

Vascular injury

Males 80% (20-40 y)

(1) Blunt : post M.V.A , fracture ,
dislocation

(2) Penetrating :

(stab wound , gunshot , fall , explosives)

(3) Iatrogenic (angiography , cardiac
cath, central line) 5-10% incidence

(4) Self induced (drug abuse)

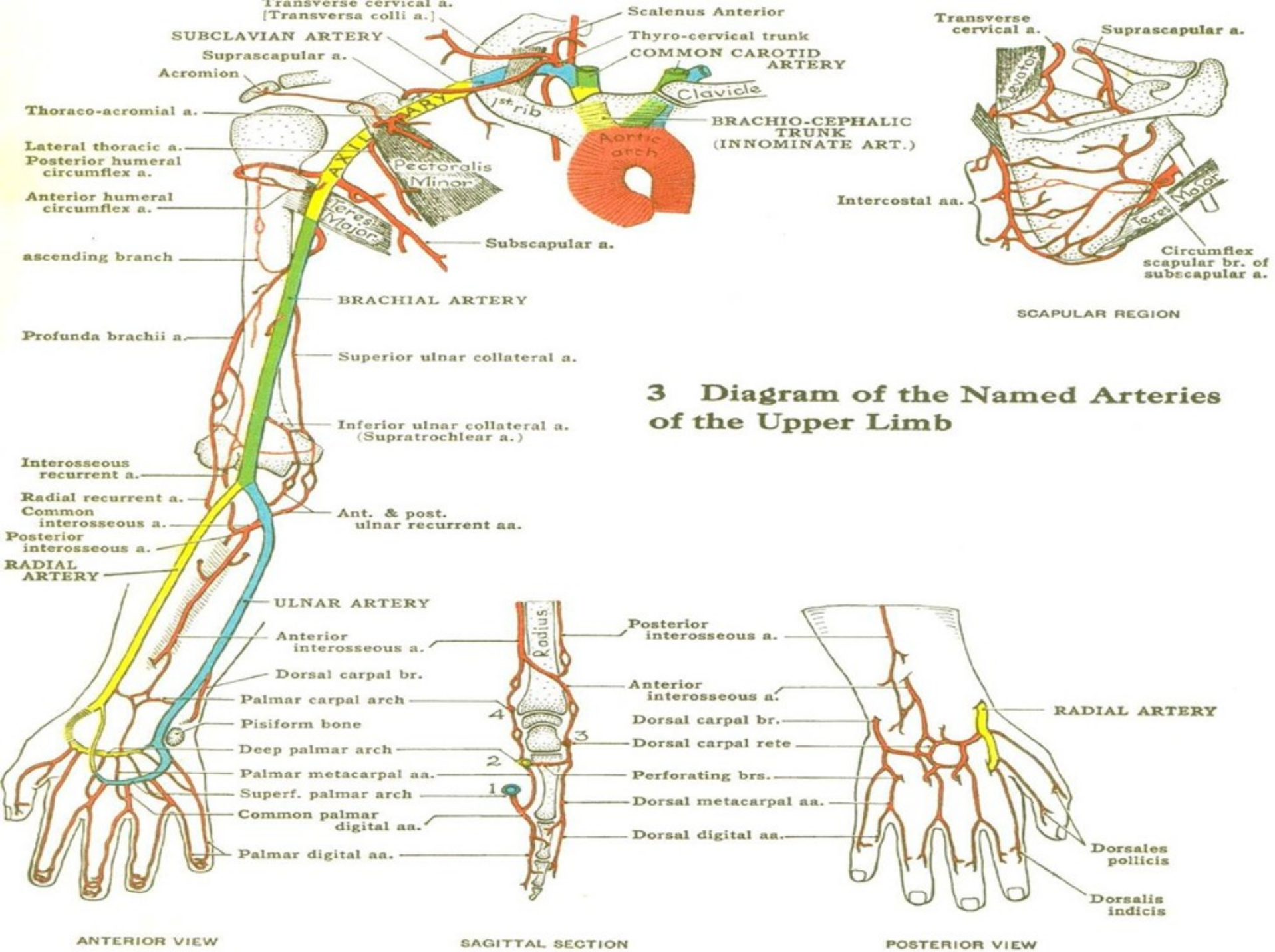
High Risk Areas for Peripheral Vascular injury

Upper limb :

