

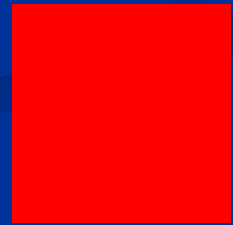
Arterial diseases I



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ISCHEMIA OF LOWER LIMB



■ A 72-year-old man complains of bilateral thigh & buttock claudication of several months duration. He was told by his physician that the angiogram revealed findings indicating that he has leriche syndrome. What does this patient have?

- A. Abdominal aortic aneurysm
- B. Aortoiliac occlusive disease
- C. Iliac artery aneurysm
- D. Femoropopliteal occlusive disease
- E. Tibial occlusive disease

Answer: B

ETIOLOGY

Arterial stenosis or occlusion:

1. *Atherosclerosis*
2. *Emboli*
3. *Trauma*



Fig. 15.2 Right superficial femoral stenosis. Left superficial femoral occlusion (causing claudication), Note collateral vessels.

CLINICAL FEATURES

- *It may be **chronic** (atherosclerotic), or **acute** (embolic, traumatic).*
- *Both lower limbs, only one limb, or a part of one limb is affected, depending on the site of arterial obstruction:*
 - *Aortoiliac*
 - *Iliac*
 - *Femoropopliteal*
 - *Distal (anterior & posterior tibial)*

Symptoms

- *Pain*
 - *Site*
 - *Types*
 1. *Intermittent claudication*
 2. *Rest pain*
- *Coldness, numbness & paresthesia*
- *Impotence*
 - *Failure to achieve penile erection in male patients in cases of aortoiliac obstruction (*Leriche's syndrome*).*

Signs

1. *Color changes*

- *Blanched on elevation*
- *Bluish-purple on dependency*

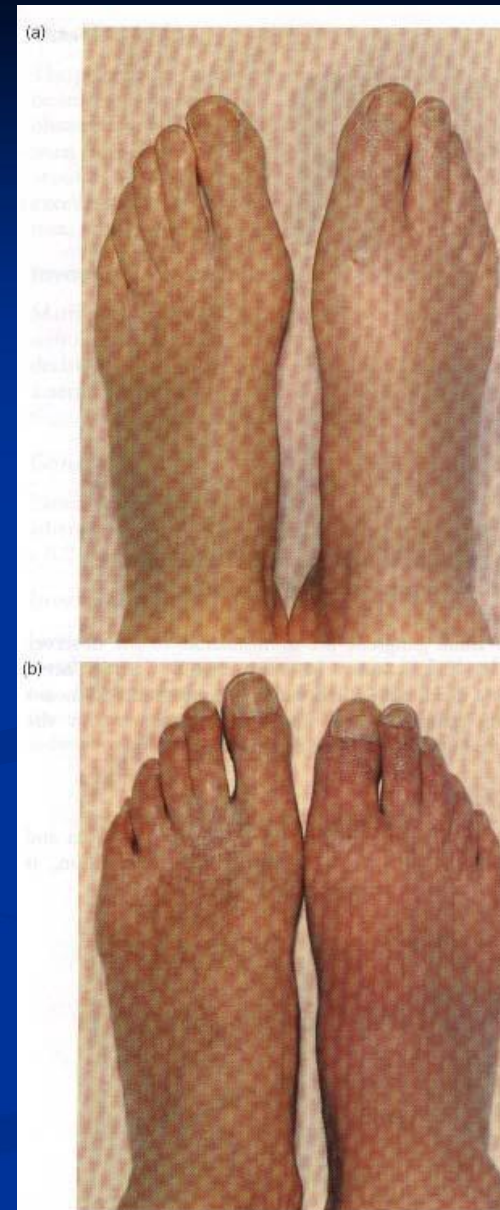


Fig. 15.3 Colour changes with (a) elevation and (b) dependency

2. *Ulceration*

Occurs with severe insufficiency:

- *A painful superficial erosions between toes.*
- *Small, shallow, indolent nonhealing ulcers on dorsum of feet, on shins, & esp. around malleoli.*

3. **Gangrene**

Occurs with severe arterial insufficiency:

1. **Pregangrene** → Combination of rest pain, color changes, edema & hyperesthesia, with or without ischemic ulceration.
2. **Impending gangrene** → A dead, white limb which becomes mottled.
3. **Frank gangrene** → Blackened mummified skin & tissues.



Fig. 15.5 Severe acute ischaemia (embolism - too late for embolectomy).



Fig. 15.4 Severe chronic ischaemia with dry gangrene.

