Peripheral Arterial Disease & Varicose Veins

週邊動脈疾病和靜脈曲張

BChinMed IV – Fundamental of Surgical Diagnosis – Vascular Surgery

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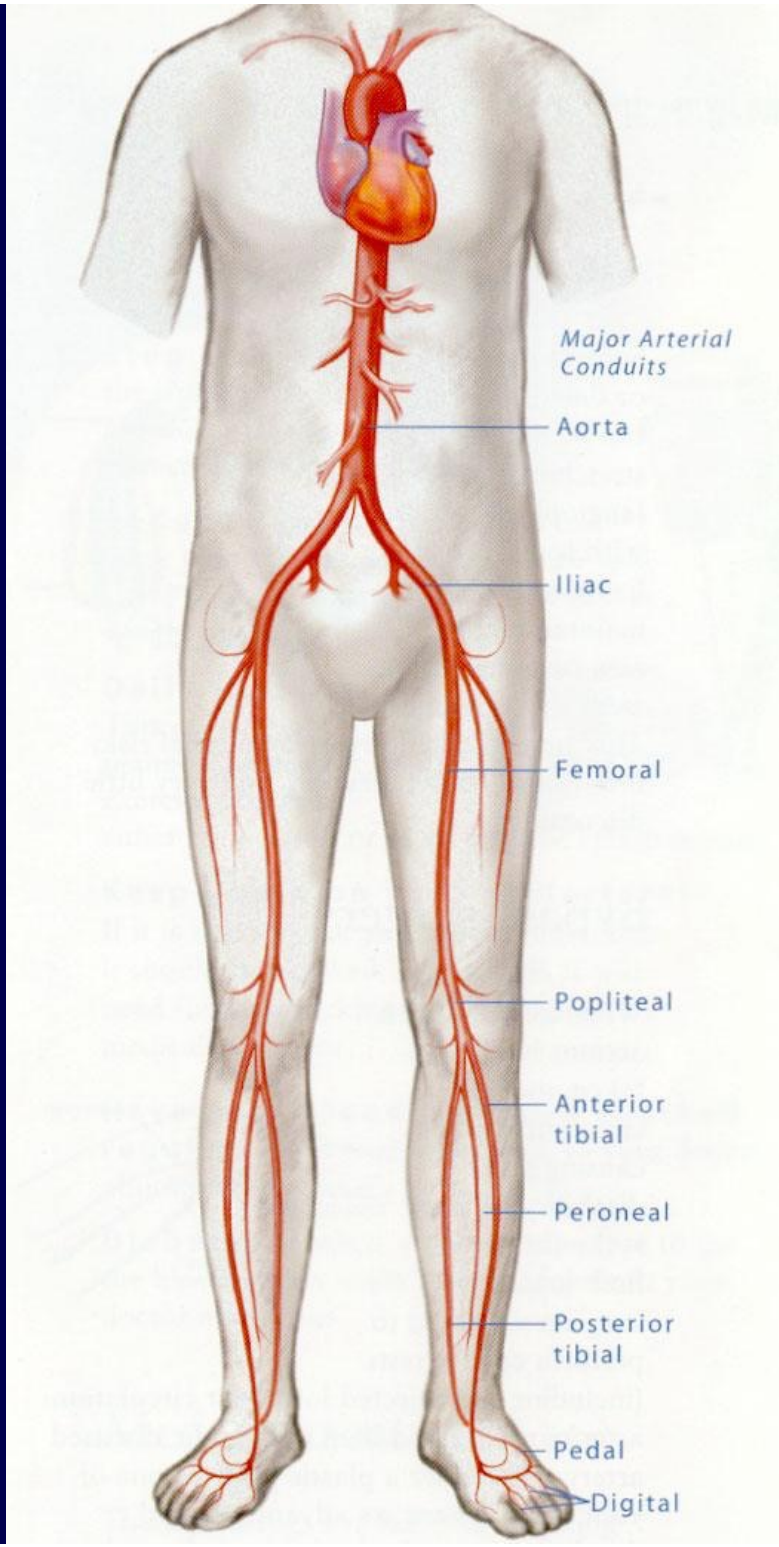
Peripheral Arterial Disease
週邊動脈疾病


Major Arterial Conduits
Aorta
Iliac
Femoral
Popliteal
Anterior tibial
Peroneal
Posterior tibial
Pedal
Digital

Intermittent claudication

間歇性跛行

- Pain in muscle groups (usually calf, but may affect thigh, buttock, arms)
- After walking some distance
- Worse hurrying, up / downhill, stairs
- Relieved by short rest

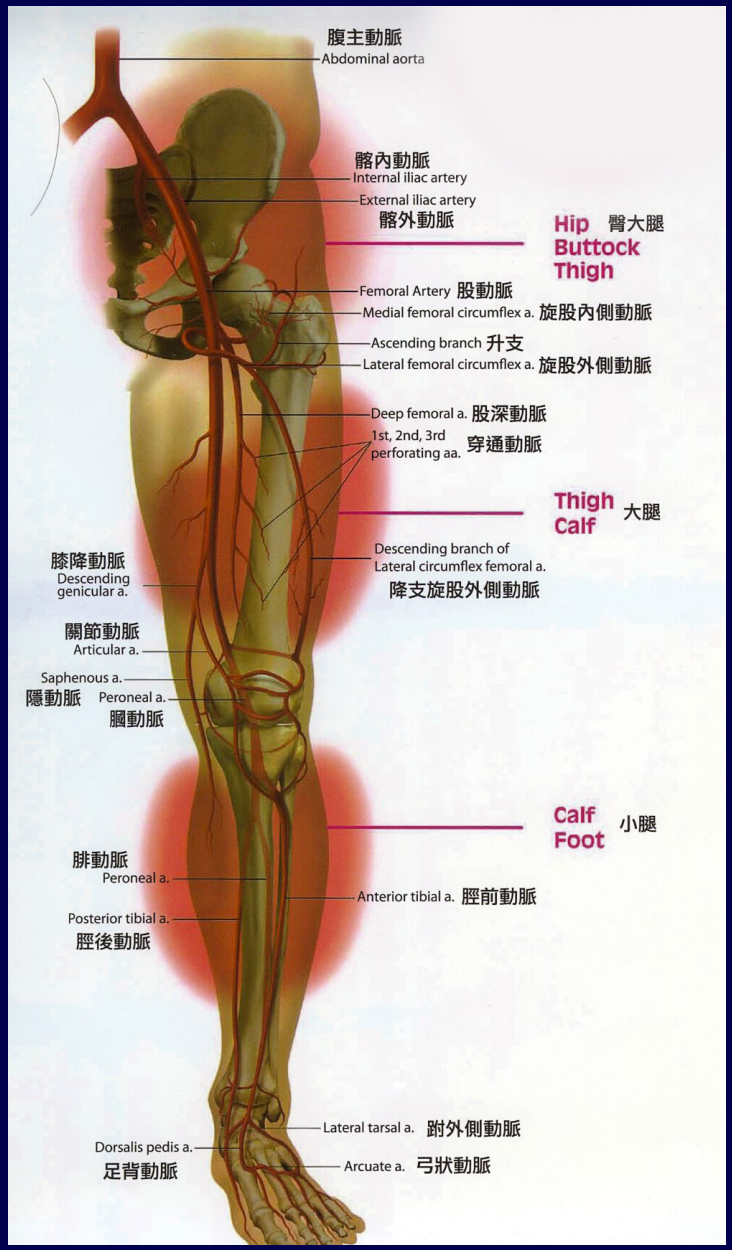
In general:

single-level stenosis *狹窄* ***/ occlusion*** 閉塞 will cause claudication,

multi-level stenosis/ occlusion will cause rest pain/ tissue loss

History of Intermittent Claudication

- ***Speed of onset***
  - May reflect aetiology 病因 (embolism 栓塞 vs thrombosis in-situ 血栓形成 / atherosclerosis 動脈粥樣硬化)
- ***Which muscle groups***
  - May indicate the level of arterial stenosis/ occlusion



Ischaemic Rest pain

缺血性静息痛

- Pain in the forefoot, toes, or ankle
- Aggravated by elevating the leg
- Improved by placing the leg in dependent position
- Caused by hypoxia 缺氧 of the cutaneous nerves

Ischaemic Rest pain

- ***Frequently worse at night***
  - Lack of gravity-induced increase in arterial blood flow
  - Lower mean arterial pressure/ perfusion pressure during sleep
- *Patients may need to sleep in a chair to keep the foot in dependent position*

Ischaemic ulcers / gangrene

缺血性潰瘍 / 壞疽

- Usually in toes/ heel/ pressure points
- Ulcers are unhealthy with punched out edges
- Lack of granulation tissues
- Painful (apart from diabetics)

Ischaemic ulcers/ gangrene in Diabetics

- *Peripheral arterial disease*
  - *Macrovascular (usually infra-popliteal disease)*
  - *Microvascular*
- *Peripheral neuropathy*
- *Prone to sepsis*
- *Poor healing*
- *Poor glycaemic control*

Examination of Patients with peripheral vascular disease

- *Inspection*
  - Patients with intermittent claudication may have no clinical signs on inspection
  - Patients with severe lower limb ischaemia
    - Thin atrophic nails/ skin
    - Previous toe amputation
    - Ulcers: toes, heel, pressure points of foot/ ankle
    - Previous surgical scars for bypass surgery
    - Pale on elevation and dependency hyperaemia (Buerger's test)

Figure 2.2 Sunset red foot due to dilated capillaries caused by critical (limb-threatening) ischaemia. Elevation of the foot will result in pallor (Buerger's or Ratshow's test positive).

