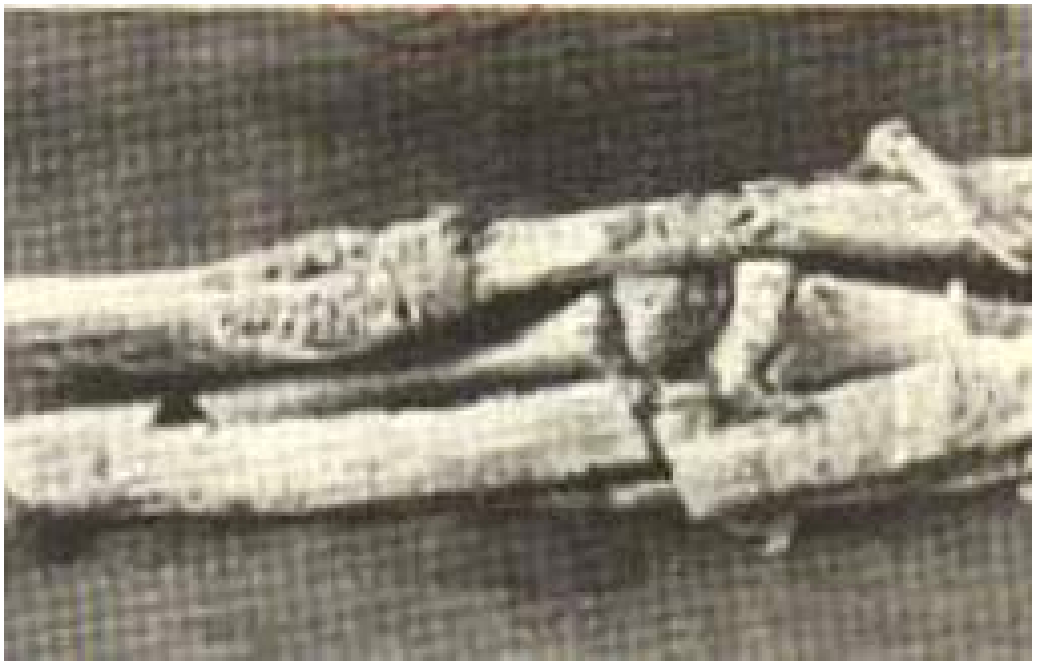
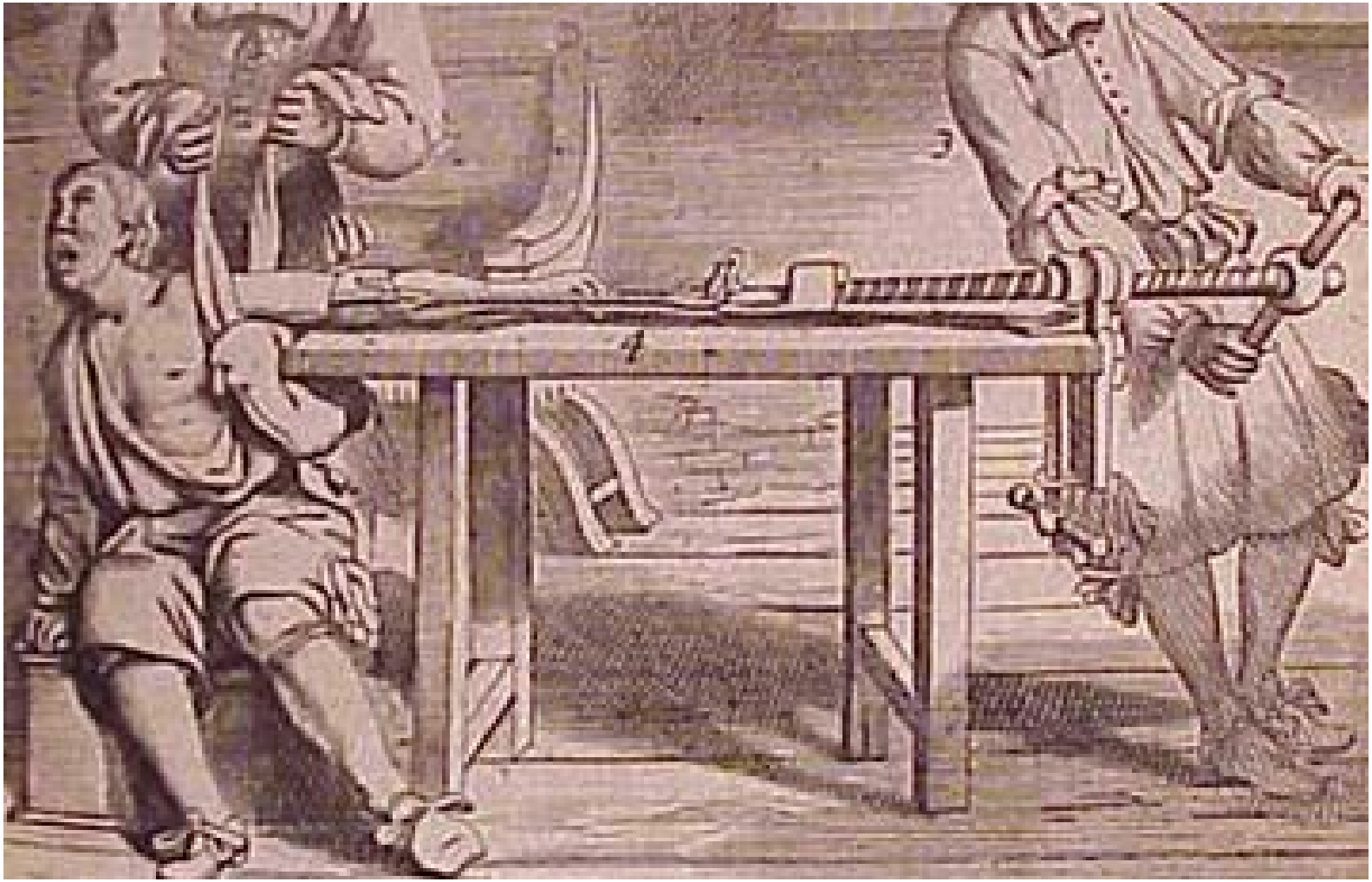
Upper limb fractures



