FRACTURES OF UPPER EXTREMITY

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TOPICS

- Shoulder gridle
- Arm
- Forearm
- Wrist
- Carpus
- Hand

Identify the major anatomical areas of a long bone.

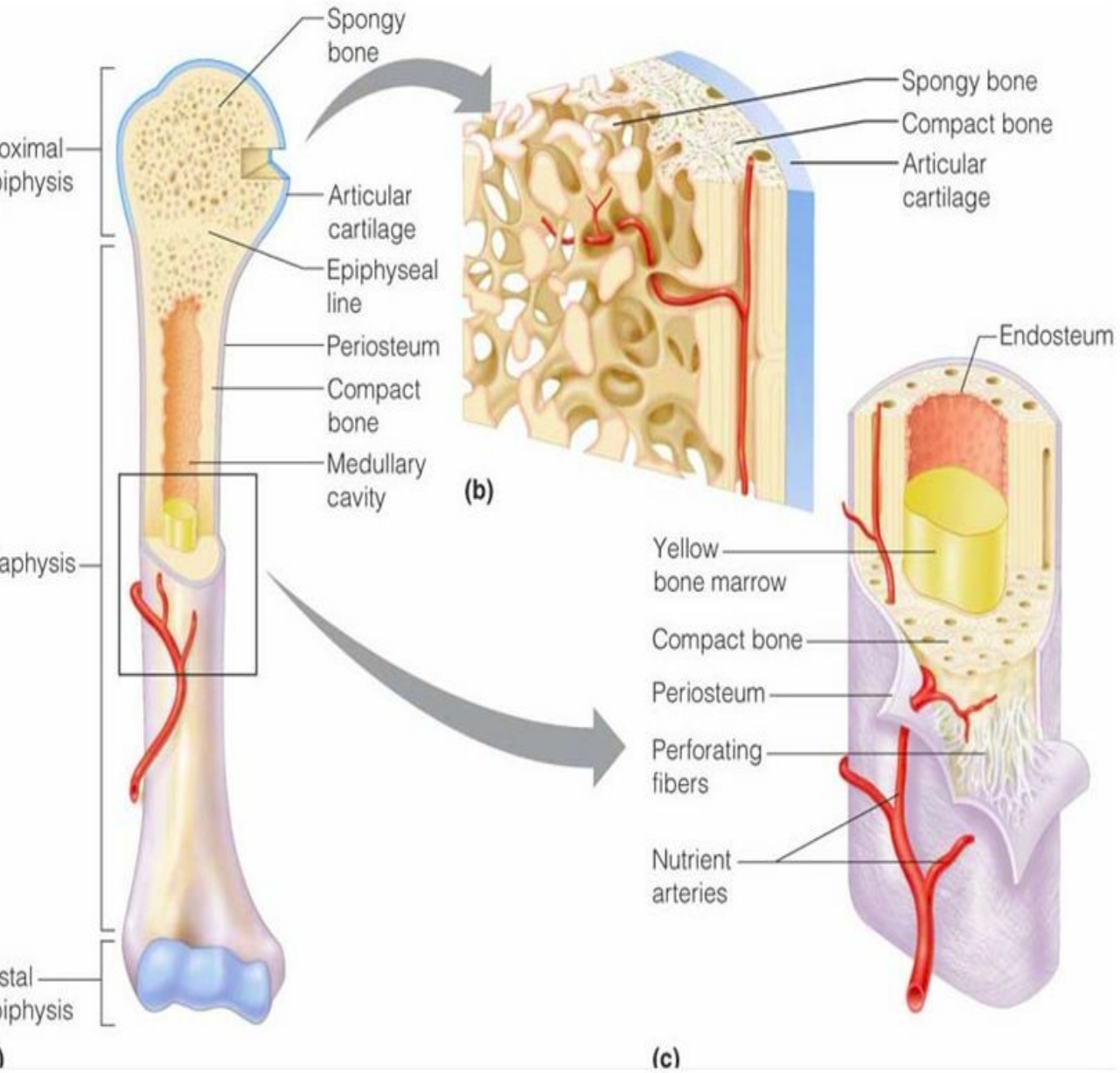
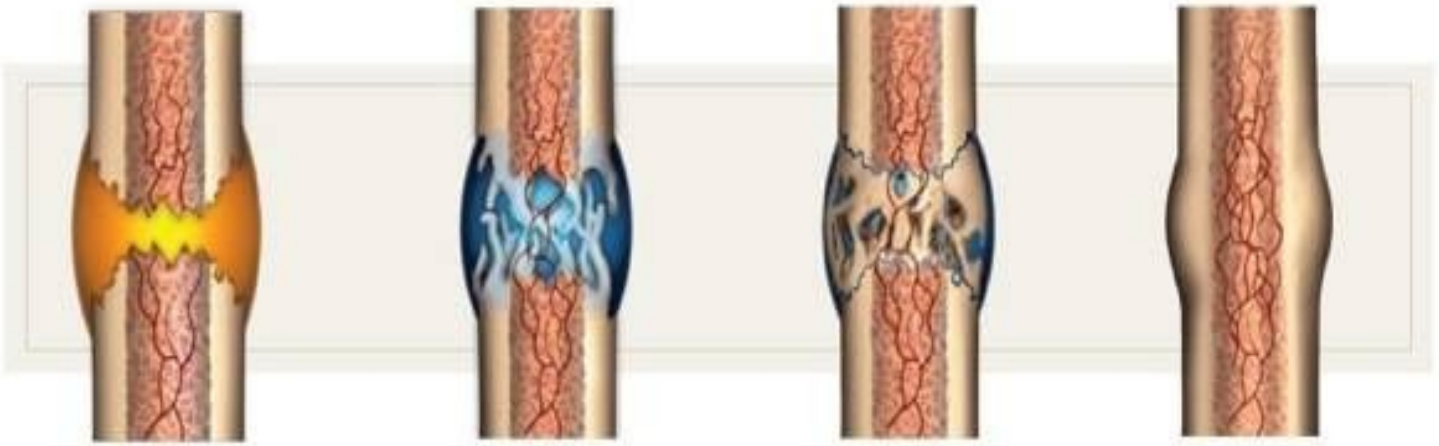


FIGURE 5.2 The structure of a long bon (humerus).
(a) Anterior view with longitudinal section cut away at the proximal end.
(b) Pie-shaped, three-dimensional view of spongy bone and compact bone of the epiphysis.
(c) Cross section of the shaft (diaphysis

Note that the external surface of the diaphysis is covered by a periosteum, but the articular surface of the epiphysi (see b) is covered with hyaline cartilage

Bone healing



Inflammation

Soon after a fracture occurs, a hematoma forms at the injury site. Macrophages and inflammatory leukocytes move into the damaged area to scavenge debris and begin producing the pro-inflammatory agents that initiate healing.

Soft callus

Inflammation triggers cell division and the growth of new blood vessels. Among the new cells, chondrocytes secrete collagen and proteoglycans, creating fibrocartilage that forms the soft callus.

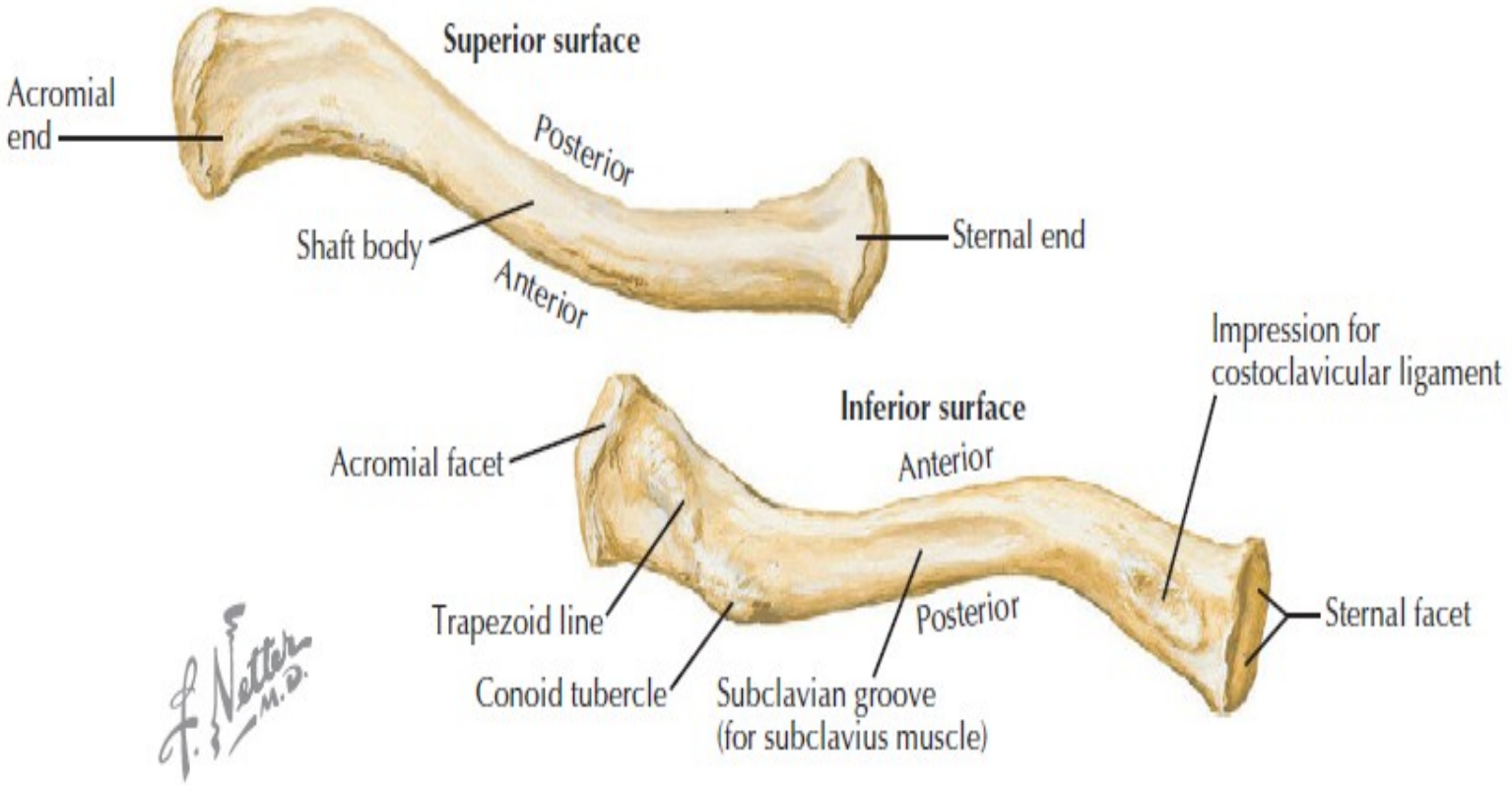
Hard callus

Through endochondral ossification and direct bone formation, woven bone replaces the soft callus to create a hard callus around the broken fragments of bone.