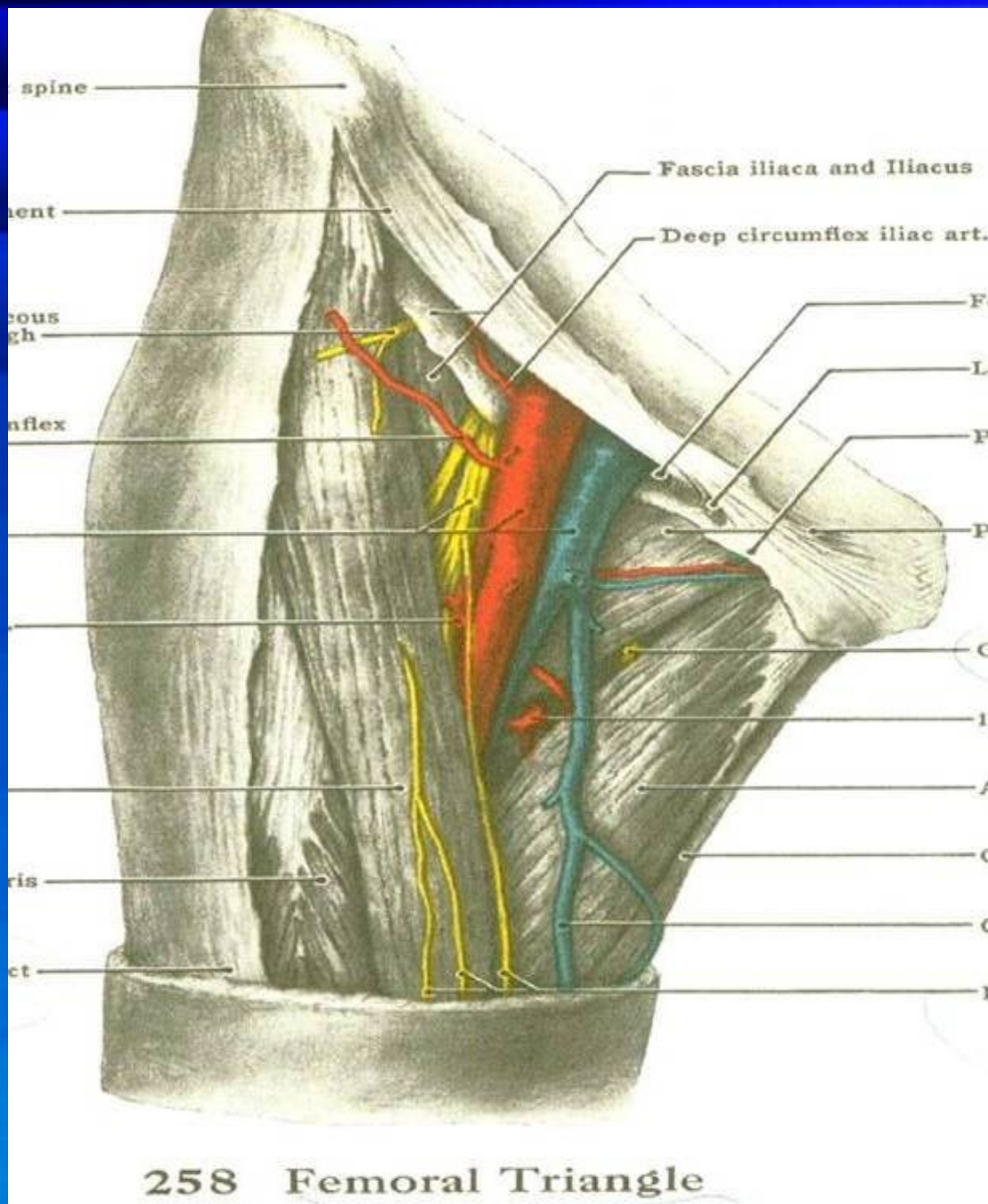
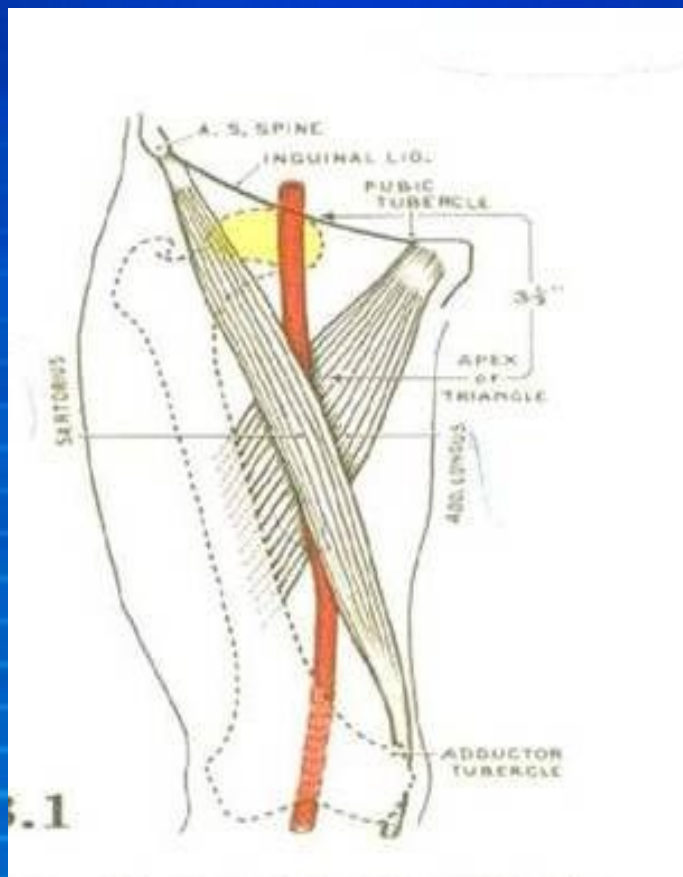
- 1) Axilla
- 2) Deltopectoral groove

Lower limb :