Examination of Patients with peripheral vascular disease

- *Palpation*
  - Capillary return of toes
  - Temperature
  - Pulses
    - Femorals
    - Popliteals
    - Pedal pulses

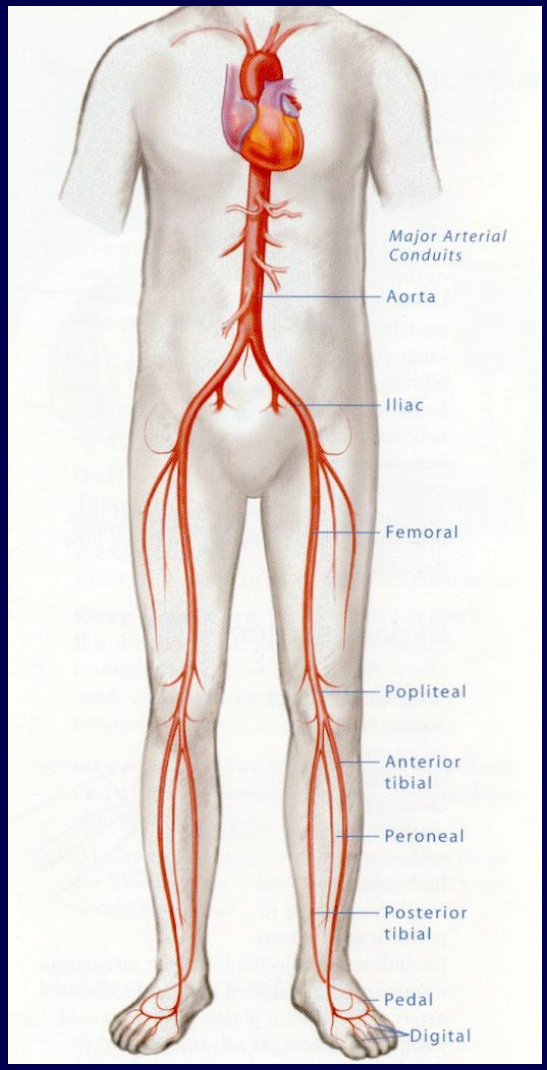


Figure 2.6 Palpation of the femoral pulse may require both hands except in the thin patient. One hand pushes the lower abdomen out of the way and the other palpates the femoral artery/pulse.

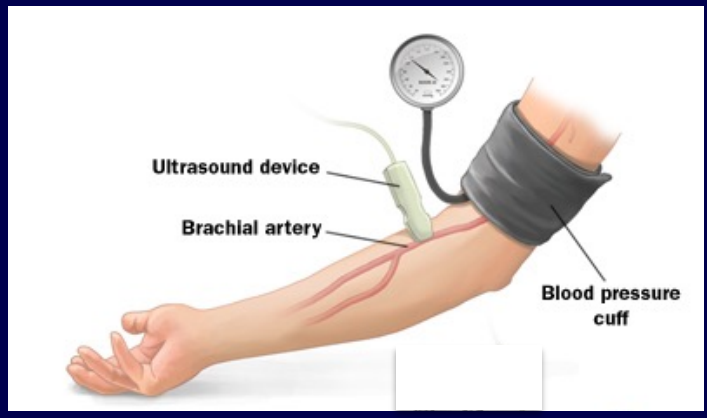
Figure 2.7 A popliteal pulse is best felt using both hands with the leg relaxed in slight flexion.

Examination of Patients with peripheral vascular disease

- *Auscultation*
  - *Bruits*
  - *Carotid bruits*
  - *Cardiac murmur*
  - *Abdominal or femoral bruits*

Ankle Brachial Pressure Index

踝肱動脈血壓指數



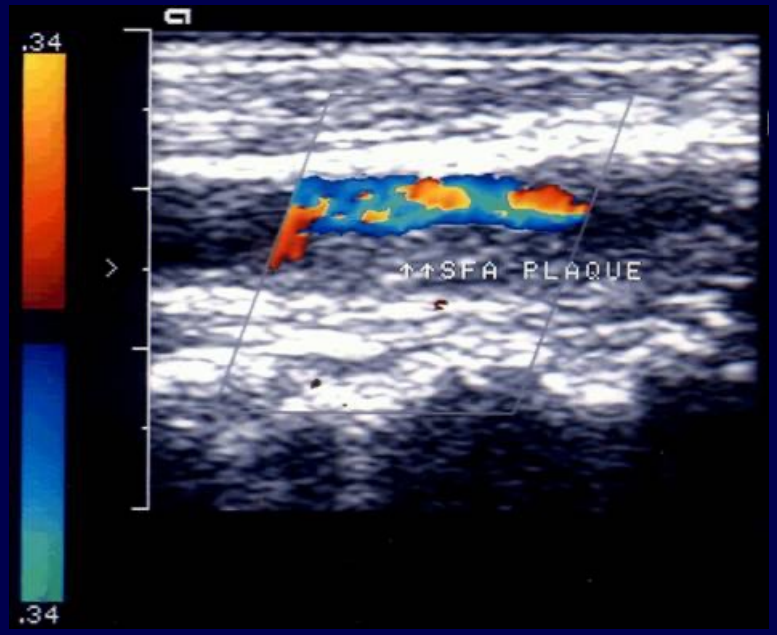
- Normal ABI is 1.0 to 1.1
- Progressive lower values corresponding to worsening arterial disease
- Claudication 0.6 +/- 0.2
- Rest pain 0.3 +/- 0.1
- Tissue necrosis 0.1 +/- 0.1

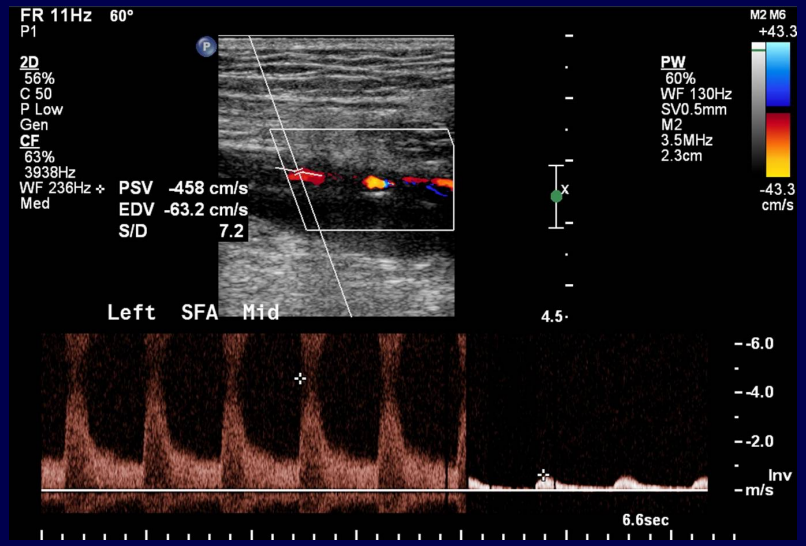
Investigations

- ***Special vascular tests***
  - ***–Non-invasive***
  - ***–Invasive***

Limitations of Arterial Duplex Ultrasound

多普勒超聲波



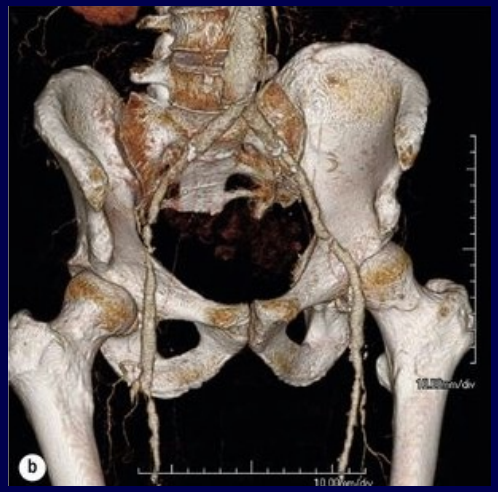


- User dependent, machine dependent
  - Credited scanners, properly trained
- Calcified plaques
- Obscured by dressings / surgical wounds
- Time consuming