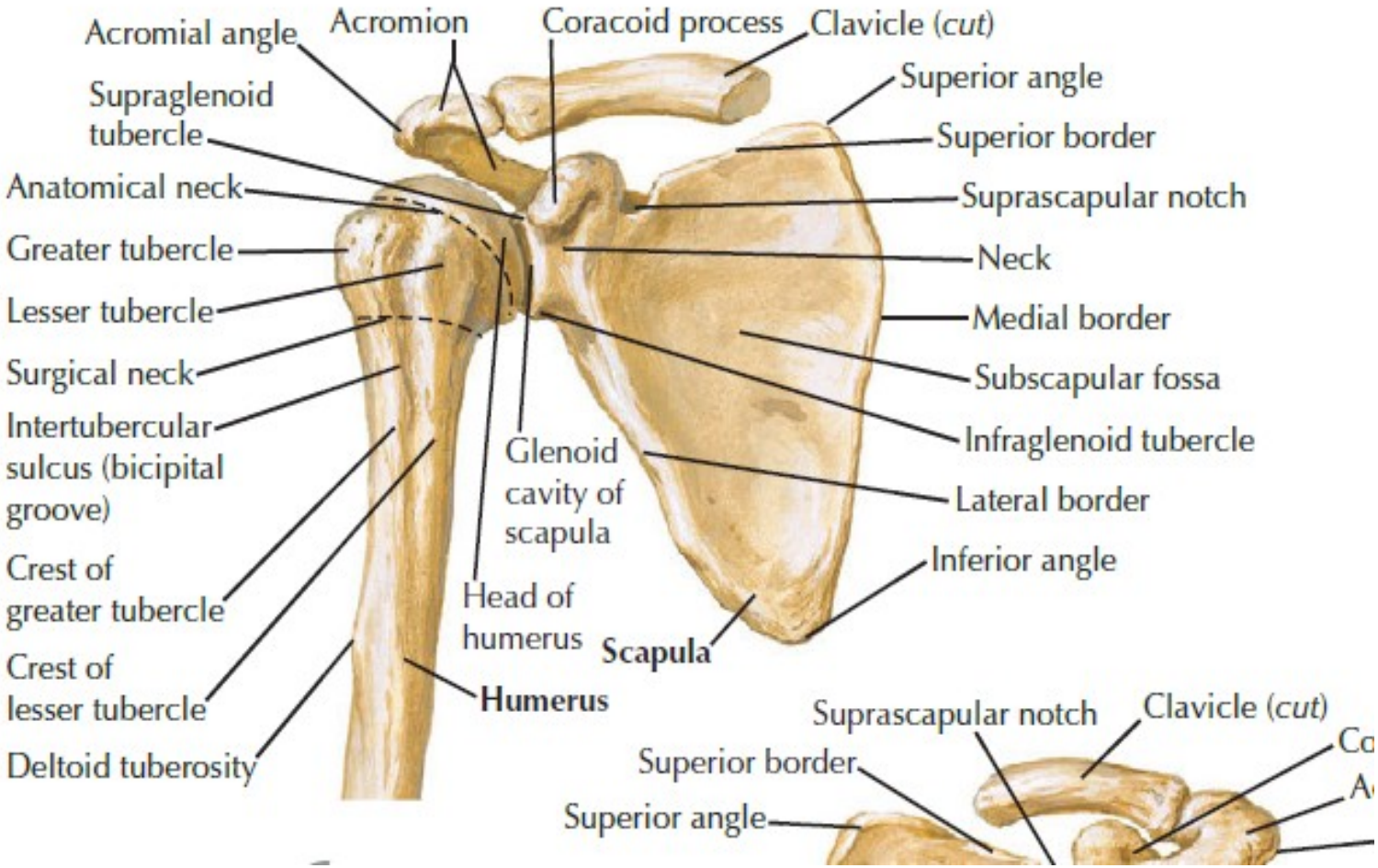
Remodeling

Over time, mechanically strong, highly organized cortical bone replaces the weaker, disorganized woven bone. Because it is continually remodeled, bone is the only tissue to heal without a scar.

