Introduction to fractures

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- Definition: loss of bone continuity.
- Aetiology:
  - Traumatic
    - Direct
    - Indirect
    - Stress fracture
  - Pathological
    - Osteoporosis
    - Tumors

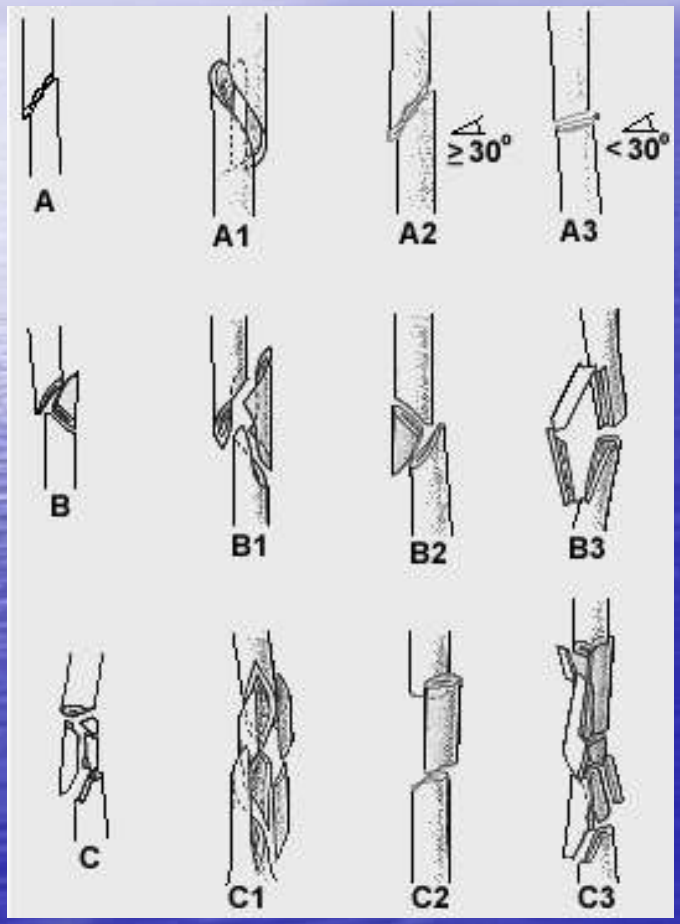
Diagnosis

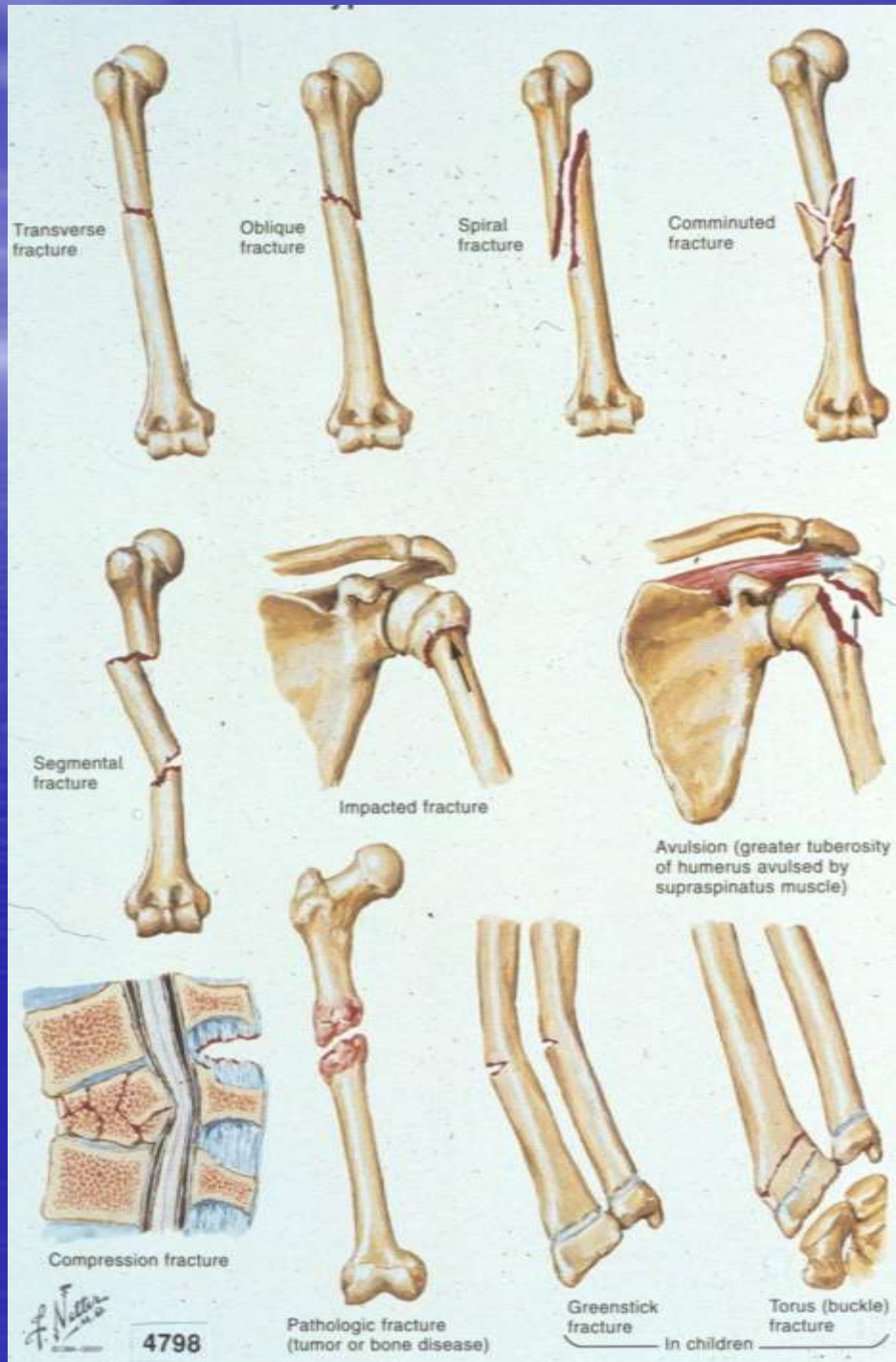
- History
- Examination
  - Tenderness
  - Swelling
  - Deformity
  - Abnormal mobility
  - Loss of function
  - Crepitus
  - Examination of the neurovascular status below the level of the fracture
- Radiographic examination

