Peripheral- vascular disease
Lower Limb Ischemia

Moaath Alsmady

- Acute
- Chronic
- Acute on top of Chronic

Acute Lower Limb Ischemia

- Definition

- Causes
  - embolism
  - thrombosis
  - trauma

Emboli

- ***Cardiac***
- Arrhythmia (A. Fib)
- Valvular heart diseaes. (MS)
- Prosthetic heart valves.
- Hx of MI
- Atrial myxoma.

- ***Arterial source***
- Atherosclerotic aorta
- Aneurysm

- ***Other***
- Pardoxial.
- Hx of medication (oral contraceptives)

- Emboli usually impact at branching points in arterial tree, particularly at
  - the bifurcation of the aorta
  - **the common femoral bifurcation**
  - popliteal trifurcation

Sites of occlusion embloi to the lower limb:

Femoral artery
Aorta & iliac artery
popliteal artery
tibial artery

Thrombosis

- occur on a pre-existing atherosclerotic lesion.
- Occasionally on relatively normal artery
- In patients with hypercoagulabale states eg.
  - Malignancy
  - polycythemia
  - pt taking high doses of oestrogen.

Trauma

- It is important to determine a history of
  - arterial trauma
  - arterial catheterization,
  - intra-arterial drug induced injection
  - aortic dissection
  - limb fractures.

Clinical Features

- The ***6 P's***
  - Pain.
  - Pallor.
  - Pulselessness.
  - Perishing cold (poilikothermia)
  - Paraesthesia.
  - Paralysis

Clinical differentiation between thrombosis & embolism

Embolism:

- obvious cardiac source
- No hx of cluadication
- Normal pulses in contralateral limb
- Angiogram: minimal atherosclerotic
- Few collateral

Thrombosis:

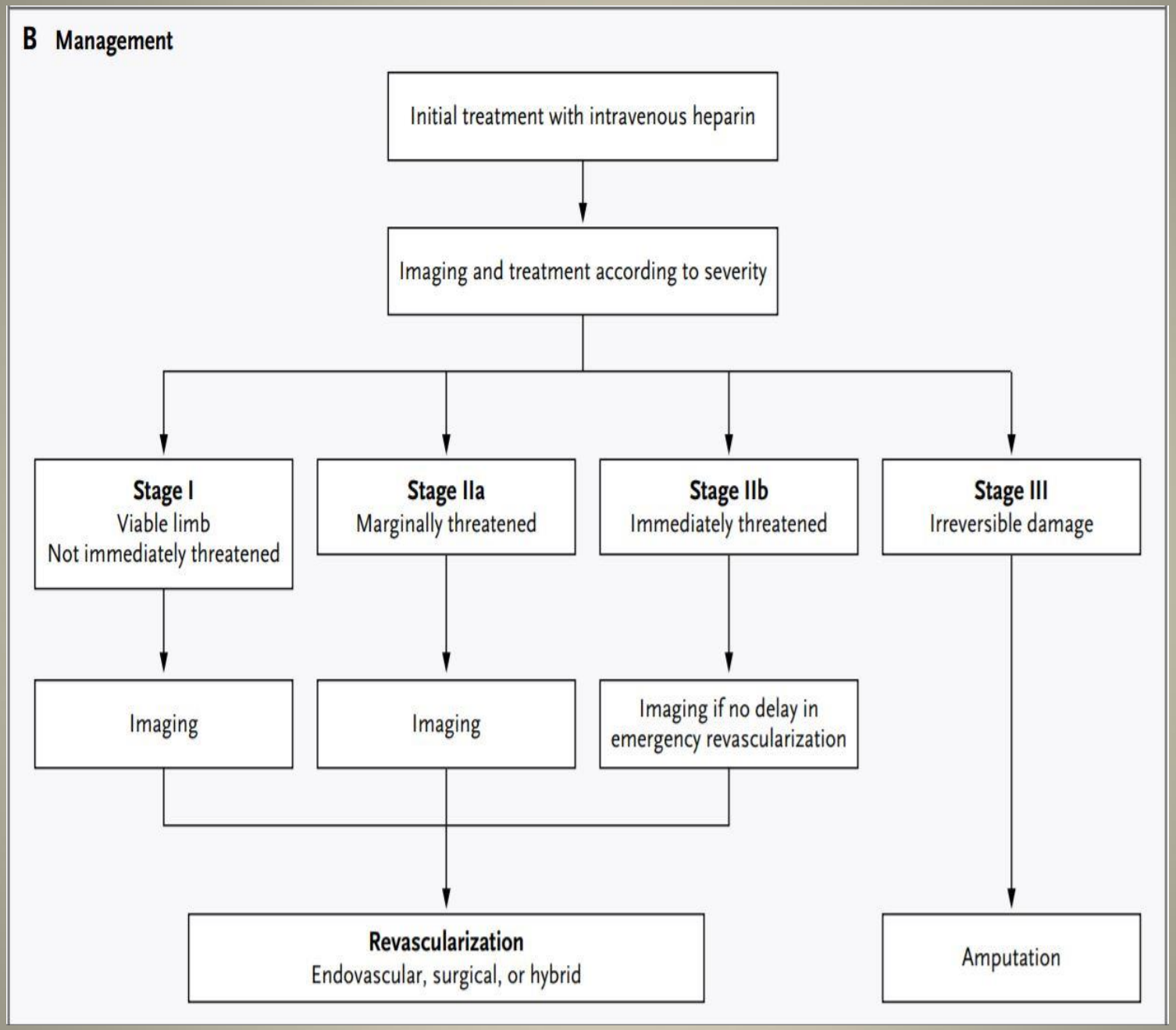
- No obvious cardiac source.
- history of cluadication.
- abnormal pulses in contralateral limb.
- Angiogram: diffuse atherosclerotic
- Well developed collateral

