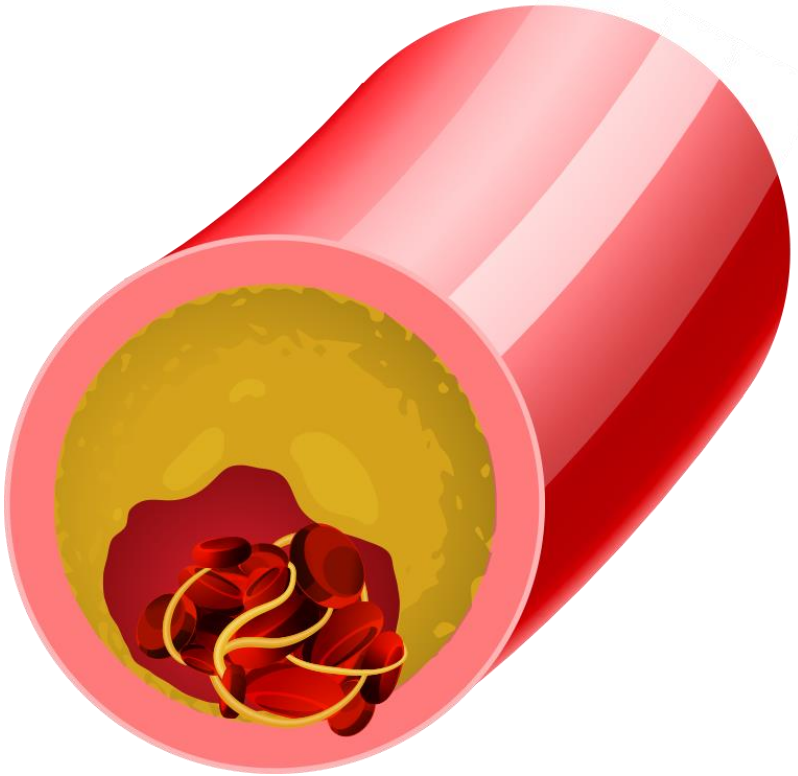
Peripheral Vascular Disease



Chronic limb ischaemia

- It is a continuum from asymptomatic atherosclerotic peripheral arterial disease (PAD) through intermittent claudication to limb threatening critical limb ischaemia.

Epidemiology

- 10% prevalence
- 15-20% over 70-year-olds
- Age: > 50 years
- Male : Female = 2:1

Causes of arterial stenosis

Chronic	Acute
• Atheroma • Buerger's disease • Thrombophilia • Popliteal artery entrapment • Iliac artery end fibrosis • Cystic adventitial disease • Fibromuscular dysplasia	• Thrombotic • Embolic • Dissection • External compression

- Atheroma - Principal cause.
- Young patient <55 - exclude thrombophilia.
- Males who have heavy smoking history - Buerger's disease should be considered.
- Athletic patients –
  - ❑Popliteal artery entrapment
  - ❑Iliac artery endo fibrosis
- Young patient with no risk factors - consider
  - ❑Cystic adventitial disease
  - ❑Fibromuscular dysplasia

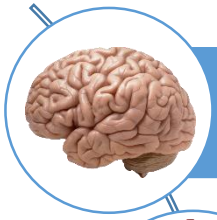
Buerger's disease

- Thrombo-angitis obliterans.
- Non-atherosclerotic inflammatory condition.
- Vasculitis and thrombosis of medium sized limb arteries and veins.
- Raynaud's phenomenon occurs in approximately 40% of patients.
- Superficial thrombophlebitis can occur as a very early disease manifestation.
- Almost all are Males, < 45 years and smokers.