Fracture classification

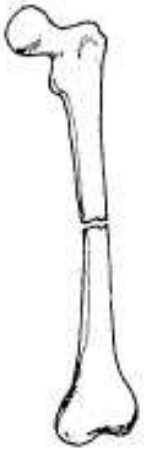
- Anatomical classification
- According the configuration of fracture
- According to soft tissue condition

Fracture configurations





Linear



Transverse

Oblique

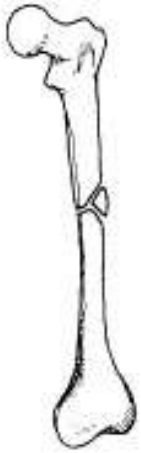
Spiral

Comminuted

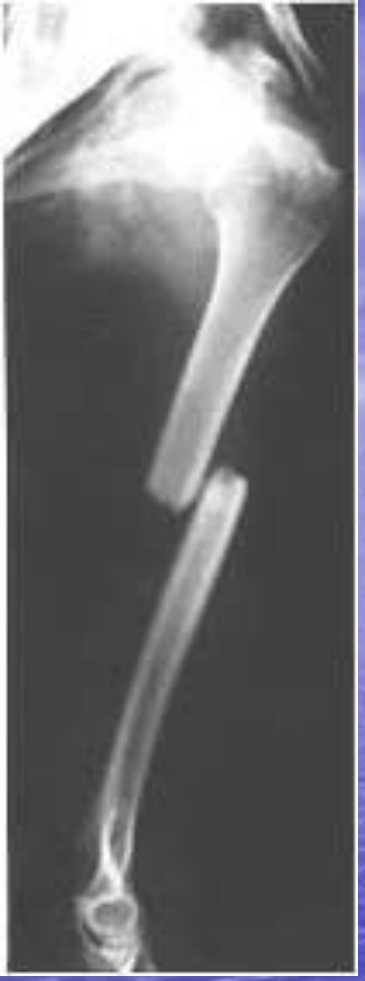
Comminuted ≤ 50%

Comminuted ≥ 50%

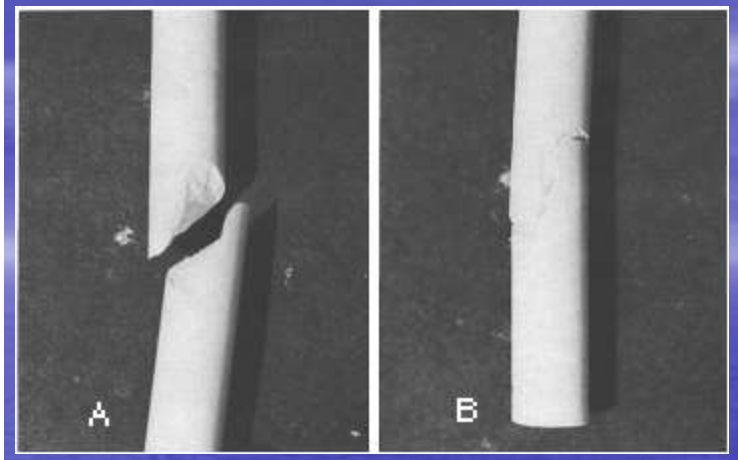
Butterfly < 50%



Butterfly ≥ 50%

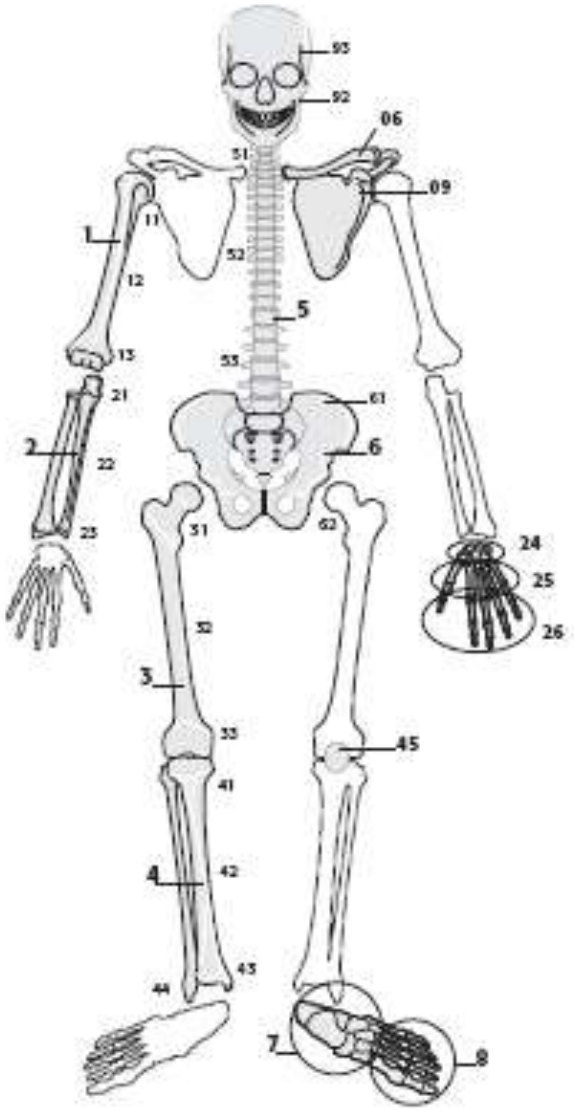


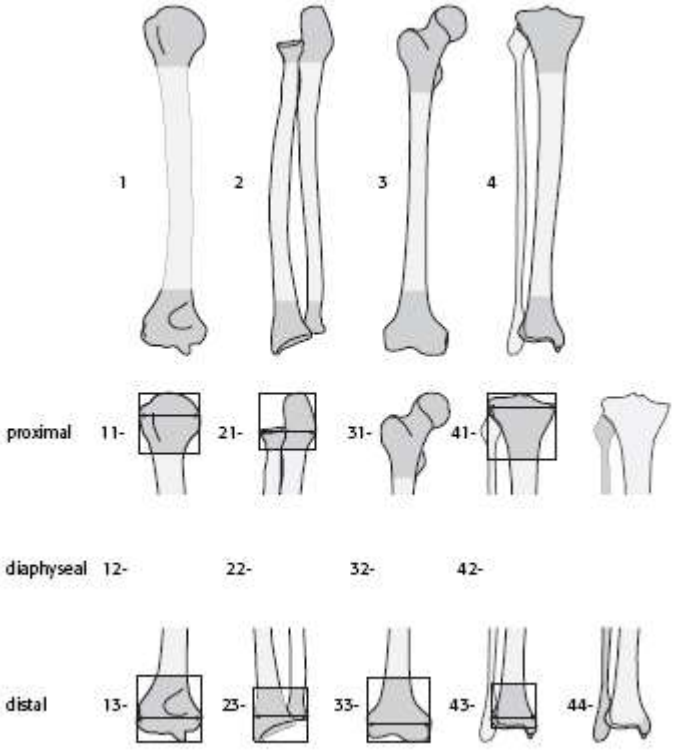

B

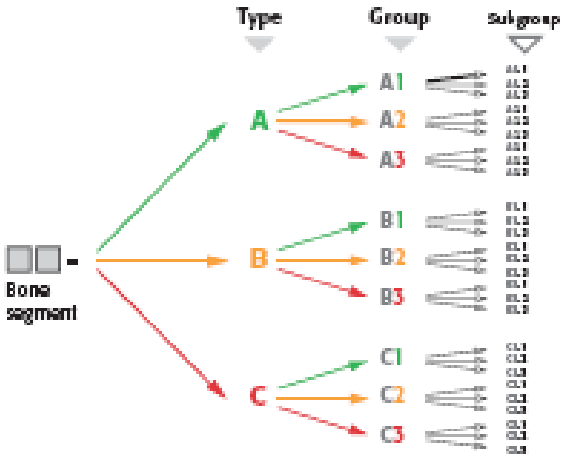

A
B


B

AO Classification system







- Which bone?
- Which bone segment ?
- Which fracture type ?
- Which group ?
- Which subgroup ?

Soft tissue injury – Gustilo & Anderson classification

- **Type I** open fractures have a clean wound less than 1 cm long.
- **Type II** wounds the laceration is more than 1 cm long but is without extensive soft tissue damage, skin flaps, or avulsions.
- **Type III**
  - ***Type IIIA:***
    - open fractures have extensive soft tissue lacerations or flaps but maintain adequate soft tissue coverage of bone,
    - or they result from high-energy trauma regardless of the size of the wound. This group includes segmental or severely comminuted fractures, even those with 1-cm lacerations.