Management

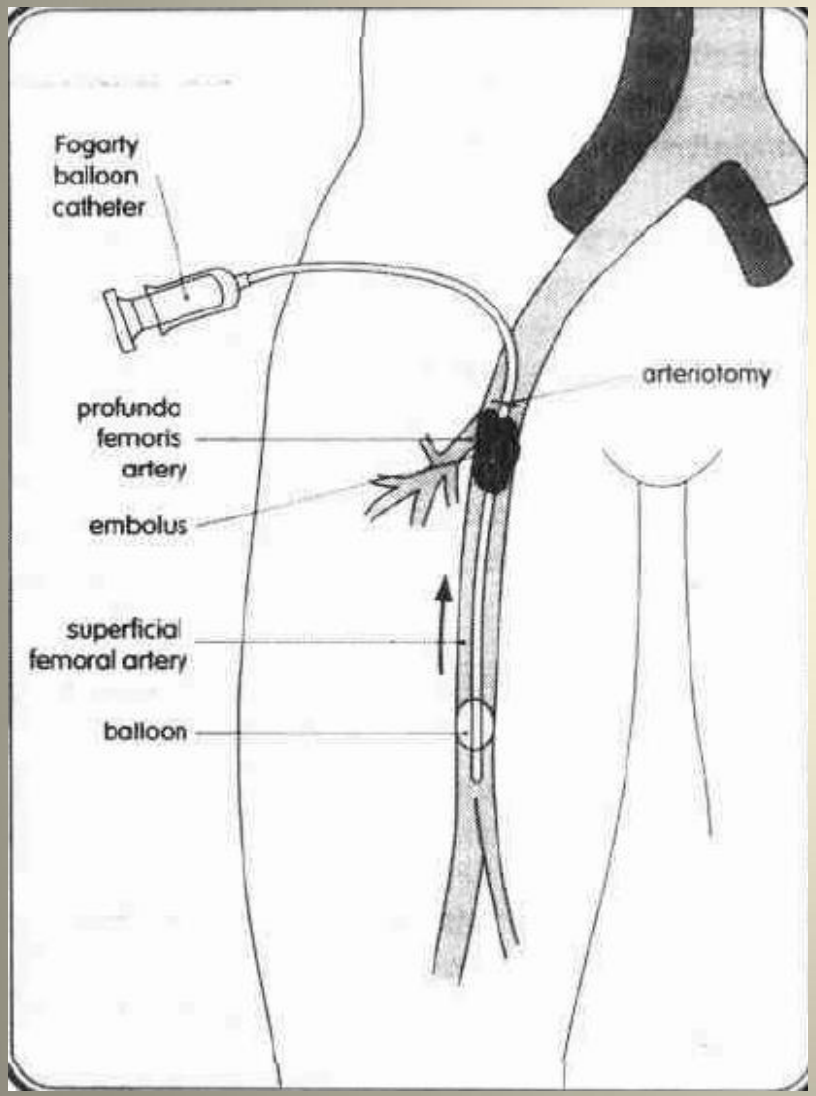
Immediately :

- Anticoagulant with heparin to prevent propagation of thrombus & distal thrombosis

- Arteriography should be considered to define the extent of problem before revascularization.


B Management
Initial treatment with intravenous heparin
Imaging and treatment according to severity
Stage I
Viable limb
Not immediately threatened
Stage IIa
Marginally threatened
Stage IIb
Immediately threatened
Stage III
Irreversible damage
Imaging
Imaging
Imaging if no delay in emergency revascularization
Revascularization
Endovascular, surgical, or hybrid
Amputation