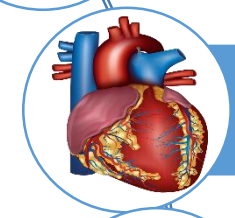
Risk factors

Modifiable	Non-modifiable
• Smoking • DM • Hypertension • Hyperlipidaemia • Hypercoagulability	• Age • Gender • Ethnicity

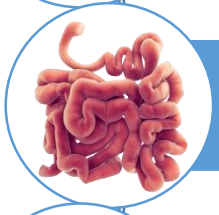
Effects of atherosclerosis



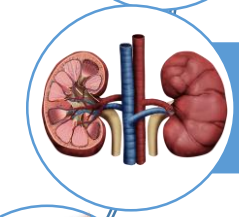
TIA, Stroke



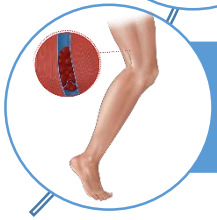
Angina, MI



Mesenteric ischaemia



Hypertension, Renal failure



Claudication, Rest pain, Gangrene

Clinical features

- Intermittent claudication
- Rest pain
- Dependent rubor or sunset foot
- Ulceration
- Gangrene
- Arterial pulsation diminished or absent
- Arterial bruit
- Slow capillary refilling

Intermittent Claudication

- Pain not present at first step
- Gets pain after walking for a distance Pain starts in the calf muscles - Claudication distance
- Cramping ischaemic pain in groups of muscles
- Worse when climbing hills
- Walking distance progressively reduces
- Relieved by stopping for 1-2 min
- Reproducible

Rest pain

- Occurs in critical limb ischaemia
- Forefoot pain that occurs at rest lasting for more than 2 weeks
- Increased at night
- Exacerbated by elevation of the foot/lying down on the bed
- The pressure of bed clothes on the foot usually makes the pain worse.
- Reduced by hanging the foot down, but not by usual analgesics

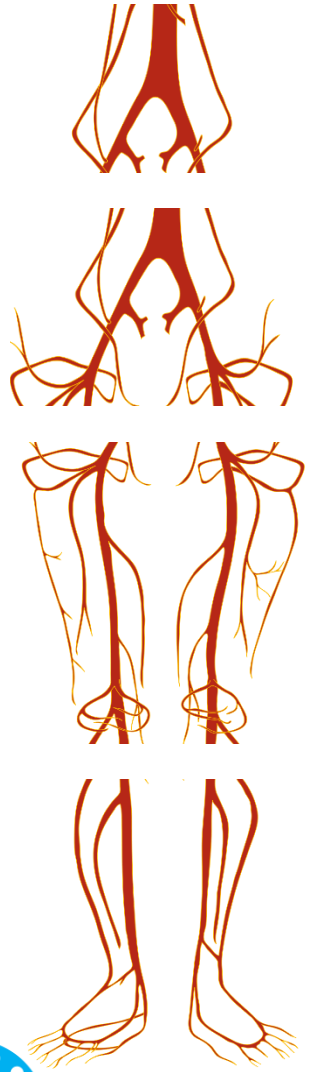
Ulceration and gangrene

- Occurs with severe arterial insufficiency
- Present as a painful erosion between the toes or as shallow, nonhealing ulcers on the dorsum of the feet, on the shins and especially around the malleoli.
- The blackened mummified tissues of frank gangrene are unmistakable, and superadded infection often makes the gangrene wet.

Colour, temperature, sensation and movement

- Acutely ischaemic foot - cold, white, paralysed and insensate.
- Chronically ischaemic limb tends to equilibrate with the temperature of its surroundings and may feel quite warm under the bedclothes.
- Chronic ischaemia does not produce paralysis and sensation is usually intact.
- Elevation of the limb produces pallor which changes to a red/purple colour when the limb is allowed to hang down (**dependent rubor or the sunset foot sign**).
- CRFT may be prolonged to 10 seconds in severe ischaemia.

Location of the occlusion



Aortoiliac obstruction

Claudication in both buttocks, thighs and calves.
Femoral and distal pulses absent in both limbs.
Bruit over aortoiliac region.
Impotence.

Iliac obstruction

Unilateral claudication in the thigh and calf and sometimes the buttock.
Bruit over the iliac region Unilateral absence of femoral and distal pulses.

Femoropopliteal obstruction

Unilateral claudication in the calf.
Femoral pulse palpable with absent unilateral distal pulses.

Distal obstruction

Femoral and popliteal pulses palpable.
Ankle pulses absent.
Claudication in calf and foot.

