |  |
|-----------|--|
| Patent    | <ul style="list-style-type: none"> <li>– Flow is heard at the anatomical level of the vein</li> <li>– Rarely does the flow completely disappear with DVT</li> <li>– DVT is associated with continuous, high pitched signal</li> </ul>  |
| Augmented | <ul style="list-style-type: none"> <li>– Firm, gentle compression of the limb for a few seconds distal to the vein should result in augmentation of the flow</li> <li>– Proximal compression followed by release should also result in augmentation</li> <li>– Augmentation produced by proximal compression before release or distal compression after release indicates valvular incompetence</li> </ul> |

- Spontaneous – DVT results in loss of spontaneous flow
- Anything causing vasoconstriction also causes loss of spontaneity
- Phasic – Variation with respiration is called phasicity
- A Valsalva maneuver should decrease the signal and a deep breath should augment the signal with normal venous physiology
- This is lost in DVT.

3. *Venography (Phlebography)*: Invasive—not done now-a-days. For identifying incompetence of the valves a descending phlebography is done where the dye is injected into the femoral vein with the patient standing.

For ruling out deep vein thrombosis an ascending phlebography is done by injecting the dye to the foot vein after occluding the superficial veins above the ankle by a tourniquet.

4. *Ambulatory venous pressure study*: Is not done routinely. It is considered by many to be the gold standard venous function test (the significance of the pressure is described earlier).
5. *Raju's test*: Arm-foot venous pressure study—(described earlier).
6. CT/MR venogram.

*Ultrasound of the abdomen*: To rule out abdominal pathology in suspected cases of secondary varicose veins.

#### Q 40. What is mickey mouse sign?

It is the Doppler finding of SFJ incompetence. GSV, common femoral veins (CFV) and accessory saphenous vein gives this image.

#### Q 41. What are goals of treatment?

- Alleviation of pain
- Reduction of edema
- Healing of ulcers if present
- Prevention of recurrence.

**Compression remains the cornerstone of treatment.**

#### Q 42. What is the contraindication for surgery?

**Deep venous thrombosis.** Superficial varices developing after a venous thrombosis may be the only route of venous drainage in the lower limb and should not be removed until the patency of the deep veins of the limb has been shown.

#### Q 43. What are the treatment options available? (Flow chart 13.1).

##### Treatment options for varicose veins

- Reassurance
- Elastic compression stockings
- Injection sclerotherapy—foam sclerotherapy, echo-sclerotherapy and microsclerotherapy
- Surgical treatment
- Laser therapy.

#### Q 44. What are the indications for treatment?

Better results are obtained with early treatment before continuous reflux:

- Varicose veins that cause discomfort
- Cosmetic embarrassment
- Complications like venous ulcers.

#### Q 45. What is the role of compression stockings?

The symptoms of varicose veins may be relieved by the use of compression stockings. Which are available in 3 grades—Class 1, 2 and 3.

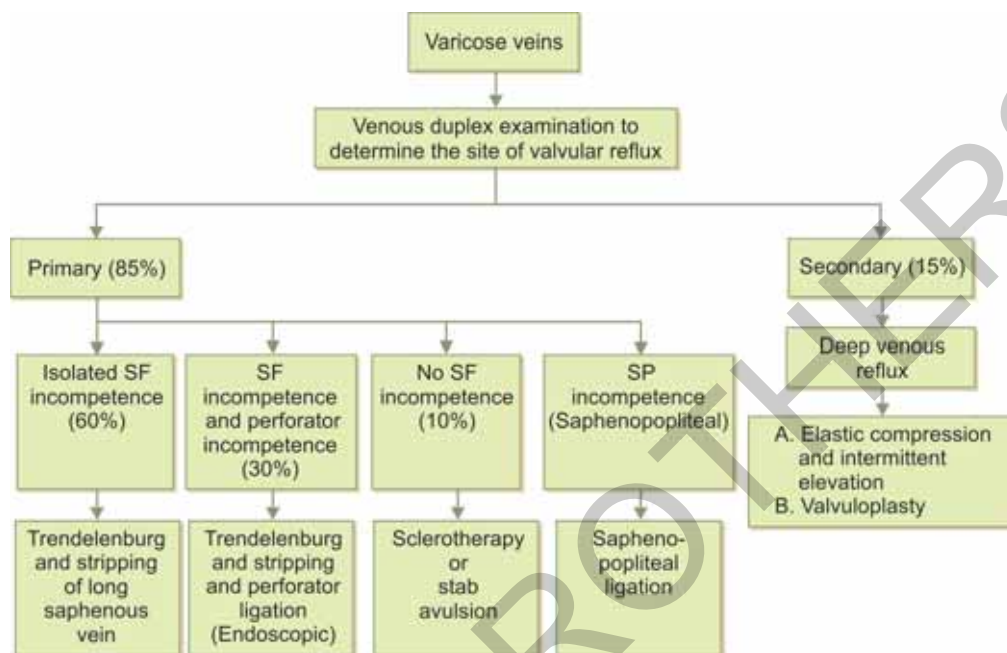
#### Q 46. What are the agents used for injection sclerotherapy?