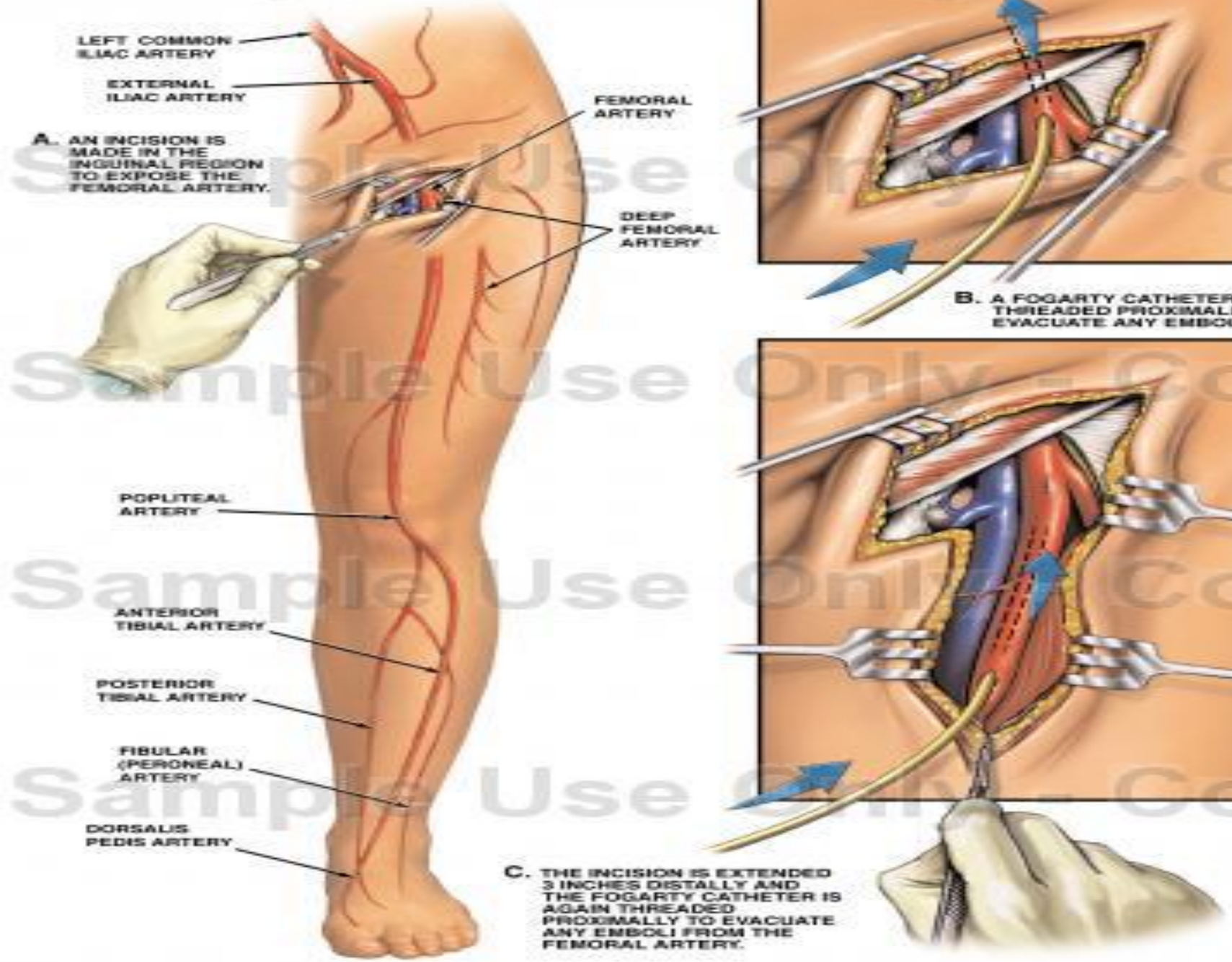
Management



Embolectomy

Surgical Embolectomy Procedure

Sample Use Only - Copy



Management

Thrombolytic therapy:

- Percutaneous intra-arterial thrombolytic therapy.
- Takes approximately 12-72 hours to dissolve the clot.
- Agents used: streptokinase, urokinase & tissue plasminogen activator.

Chronic Lower Limb Ischemia

Definition:

- It is the decrease in arterial blood supply to the tissues due to partial occlusion of arteries
- Stenosis or occlusion produces symptoms & signs that are related to the organ supplies by the artery.
- The severity of symptoms is related to the size of the vessel occluded & alternative routes (collaterals) available for blood flow.

Causes:

- Atherosclerosis
- Burger’s disease
- Raynaud’s disease
- Others

Atherosclerosis

Definition:

- It is the process underlying the formation of focal obstructions or plaques in large & medium sized arteries.
- It is characterised by the presence of focal intimal thickening, these intimal elevations being made up of accumulations of cholesterol rich & a proliferation of connective tissue.
- An essential component of atherogenesis is inflammation involving monocytes / macrophages, T lymphocytes & mast cells.

Risk factors

- Smoking
- Hypertension
- Hyperlipidaemia (raised LDL)
- High fat diets

High risk factors

- Diabetes mellitus
- Elevated blood uric acid (gout)
- Hypothyroidism
- Renal disease
- Familial history of premature atherosclerosis
- Male sex & age

Other risk f

- Sedentary life
- Obesity
- Anxiety

Factors having an uncertain role

Common sites of plaque formation in arteries

- Branch points.
- Tethered sites like in superficial femoral artery in Hunter's canal in the leg