4. *Temperature*

- *Usually cold.*
- *Sometimes paradoxically warmer.*

5. *Sensations*

- *Absent in acutely ischemic limbs.*
- *Hyperesthesia is common esp. on borderline of gangrene, in severe chronic ischemia.*

6. *Movements*

- *Absent, ie paralytic limbs, in acute ischemia.*

7. *Venous refilling*

Reduced venous refilling occur in severe arterial insufficiency, which is demonstrated by:

1. *Elevating the limb for 30 seconds, which is then laid flat on bed → Observe. (Normal refilling occurs within seconds).*
2. *Harvey's sign*

8. *Arterial pulsations*

- *Distal pulses are usually **absent, or diminished** (in the presence of good collaterals).*
- *Distal pulses may be **normal** (due to highly developed collaterals); arterial insufficiency is revealed by performing '**disappearing pulse test**'.*

9. *Arterial bruits*

- *A systolic bruit is present over an obstructed artery, & it may be conducted distally.*

Diff. B/W Embolic & Atherosclerotic Arterial Obstruction

Embolic (Acute)

1. *No preceding history of claudication*
2. *A source of emboli can usually be found, eg recent MI, arrhythmias*
3. *Loss of function occurs within 4-6 hours after the onset of pain, eg patient unable to move toes*

Atherosclerotic (Chronic)

1. *Preceding history of claudication is present*
2. *A source of emboli can not be found*
3. *Loss of function not present within hours (because collaterals have had time to be established)*

DIAGNOSTIC INVESTIGATIONS

1. *Blood & urine tests*

- *Blood C/P & ESR*
- *Platelets count*
- *Plasma fibrinogen*
- *Protein electrophoresis*
- *Blood & urine glucose*
- *Blood lipid profile*

2. *Plain X-ray abdomen*

- *May show arterial calcification, & flecks of calcium may outline an aneurysm*

3. *Investigations for cardiac assessment*

1. *ECG*
2. *Radioisotope ventriculography*
3. *Echocardiography*

4. *Investigations for detection of arterial obstruction*

1. *Doppler ultrasound blood flow detection*
2. *Duplex imaging*
3. *Treadmill (measurement of claudication distance)*
4. *Arteriography (via Seldinger technique)*
5. *Digital subtraction angiography*
6. *MRI*

TREATMENT

Treatment Of Atherosclerotic Cases

Conservative treatment

1. *Explanation & advises*

- *Told the patient that walking is not harmful.*
- *Use of a bicycle or a car.*
- *Stop smoking esp. in Buerger's disease.*
- *Take regular exercise.*
- *Reduce weight.*
- *Care of feet.*
- *Heel raise by 1 cm.*
- *Sleep in Buerger's position.*
- *Buerger's exercises*

2. *Drugs*

1. *Vasotherapeutics*

1. *Naftidrofuryl oxalate* (praxilene), alter tissue metabolism thereby increasing claudication distance → 100-200 mg TDS orally or, 20 mg BD IV.
2. *Oxpentifylline* has some effect on blood viscosity.

2. *Analgesics.*

3. *Anti-platelets*

- *Aspirin* (dispirin) → 300 mg, 3 times a week.

4. *Anti-diabetics*

5. *Anti-hypertensives*

6. *Anti-hyperlipidemics*

Minimally invasive procedures

1. *Angioplasty*

- *Percutaneous transluminal angioplasty [PTA].*
- *It is particularly good in treating short segments of iliofemoral stenotic disease.*

2. *Atherectomy*

- *percutaneous removal of atheroma.*

3. *Intraluminal stents*

- *after balloon dilatation, the vessel lumen is hold open using a metal stent.*
- *introduced on a balloon catheter, or is of self-expanding type.*

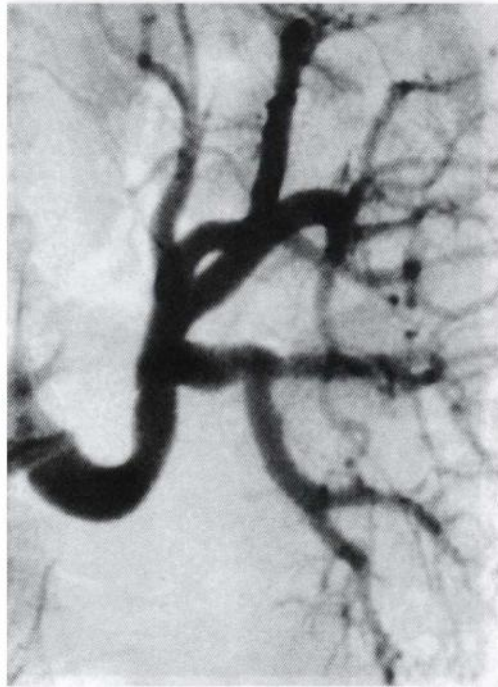


Fig. 15.17 (a) Before and (b) after balloon dilatation of a severely stenosed left renal artery in a 20-year-old woman with uncontrollable hypertension. The blood pressure fell to normal after the procedure. The stenosis was probably due to fibromuscular hyperplasia but there was no tissue available for histological diagnosis.