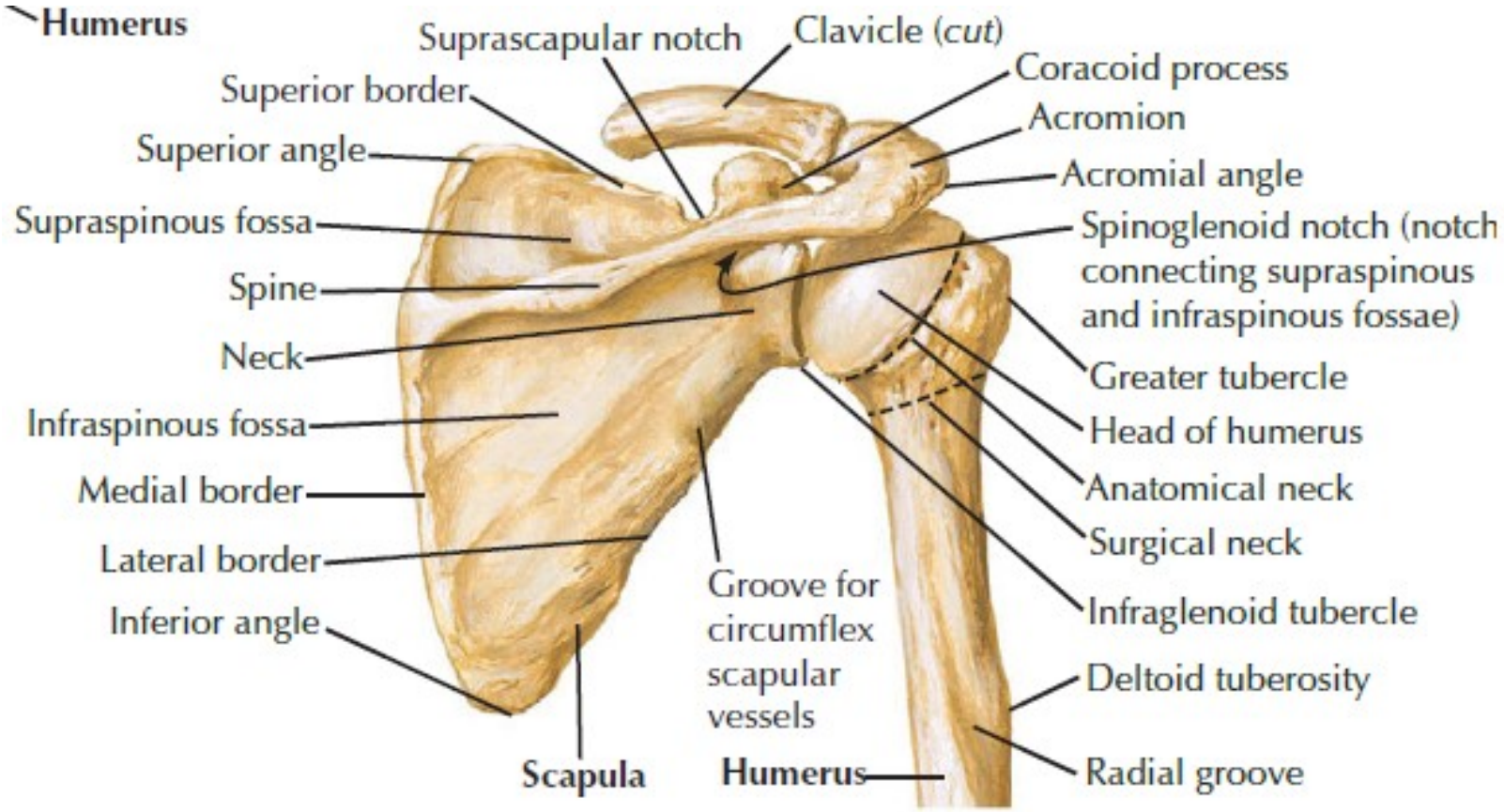
CLAVICLE

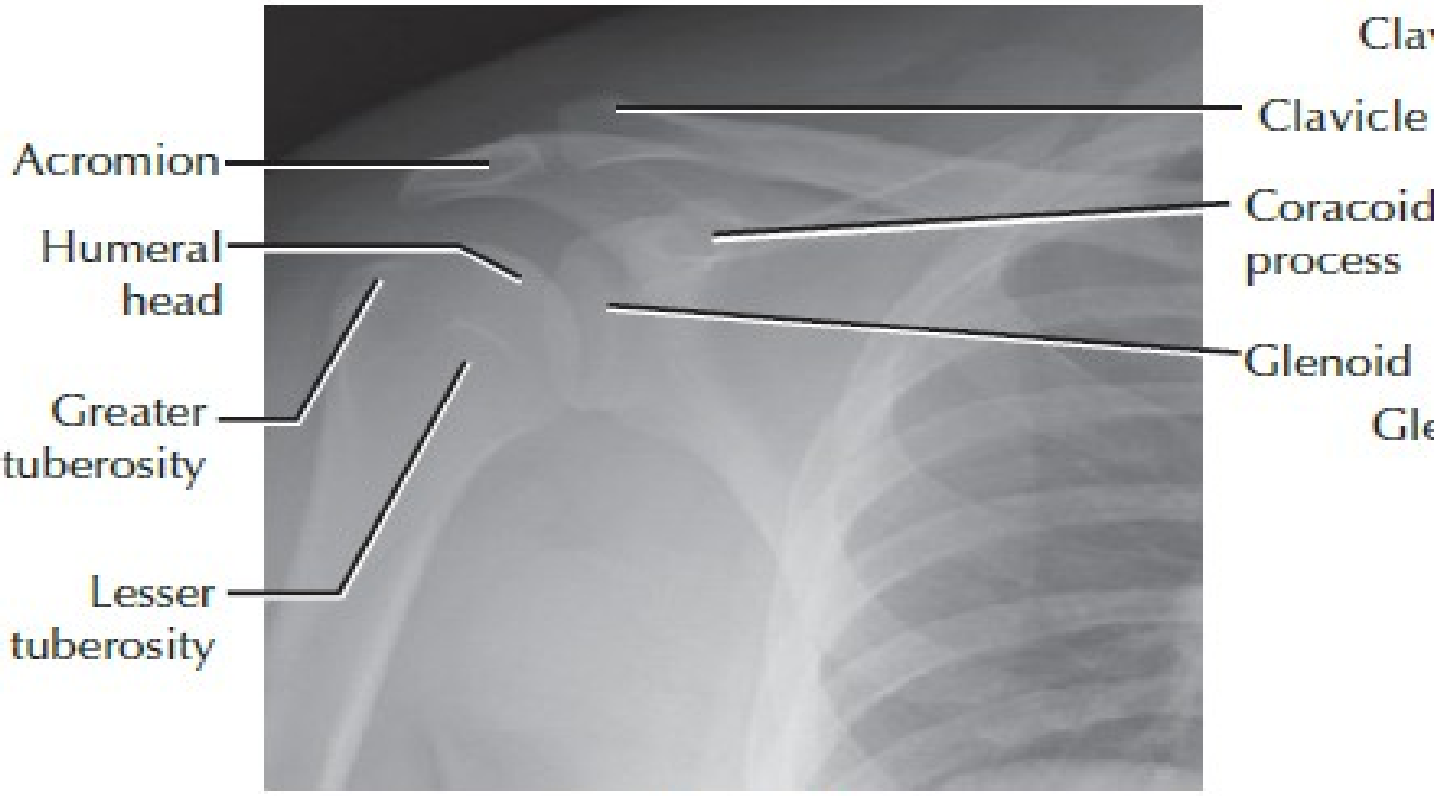

Superior surface
Acromial end
Posterior
Shaft body
Anterior
Sternal end
Impression for costoclavicular ligament
Inferior surface
Acromial facet
Anterior
Trapezoid line
Posterior
Sternal facet
Conoid tubercle
Subclavian groove (for subclavius muscle)
F. Netter M.D.

SHOULDER GRIDLE



SHOULDER GRIDLE




Cla
Clavicle
Acromion
Coracoid
process
Humeral
head
Glenoid
Gle
Greater
tuberosity
Lesser
tuberosity

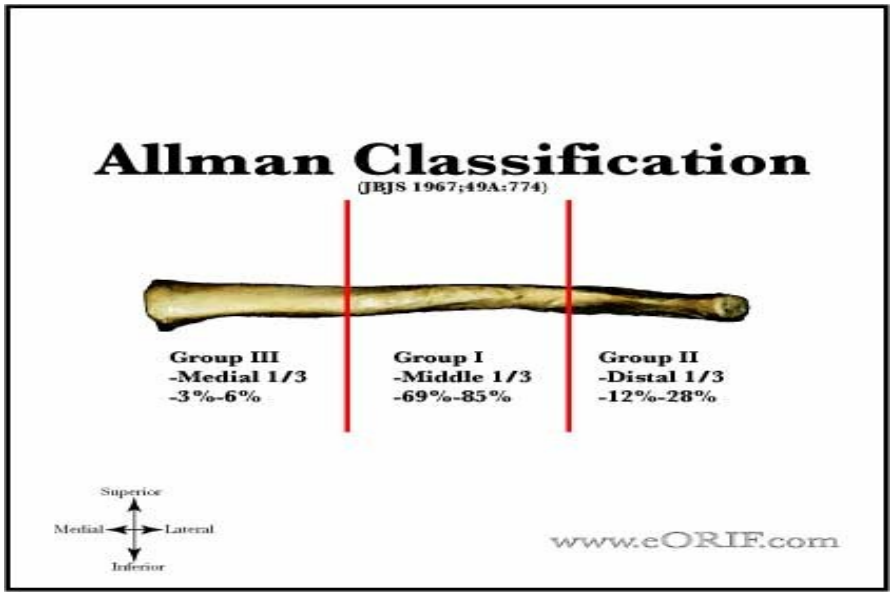
X-ray, AP

CLAVICLE FX

- Most common fx
- 80 % in middle third

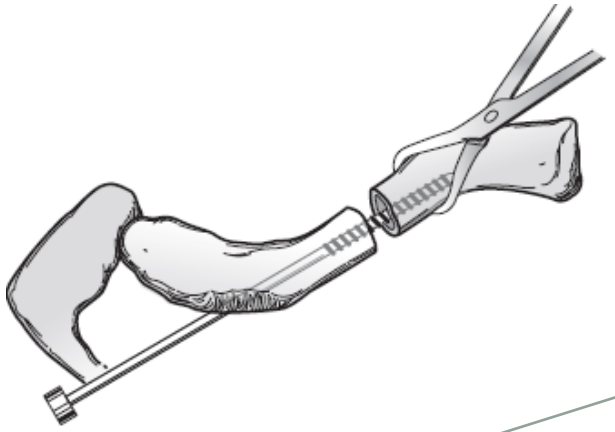
- Closed treatment for most groups 1& 3 fxs

- ORIF for fxs severely shortened, tented, open, associated with vascular injuries