Examination

- General – BMI, Pallor/ plethoric
- Signs of hyperlipidaemia - Xanthalasma
- Nicotine stains
- CVS
  - ❑Increased blood pressure
  - ❑Peripheral pulses
- Abdomen
  - ❑Pulsatile lumps: AAA
- Bruits
  - ❑Carotid
  - ❑Renal
  - ❑Aortic bifurcation
  - ❑Iliac and common femoral
  - ❑Superficial femoral artery at adductor hiatus

Lower limb examination

- Trophic changes
  - ❑Dry skin / Loss of sweating
  - ❑Loss of hair
  - ❑Brittle nails
- Pulses immediately above the affected group of muscles can be weak or absent.
- Cold skin
- Decreased sensation
- Decreased strength

Fontaine classification

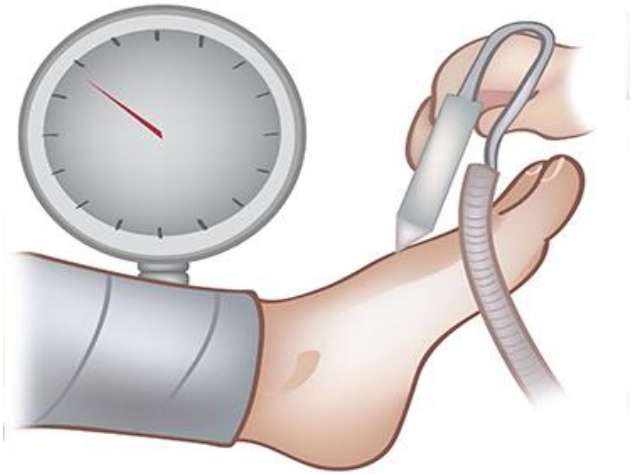
Stage I	Asymptomatic. Only detected by ABPI<0.9
Stage IIa	Intermittent claudication not disabling the patient's life(CD<200m)
Stage IIb	Intermittent claudication disabling the patient's life(CD>200m)
Stage III	Rest pain
Stage IV	Tissue loss

Investigations

Basic	Assessment of perfusion	Anatomical assessment of occlusion
• FBC • FBS • RFT • Lipid profile • ECG • Thrombophilia screening • ABG	• ABPI • Toe brachial pressure index • TCPO2 - Transcutaneous oxygen levels	• Doppler USS • Angiography – DSA, CTA

Ankle brachial pressure index

- Bed side test
- Done by using Handheld doppler + Sphygmomanometer.
- Brachial systolic pressure using the handheld doppler device - take measures of both limbs.
- Ankle pressure - dorsalis pedis 2 reads, posterior tibial 2 reads.
- Highest of ankle pressure divided by highest of brachial pressure.
- ABPI=$\frac{\text{Ankle pressure}}{\text{Brachial pressure}}$

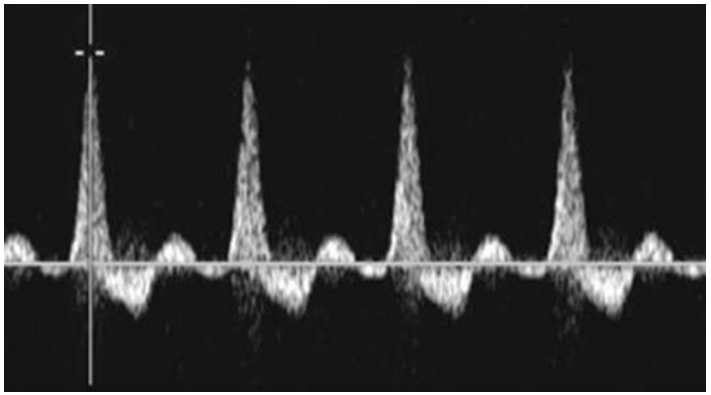


>0.9	Normal
0.6 – 0.9	Intermittent claudication
< 0.5	Critical limb ischaemia
> 1.3	DM Renal failure Heavy smokers