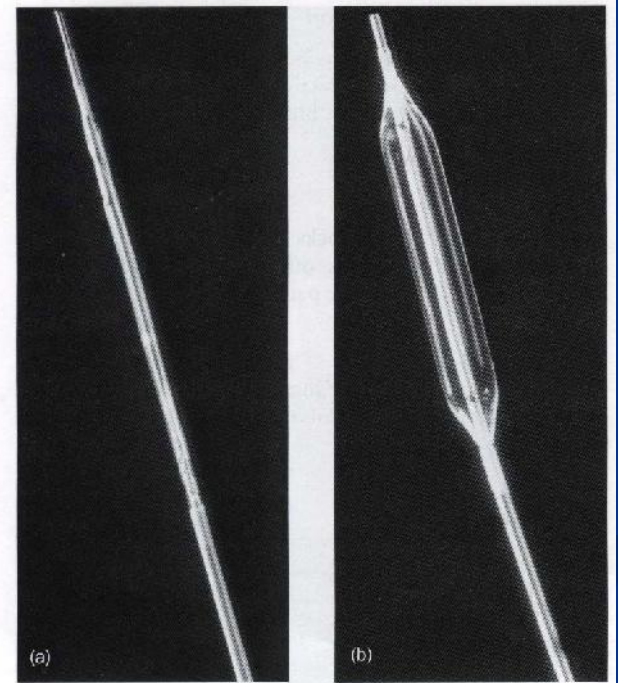


Fig. 15.15 (a) Catheter balloon deflated; (b) balloon inflated.

Operation

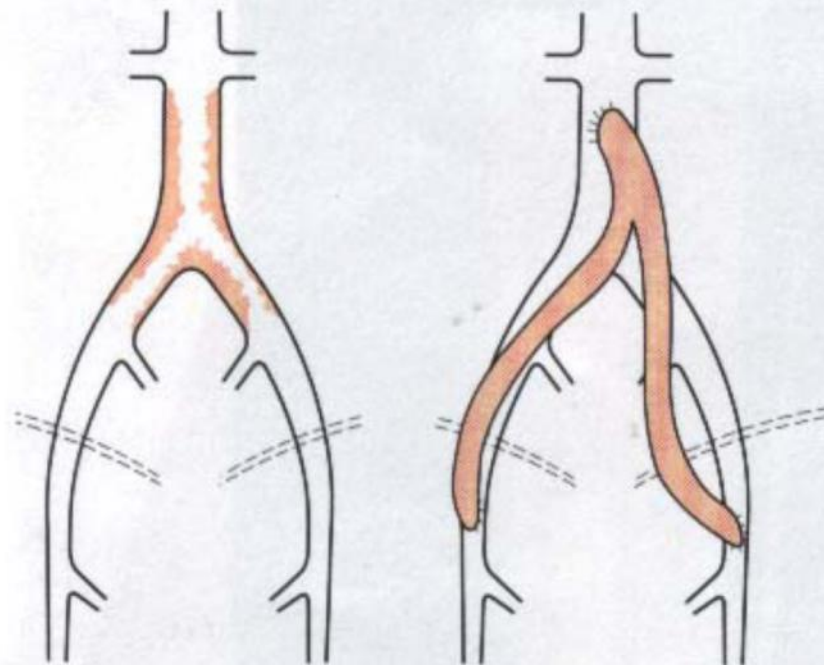
■ *Indications*

1. *Rest pain.*
2. *Claudication.*
3. *Ischemic ulceration that does not respond to conservative methods.*
4. *Acute embolic occlusion.*

■ *Procedures*

- *In aortoiliac obstruction*
 - *Aortofemoral bypass procedure.*
 - *Femorofemoral cross-over grafts*
 - *Ilio-femoral cross-over grafts*
 - *Axillo-bifemoral graft*
- *In superficial femoral & profunda artery obstructions*
 - *Femoropopliteal bypass graft.*
 - *Profundaplasty*
- *In obstructions below popliteal artery*
 - *bypass to the tibial vessels.*