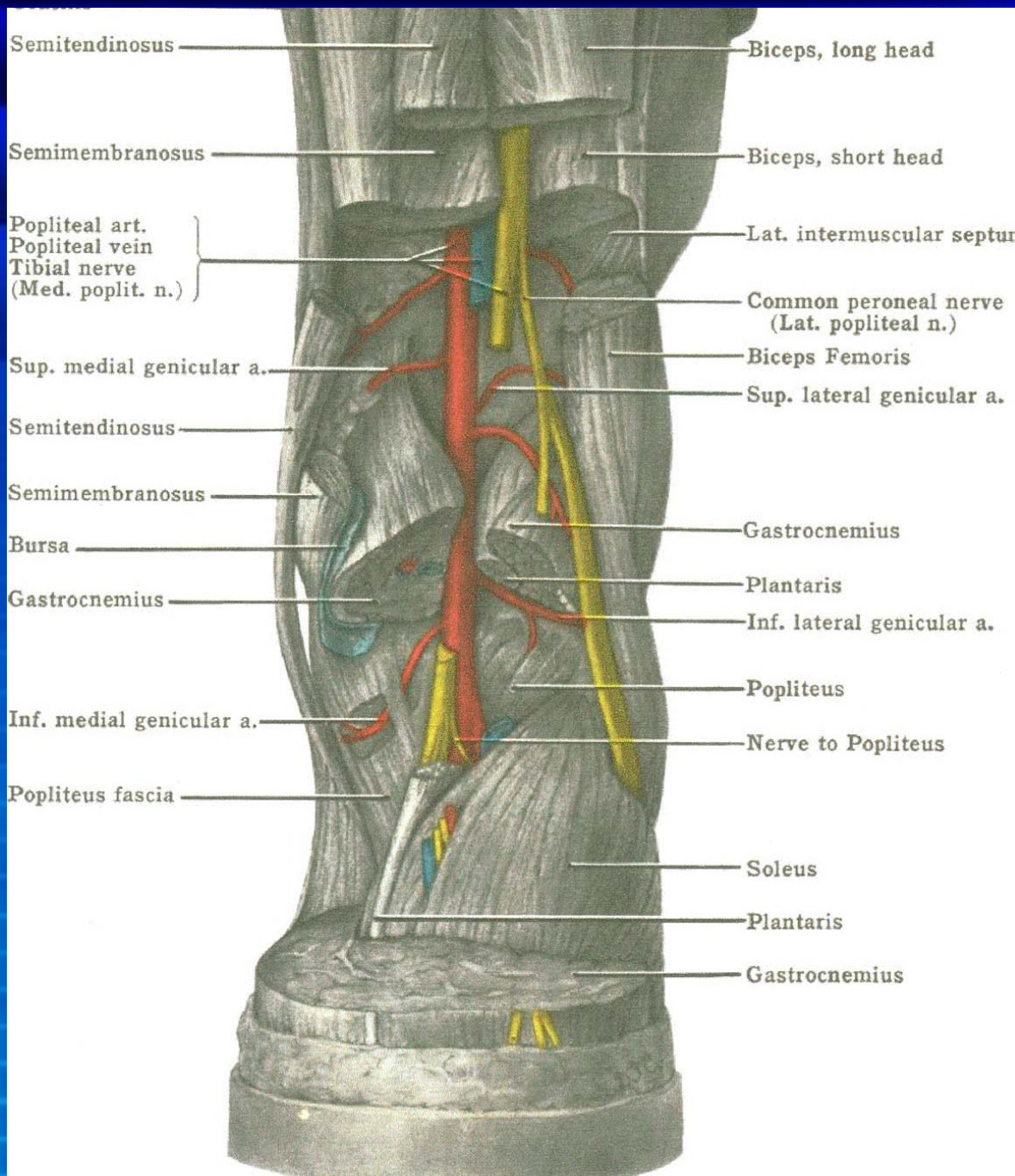
- 1) Inguinal region
- 2) Popliteal fossa