  - ***Type IIIB:*** open fractures have extensive soft tissue loss with periosteal stripping and bony exposure. They usually are massively contaminated.
  - ***Type IIIC:*** open fractures include open fractures with an arterial injury that requires repair regardless of the size of the soft tissue wound.

Gustilo and Anderson classification of open fracture

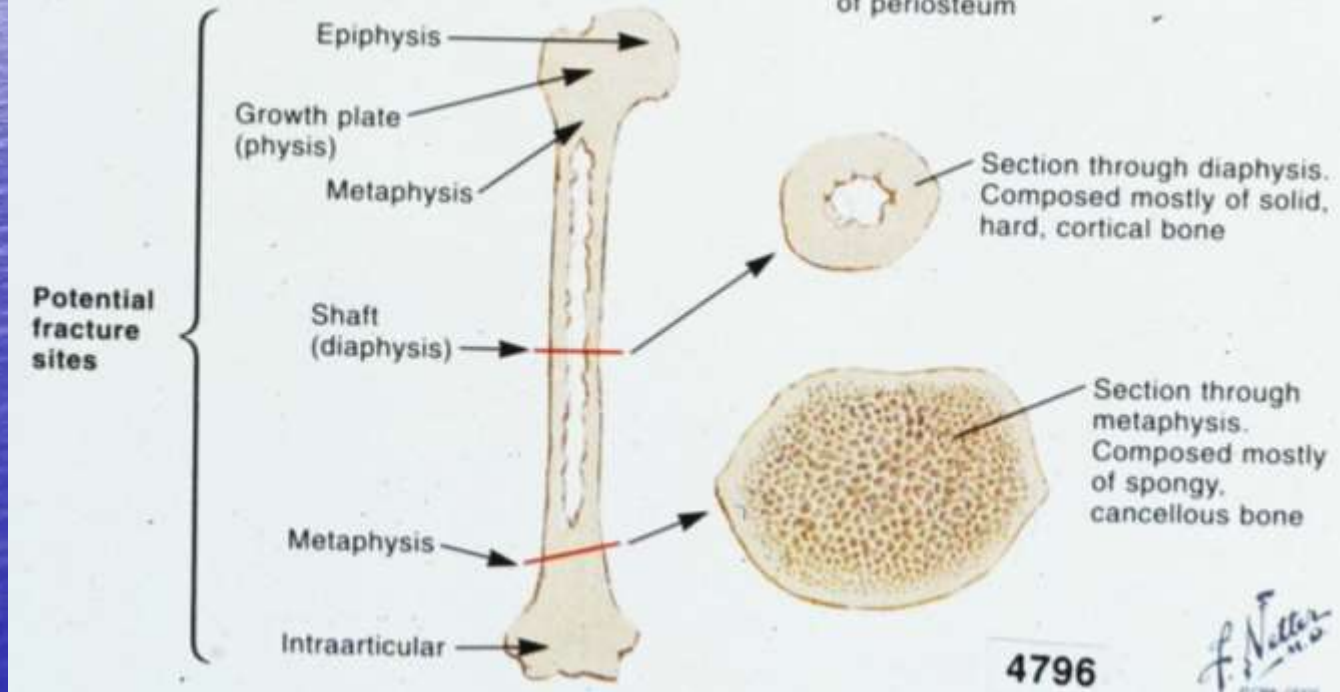
Type I. Wound ≤1 cm long. No evidence of deep contamination

Type II. Wound >1 cm long. No extensive soft tissue damage

Type IIIA. Large wound. Good soft tissue coverage

Type IIIB. Large wound. Exposed bone fragments, extensive stripping of periosteum

Type IIIC. Large wound with major arterial injury



Management

- General
- Local

General: ABCDE

- A- Airway with control of cervical spine
- B- Breathing
- C- Circulation
- D- Disability
- E- Exposure

Trauma team

- Team leader …
  - General surgeon
  - At the head of the patient
  - Airway management and control of cervical spine
- Physician to the right
  - I.V. access
  - Foley's catheter
  - Intercostal tube
- Physician to the left
  - Begin in the initial survey
- Trauma team nurses
  - Record vital signs
  - Administer drugs and fluids
  - Obtain blood samples
  - Removal of patient's closing and assisting in primary and secondary survey