(a)



(b)

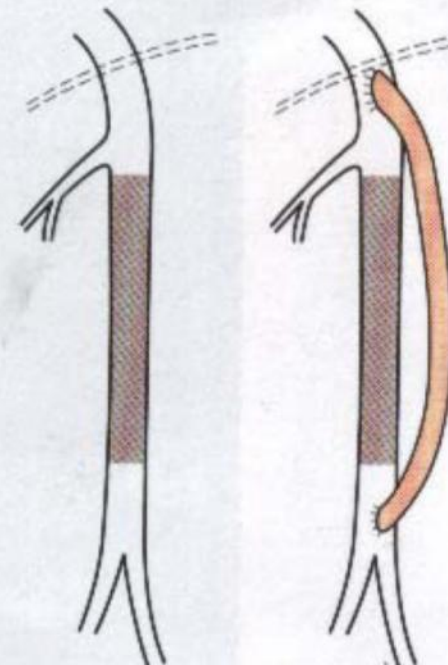


Fig. 15.20 (a) Atherosclerotic narrowing of the aortic bifurcation. Aorto-bi-femoral graft to bypass stenosis. (b) Superficial femoral artery occlusion with profunda femoris stenosis providing poor collateral circulation. Femoropopliteal graft used to bypass the occluded area into good 'runoff' below.

Sympathectomy

- *Chemical sympathectomy*
 - *Infiltration of lignocaine 1% alongside the lumbar sympathetic chain.*
- *Surgical sympathectomy*
 - *Division of lumbar sympathetic chain.*

Treatment Of Embolic Cases

Medical treatment

- *Early administration of **heparin** → 5000-10,000 units, IV (to prevent distal & proximal extension of thrombus).*
- *Intra-arterial **thrombolysis** → If ischemia is not severe to warrant operation.*
 - *Arteriography is carried out, followed by the passage of a narrow catheter into the occluded vessel.*
 - *A thrombolytic agent (eg streptokinase, urokinase & tissue plasminogen activator [TPA]) is then infused into this catheter over a period of several hours, which lysed the clot.*

Surgical treatment

1. *Embolectomy & thrombectomy*
 2. *Fogarty catheterization*
 3. *Other surgical procedures as mentioned above in atherosclerotic cases.*
- *Postoperative care*
 - *Anticoagulant therapy with warfarin.*

Treatment Of Traumatic Cases

■ *Medical treatment*

This is valuable if only arterial spasm is present:

- 1. Local application of papaverine*
- 2. Injection of heparin saline into artery from above.*

■ *Surgical treatment*

- 1. Resection of lacerated segment of artery, with end-to-end anastomosis or interposed vein graft.*
- 2. Urgent fasciotomy in compartmental syndrome.*
- 3. Fractures of bone, if any, require stabilisation,*
 - both in their own right & to protect the vascular repair.*

- A 55-year-old male patient, having recovered from an attack of myocardial infarction, suddenly develop pain, paresis, pulselessness, paresthesia & pallor of left leg. It is best treated by
 - A. Subcutaneous heparin
 - B. Oral warfarin
 - C. Fogarty catheterization
 - D. Intra-arterial thrombolysis in severe ischemia
 - E. Bypass graft

Answer: C

Gangrene

Definition

It is death with putrefaction of macroscopic portions of tissue.

Common sites

- *Distal part of limb*
- *Appendix*
- *Loop of small intestine*
- *Sometimes organs such as gallbladder, pancreas, or testis.*

ETIOLOGY

1. *Secondary to arterial obstruction*

1. *Thrombosis & embolism.*
2. *Arteritis with neuropathy in diabetes.*
3. *Buerger's disease, Raynaud's disease, & ergotism.*
4. *Intra-arterial inj. of thiopentone & cytotoxics.*

2. *Infective*

1. *Boils & carbuncles.*
2. *Gas gangrene.*
3. *Fournier's gangrene.*
4. *Meleney's gangrene*

3. *Traumatic*

1. *Direct* → Crushes, pressure sores, & constriction groove of strangulated bowel.
2. *Indirect* → Injury of vessels at some distance from the site of gangrene, eg pressure on popliteal artery by lower end of a fractured femur.