Doppler USS

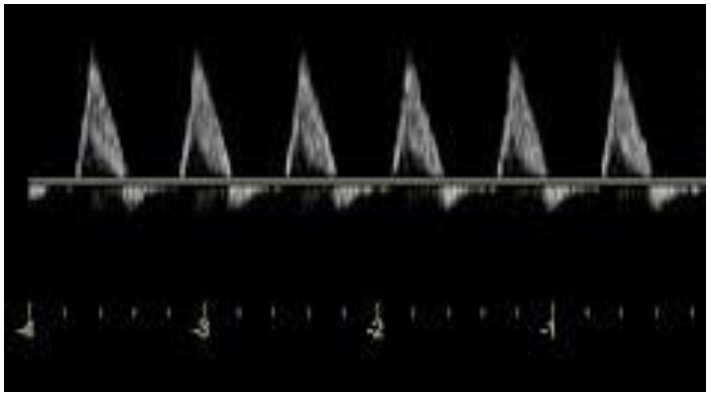
- This is as good as angiography in experienced hands
- But aorto-iliac segment cannot be assessed well.
- Normal arterial pulsations - Triphasic
- If a mild stenosis is present - Biphasic
- If a severe stenosis is present - Monophasic

Triphasic



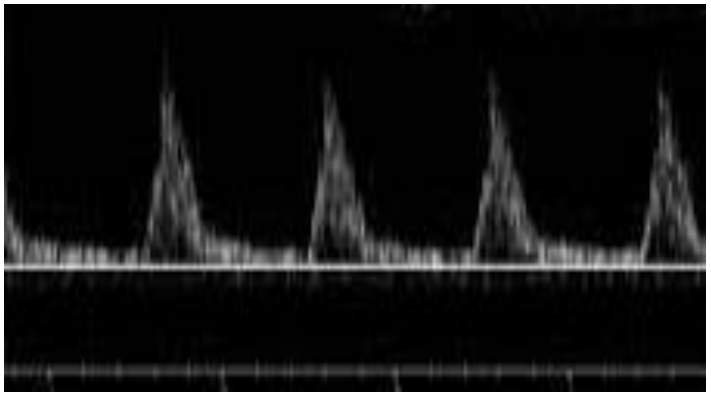
- Antegrade systole
- Antegrade late diastole
- Retrograde early diastole

Biphasic



- Antegrade systole
- Reverse flow during systole

Monophasic



- Diastole that signifies a good outflow

DSA(Gold standard)

- If planning to intervene at the same time, this is the investigation of choice!
- Involves injection of a radio-opaque dye in to the femoral artery → Images are obtained by x-rays → digitized by the computer and extraneous background (bone/soft tissue) removed to provide clear images of the arterial tree

Advantages of DSA	Disadvantages of DSA
• Can see site of obstruction • Can see length of obstruction • Availability of collaterals are visible • Distal run off is clear	• Invasive • Risk of complications ❑ Haematoma formation ❑ Perforation ❑ Pseudo-aneurysm ❑ Distal embolization ❑ Arterial dissection • Use of contrast • Expensive