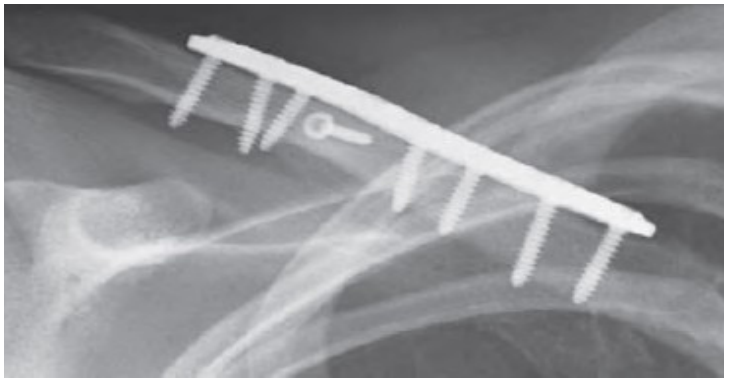


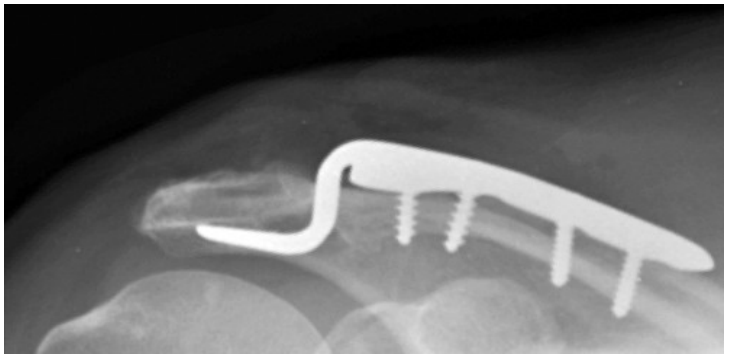
CLAVICLE FIXATION DEVICES

- Intramedullary Pinning or Screw



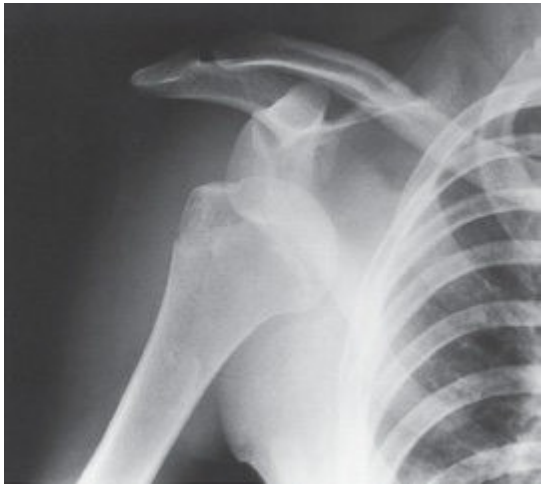
- ORIF





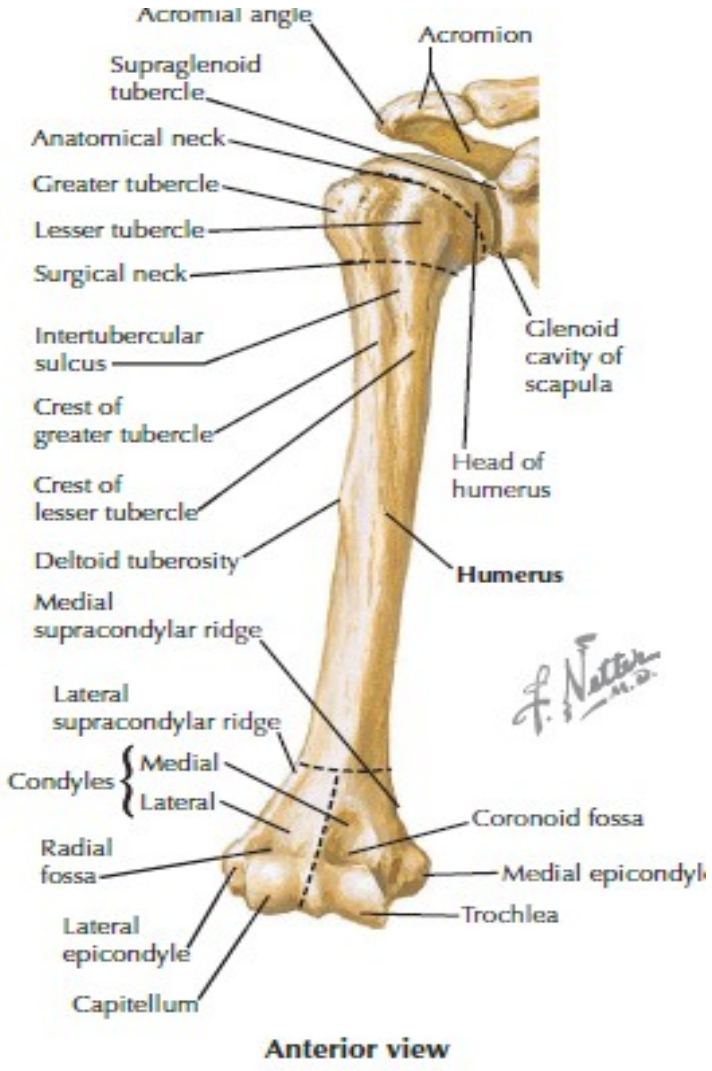
SHOULDER DX

- Anterior shoulder Dx

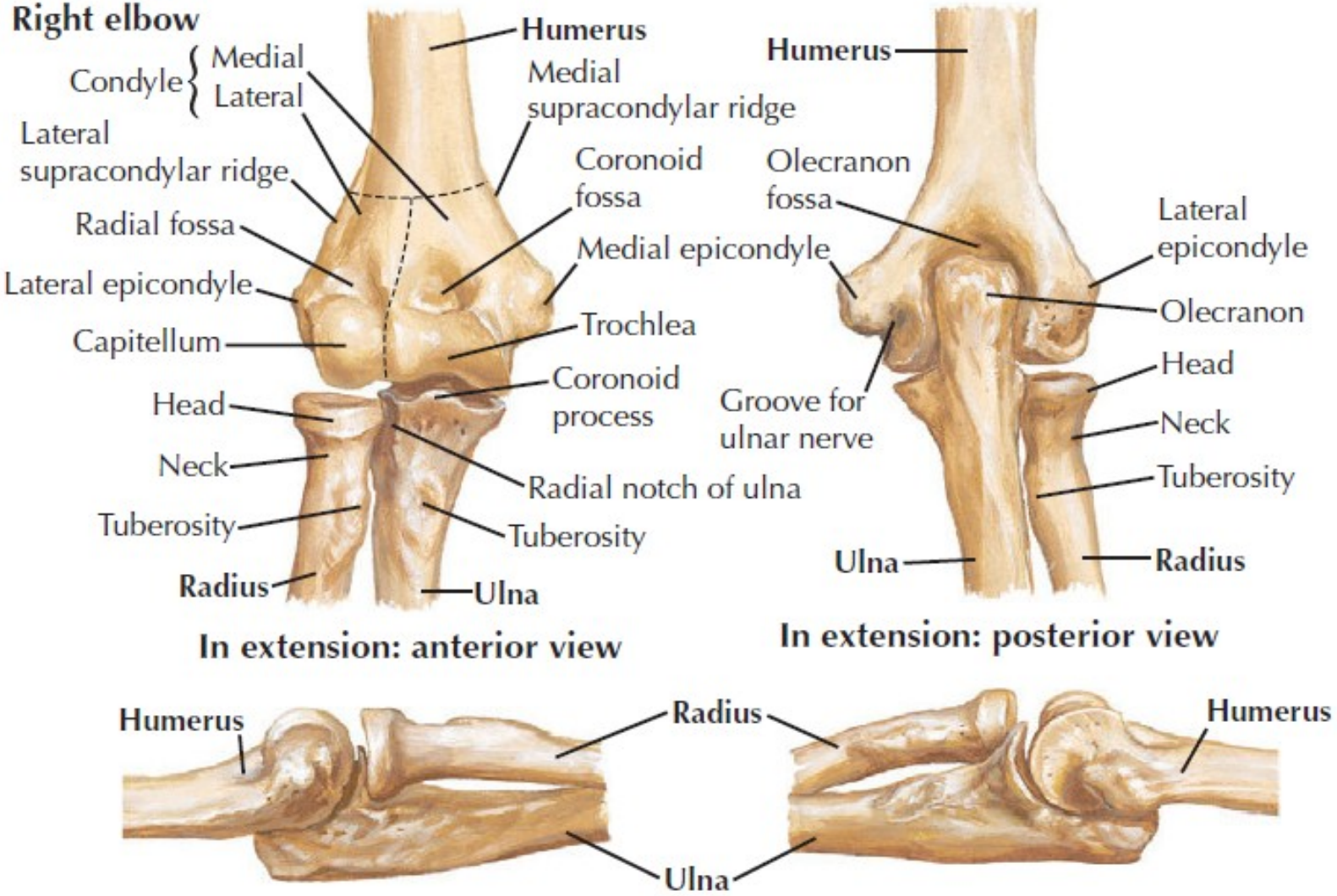


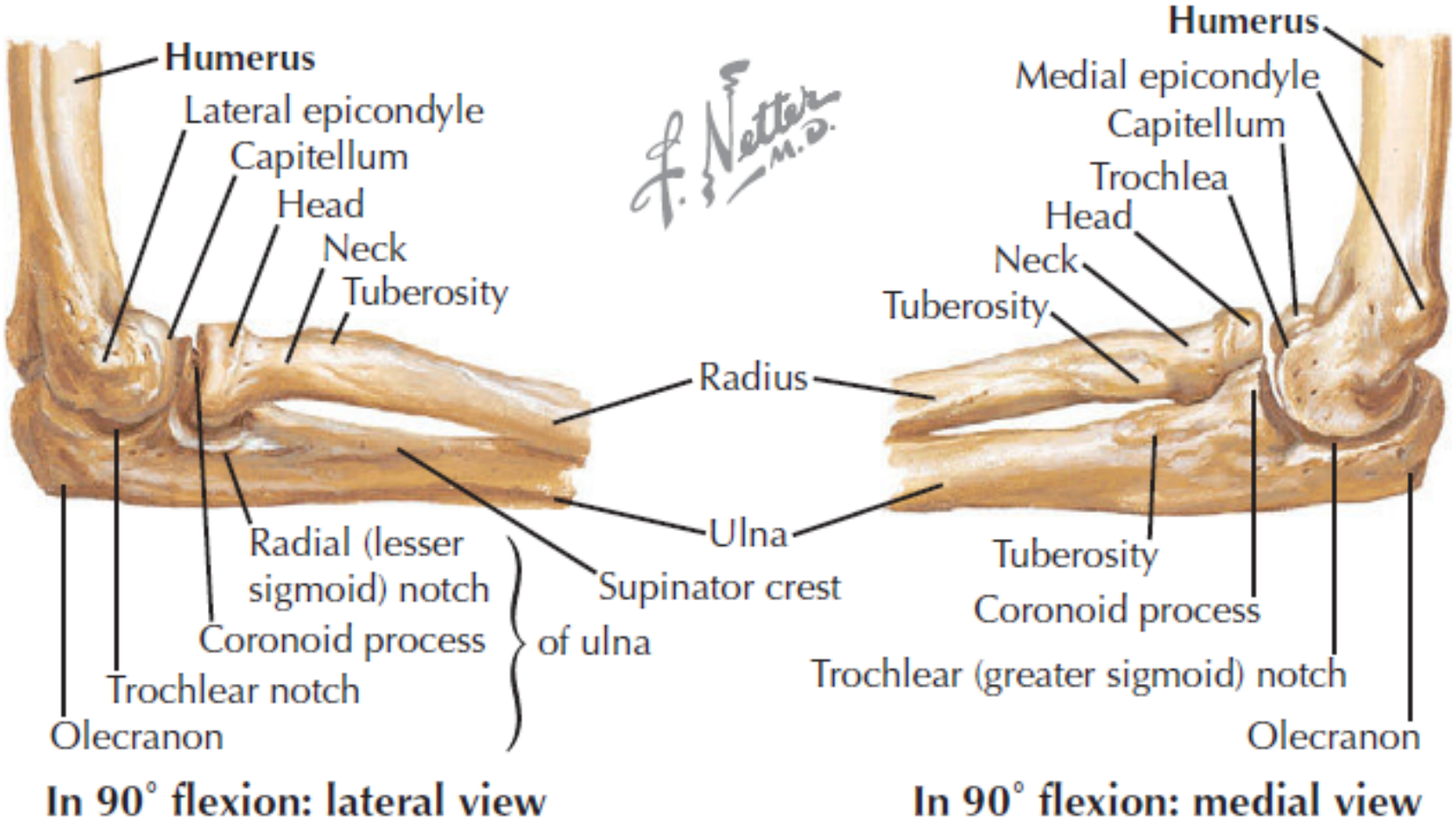
- Posterior shoulder Dx

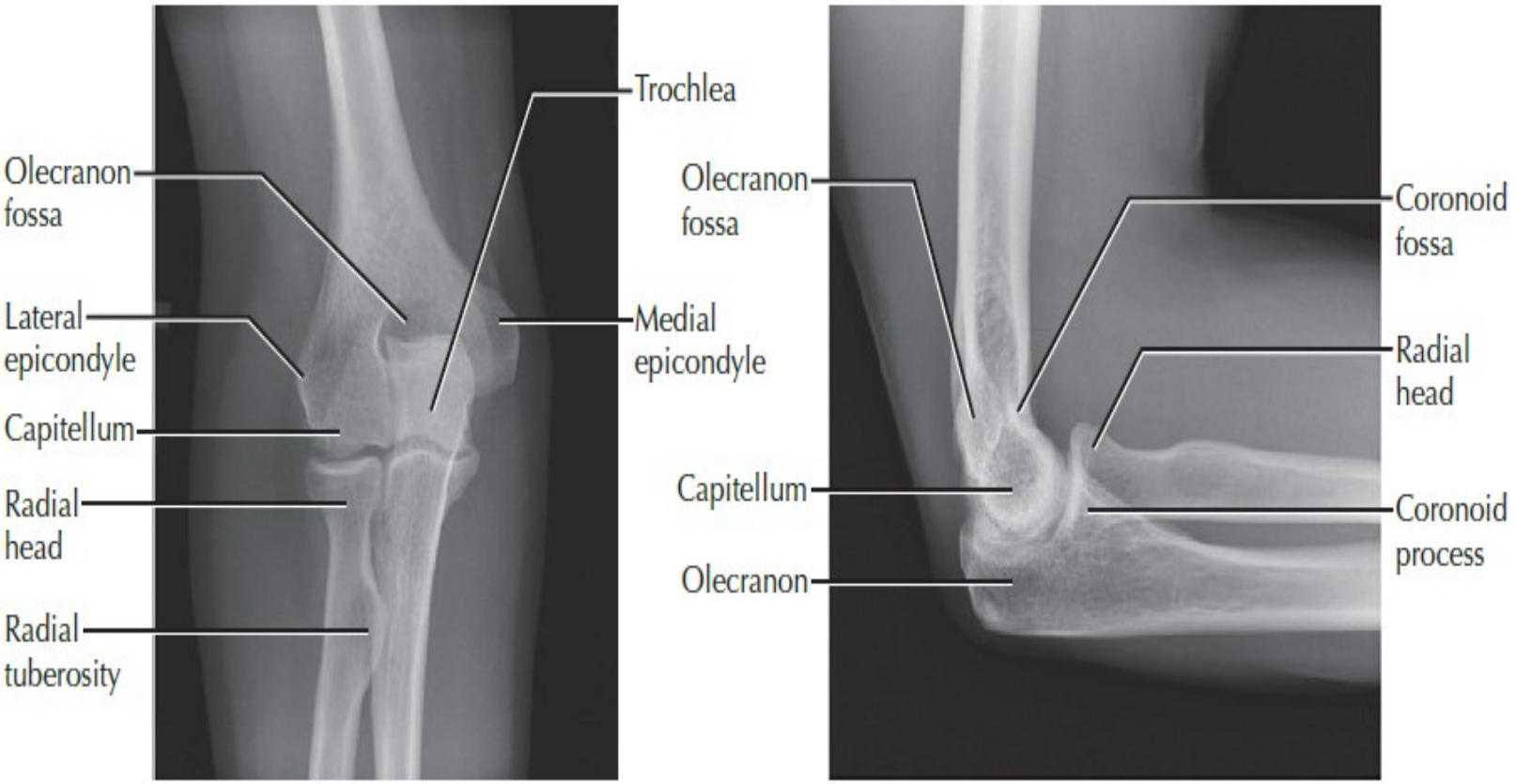
HUMERUS Fx


Acromial angle
Acromion
Supraglenoid tubercle
Anatomical neck
Greater tubercle
Lesser tubercle
Surgical neck
Intertubercular sulcus
Crest of greater tubercle
Crest of lesser tubercle
Deltoid tuberosity
Glenoid cavity of scapula
Head of humerus
Humerus
Medial supracondylar ridge
Lateral supracondylar ridge
Condyles
Medial
Lateral
Radial fossa
Coronoid fossa
Medial epicondyle
Trochlea
Lateral epicondyle
Capitellum
Anterior view


Acromion
Greater tubercle
Head of humerus
Anatomical neck
Surgical neck
Infraglenoid tubercle
Deltoid tuberosity
Radial groove
Humerus
Medial supracondylar ridge
Medial epicondyle
Lateral supracondylar ridge
Olecranon fossa
Lateral epicondyle
Trochlea
Groove for ulnar nerve


Right elbow
Humerus
Condyle
Medial
Lateral
Medial supracondylar ridge
Lateral supracondylar ridge
Coronoid fossa
Radial fossa
Medial epicondyle
Lateral epicondyle
Trochlea
Capitellum
Coronoid process
Head
Neck
Radial notch of ulna
Tuberosity
Tuberosity
Radius