4. *Physical*

- Burns, Scalds, Frostbite, Chemicals, Irradiation, Electricity

5. *Venous thrombosis*

CLINICAL TYPES

Dry gangrene

- *It occurs when the tissues are desiccated by gradual slowing of bloodstream, typically as a result of atherosclerosis (senile gangrene).*
- *Affected part becomes dry, wrinkled, discolored, & greasy to touch.*
- *There is no infection.*

Moist (wet) gangrene

- *It occurs when venous as well as arterial obstruction is present, when artery is suddenly occluded, & in diabetes.*
- *Affected part becomes swollen, discolored, & the epidermis may be raised in blebs.*
- *Infection & putrefaction are always present.*

CLINICAL FEATURES

Symptoms

- *Discoloration involving a patch of skin, a toe, or whole of lower limb.*
- *Pain on proximal side of line of demarcation (absent in traumatic cases).*

Signs

■ *Dead tissue*

- *Dry wrinkled, hard, & brown or black in color.*
- *Soft & boggy, if it become infected.*

■ *Separation by demarcation*

- *First, a zone of demarcation appears, indicated by a **band of hyperemia & hyperesthesia.***
- *Then a **layer of granulation tissue** forms.*
- *Finally, a line of demarcation form, indicated by **ulceration.***

■ *Surrounding tissues*

- *Tenderness is often present on proximal side of line of demarcation.*

■ *Other signs (in gangrenous part)*

- *Lack of arterial pulsation*
- *Lack of venous return*
- *Lack of capillary response to pressure*
- *Lack of sensation*
- *Lack of warmth*
- *Lack of function*

TREATMENT

Conservative treatment

1. *Treatment of cardiac failure, atrial fibrillation, & anemia, in order to improve tissue oxygenation.*
2. *Give a nutritious diet.*
3. *Control of diabetes when present*
4. *Analgesics.*
5. *Care of affected part → Keep it absolutely dry.*
6. *Protection of local pressure areas, eg skin of heel or malleoli.*

Surgical treatment

1. *Minor surgical toilet*

- *Lifting of a crust, or removal of hard & desiccated skin, may assist in demarcation, release of pus & relief of pain.*

2. *Amputation*

1. *Distal (limb-saving) amputation*

- *Performed for gangrene affecting hand & feet.*

2. *Major (life-saving) amputation*

- *Performed for a badly crushed limb, rapidly spreading symptomatic gangrene, & gas gangrene.*

DIABETIC GANGRENE

Predisposing Factors

1. *Trophic changes due to peripheral neuritis.*
2. *Ischemia due to atheroma of arteries.*
3. *Excess of sugar in tissues which lowers their resistance to infections.*

Pathology

- *Thick callosities develop on sole, which are means whereby infection gain entry.*
- *Neuropathic factor impairs sensation → Patient neglects minor injuries & infections, so that inflammation & damage to tissues proceeds.*
- *Infection involving fascia, tendon, & bone can spread rapidly upwards via subfascial planes.*

Clinical Features

- *Moist gangrene*
- *Loss of reflexes & deformities in cases of muscular involvement*
- *Neuropathic joints (sometimes)*



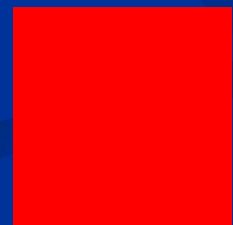
Fig. 15.33 Diabetic gangrene.

Diagnostic Investigations

- *Urine & blood sugar*
- *Bacteriological examination of pus, if any.*
- *X-ray of gangrenous part → Reveal the extent of any osteomyelitis.*

Treatment

- *Control of diabetes.*
- *Treatment of gangrene.*



- A 50-year-old male suffering from paraplegia due to a recent stroke now develops a large ulcer over his sacrum. This ulcer is likely to be due to all of the followings, except

- A. Pressure
- B. Anemia
- C. Moisture
- D. Neuropathy
- E. Injury

Answer: D

Bedsores (decubitus ulcers)

Predisposing Factors

1. *Pressure*
2. *Injury*
3. *Anemia*
4. *Malnutrition*
5. *Moisture*

Clinical Features

- *Initially, erythema appears which does not change color on pressure.*
- *Maceration leading to wet gangrene.*

Treatment

Prophylactic measures

- *Avoidance of pressure over the bony prominences,*
 - *by a 2-hourly change of posture & protection by foam blocks.*
- *Nursing on specially designed beds, which reduces the pressure to the skin.*
 - *Examples are high air loss Clinitron bed, low air loss Mediscus bed & very low air loss OSA 1000.*
- *Hemoglobin level should be maintained.*

Treatment once sores develop

- *Application of lotions or aerosol silicone spray, or exposure to keep them as dry as possible.*
- *Skilled nursing to combat injury due to wrinkled bed-sheets & maceration of the skin by sweat, urine or pus.*
- *Excision of the dead tissue & flap pedicle skin grafting.*

Thank you!