CTA

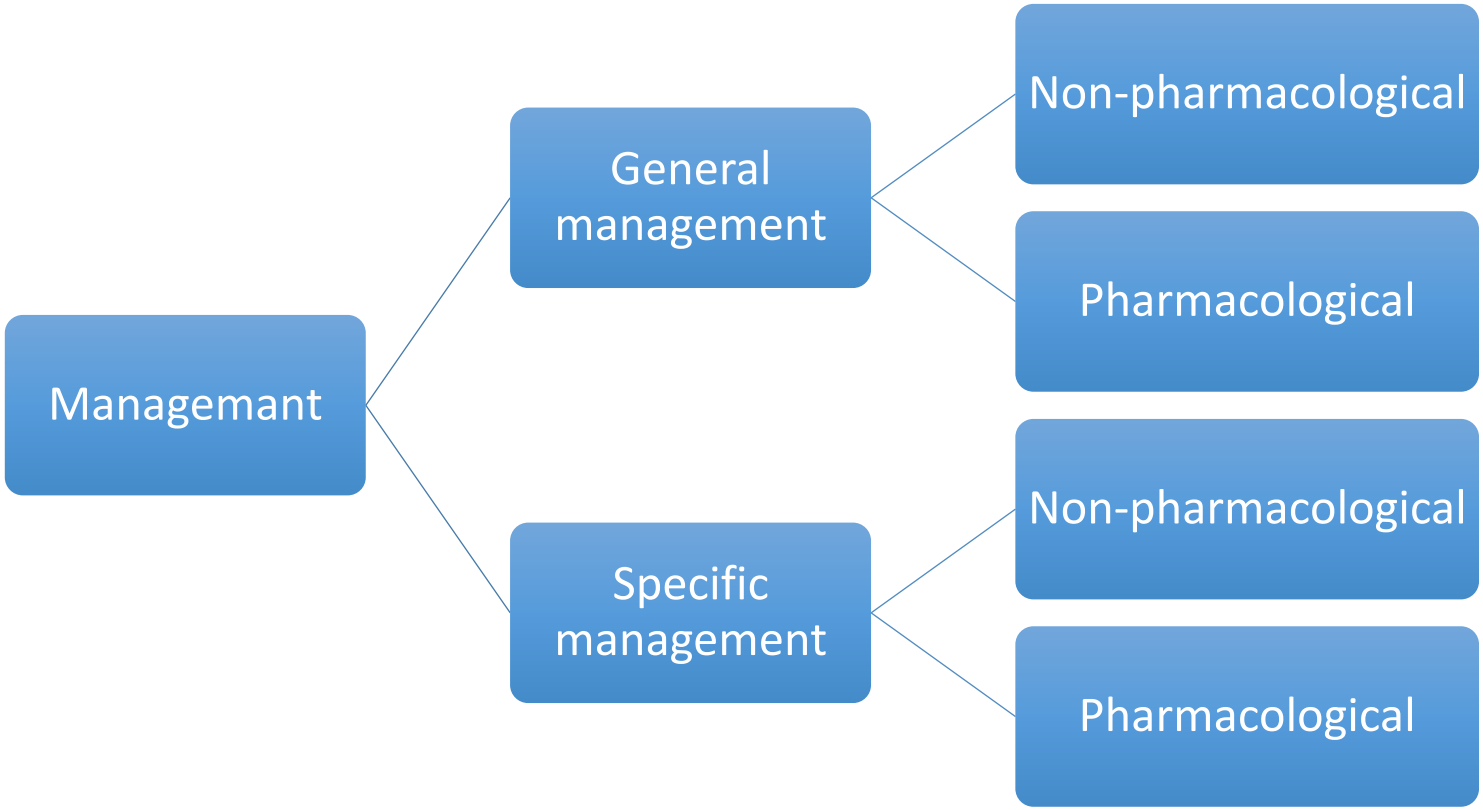
- Less hazardous than DSA because femoral artery puncture is not required, Usually peripheral vein is used to inject the contrast agent.
- Better for above inguinal vessels.
- More available than MRA.

MRA

- Unlike CTA, artefacts aren't a problem as they can be taken out better than the CTA + Q sequence to remove venous contamination.
- Sensitivity and specificity are about 95%.
- Renal friendly.
- No ionizing radiation.

Management

1. Intermittent claudication



General management - Non-pharmacological

- Stop smoking
- Dietary advices
- Weight loss in obese

General management - Pharmacological

- Control DM.
- Manage hypertension (Beta blockers can exacerbate claudication).
- Statin - to stabilize atherosclerotic plaque (even if blood lipids are normal).
- Antiplatelet - aspirin 75mg/daily (clopidogrel 75mg if patient is intolerant to aspirin).
- Drugs to help with smoking cessation.

Specific management - Non-pharmacological

- Supervised regular exercise (walking) within the disability (no gain in walking in pain) - 30-60 minutes a session.
- Intermittent pneumatic compression of lower limbs (foot and calf).

Specific management - Pharmacological

- Cilostazol - Phosphodiesterase 3 inhibitor.
- Pentoxifylline.
- Naftidrofuryl.