Ulna
In extension: anterior view
Humerus
Olecranon fossa
Lateral epicondyle
Olecranon
Groove for ulnar nerve
Head
Neck
Tuberosity
Ulna
Radius
In extension: posterior view
Humerus
Radius
Ulna
Humerus


Humerus
Lateral epicondyle
Capitellum
Head
Neck
Tuberosity
Radius
Ulna
Radial (lesser sigmoid) notch
Coronoid process
Trochlear notch
Olecranon
Supinator crest
of ulna
In 90° flexion: lateral view
Humerus
Medial epicondyle
Capitellum
Trochlea
Head
Neck
Tuberosity
Tuberosity
Coronoid process
Trochlear (greater sigmoid) notch
Olecranon
In 90° flexion: medial view



Elbow x-ray, AP

Elbow x-ray, lateral

PROXIMAL HUMERUS Fx

- Common fx
- Based on 4 anatomic parts
  - anatomic neck
  - surgical neck
  - GT
  - LT
- Most non displaced fx are treated conservatively
- Displaced fx are treated operatively

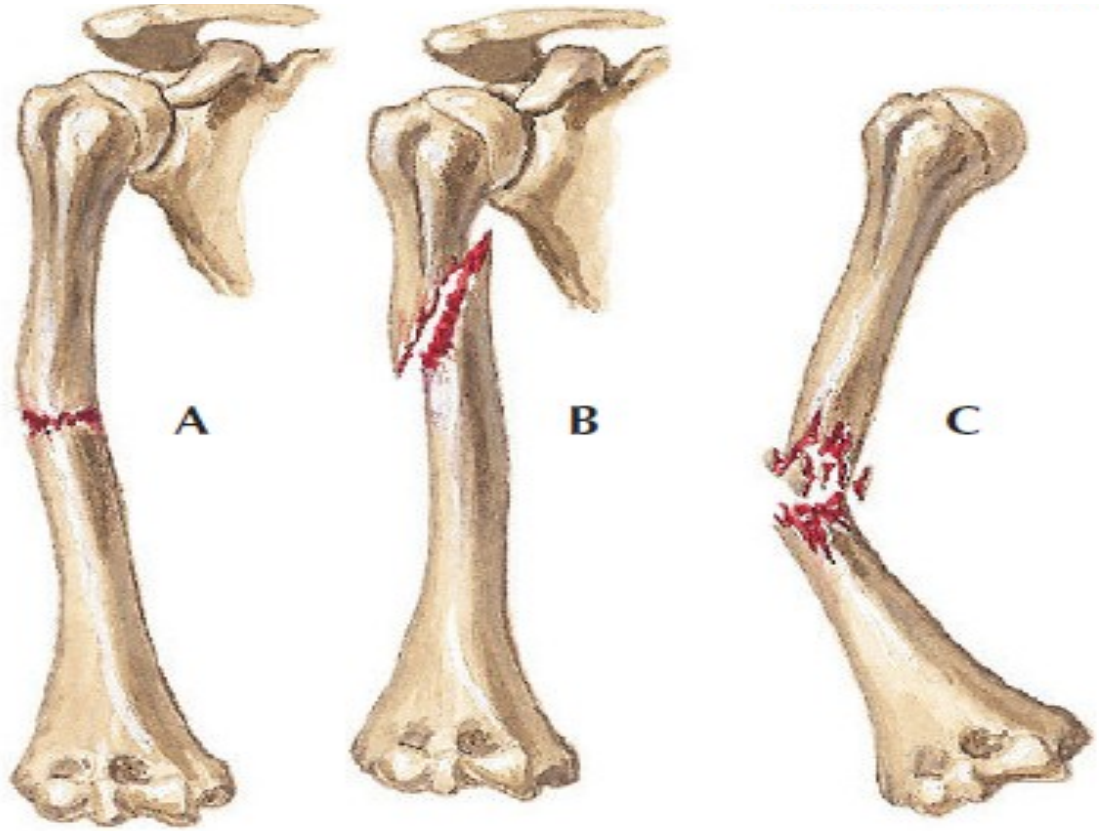
PROXIMAL HUMERUS Fx

- Operative treatment include

CRIF using pins

ORIF using plate & screw

HUMERAL SHAFT Fx



A. Transverse fracture of midshaft
B. Oblique (spiral) fracture
C. Comminuted fracture with marked angulation

HUMERAL SHAFT Fx

- Common long bone fracture

- Cast/brace: acceptable alignment

  3cm shortening

  20° A/P angulation

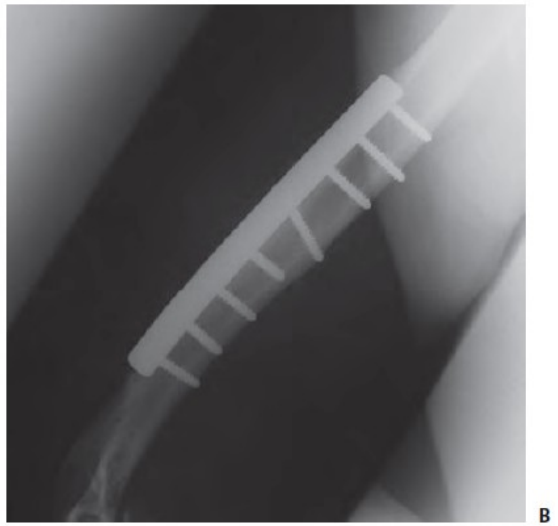
  30°varus/valgus angulation

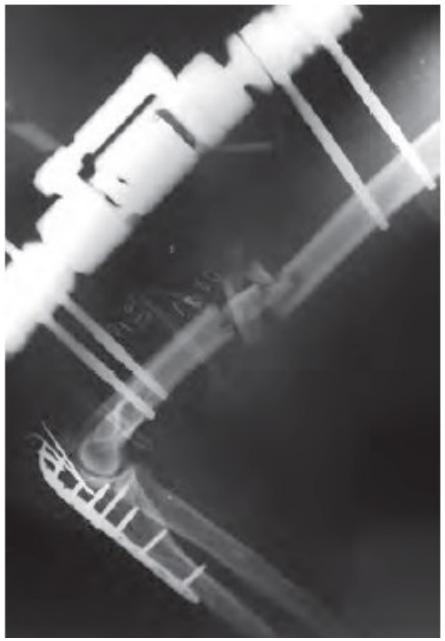
- Surgical treatment:
- Open fx, flaoating elbow, segmental fx, polytrauma,
- vascular injury