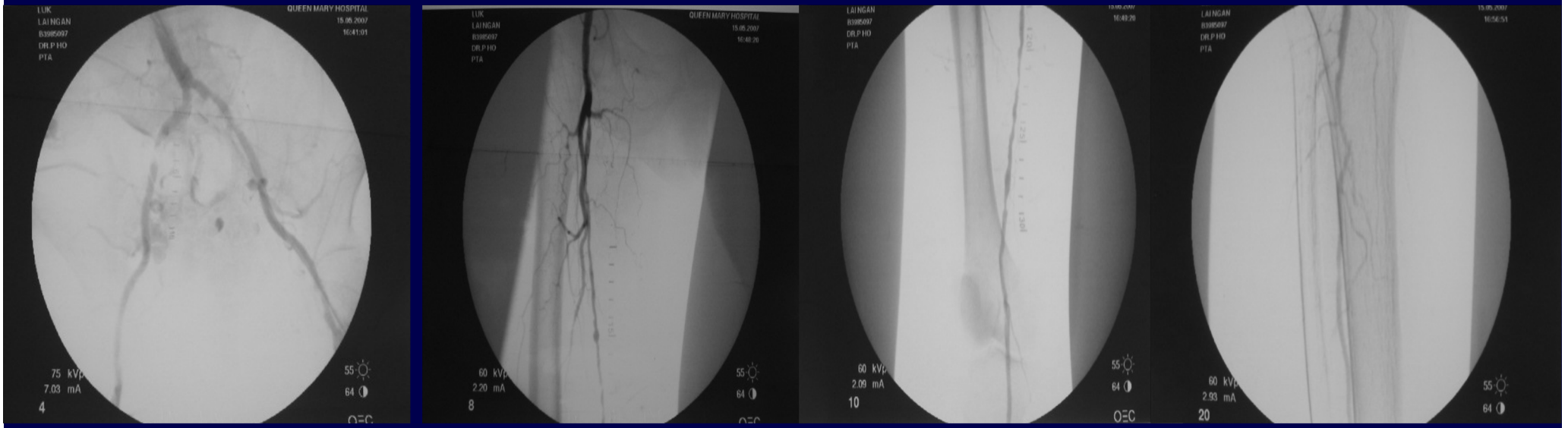
Angiogram

動脈造影

- Intra-arterial digital subtracted angiogram (IADSA)
- CT angiogram
- MR angiogram



IADSA



1. Name the artery (according to bony landmarks) and divide into thirds (proximal, middle, distal)
2. Describe degree of stenosis (mild, moderate, severe, occlusion)
3. Length of stenosis/ occlusion
4. Run-off vessels


QUEEN MARY HOSPITAL
25.07.2007
15:46:37
61 kVp
2.81 mA
2
55
64
OEC


25.07.2007
16:25:43
61 kVp
2.52 mA
13
55
64
OEC


QUEEN MARY HOSPITAL
25.07.2007
16:34:35

Acute lower limb ischaemia

- ***Pain***
- ***Perishing cold***
- ***Pallor***
- ***Pulselessness***
- ***Parasthaesia***
- ***Paralysis***

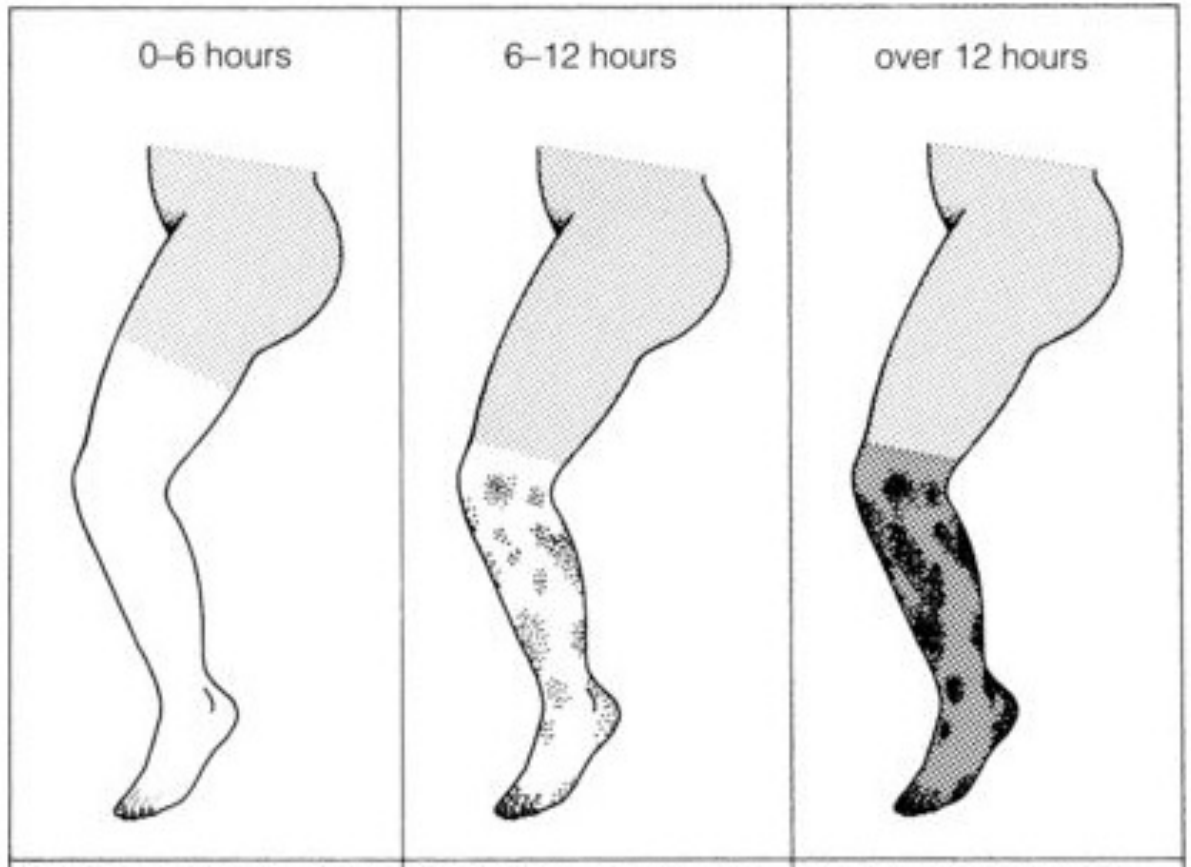
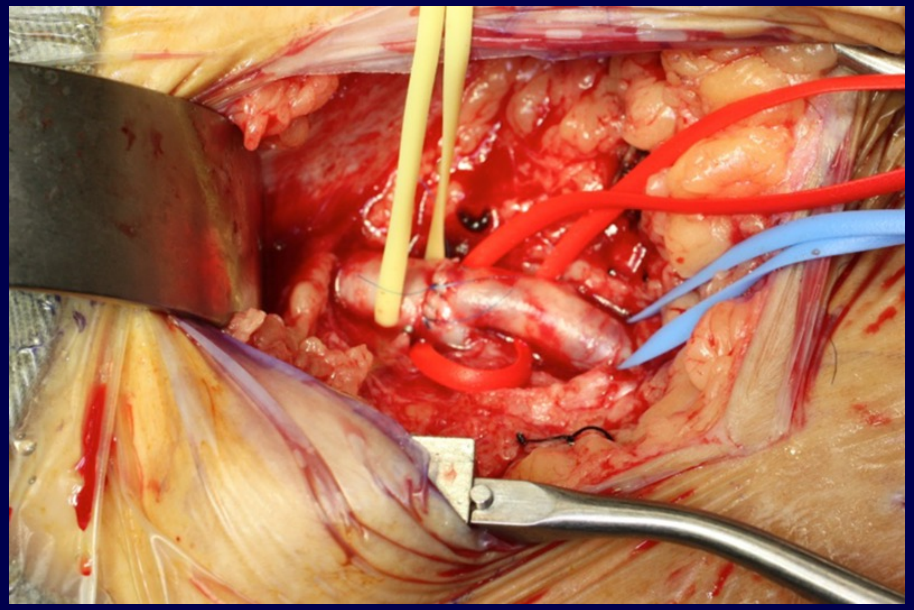
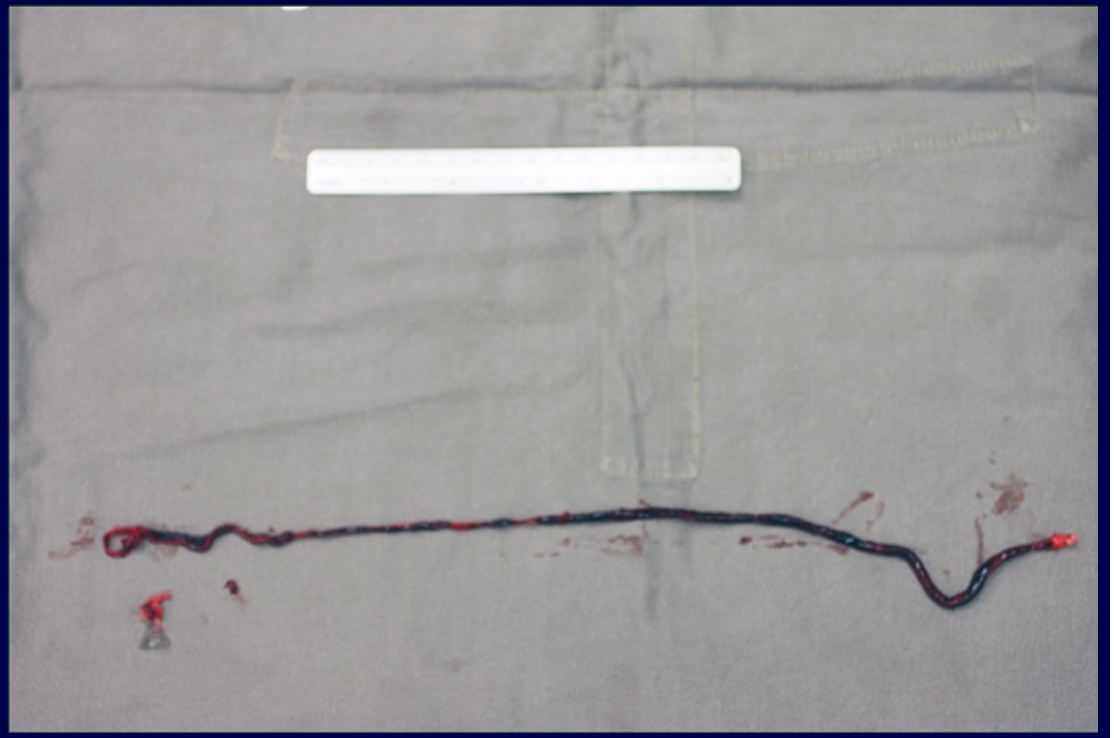