Management

2. Critical limb ischaemia

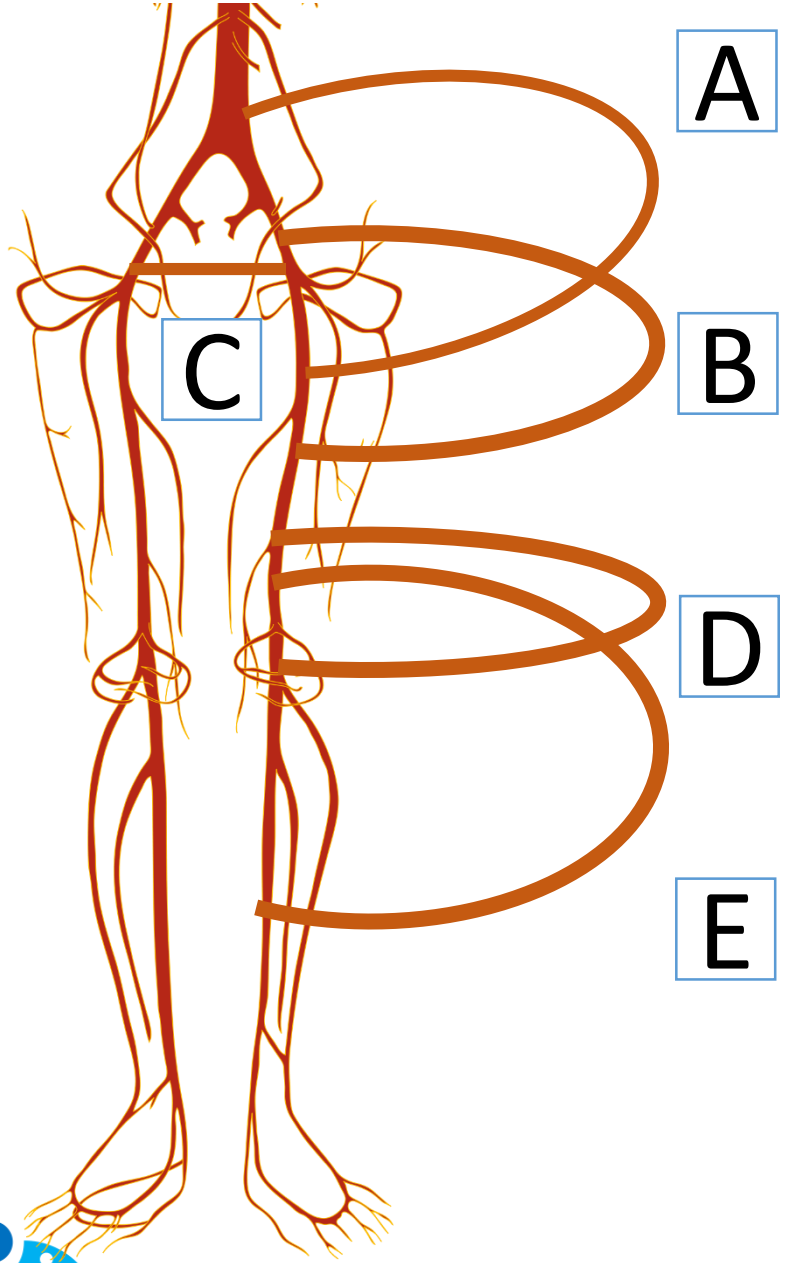
Conservative management	Medical optimization	Surgical management
• For surgically unfit patients. • IV administration of Iloprost/PGE-1	• Risk factor control • Symptom control	• Revascularization 1. PTA 2. Surgical by-pass • Amputation • Palliative

Transluminal angioplasty and stenting

- Endovascular strategies are for mainly iliac disease.
- They are superior to bypass with prosthetic grafts.
- Procedure
    1. Percutaneous femoral artery puncture under LA
    2. Insertion of guide wire negotiated through the stenosis under fluoroscopy guidance
    3. Balloon catheter is inserted over the guide wire and positioned within the lesion
    4. Balloon is inflated at high pressure for 1 minute and then deflated
    5. Dilation is confirmed by performing an angiogram
- Proven to be very successful in dilating iliac and femoropopliteal segments.

Surgery

- Reserved for,
  - ❑Those with severe symptoms where angioplasty failed or is not possible
  - ❑Infrainguinal disease in those who are fit for surgery (life expectancy >2 years)
- Types depends on the site of the disease.
- Conduits
  - ❑Natural - Autologous vein, Cryopreserved cadaveric vein
  - ❑Artificial conduits - Artificial conduits(E-PTFE, DACRON, Heparin coated conduits)



A - Aorto-femoral bypass
Aorto-iliac occlusion

B - Ileo-femoral
C - femoro-femoral cross over graft
Iliac occlusion

D - Femoro-popliteal bypass
SFA disease

E – Femoro-distal bypass
Popliteal artery occlusion