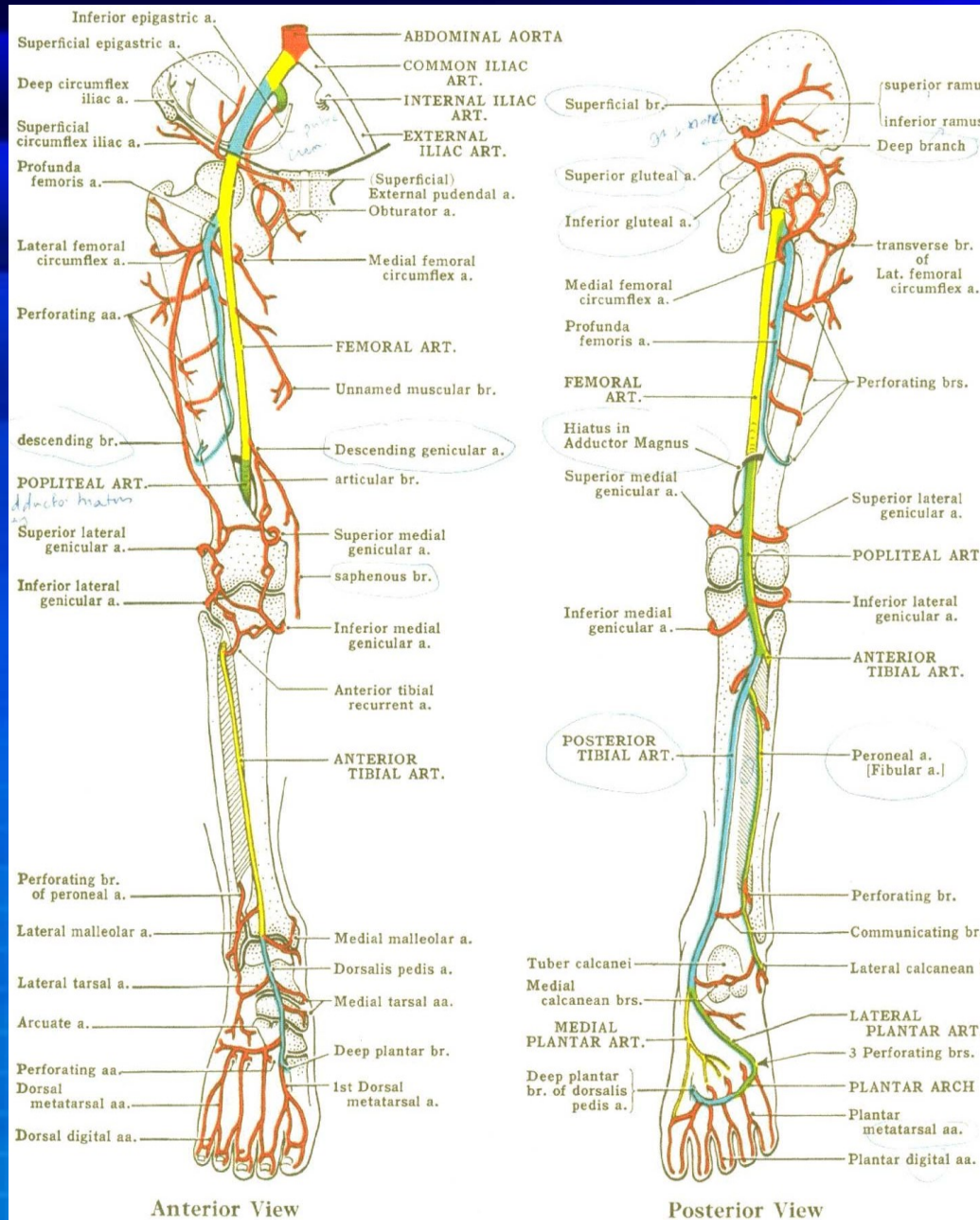
Femoral Triangle



258 Femoral Triangle

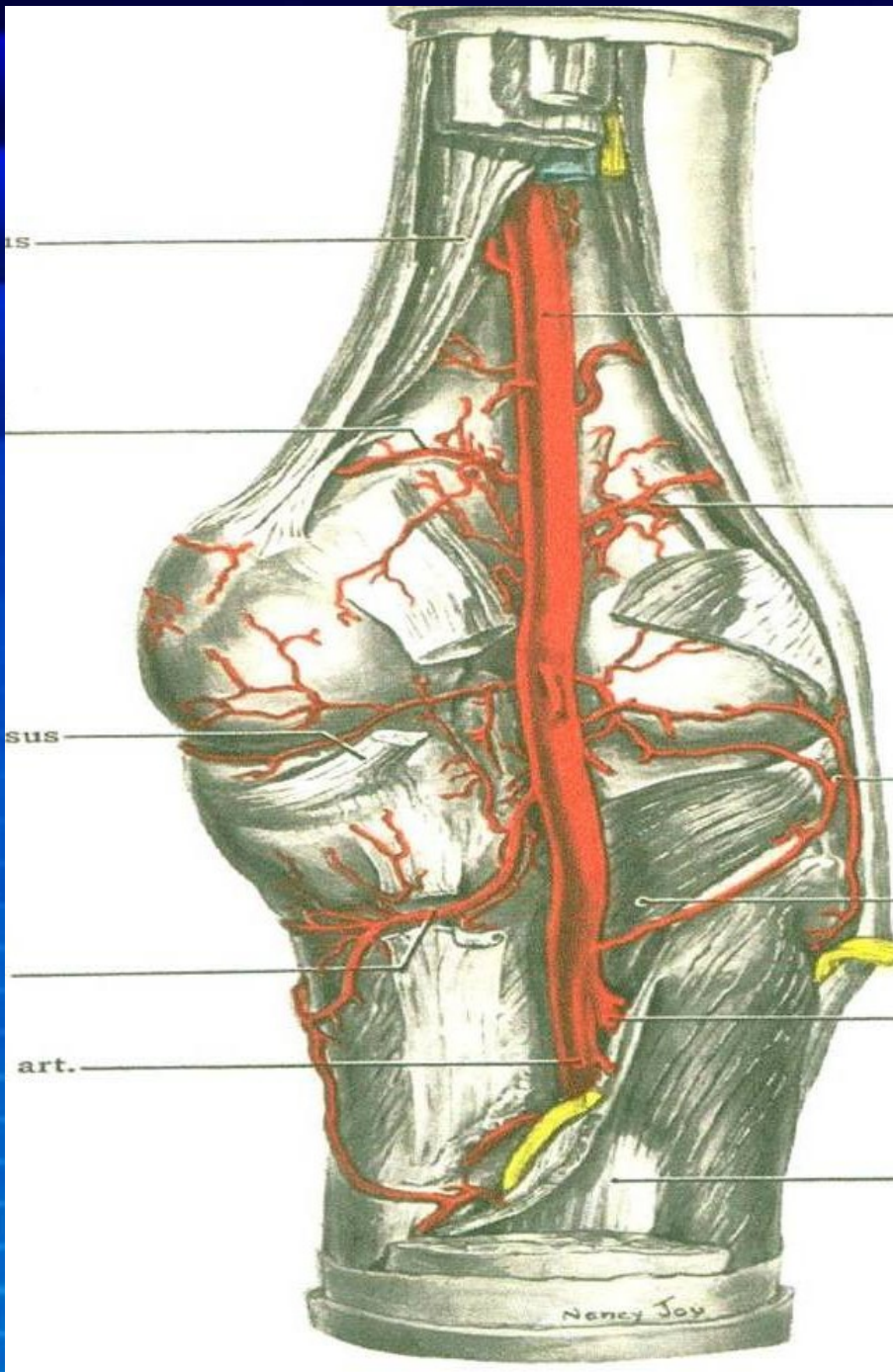


Step Dissection of the Popliteal Fossa



Anterior View

Posterior View



Anastomosis around the Knee

Physiology of Bleeding (Haemostasis)

- Vasoconstriction ,
platelet aggregation
- Coagulation intrinsic ,
extrinsic
- Hypotension

Vascular Pathology

- Intimal injury
- Thrombosis
- Transection : Partial , or complete
- Bleeding :
 - false aneurysm (hematoma)
 - hemorrhage , exsanguination

History

- Mechanism of trauma (etiology)
- Time interval
- Prior vascular injury or D.V.T
- Anticoagulation therapy
- Specific vascular symptoms
Pulsatile mass , bleeding ,
ischemia

Examination

- ❖ Vital signs
- ❖ Vascular examination
- ❖ Arterial pressure index
- ❖ Ankle / brachial index
- ❖ Allen index









Diagnosis

Hard signs of vascular injury post trauma :

- Pulsatile bleeding