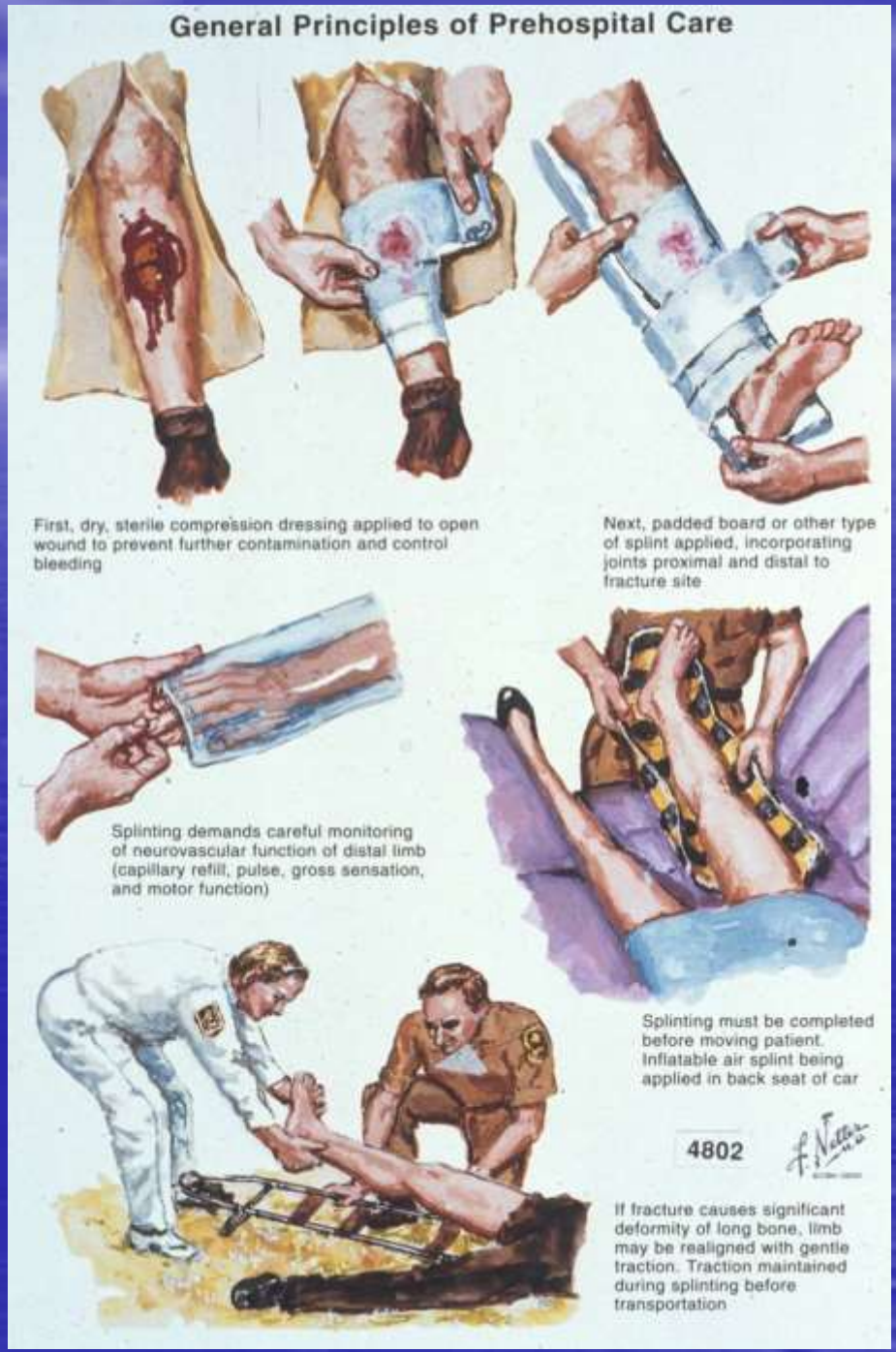
Trauma team (Cont.)

- Radiology technician
- Lab facilities
  - quick and accurate hematologic assessment
  - Blood transfusion

Local:

- First aid measures
  - Splintage
  - Dressing for compound fracture
- Definitive treatment
  - Conservative
  - Operative