- STD—sodium tetradecyl sulphate (3%)
- Polidocanol
- Ethanolamine oleate.

#### Q 47. What is the indication for sclerotherapy?

- This is used to treat varicose veins in the absence of junctional incompetence and major perforating veins.
- Used for smaller veins <3 mm in size.

Flowchart 13.1: Management of varicose veins



**Q 48. What is the technique of injection sclerotherapy?**

The sclerosant is injected into an empty vein and the vein is compressed. The endothelial lining is destroyed. If the vein is not compressed it will produce thrombosis which will later get recanalized producing recurrence.

**Q 49. What is foam sclerotherapy (by Tessari)?**

In this technique the STD is drawn into one syringe and air is taken in another syringe. Using a three way, rapid to-and-fro movements of the piston of the syringe, the foam is produced. This foam is then injected into the long saphenous vein after cannulation. The air is absorbed, the vein collapses and the endothelial lining is destroyed. A much larger volume can be injected into the vein with a small quantity of sclerosant so that it will fill the superficial varicosities. The patient is lying supine with the leg elevated instead.

**Q 50. What is echosclerotherapy? (PG)**

When the procedure of foam sclerotherapy is done under the guidance of duplex ultrasound imaging it is called echosclerotherapy.

**Q 51. What is the advantage of sclerotherapy?**

The patients can undergo repeated treatment sessions to ensure that all veins are removed.

**Q 52. What are the complications of sclerotherapy?**

**Complications of sclerotherapy**

- Skin pigmentation
- Injury to the skin and ulceration
- Allergic reaction
- Thrombophlebitis
- Deep vein thrombosis

**Q 53. What is microsclerotherapy? (PG)**

The thread veins and reticular varices are injected by inserting a 30 G needle. The solutions used are STD and polidocanol. After



# CLINICAL SURGERY PEARLS

This is an examination-oriented clinical book meant for both undergraduates and postgraduates in question-answer format. The questions for postgraduates are separately marked as PG. Each case starts with a case capsule, followed by a checklist for history and physical examination followed by the diagnostic points for that particular case. This is followed by the commonly asked examination questions related to those cases reviewing the relevant anatomy, physiology, investigations, differential diagnosis and updated staging and "evidence-based management". The book is highlighted with flowcharts and boxes. There is a separate section for definitions of various clinical terminologies. The presentation and style are unique.

In this third edition all the chapters have been thoroughly revised and updated. New drawings, flowcharts and about 70 new clinical photographs are added. The new AJCC, 8th edition is used for staging and management. The third edition of the book is coming in different shape and format, however still retaining the student-oriented approach.

## Review by S Vaidyanathan on "Clinical Surgery Pearls"

It gives me immense pleasure to write a reference to this wonderful compendium of Surgical Wisdom by Professor R Dayananda Babu. The Clinical Scenarios with the problem-solving approach, bring surgical principles to bedside. This was a long-felt need and *Clinical Surgery Pearls* has bridged the gap very effectively.

Each section starts with a Clinical Scenario. Commencing from the basic fundamental issues it elevates the reader progressively to more advanced cognitive levels. This approach from the known to the unknown and from the simple to complex, is in conformity with sound learning principles. This is why, the vast student population has accepted this book so wholeheartedly. The question-answer format lends further clarity to learning process. Needless to say, each section is complete in itself and is of great help to our student community. I am happy to note that the third edition of this book is being released with updated information on, 'What is new' in each section. This will further enhance the utility of this work, especially for our postgraduate students.

I have no hesitation in recommending this book for our undergraduate and postgraduate students in General Surgery.

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