- Visible expanding hematoma
- Distal ischemia (5 P's)
- Arterial thrill ((vibration))
- Bruit over artery

Distal normal pulses does not preclude vascular injury

Diagnosis

Soft signs of vascular injury post trauma :

- Hypotension or shock
- Neurologic deficit , fracture , dislocation
- Stable, nonpulsatile or small hematoma
- Proximity of the wound to major vascular structures

Investigation

- Blood C.B.C , electrolytes B.U.N , creat. , P.T. , P.T.T
- Duplex doppler ultrasound (soft signs)
- Multidetector helical CT (MDCT) angiography
- Angiography (hard signs)

* Renal toxicity avoid by rehydrat.+ alkaliniz. of urine

* Allergy

* Cost , time consuming , expertise

* iatrogenic tauma (0.6%)







Management

General

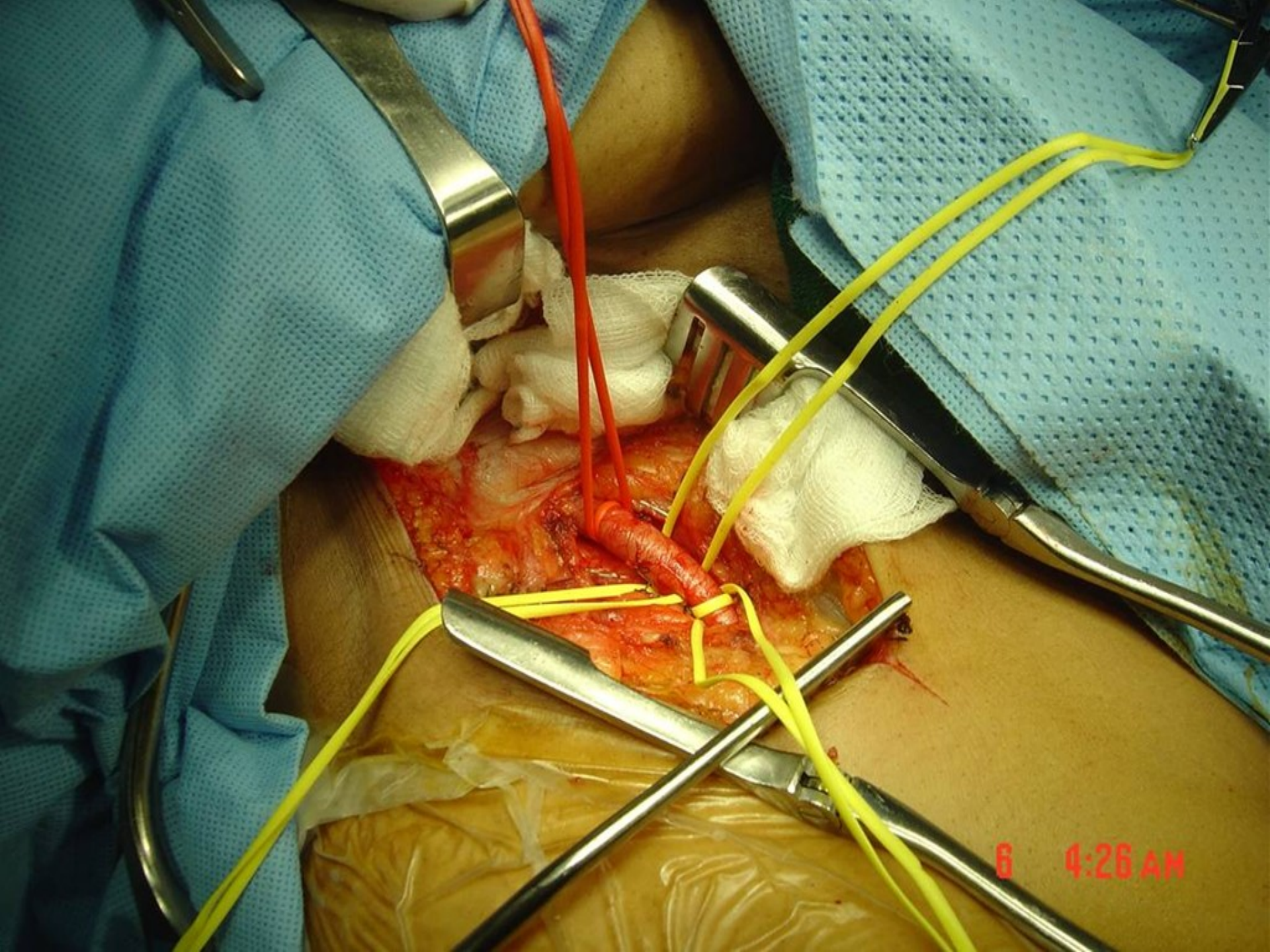
- Resuscitation
- Reduce displaced fracture , dislocation
- Stop hemorrhage :
 - Direct pressure
 - Avoid tourniquet except in exanguination
 - Avoid clamps