First aid measures

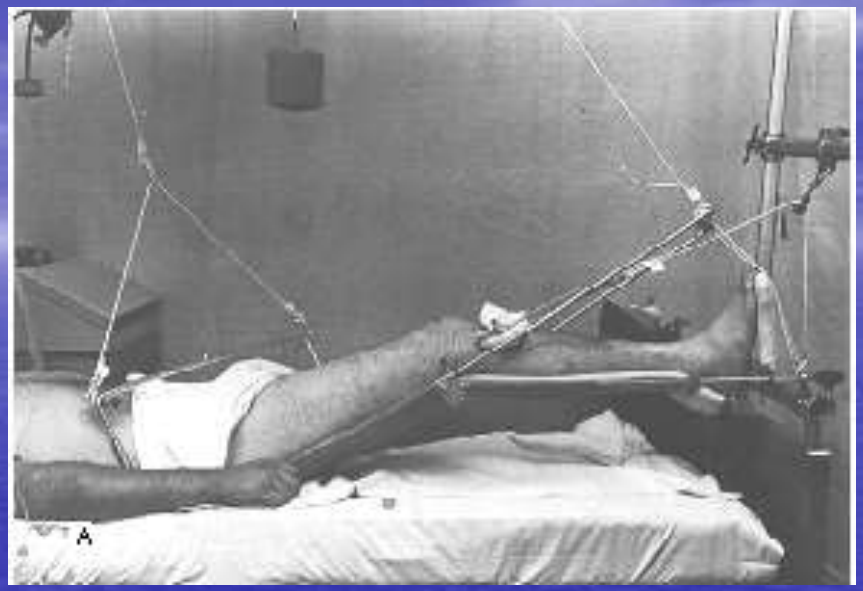


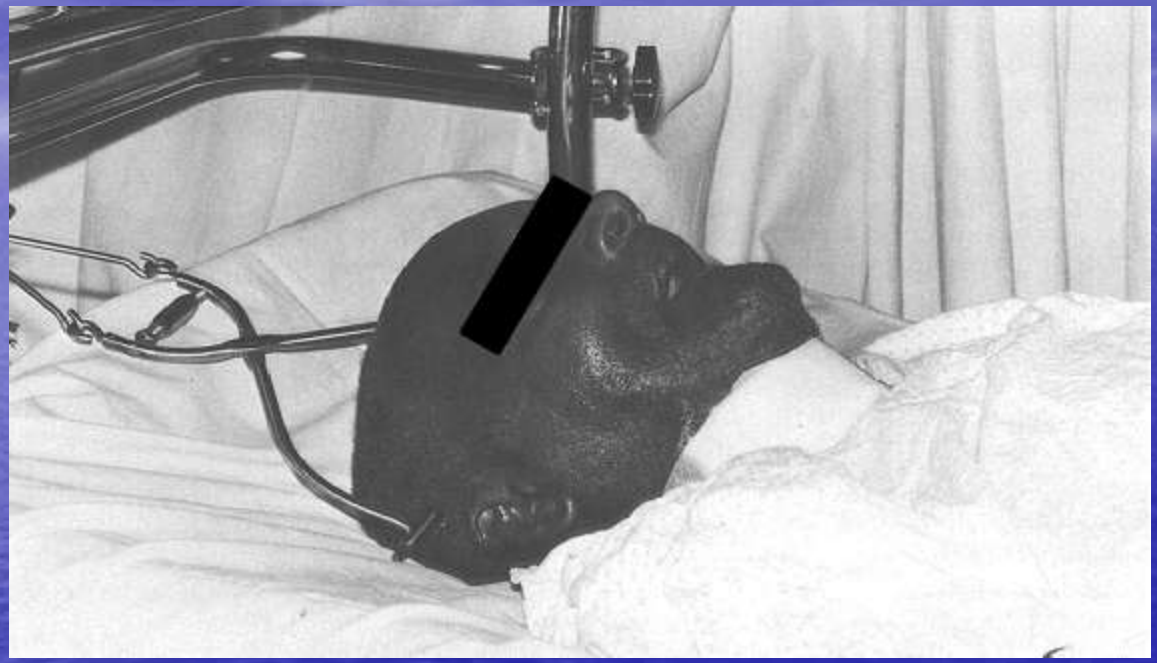
Conservative treatment for fractures

- Indications
  - Children
  - Undisplaced fractures
  - Poor bone quality
  - Severely comminuted fractures
  - Local contraindications to surgery
  - Systemic contraindication to surgery
- Methods
  - Cast or slab
  - Traction
    - Skeletal
    - Skin


A

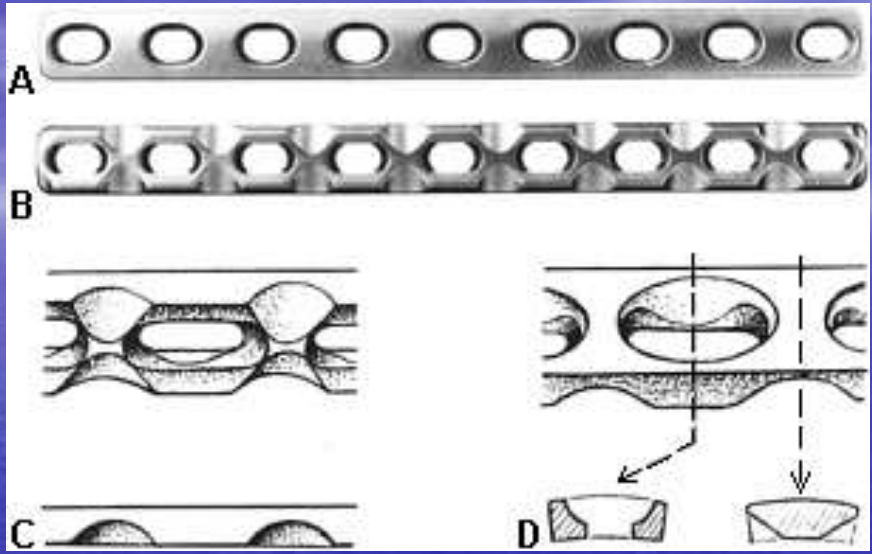

B


A



Operative treatment

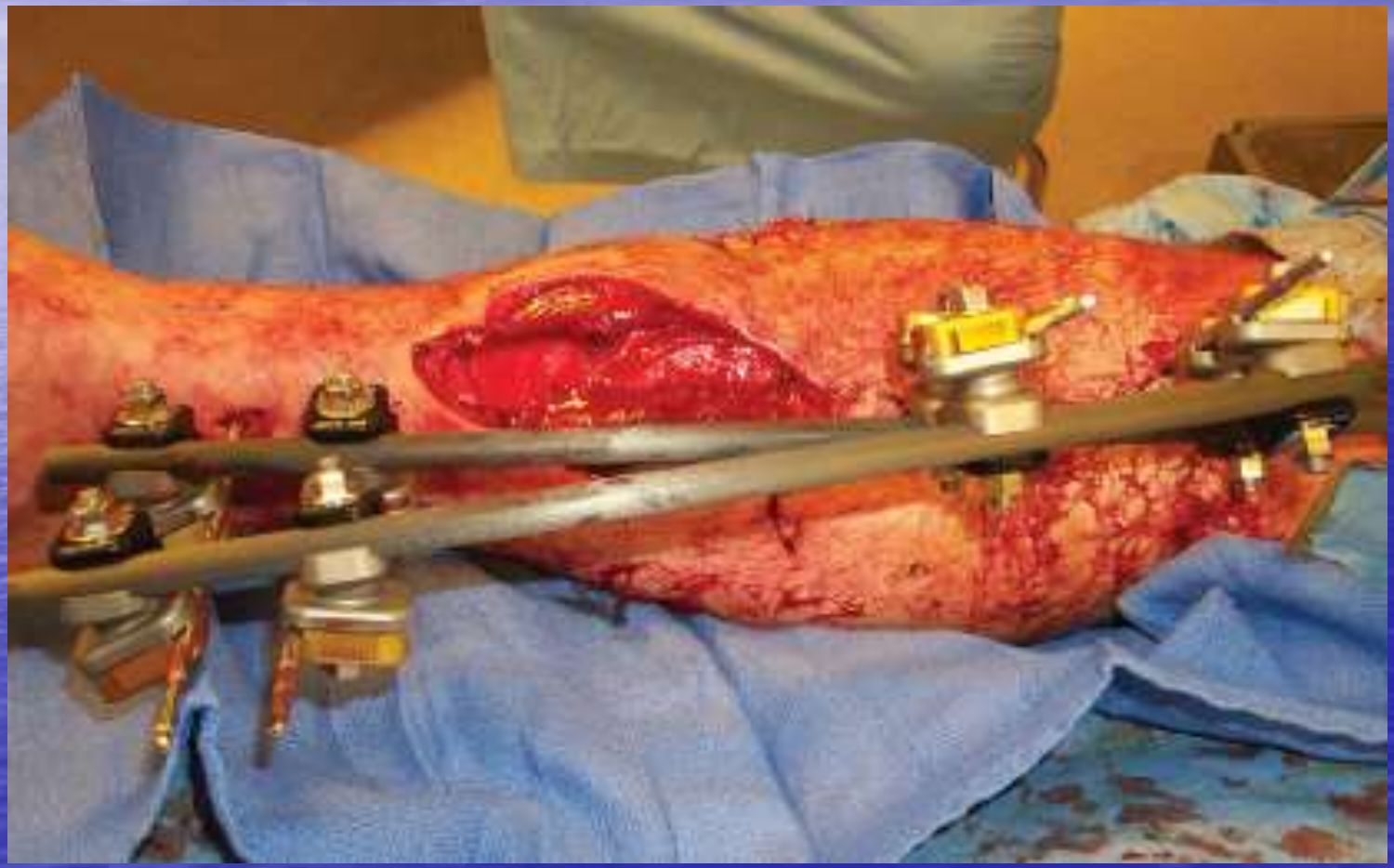
- K wires
- Screws
- Plates and screws
  - Dynamic compression plates DCP
- Intramedullary nails
- External fixators
- Prosthetic replacement