Figure 8.4 Clinical outcome after acute leg ischaemia.

Emergency femoral embolectomy



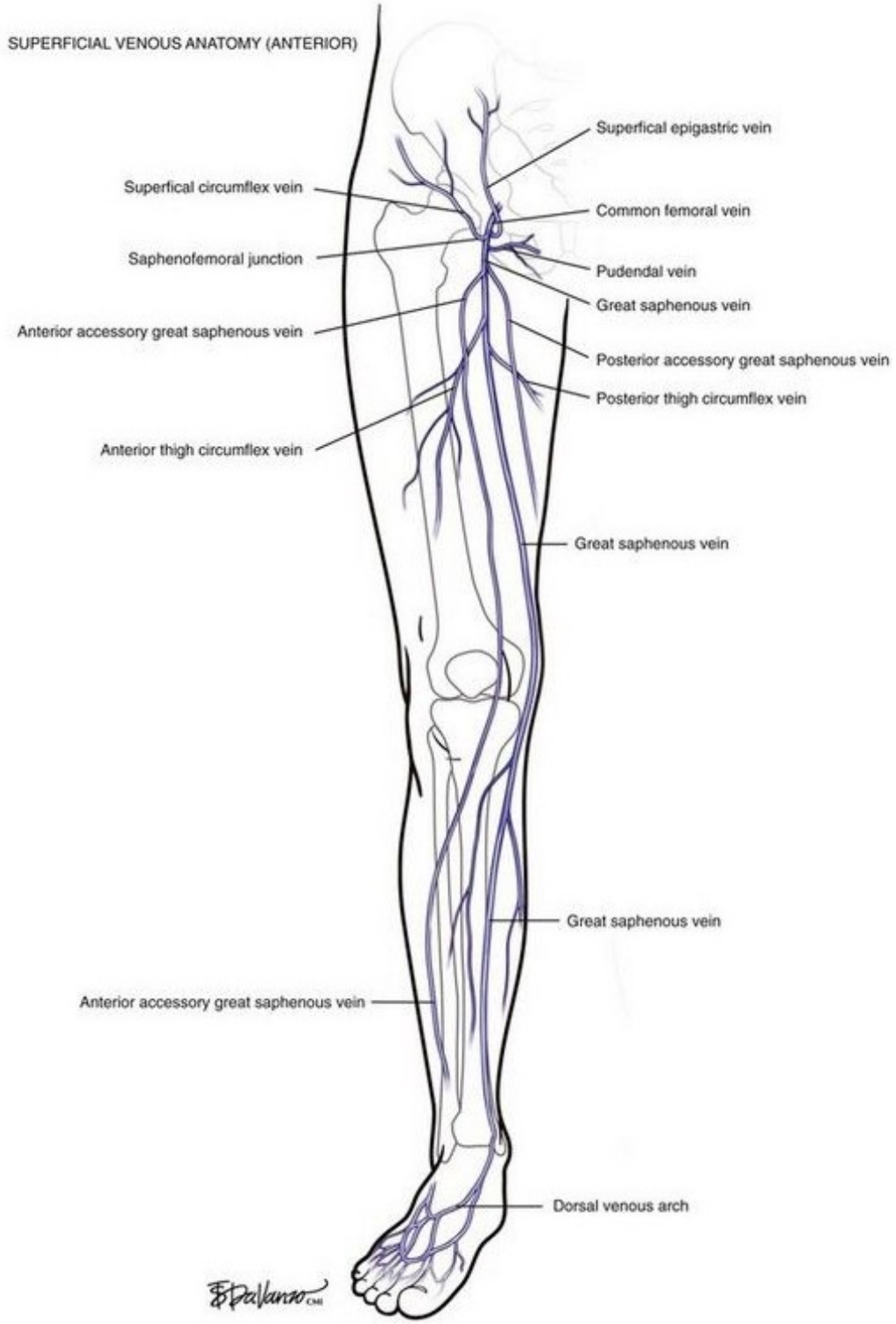


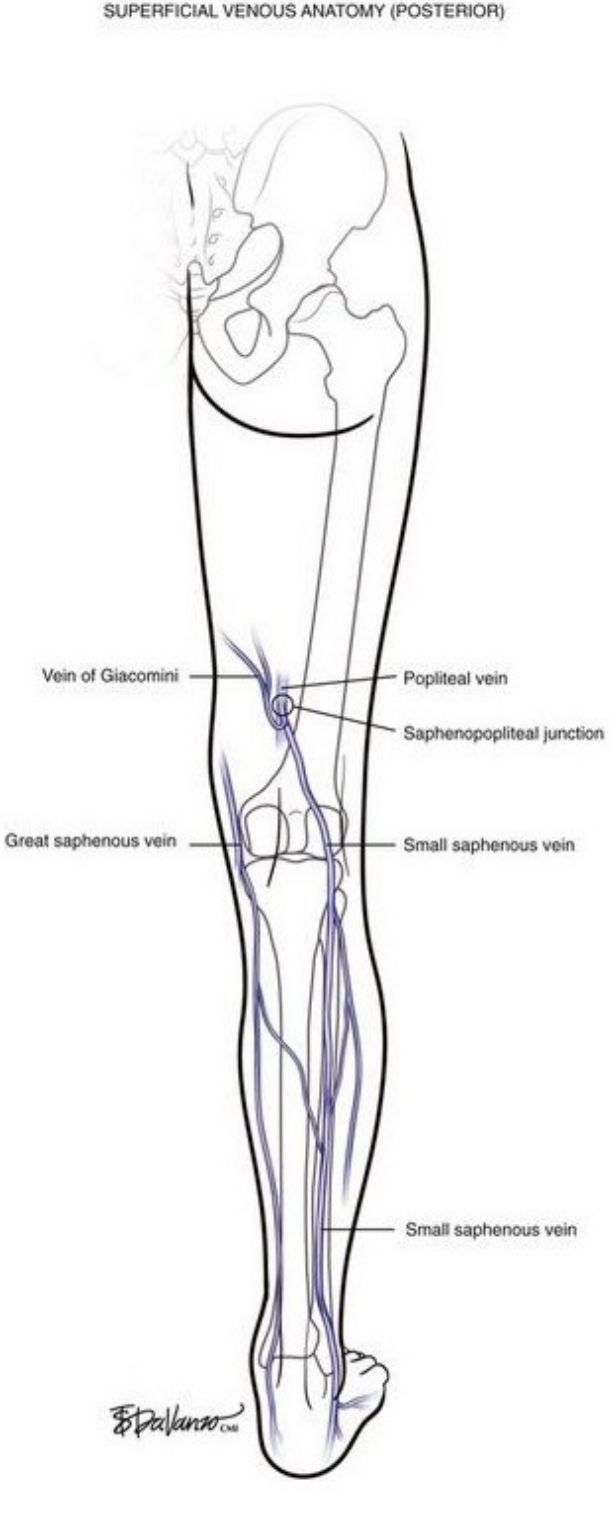
Varicose Veins
靜脈曲張

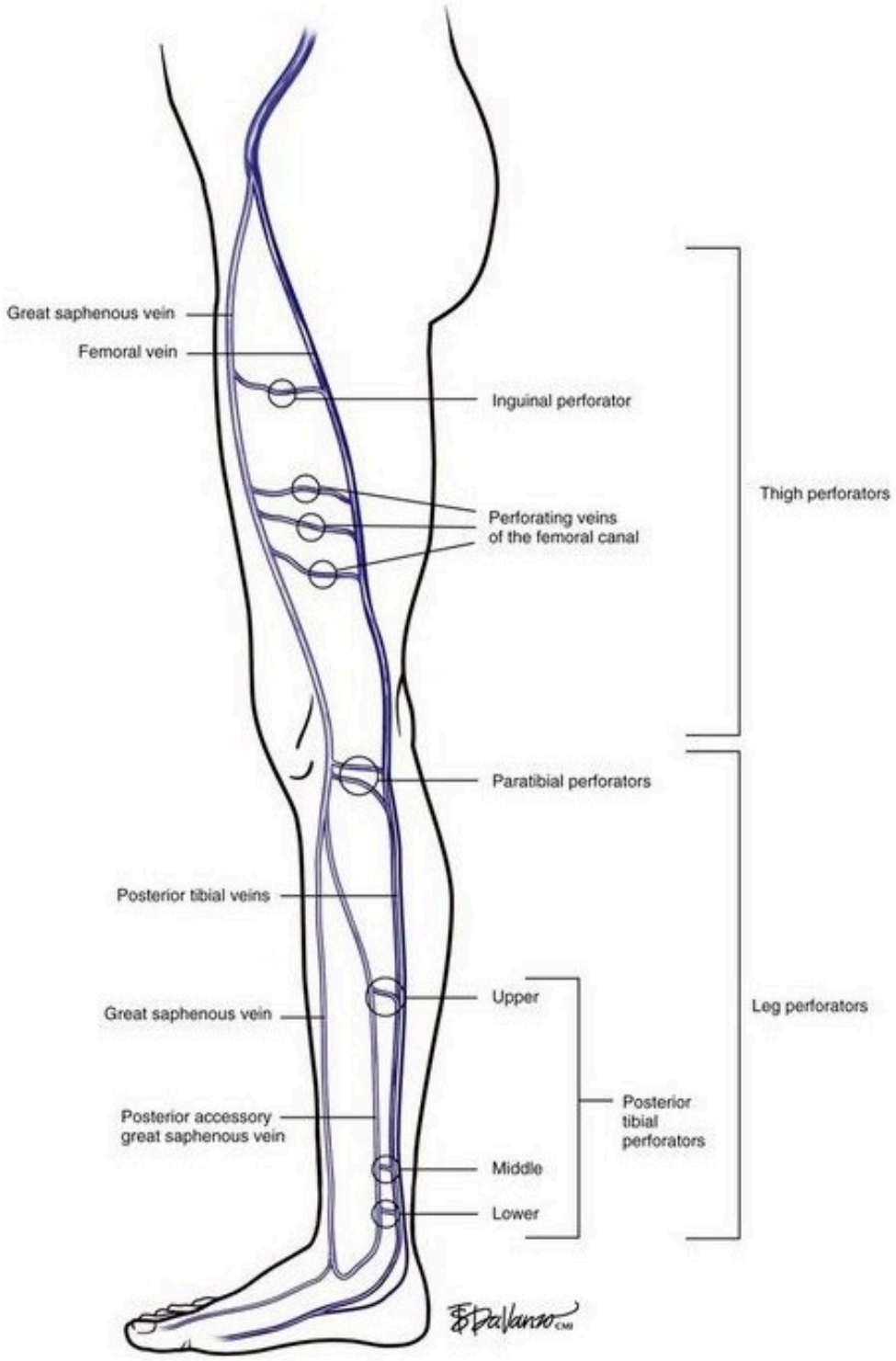
Varicose Veins

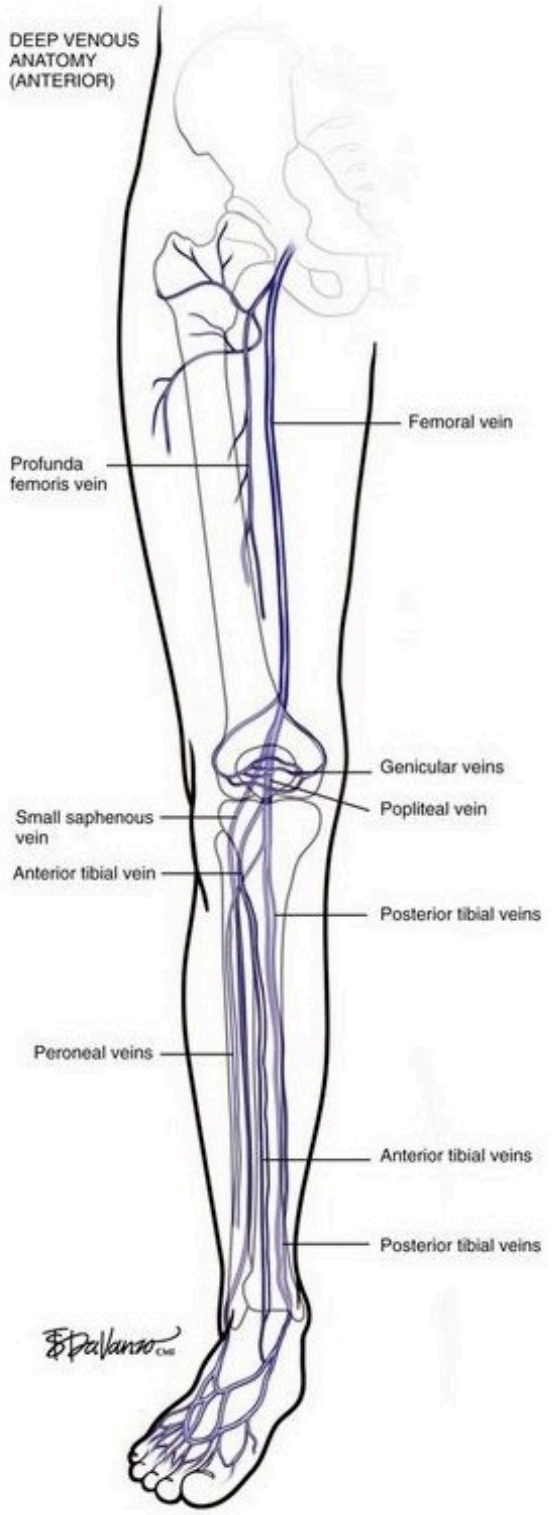
- More common in women (3.5:1)
  - Pregnancy aggravates veins
  - More symptomatic in women (cosmetic concerns)

- Tortuous dilated cutaneous veins
  - Primary trunk incompetence v v's
    - Long/ short saphenous veins 隱靜脈
  - Secondary trunk incompetence v v's
    - Acting as collaterals ***in the presence of damage, occluded, or absent deep veins*** (usually severe skin changes and not much v v's)