Management

Specific

- Surgical exploration
- Indication

Hard signs of vascular injury,
Refractory hypotension,
Obvious limb ischemia



6 4:26 AM

Vascular Repair

- Arterial repair:
 - (1) direct arterial repair.
 - (2) arterial patch repair.
 - (3) interposition graft repair.
 - (4) bypass repair.
- Venous repair whenever possible
avoid ligation.

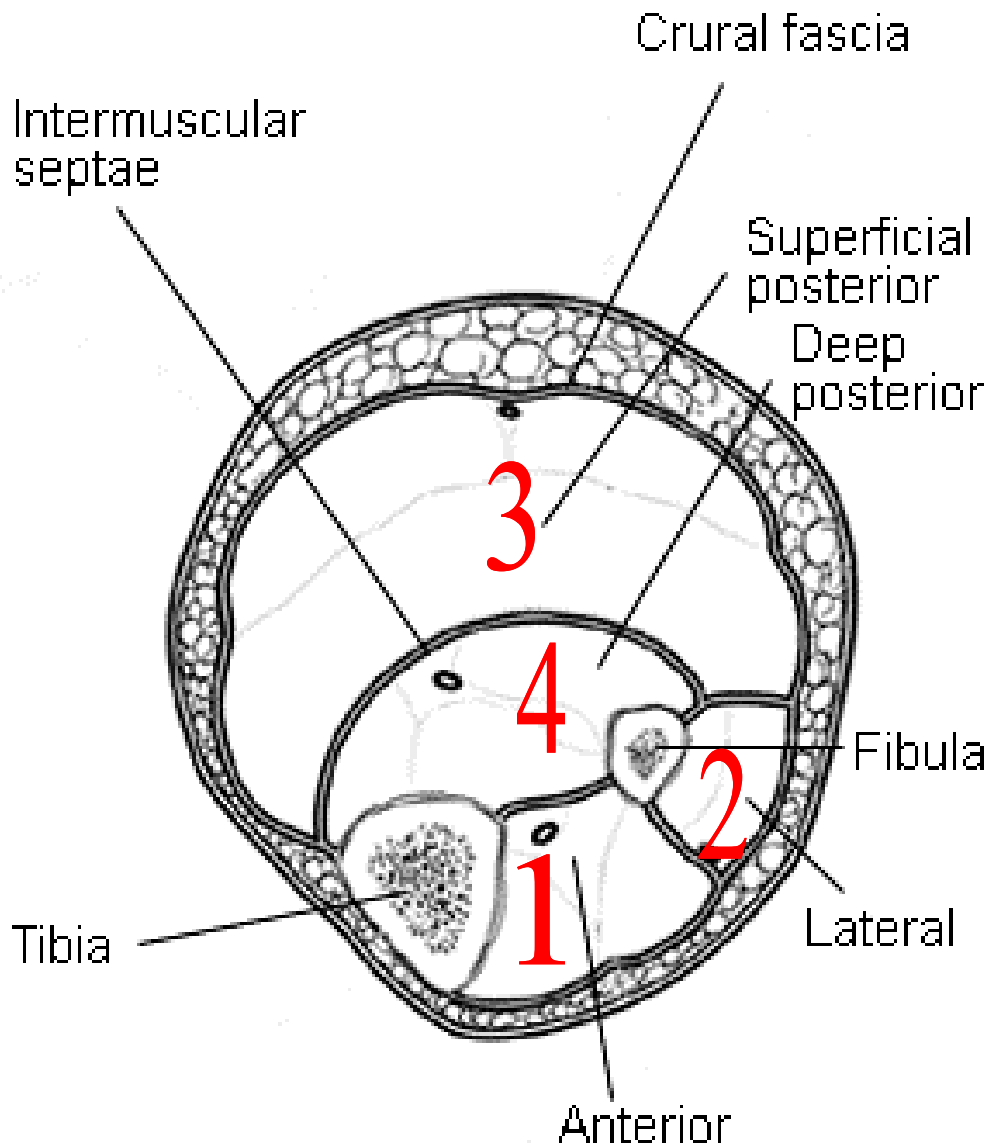
Compartment syndrome

- Swelling of muscles causing compression of nerves and blood vessels.
- Pathophysiology
prolonged ischemia → tissue hypoxia → anaerobic metabolism → lactic acid accumulation → reperfusion → vasodilatation → transudation