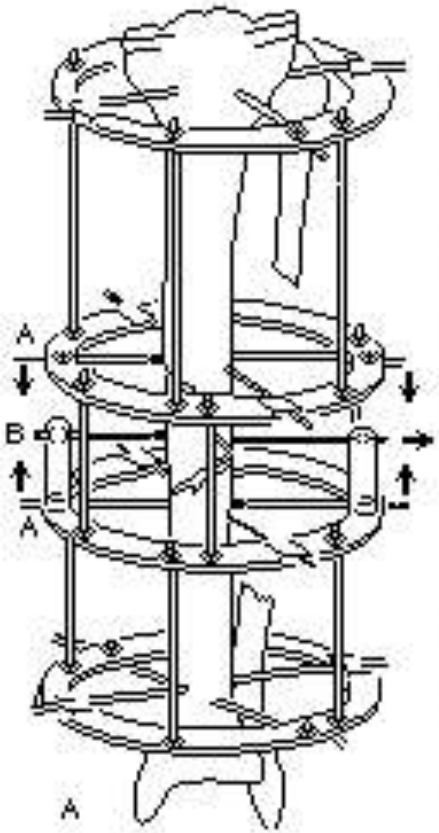

A
B
C
D


C

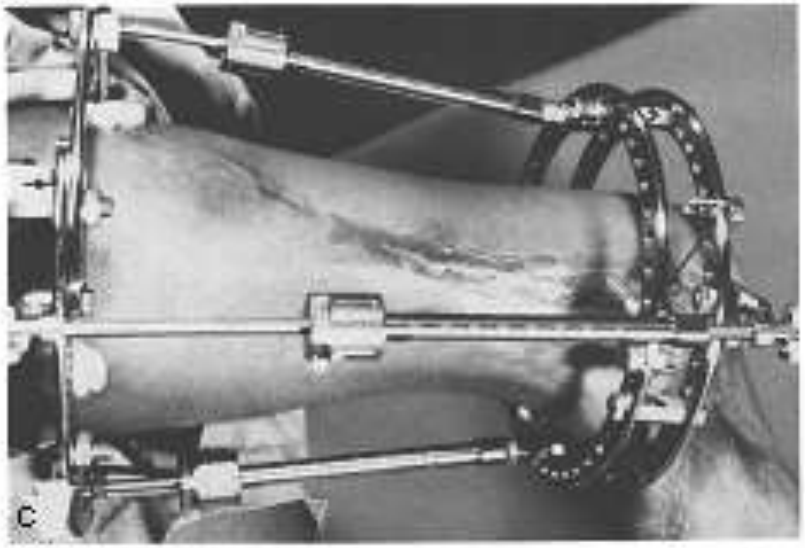
Monagement of compound Fr.