SUPERFICIAL VENOUS ANATOMY (ANTERIOR)
Superfical epigastric vein
Superfical circumflex vein
Common femoral vein
Saphenofemoral junction
Pudendal vein
Great saphenous vein
Anterior accessory great saphenous vein
Posterior accessory great saphenous vein
Posterior thigh circumflex vein
Anterior thigh circumflex vein
Great saphenous vein
Great saphenous vein
Anterior accessory great saphenous vein
Dorsal venous arch


SUPERFICIAL VENOUS ANATOMY (POSTERIOR)
Vein of Giacomini
Popliteal vein
Saphenopopliteal junction
Great saphenous vein
Small saphenous vein
Small saphenous vein


Great saphenous vein
Femoral vein
Inguinal perforator
Perforating veins
of the femoral canal
Thigh perforators
Paratibial perforators
Posterior tibial veins
Great saphenous vein
Upper
Leg perforators
Posterior accessory
great saphenous vein
Posterior
tibial
perforators
Middle
Lower


DEEP VENOUS
ANATOMY
(ANTERIOR)
Femoral vein
Profunda
femoris vein
Genicular veins
Popliteal vein
Small saphenous
vein
Anterior tibial vein
Posterior tibial veins
Peroneal veins
Anterior tibial veins
Posterior tibial veins

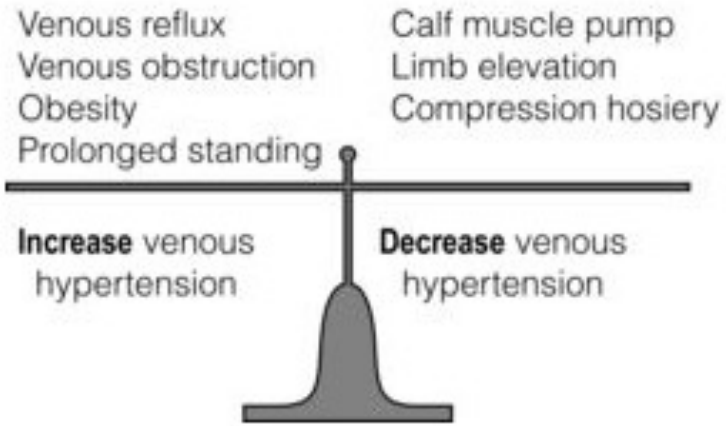
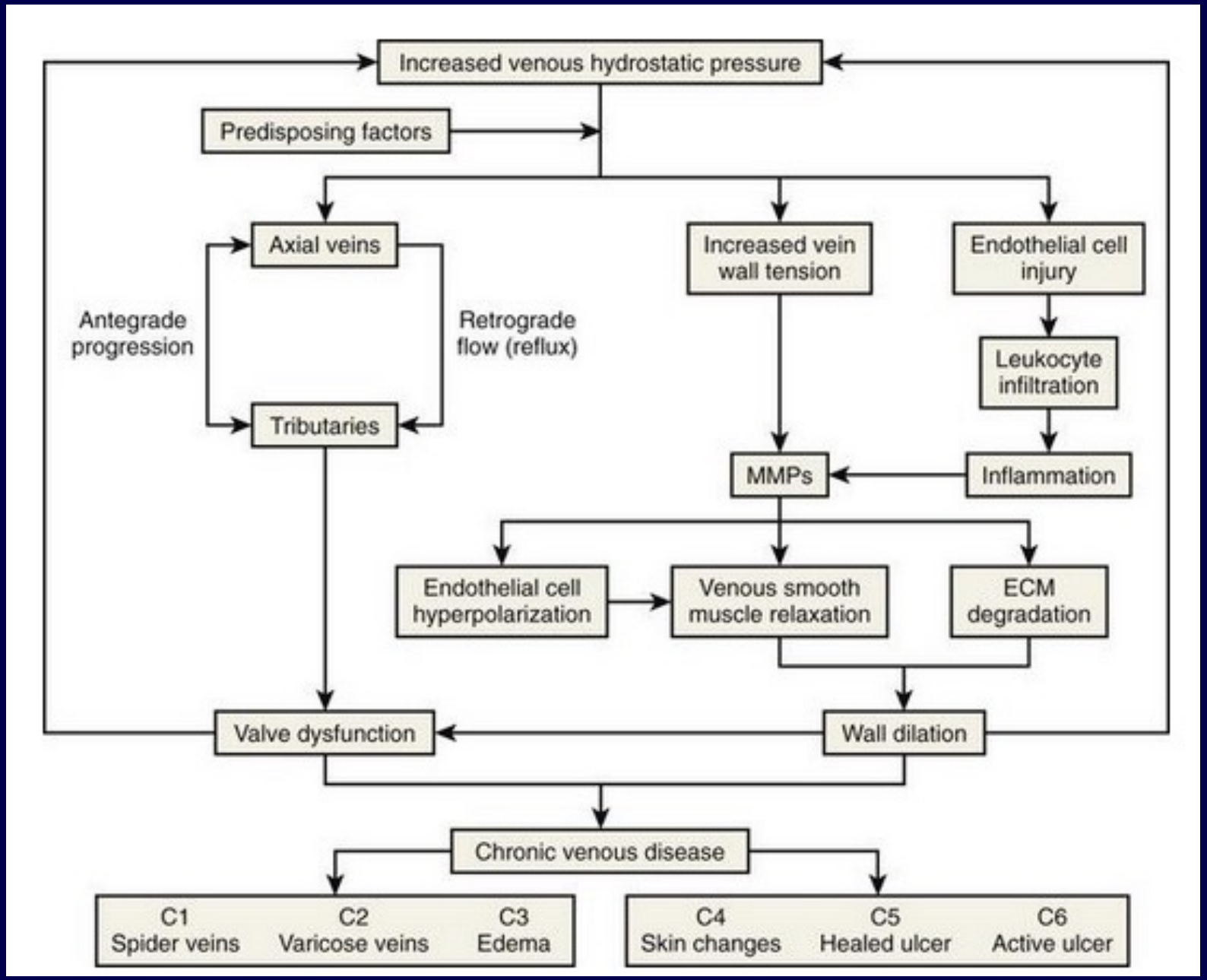


Figure 17.1 Factors affecting venous hypertension.


Increased venous hydrostatic pressure
Predisposing factors
Axial veins
Antegrade progression
Retrograde flow (reflux)
Tributaries
Increased vein wall tension
Endothelial cell injury
Leukocyte infiltration
Inflammation
MMPs
Endothelial cell hyperpolarization
Venous smooth muscle relaxation
ECM degradation
Valve dysfunction
Wall dilation
Chronic venous disease
C1 Spider veins
C2 Varicose veins
C3 Edema
C4 Skin changes
C5 Healed ulcer
C6 Active ulcer

Examination of Varicose Veins

- Are there any varicose veins (tortuous and dilated)
- What distribution? (LSV, SSV, deep, combination)
- Are there any complications
  - Eczema / itchiness
  - Pigmentation
  - Lipodermatosclerosis 脂性硬皮病
  - Ulcerations
- Tourniquet tests
- Pulses
- *Tap test / cough test*
- *Handheld doppler with calf squeeze manoeuver*

CLINICAL CLASSIFICATION OF PRIMARY VARICOSE VEINS

TABLE

A. Telangiectasias:

- Localized
- Diffuse

B. Reticular veins

- Localized
- Diffuse

C. Truncular

- Secondary to insufficiency of:
- Great saphenous vein and tributaries
- Small saphenous vein and tributaries[24]
- Perforating veins
- Other venous systems: gastrocnemius
  Solear
  Pelvic

International Consensus
CEAP

Symptoms | **Clinical signs**

C_0S

Heavy legs, pains in the legs, pruritus... But no clinical or palpable signs of venous disease

▸ read more

C_1

Telangiectasia or reticular veins

▸ read more

C_2

Visible and palpable varicose veins

▸ read more

C_3

Venous oedema (without trophic changes)

▸ read more

C_4

Trophic changes of venous origin : atrophie blanche, pigmented purpuric dermatitis, varicose eczema

▸ read more

C_5

healed ulcer with trophic changes

▸ read more

C_6

Presence of one or more active venous leg ulcers, often accompanied by trophic changes

▸ read more

C0 - C6 : description of the progression of the disease on the basis of the clinical signs present

C : clinical signs E : etiological classification A : anatomical distribution P : pathophysiological dysfunction

Clinical*

- C_0 - No clinical signs
- C_1 - Small varicose veins
- C_2 - Large varicose veins
- C_3 - Edema
- C_4 - Skin changes without ulceration
- C_5 - Skin changes with healed ulceration
- C_6 - Skin changes with active ulceration

Etiology*

- E_C - Congenital
- E_P - Primary
- E_S - Secondary
  (usually due to prior DVT)

Anatomy*

- A_S - Superficial veins
- A_D - Deep veins
- A_P - Perforating veins

Pathophysiology*

- P_R - Reflux
- P_O - Obstruction

"Early application of compression should be performed to correct swelling and progressive scarring and to initiate the healing process by improving the venous microcirculation."