Symptoms

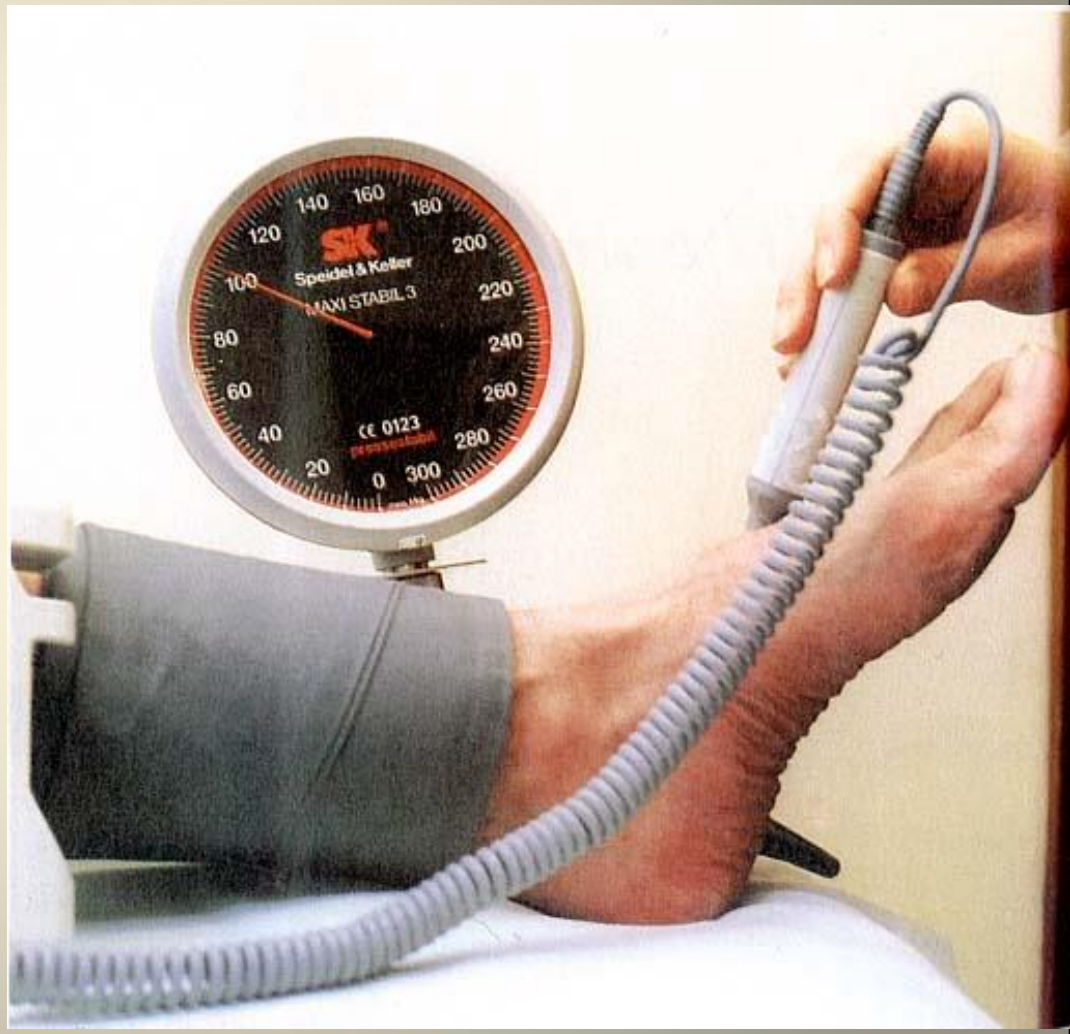
- Intermittent claudication
- Rest pain
- Erectile dysfunction
- Sensorimotor impairment
- Tissue loss

Signs

- Muscular atrophy
- Decrease hair growth
- Thick toenails
- Tissue necrosis ulcers infection
- Absent pulses
- Bruits

Intermittent claudication

- ABI: 0.5-0.9
- Cludication distance
- Calf is the most common



Ankle-Brachial Index Values and Clinical Classification

Clinical Presentation	Ankle-Brachial Index
Normal	> 0.90
Claudication	0.50-0.90
Rest pain	0.21-0.49
Tissue loss	< 0.20

- Values >1.25 falsely elevated; commonly seen in diabetic

Rest pain

- Worst at night,lying, relieved by putting the leg in dependent site
- Coldness
- Numbness
- Parasthesia
- Color change
- Differentiated from night cramps

Ulcers and gangrene

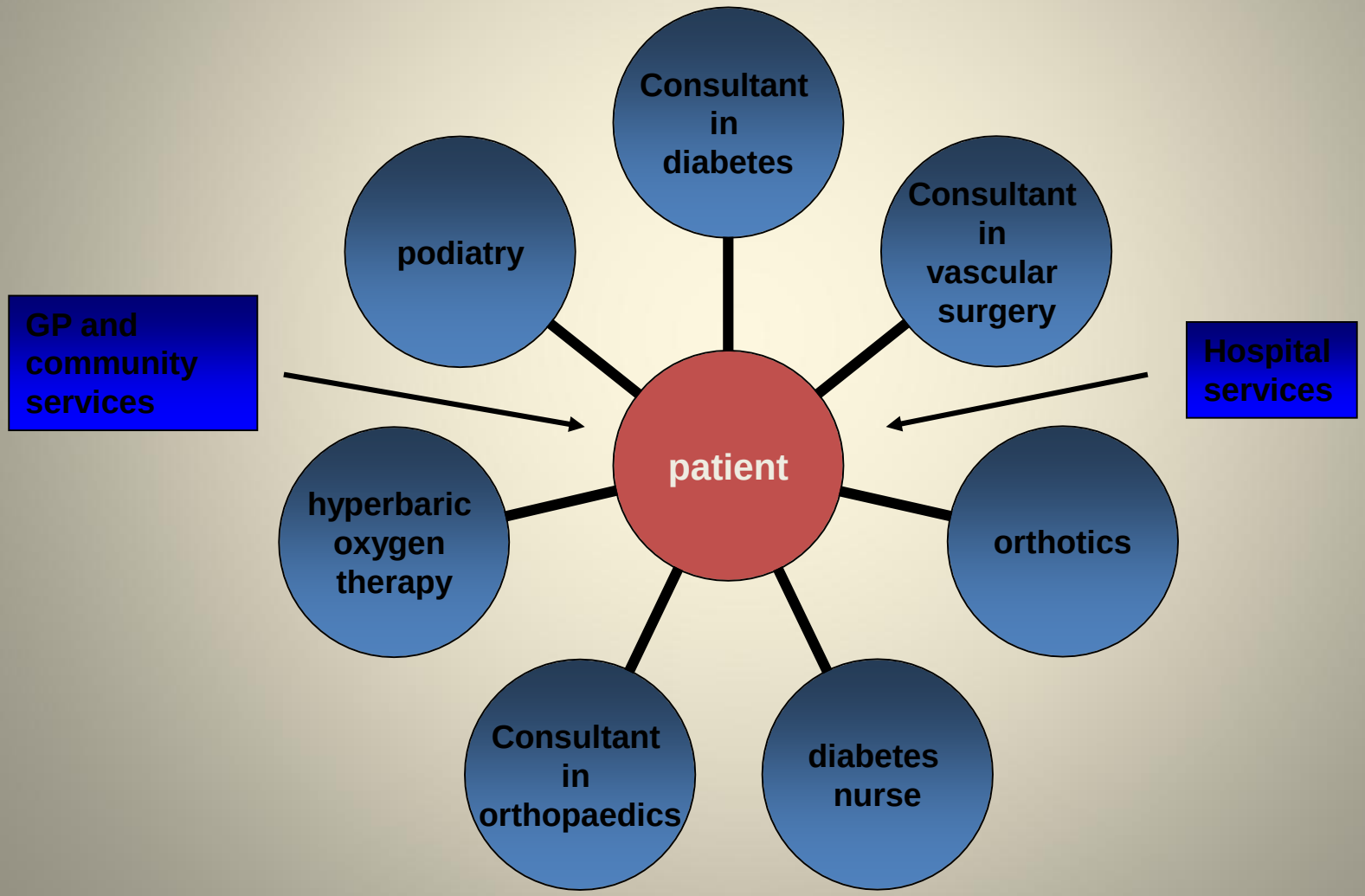
- Gangrene Between the toes
- Ulcers at the foot dorsum and leg shins