- AA
- Debridement
- External fixation




A
B
A
A


B

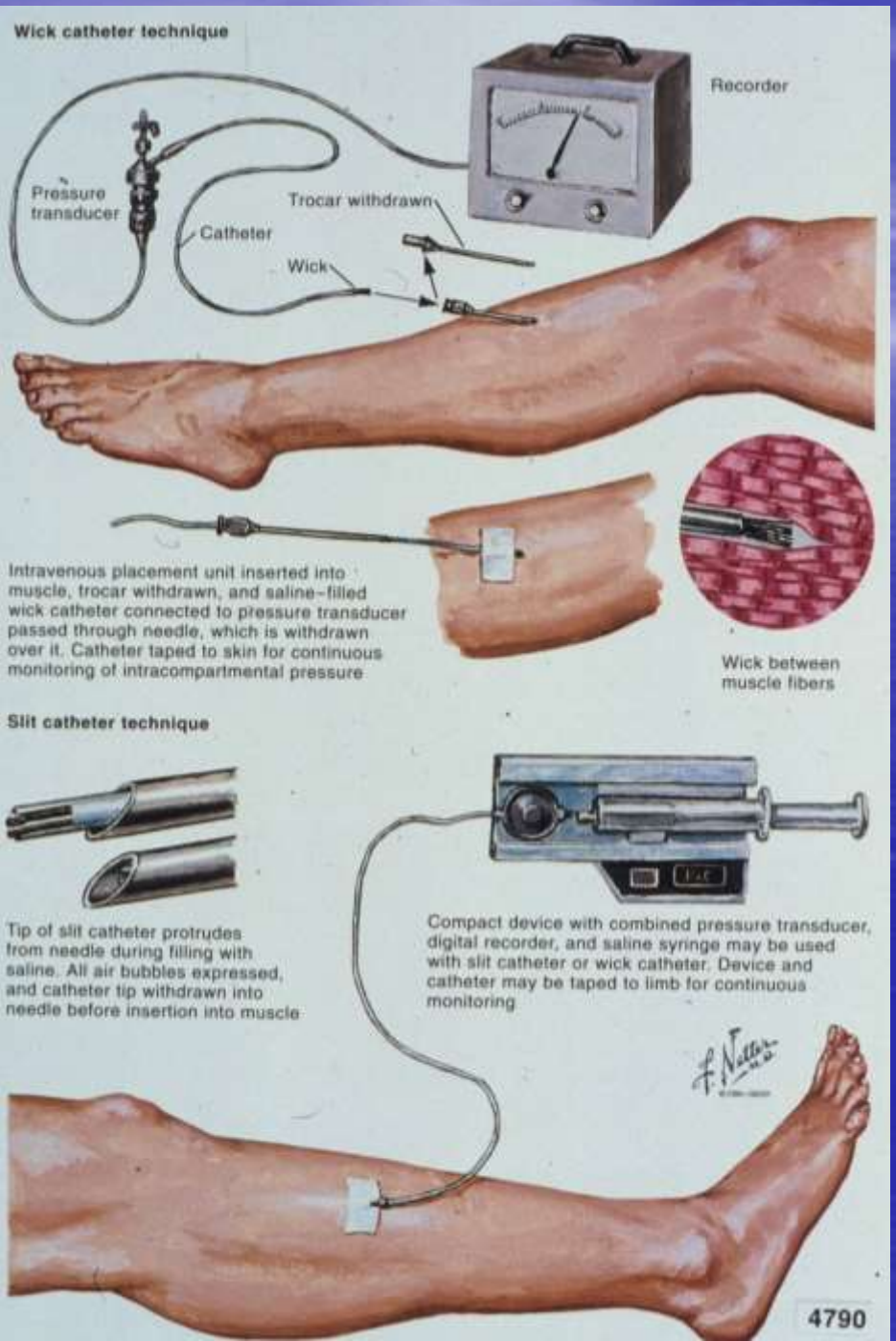

C

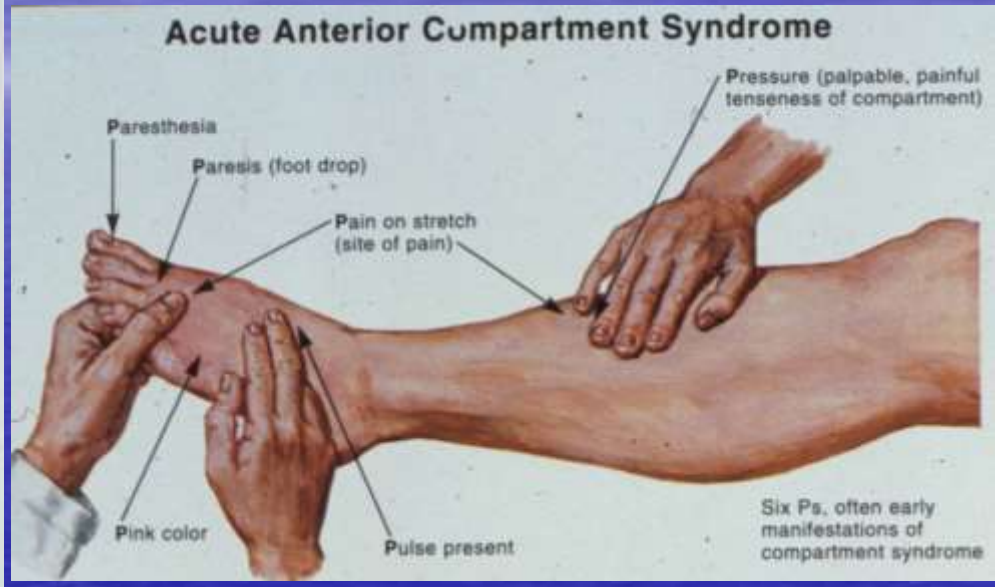

D

Complications

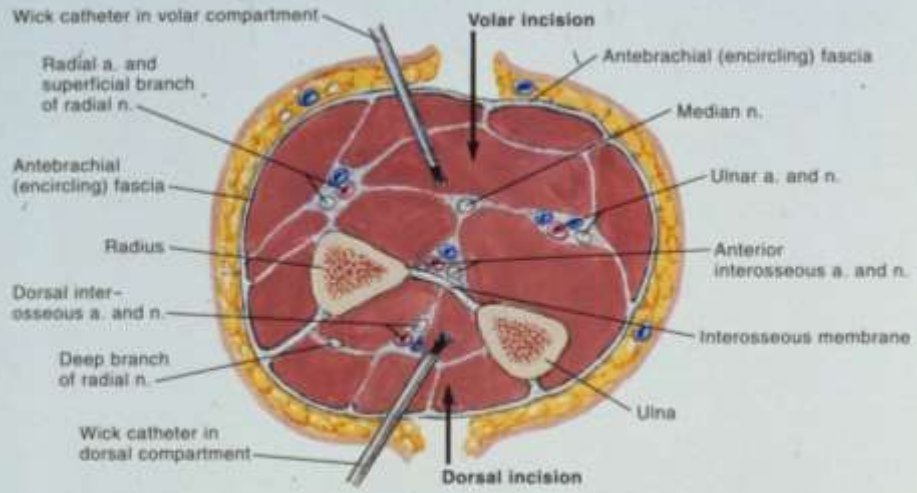
- General
  - Haemorrhage and shock
  - Crush syndrome
  - Fat embolism
  - DVT & pulmonary embolism
  - Prolonged recumbency
- Local
  - Union … malunion, delayed union, non union
  - Nearby joints … stiffness, instability, osteoarthritis
  - Soft tissue
    - Skin … plaster sores, bed sores
    - Muscles … disuse atrophy, myositis ossificans
    - Tendons … late tendon rupture, avulsion of tendon, tenosynovitis
    - Arteries … arterial injuries
    - Nerves … nerve injury
  - Compartment syndrome
  - Reflex Sympathetic dystrophy
  - Avascular necrosis