Mithun Nambiar

Orthopaedic Resident

Royal Melbourne Hospital



http://janeaustensworld.files.wordpress.com/2010/10/17_skeleton.jpg

Principles of fracture management

- Restoration of anatomy
- Stable fracture fixation
- Preservation of blood supply
- Early mobilisation of limb and patient

Restoration of anatomy

- Length
- Alignment
- Rotation

Stable fracture fixation

- Allows for fracture healing

- Prevention of loss of anatomy
  - Length
  - Alignment
  - Rotation

Preservation of blood supply

- Soft tissue protection
  - Periosteum
  - Muscle
  - Arteries
  - Veins

http://www.ubortho.buffalo.edu/tree3.

Early mobilisation

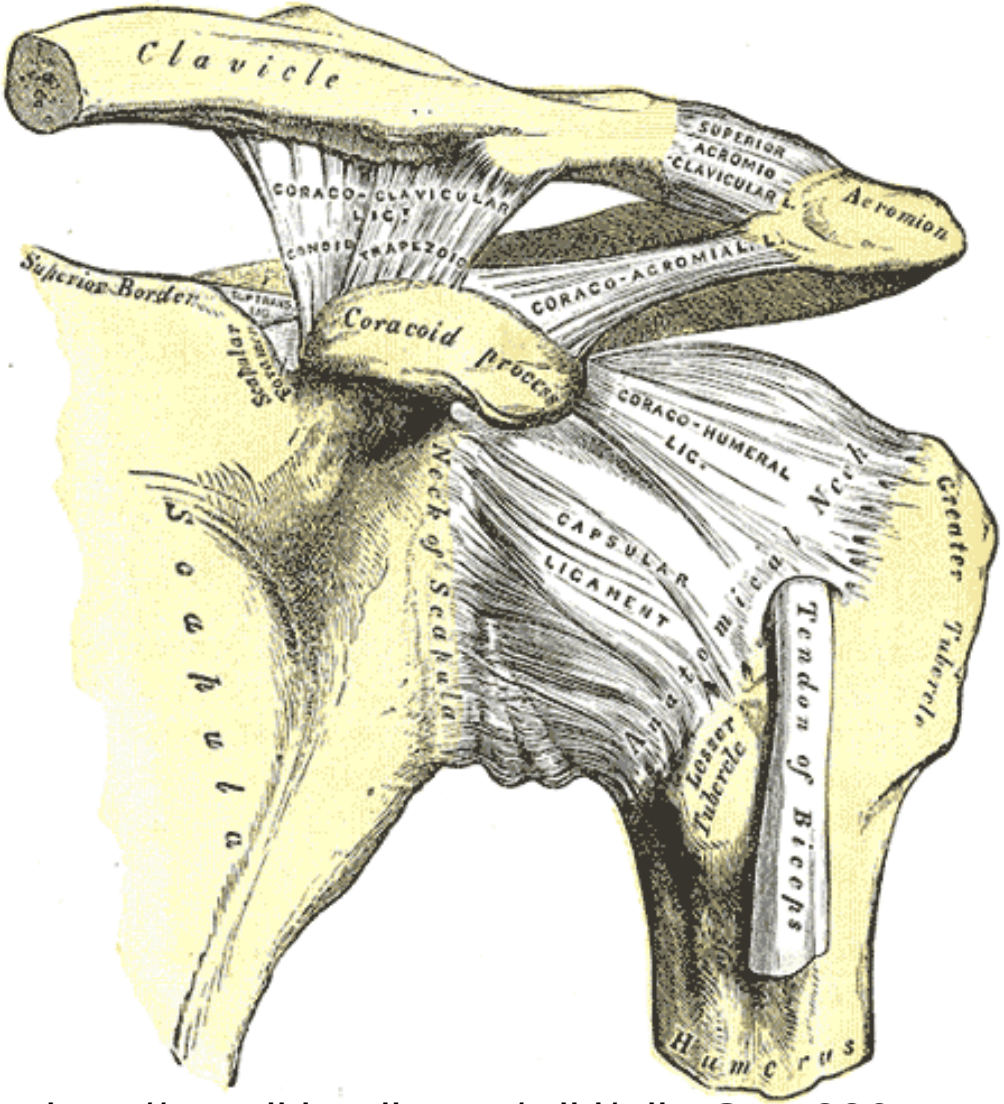
- Limb
  - Joint stiffness
  - Muscle atrophy
  - Contracture formation
- Patient
  - Pneumonia
  - DVT/Pulmonary embolus
  - Pressure sores
  - Hospital acquired infections