Aortoilliac	Claudication of both buttoks, thighs and calves, femoral and disal pulses absent,bruits, impotence
Illiac	Unilateral claudication of thigh, calf Unilateral absence of femoral and distal pulses
femoropopliteal	Unilateral claudication in calf , femoral pulse palpable with absent unilateral distal pulses
Distal obstruction	Femoral & popliteal pulses palpable, ankle pulses absent, cluadication in calf & foot

Treatment Options

- Medical
  - Risk Factor Modification*
  - Exercise Therapy*
  - Drug Therapy*
- Endovascular Therapy
  - Peripheral Transluminal Angioplasty*
  - Peripheral Stenting*
  - Atherectomy
  - Thrombolytic Therapy (adjunctive)
  - Laser
- Surgery
  - Bypass grafts*
  - Amputation*
  - Endarterectomy

Multidisciplinary teamwork with holistic approach



LifestyleModification and Secondary Prevention

- cessation of smoking is by far the single most important factor determining the outcome of patients with PAD
- Oral hypoglycemic therapies are usually required to achieve the (HbA1C) goal of <7% when baseline serum glucose is in the range of 140–180 mg/dl.
- Insulin therapy is usually required to achieve HbA1C goals when fasting glucose is >180 mg/dl

- maintaining an LDL level <100 mg/dl (<2.6 mmol/L) is strongly recommended.
* lowering total cholesterol and LDL by 25% with statin therapy reduces cvs mortality and morbidity in PAD patients by 21% irrespective of age, sex, or baseline cholesterol level.(Heart Protection Study)
- The use of (ACE) inhibitors may confer more protection against cardiovascular events
* safety using of beta-blocker PAD patients, except in the most severely affected patients with CLI (meta-analysis of randomized, controlled trials)

Antithrombotic Therapy

- lifelong aspirin therapy (75–150 mg/d) is recommended. (meta-analysis of 9706 patients with PAD)
- Clopidogrel may be superior to aspirin in reducing serious vascular events in PAD patients. (CAPRIE) trial
- oral anticoagulation improves graft patency in venous conduit , whereas aspirin gives better results for non venous, prosthetic grafts (Dutch multicenter randomized trial)

- antiplatelet agents still remain the recommended agent in the majority of patients undergoing (uncomplicated) infrainguinal vascular reconstructive surgery. Exceptions are patients with femoro-distal bypass procedures, who may be at increased risk for graft thrombosis.

Catheter-Based Revascularization

- Indication:
- lifestyle-disabling IC
- severe arterial insufficiency associated with tissue loss that may not heal without revascularization.
- CLI that jeopardizes viability of the lower limb.

- Short occlusion of left popliteal artery , treated by percutaneoustransluminal angioplasty.

- Short occlusion of left popliteal artery. The balloon catheter is passed through the occlusion over a guidewire and inflated

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indications for Operation

- Ischemic pain at rest
- actual tissue necrosis, including ischemic ulcerations or frank gangrene, as indicative of advanced ischemia and threatened limb loss.
- claudication that jeopardizes the livelihood of a patient or significantly impairs the desired lifestyle of an otherwise low-risk patient, assuming that a favorable anatomic situation for operation exists

Direct Operative Procedures

- ***Aortoiliac Endarterectomy***
- approximately 5 % to 10 % of patients with truly localized disease.
- advantages:
- 1. no prosthetic material is inserted;
- 2. the infection rate is nonexistent;
- 3. inflow to the hypogastric arteries, potentially improving sexual potency in the male,