Compartment syndrome

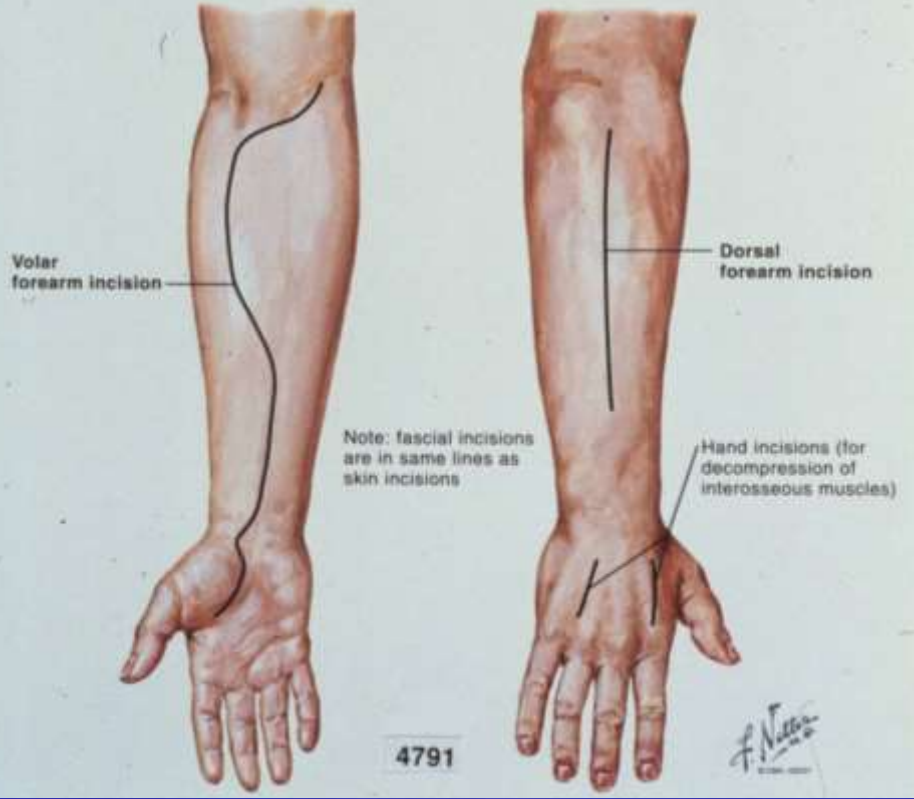

Wick catheter technique
Recorder
Pressure transducer
Trocar withdrawn
Catheter
Wick
Intravenous placement unit inserted into muscle, trocar withdrawn, and saline-filled wick catheter connected to pressure transducer passed through needle, which is withdrawn over it. Catheter taped to skin for continuous monitoring of intracompartmental pressure
Wick between muscle fibers
Slit catheter technique
Tip of slit catheter protrudes from needle during filling with saline. All air bubbles expressed, and catheter tip withdrawn into needle before insertion into muscle
Compact device with combined pressure transducer, digital recorder, and saline syringe may be used with slit catheter or wick catheter. Device and catheter may be taped to limb for continuous monitoring
4790


Acute Anterior Compartment Syndrome
Pressure (palpable, painful tenseness of compartment)
Paresthesia
Paresis (foot drop)
Pain on stretch (site of pain)
Pink color
Pulse present
Six Ps, often early manifestations of compartment syndrome

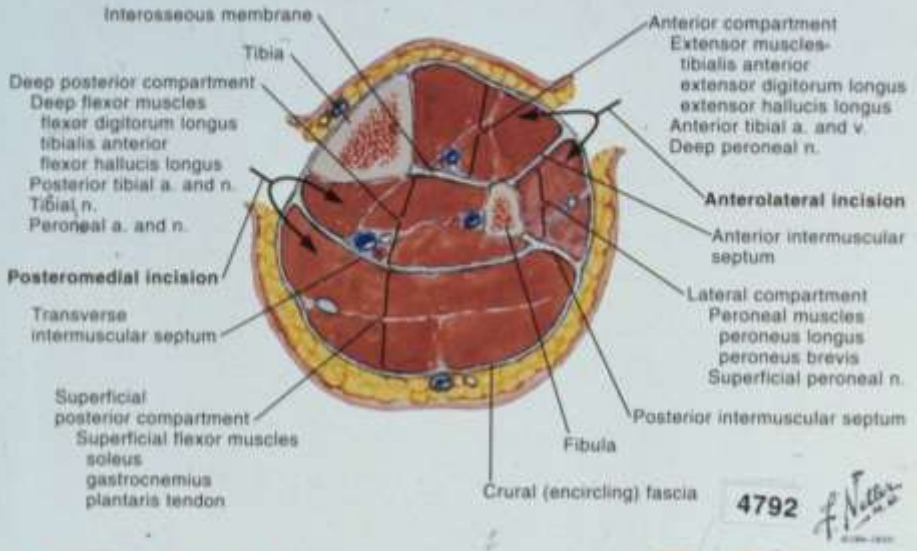
Incisions for Compartment Syndrome of Forearm and Hand

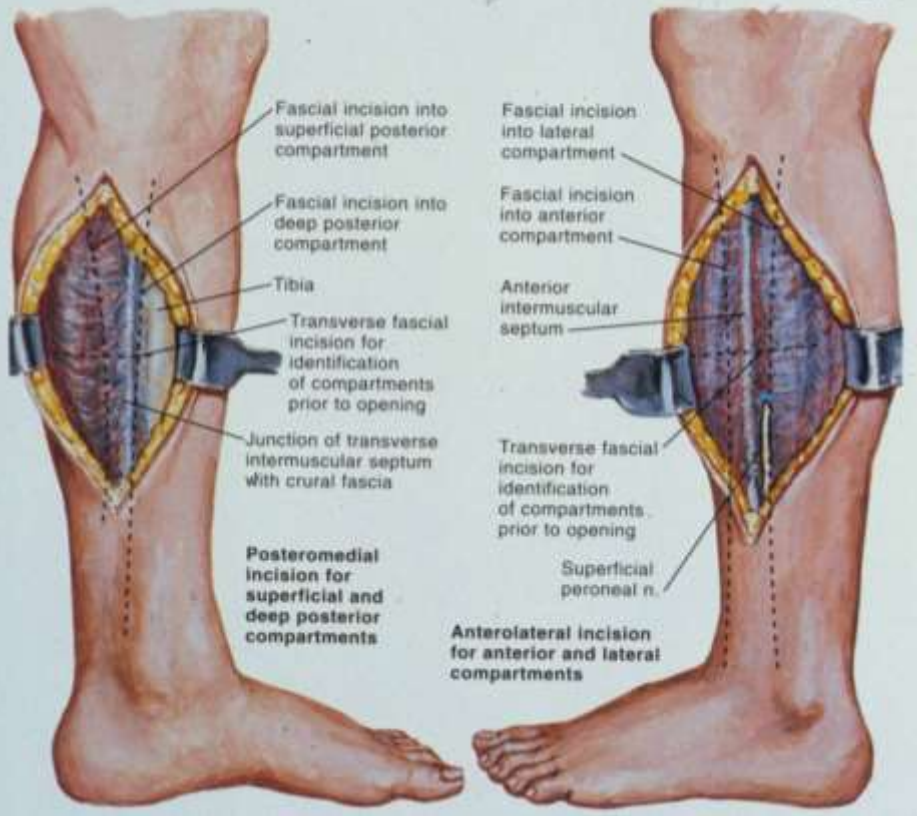


Section through midforearm



Incisions for Compartment Syndrome of Leg






Thank you