Common causes of compartment syndrome

- (1) Tibial or forearm fractures.
- (2) Ischemic-reperfusion following injury.
- (3) Haemorrhage .
- (4) Vascular puncture.
- (5) Intravenous drug injection,
- (6) Casts.
- (7) Prolonged limb compression
- (8) Crush injuries

(9) Burns

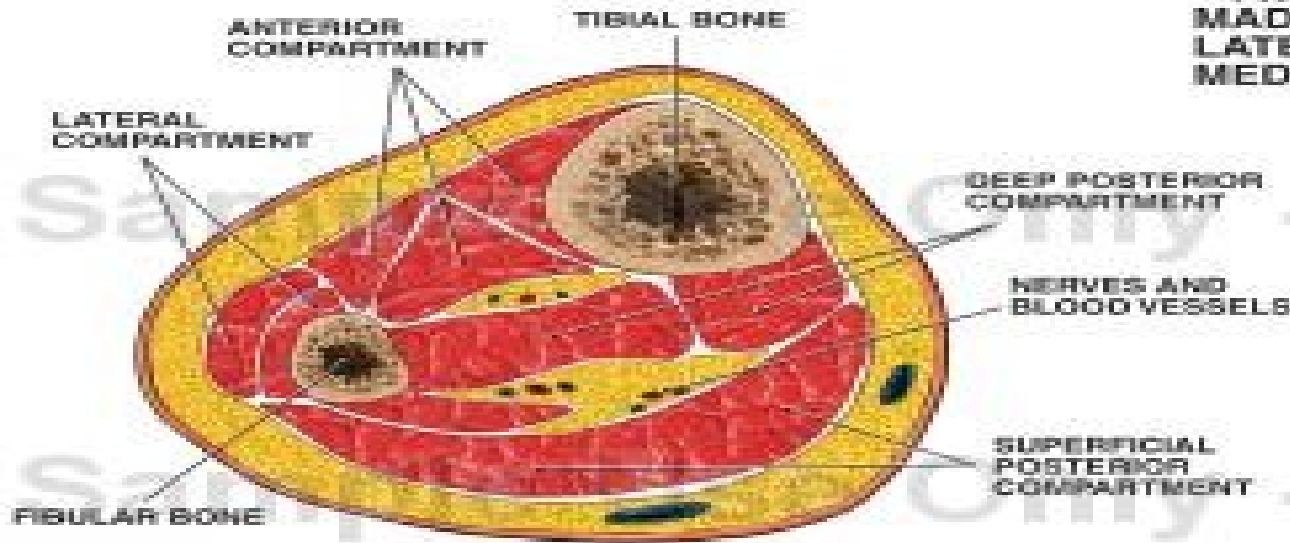


Four major leg compartments

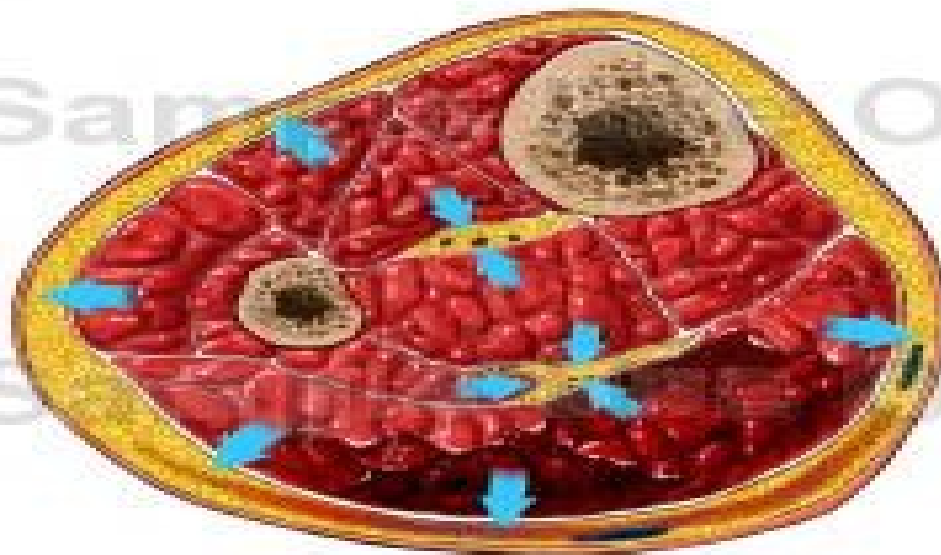
- 1) Anterior
- 2) Lateral
- 3) Superf. Poster.
- 4) Deep poster.

Compartment Syndrome with Fasciotomy Procedure

TWO LONG INCISIONS ARE MADE IN THE LOWER LEG, ONE LATERAL TO THE TIBIA AND ONE MEDIAL.