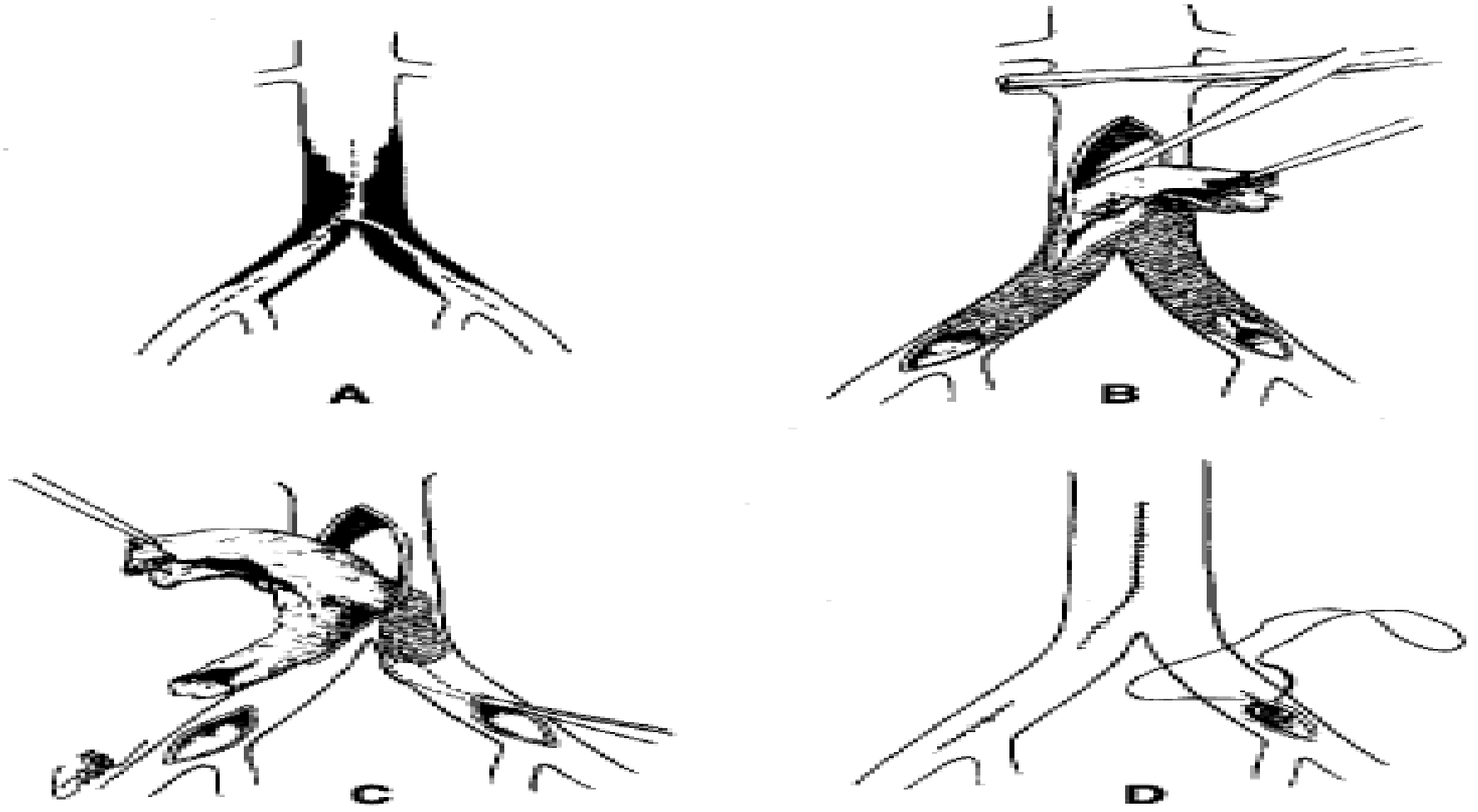
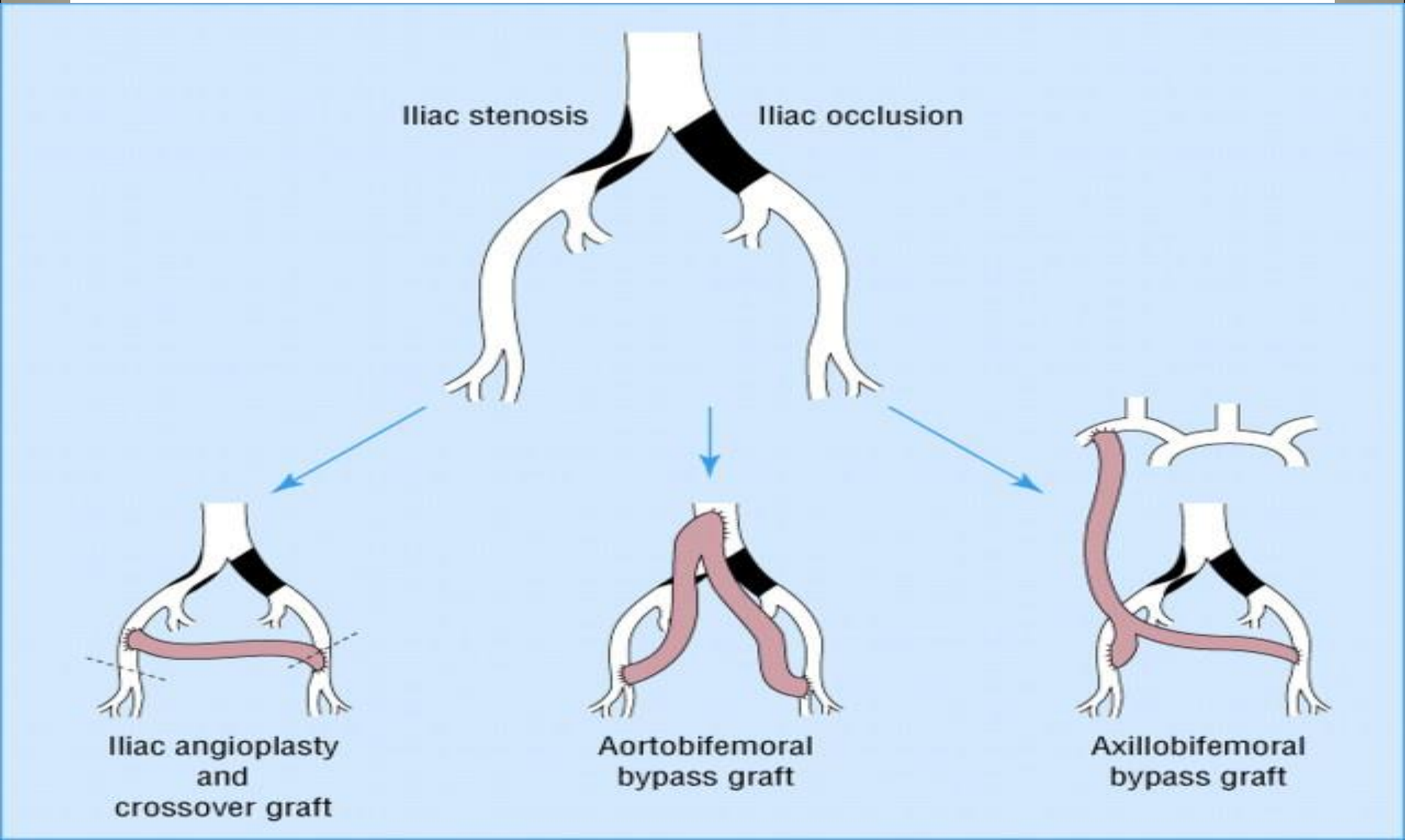