FIXATION METHODS

intramedullary nailing

plating





external fixation

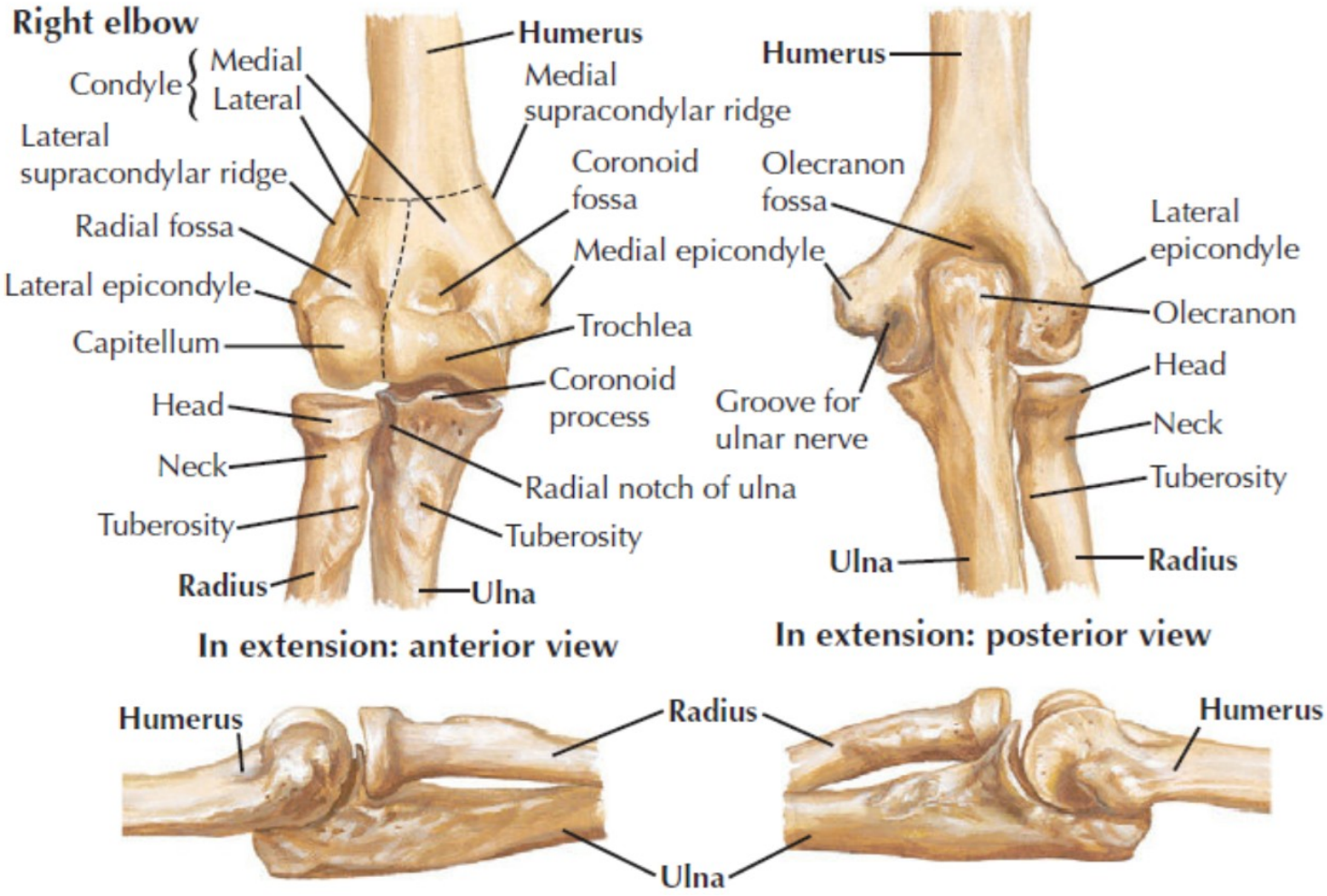
DISTAL HUMERUS FX

- Most often intraarticular
- Supracondylar fx in children
- Nonoperative: rarely indicated
- Surgical: ORIF (plates & screws)

DISTAL HUMERUS FX

C

ELBOW Fx and Dx



OLECRANON Fx

- Intraarticular fracture: congruity important for good results
- Nondisplaced : Long arm cast

- Displaced:

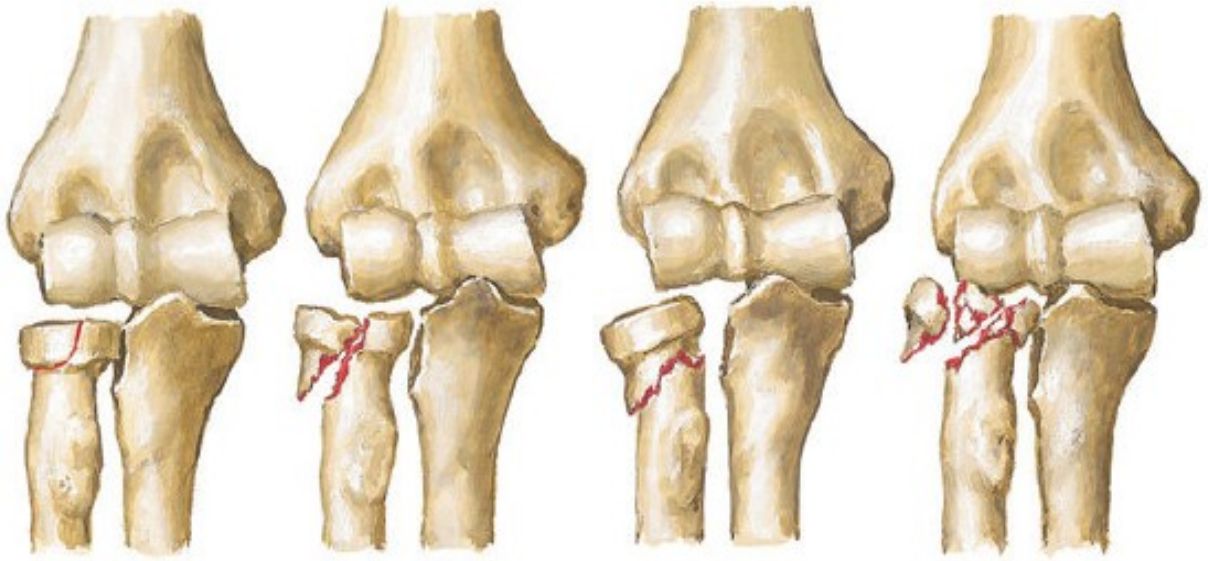
Transverse: ORIF tension band or IM screw.

Oblique/comminuted: ORIF with contoured plate

FIXATION METHODS

RADIAL HEAD Fx

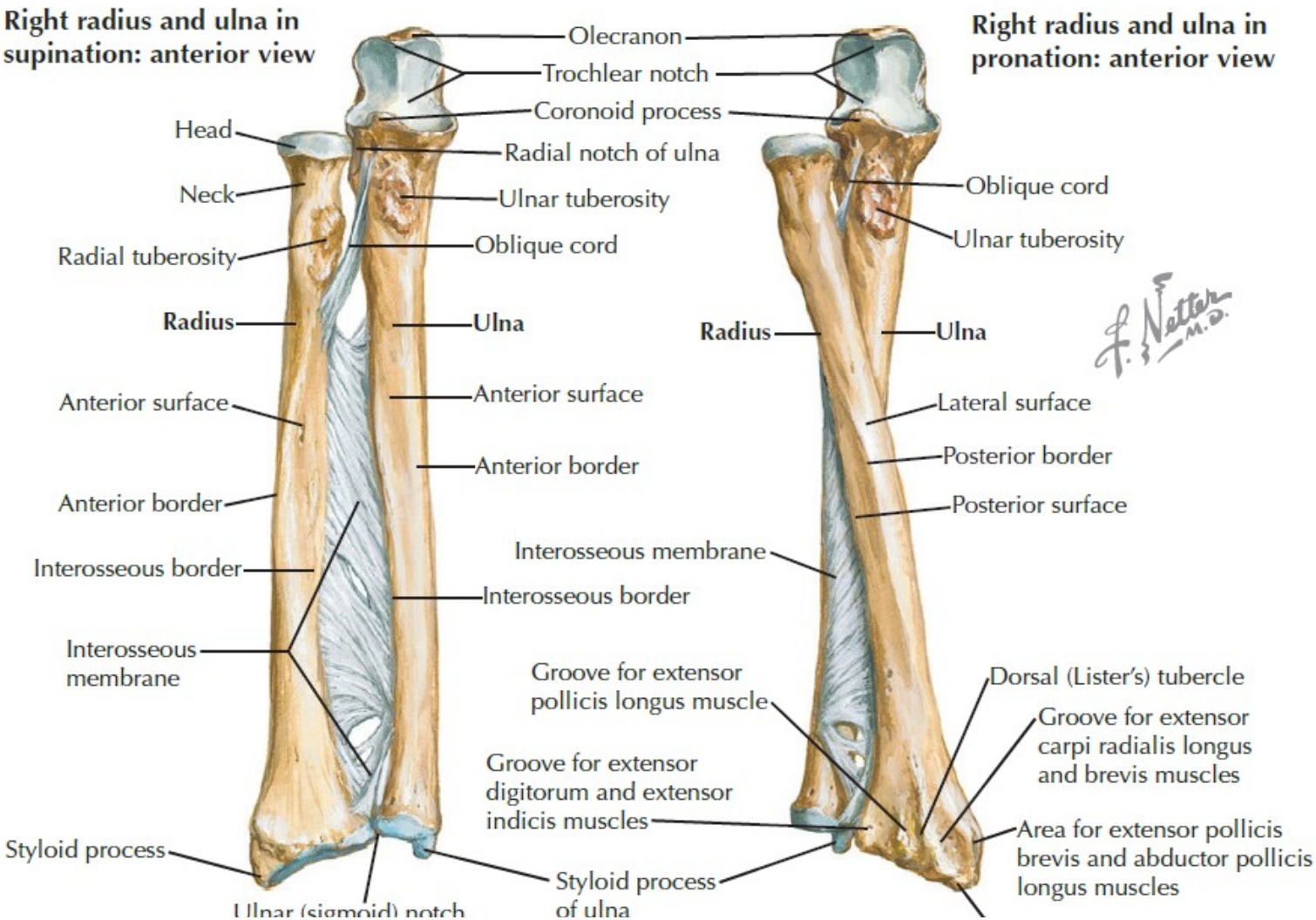
- Intraarticular fracture
- Classification



RADIAL HEAD Fx

- Type I: Elbow aspiration, sling for 3 days, early ROM
- Type II: ORIF (esp. for mechanical block to motion)
- Type III: Radial head excision and/or RH arthroplasty