Kistner R. Specific Steps to Effective Management of Venous Ulceration. Supplement to Wounds June 2010.

*Fronek HS, Bergan JJ, et al. The Fundamentals of Phlebology: Venous Disease for Clinicians. 2004. pg 151.

Clinical Classifications with examples

C_1 - telangiectasias or reticular veins

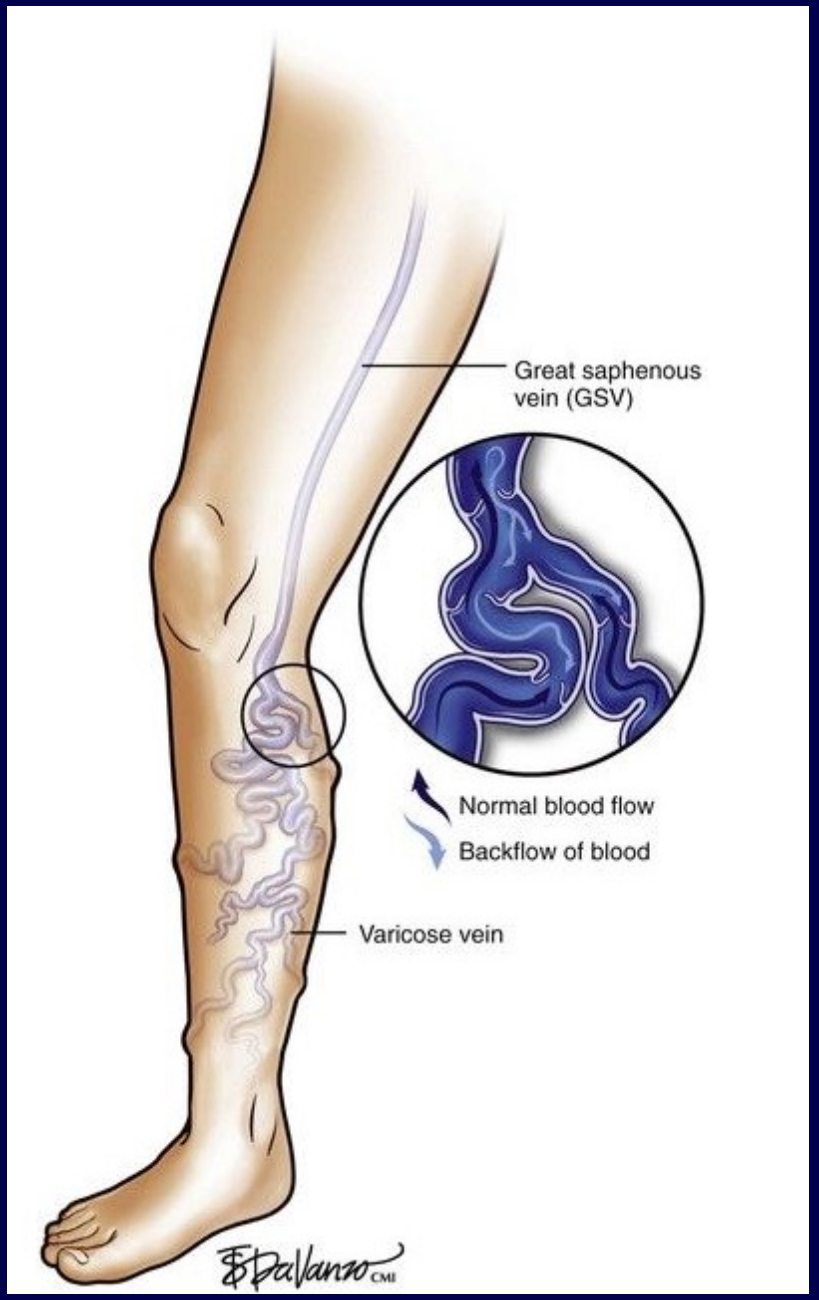
C_2 - varicose veins

C_3 - edema & corona

C_4 - lipodermato-sclerosis and eczema

C_5 - ulcer scar

C_6 - active ulcer


Great saphenous vein (GSV)
Normal blood flow
Backflow of blood
Varicose vein

Tourniquet test

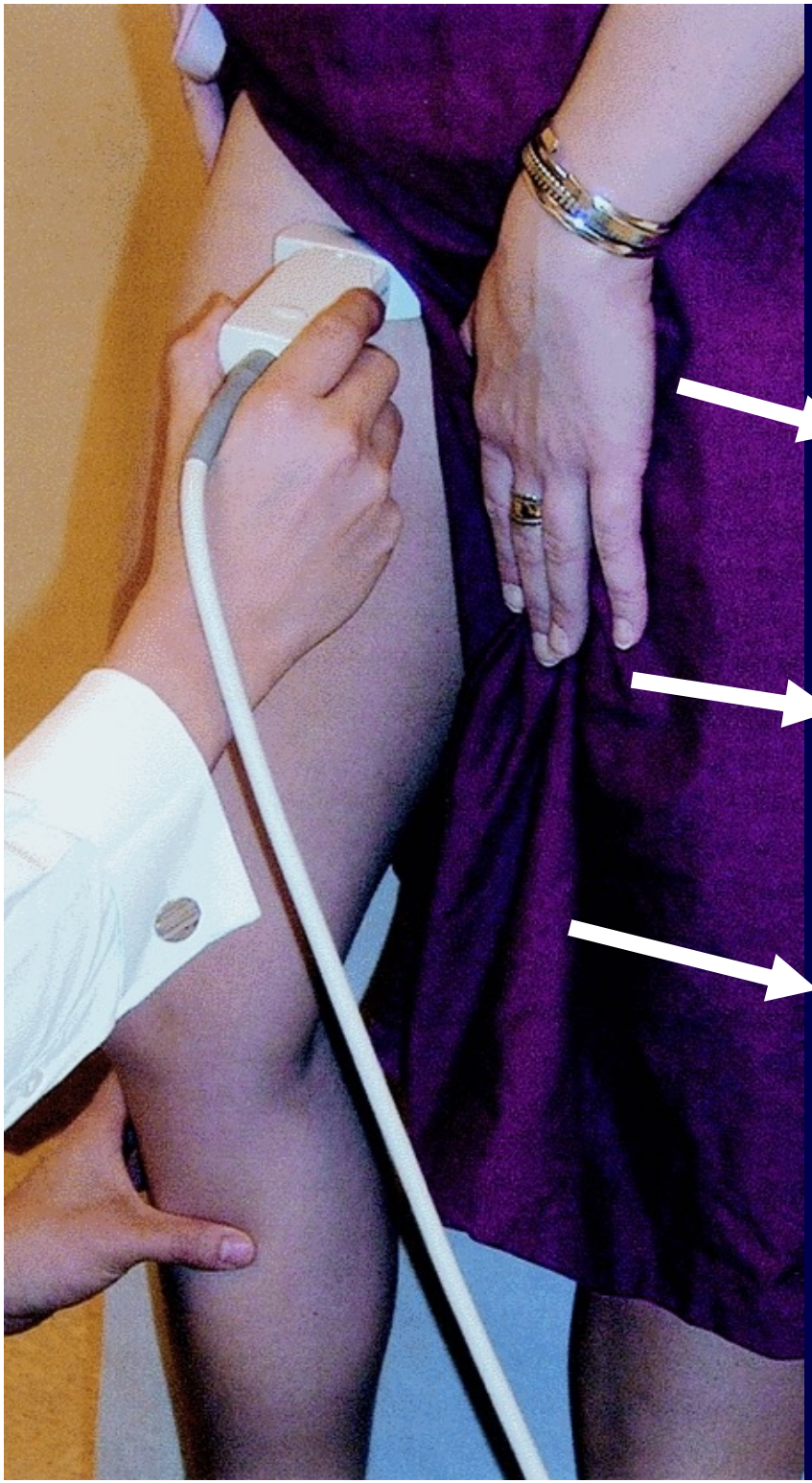
Reticular veins/ thread veins/ Spider veins