CROSS-SECTION THROUGH NORMAL CALF SHOWING MUSCLE COMPARTMENTS



COMPARTMENT SYNDROME: SWELLING OF MUSCLES CAUSING COMPRESSION OF NERVES AND BLOOD VESSELS



Anterior View



Combined Vascular/Skeletal Injury

Hard Signs Present

bleeding, hematoma, absent pulses, bruit/thrill, distal ischemia - the 5 P's of pain, pallor, paralysis, paresthesias, poikilothermy (coolness)



OR Angio

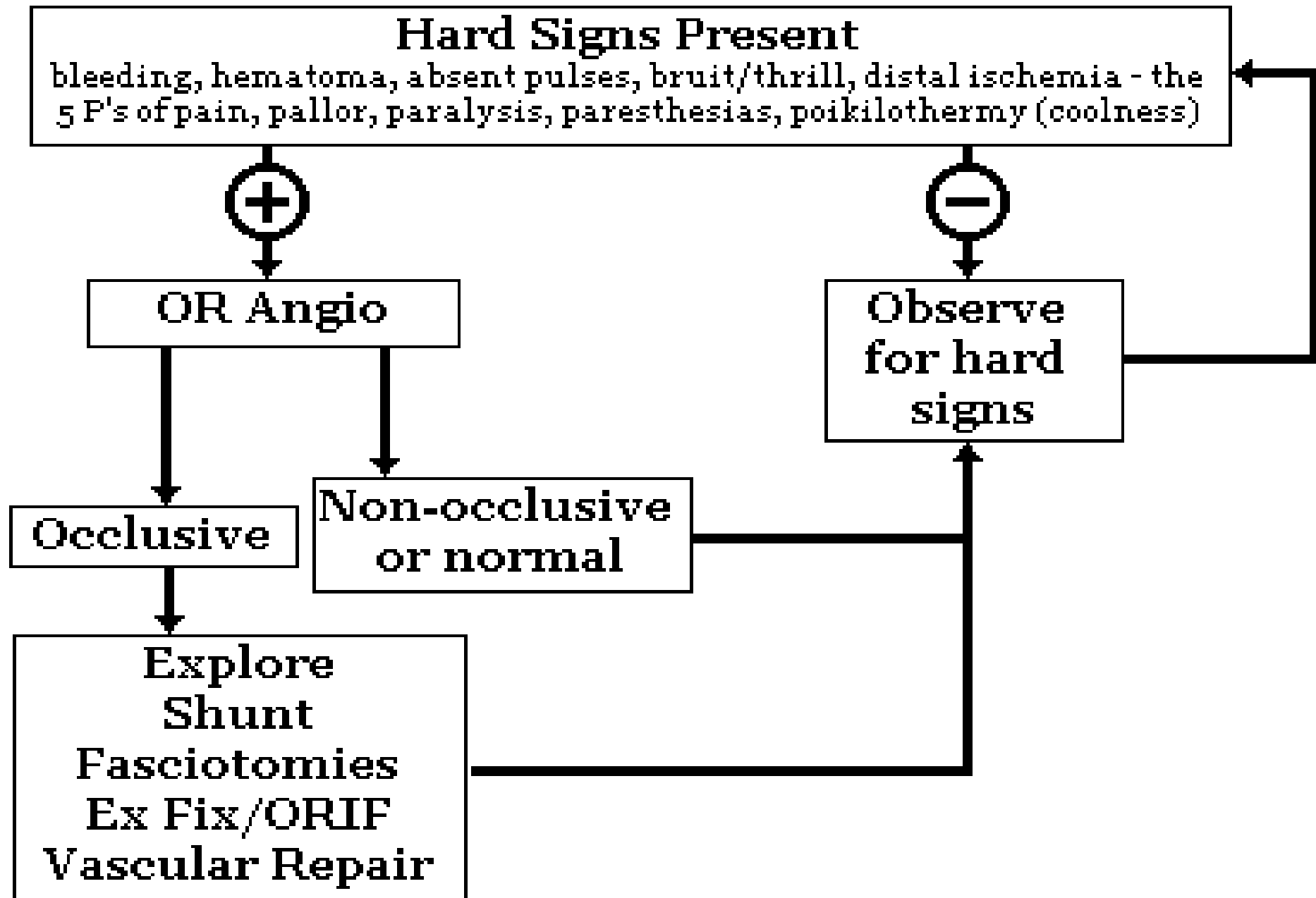


Observe
for hard
signs

Occlusive

Non-occlusive
or normal

Explore
Shunt
Fasciotomies
Ex Fix/ORIF
Vascular Repair



Morbidity

- **Limb loss**

(1) When limb perfusion is compromised for more than 6 hours warm ischemia

(2) Extensive musculoskeletal damage.

(3) Open tibial fracture

(4) Compartment syndrome

- **Paralysis Post nerve injury**

- **D.V.T post venous injury**

Factors Predicting Risk of Amputation

The MESS score :

- (1) Degree of skeletal/soft tissue injury .
- (2) Limb ischemia .
- (3) Shock .
- (4) Patient age .

MESS = mangled extremity severity score .(Heflet et al ,1990)

Mortality

Rare except from :

(1) Exsanguination

(2) Necrotizing myofascial infection

(3) Rhabdomyolysis and Renal failure in untreated acute compartment syndrome

Thank you

Any questions

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