RADIOULNA Fx



RADIOULNA Fx

- Isolated
- Both bone
- Associated injury
  - Monteggia
  - Galaezzi


L
a
L
b

TREATMENT

- Non operative : Cast ,,, Brace

- Operative : Most often

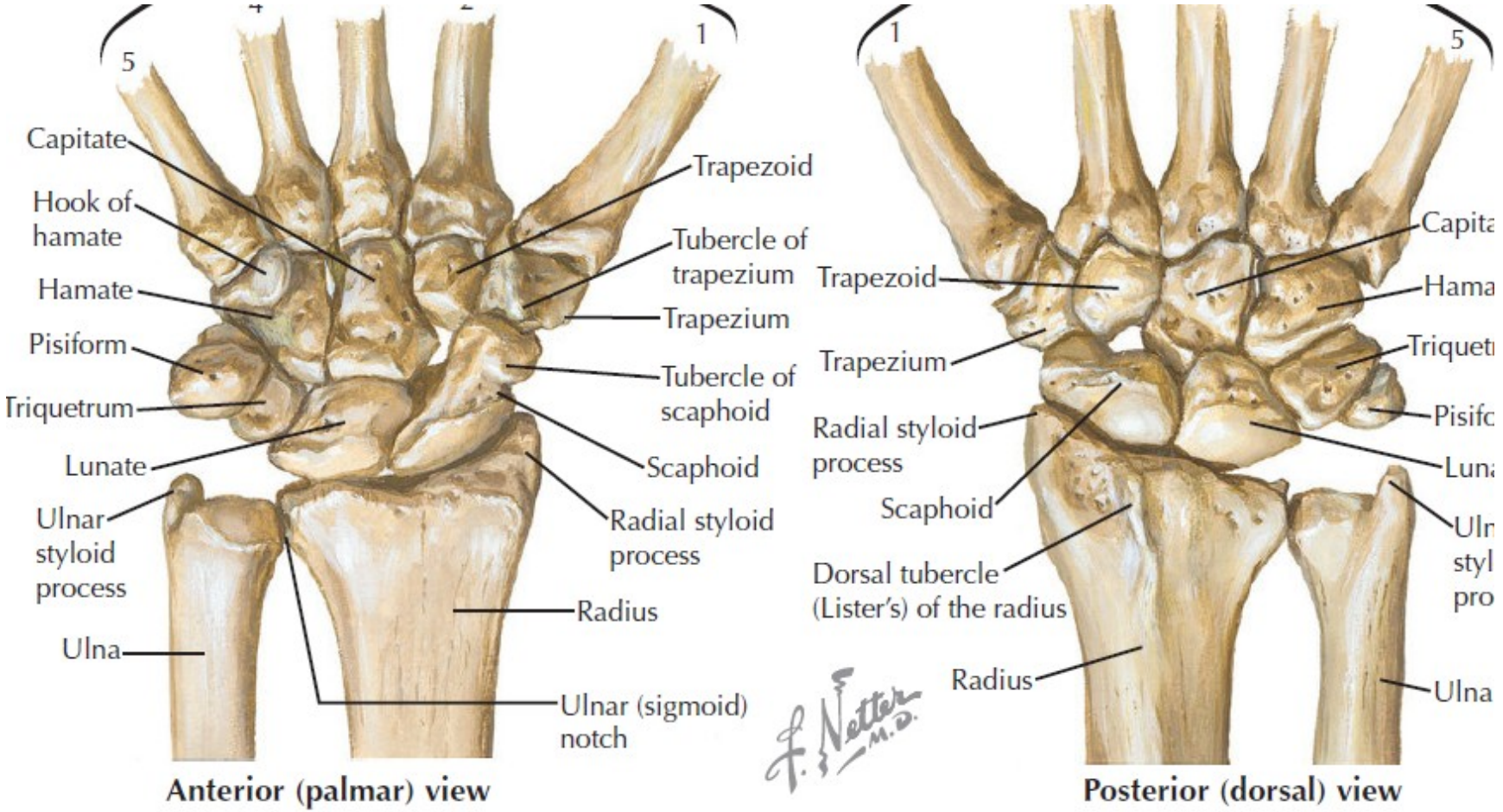
Plate fixation

IMN

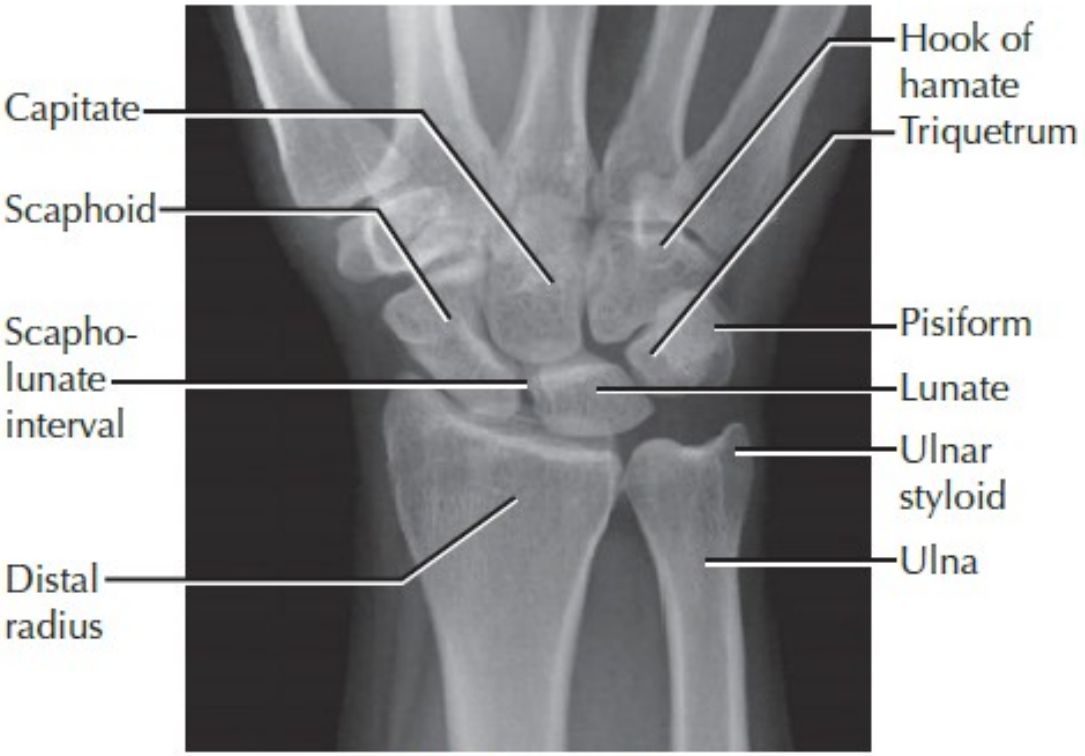
External fixator

c

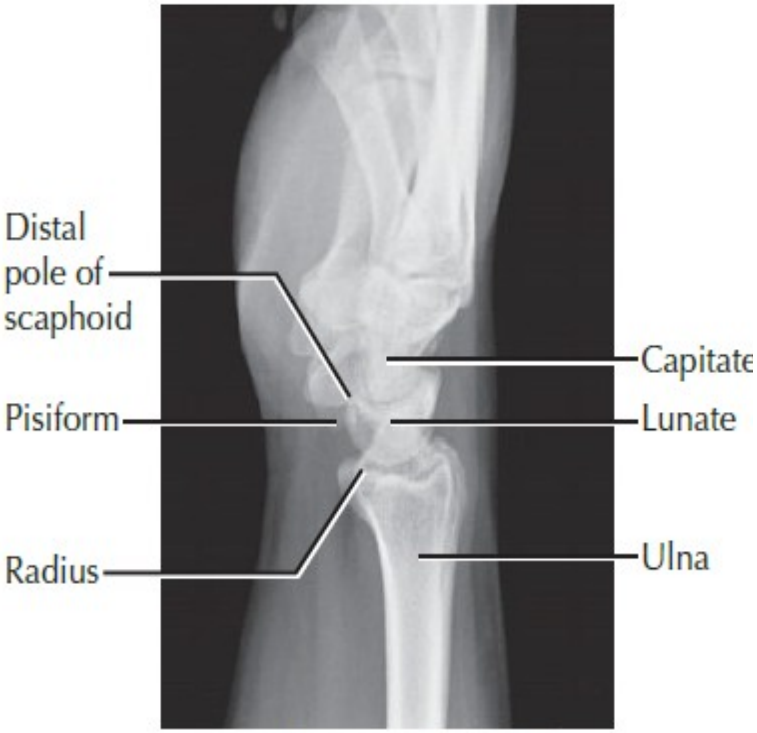
WRIST Fx


5
1
Capitate
Hook of hamate
Hamate
Pisiform
Triquetrum
Lunate
Ulnar styloid process
Ulna
Trapezoid
Tubercle of trapezium
Trapezium
Tubercle of scaphoid
Scaphoid
Radial styloid process
Radius
Ulnar (sigmoid) notch
Anterior (palmar) view
1
5
Trapezoid
Trapezium
Radial styloid process
Scaphoid
Dorsal tubercle (Lister's) of the radius
Radius
Capita
Hama
Triquet
Pisifo
Luna
Ulna
styl
pro
Posterior (dorsal) view

WRIST Fx



Wrist x-ray, AP



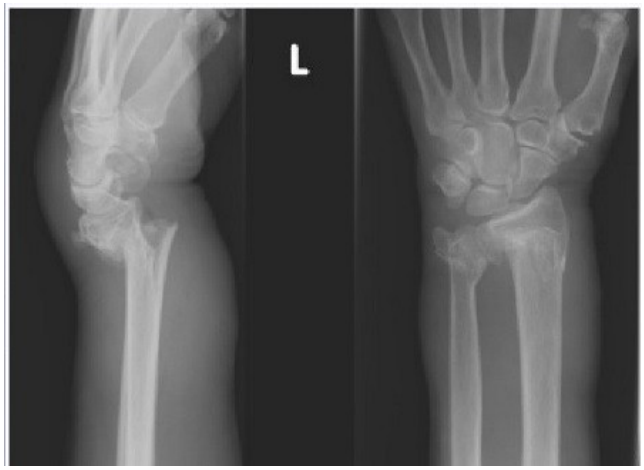
Wrist x-ray, lateral

DISTAL RADIUS Fx

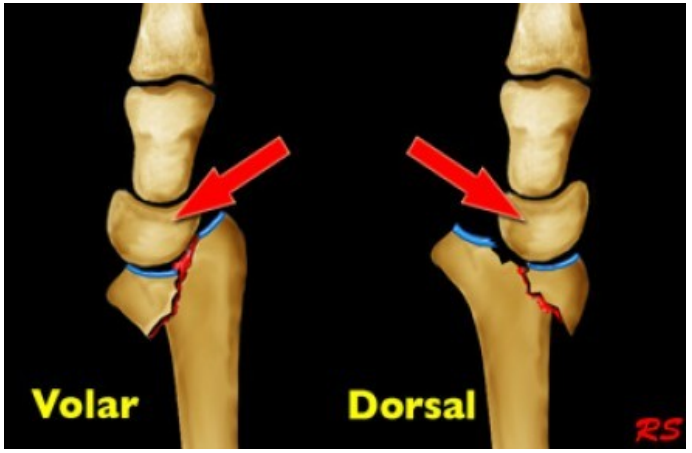
- Extra articular

  Colles Fx

  Smith Fx



- Intra articular
- Volar barton
- Dorsal barton



TREATMENT

- Based on patient's demand & Fx Pattern
- Non Operative : Casting

- Operative :