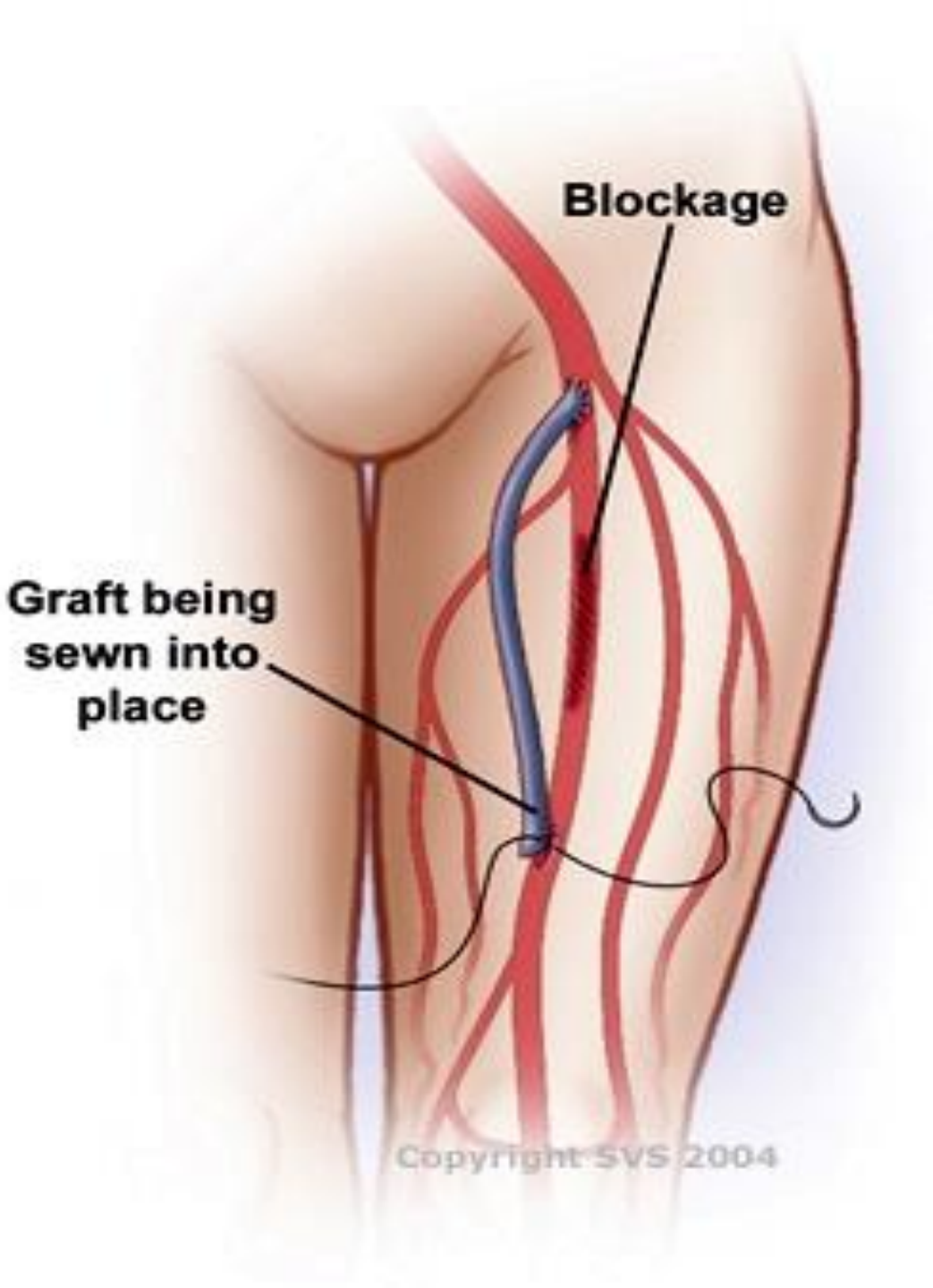