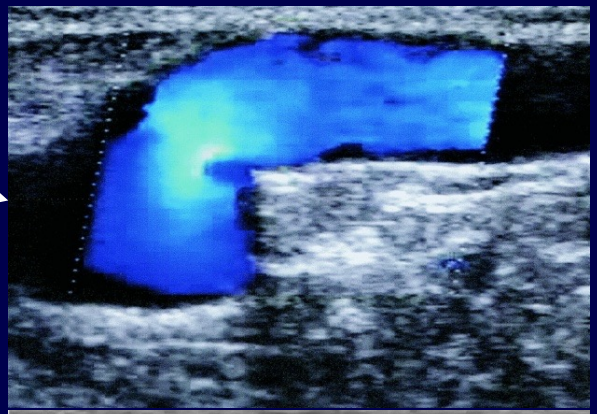
Pigmentation / ulceration
Healed ulcer

Investigation of varicose veins

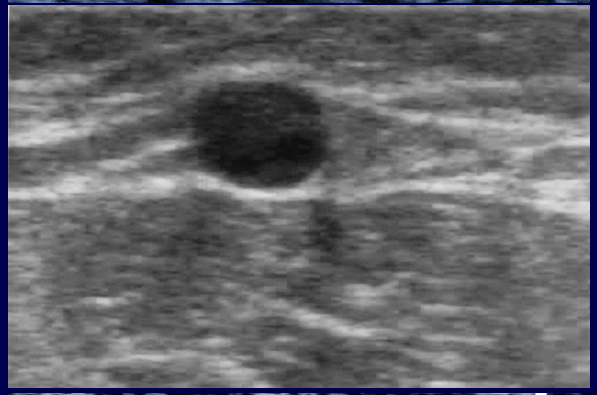
- Duplex ultrasound
  - Sites of reflux
    - Saphenofemoral junction/ long saphenous vein
    - Saphenopopliteal junction/ short saphenous vein
    - Deep veins
    - Perforators

Duplex Assessment

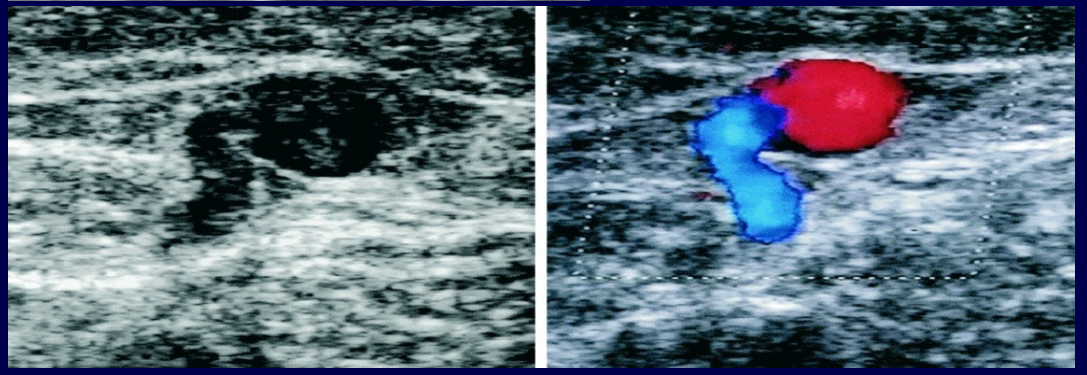


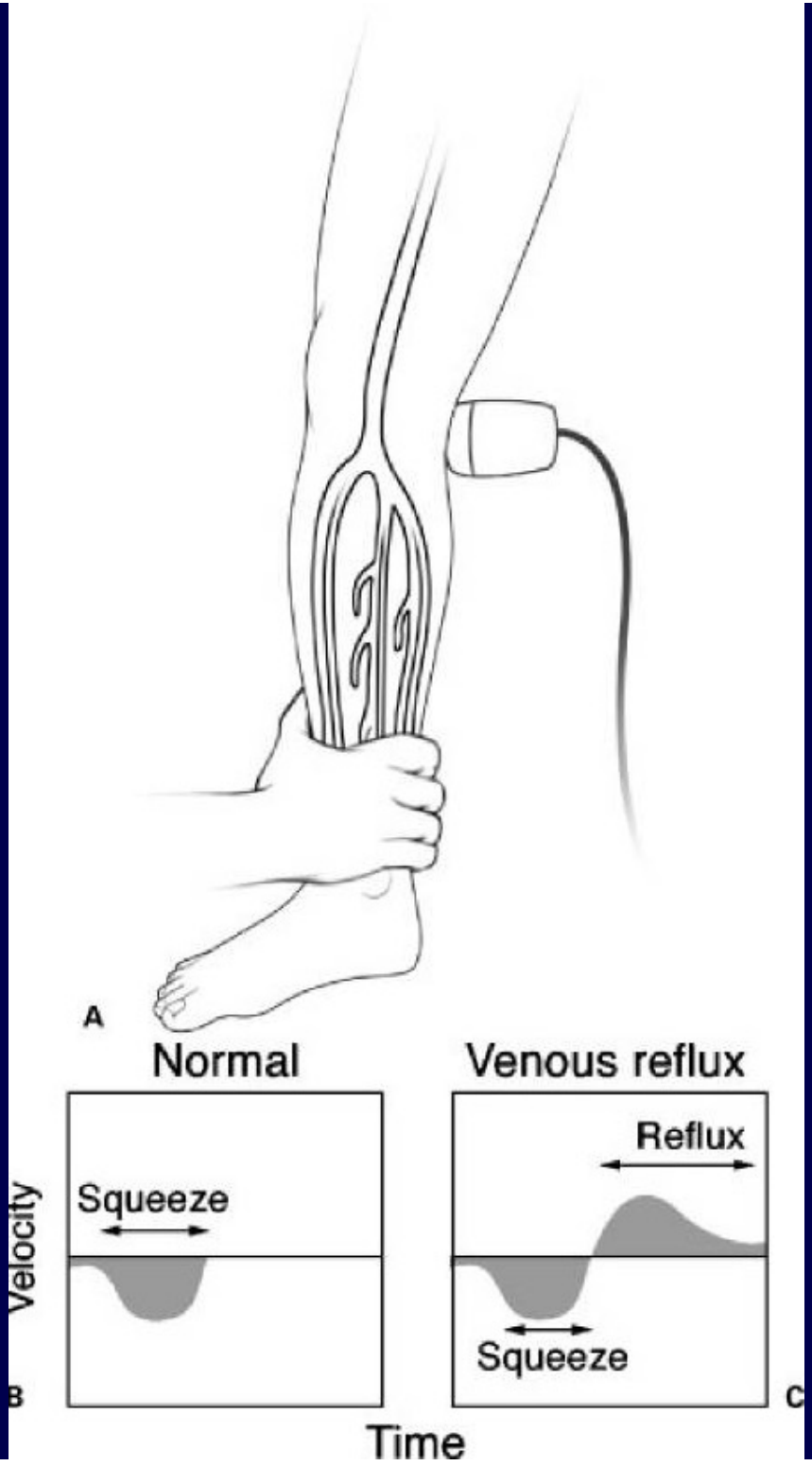


SFJ



LSV




A
Normal
Venous reflux
Reflux
Squeeze
Squeeze
Velocity
B
C
Time

Incidence of (Venous) Ulcers

- 1,500 leg ulcers in 1,000,000 subjects
- 0.15% prevalence
- 70% venous ulcers
- 25% mixed venous/arterial

- ***1% of population have had ulcers***
- ***0.25% approximately have active ulcers***

Venous Ulcers

- Typical ankle area
- Pigmentation
- Size
- Sloping edge
- Slough/ granulation at base
- Visiable v v's/ previous surgery (arterial/ venous)

- Chronic ulcer may undergo malignant changes
- ?underlying dermatological/ rheumatological disorders
- Needs biopsy

NICE National Institute for Health and Care Excellence

Varicose veins in the legs

The diagnosis and management of varicose veins

Issued: July 2013

NICE clinical guideline 168

guidance.nice.org.uk/cg168

Referral to a vascular service

- Refer people to a vascular service[1] if they have any of the following.
- Symptomatic[2] primary or symptomatic recurrent varicose veins.
- Lower-limb skin changes, such as pigmentation or eczema, thought to be caused by chronic venous insufficiency.
- Superficial vein thrombosis (characterised by the appearance of hard, painful veins) and suspected venous incompetence.
- A venous leg ulcer (a break in the skin below the knee that has not healed within 2 weeks).
- A healed venous leg ulcer.

Thank you!