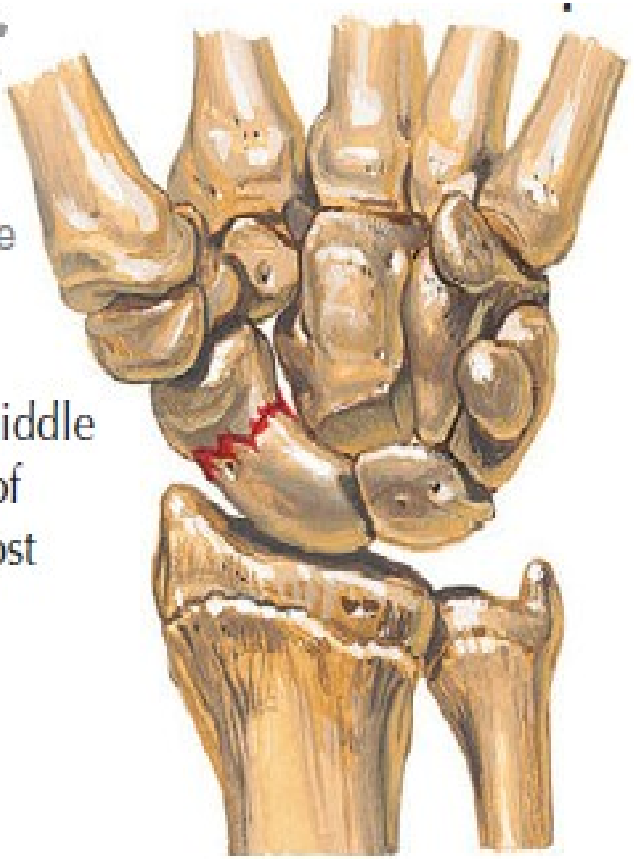
PCP

ORIF

External Fixator

SCAPHOID Fx

F. Netter M.D.
with
C.A. Luce



Fracture of middle third (waist) of scaphoid (most common)

Less common fractures

Tubercle

Distal pole

Vertical shear

Proximal pole

TREATMENT

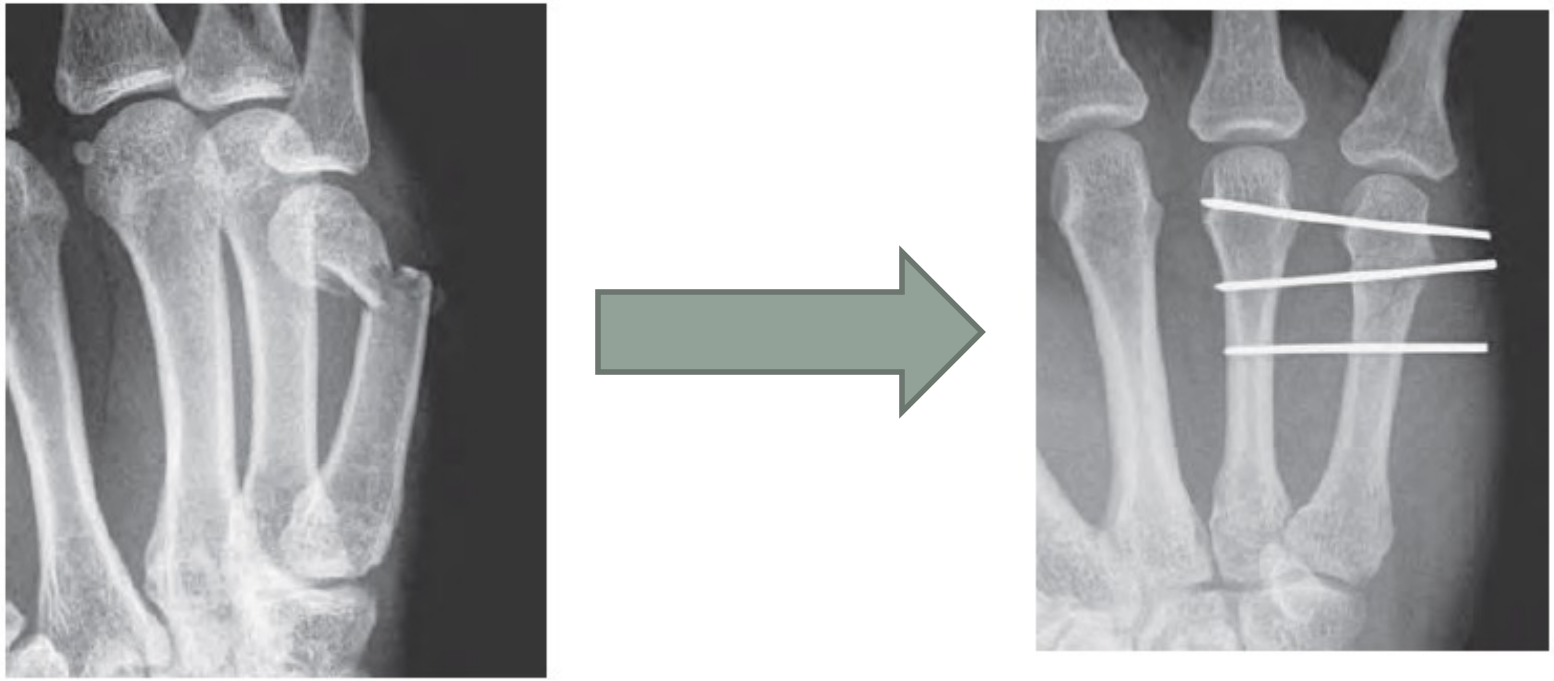
- Non operative : Casting

- Operative :

  Pining

  Screw

METACARPAL Fx



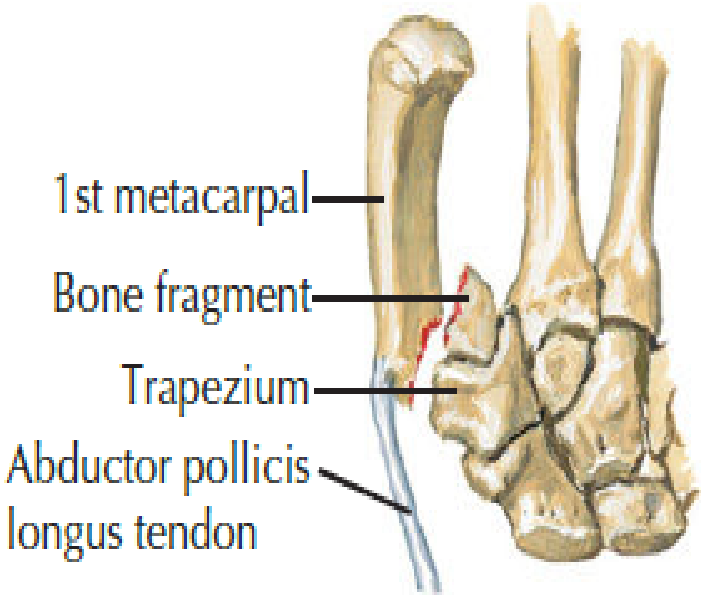
METACARPAL Fx

METACARPAL Fx

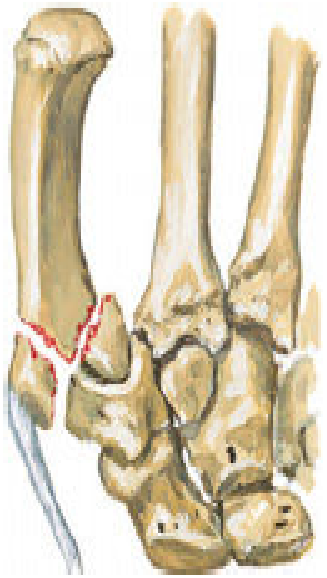
METACARPAL Fx

METACARPAL Fx

Fracture of Base of Metacarpals of Thumb



Type I (Bennett fracture). Intraarticular fracture with proximal and radial dislocation of 1st metacarpal. Triangular bone fragment sheared off



Type II (Rolando fracture). Intraarticular fracture with Y-shaped configuration

PHALANX Fx

PHALANX Fx

DEVICES FOR UPPER LIMB

- K wire or Pin

  Mostly for Hand and carpus, Distal radius , Children Fx……

- IMN

  Humerus , Radius, Ulna

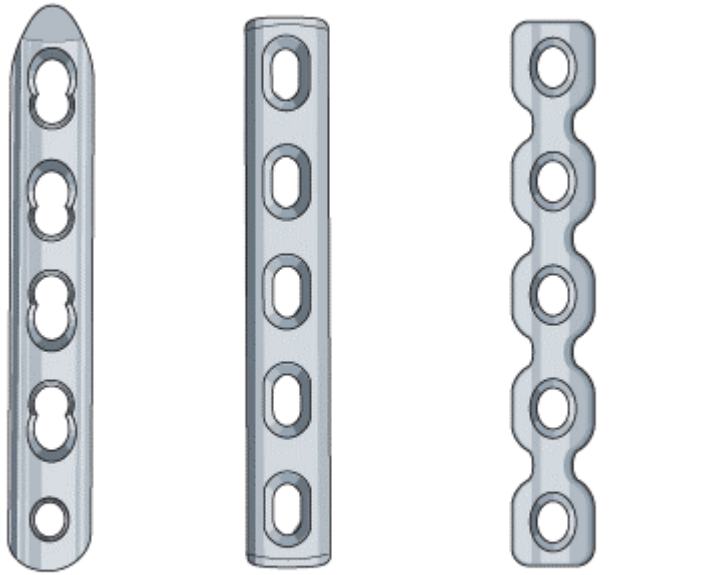
- PLATE

  Can be used anywhere

- EXTERNAL FIXATOR

- SCREW

PLATES



LCP DCP Reconstruction plate

PLATES

SCREW

4.0 mm Cancellous
Short Thread

3.5 Cortex Screw

4.0 mm Cancellous
Screw Full Thread

4.0 mm Cannulated Screw

6.5 mm Cancellous Screws,
Thread Length 16 mm

4.0 mm Canrulated Screw

4.5 Cortex Screw
310.014 to 060 with 2 mm difference

6.5 mm Cancellous Screws,
Thread Length 32 mm

SCREW