FIGURE 40.5 Aortoiliac endarterectomy. (A) Occlusive disease limited to distal aorta and common iliac arteries, with location of arteriotomies indicated by dotted lines. (B) A satisfactory endarterectomy plane is achieved, and the atheromatous material removed from the aorta from the level of the proximal clamp to the bifurcation. (C) Satisfactory end point of the endarterectomy is achieved at the iliac bifurcation, and endarterectomy continued proximally. Tacking sutures may be necessary to secure an adequate end point. (D) Closure of arteriotomies to complete procedure. See text for details.

BYPASS SURGERY

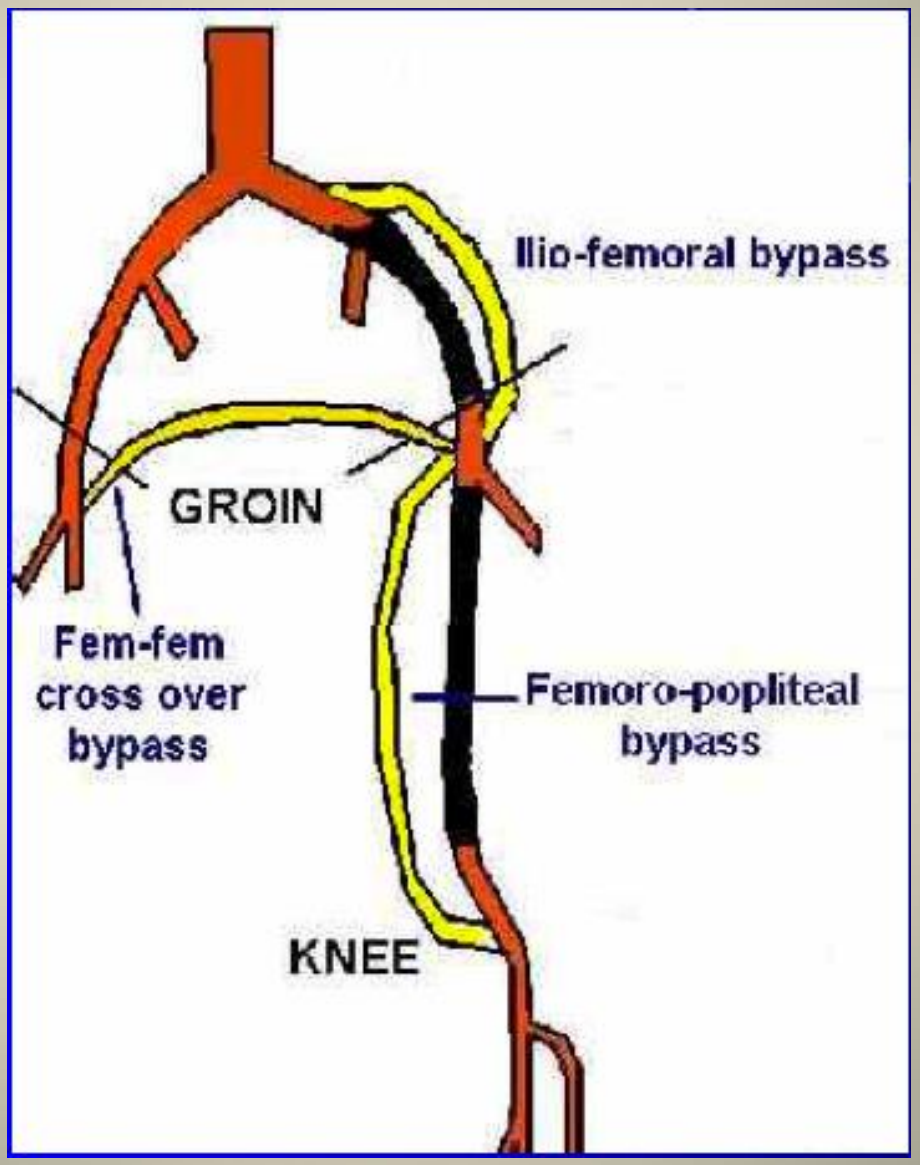


- **Femoro-popliteal bypass**



- **Femoro-distal or femoro-crural bypass**
- these grafts originate from the femoral artery at the groin and take blood to one of the 3 calf blood (anterior and posterior tibial arteries and peroneal artery).

Some Bypass Options:



Postoperative Complications

- Early complication
- Postoperative hemorrhage(severe enough to require reoperation is seen in only 1% to 2% of patients),
- Acute aortofemoral graft limb occlusion (may occur in 1% to 3% of patients)
- Acute renal failure
- Acute postoperative bowel and spinal cord ischemia
- Acute limb ischemia "trash foot,“

Late Complications

- Graft occlusion secondary to recurrent obliterative disease (remains the most common late complication, reported in from 5% to 10% of patients at 5 years and 15% to 30% of patients followed 10 years or more)
- Failure of the entire reconstruction will require another aortofemoral graft if the patient is an appropriate candidate , or extra-anatomic reconstruction for those patients felt to be less suitable for extensive reoperative surgery
- Pseudoaneurysm (3% to 5%of patients),
- Postoperative iatrogenic impotence may occur in up to one-quarter of patients
- Late graft infection
- Aortoenteric fistula formation

Amputation

- <u>INDICATION</u>
- unreconstructable peripheral vascular disease,
- fixed flexion deformities
- extensive tissue loss