Management

- Operative
- Conservative

- Weight bearing status
- Wound management
- Antiobiotics
- Anticoagulation
- Smoking
- Immunomodulators

Clavicular fractures



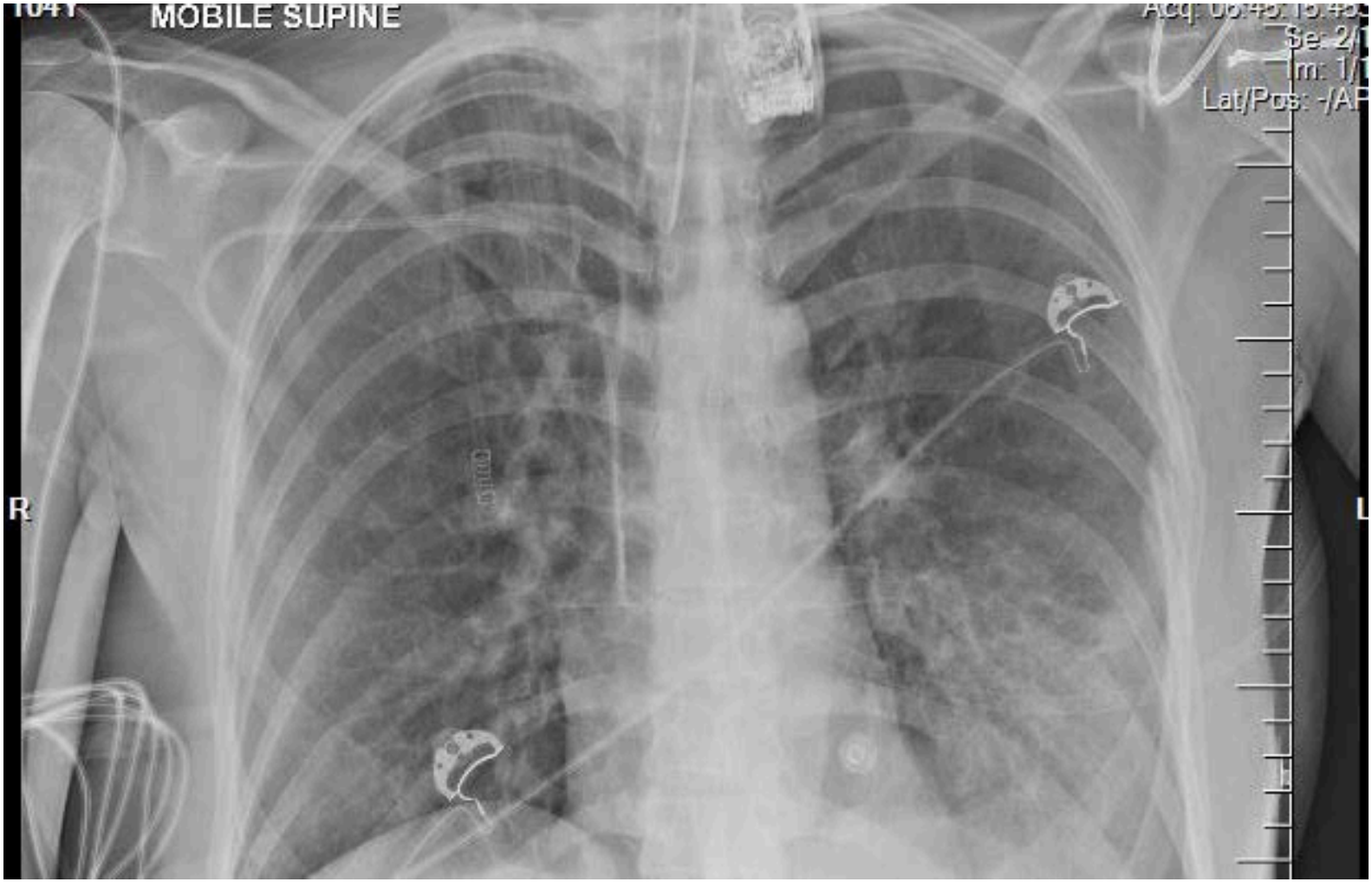
http://en.wikipedia.org/wiki/File:Gray326.png

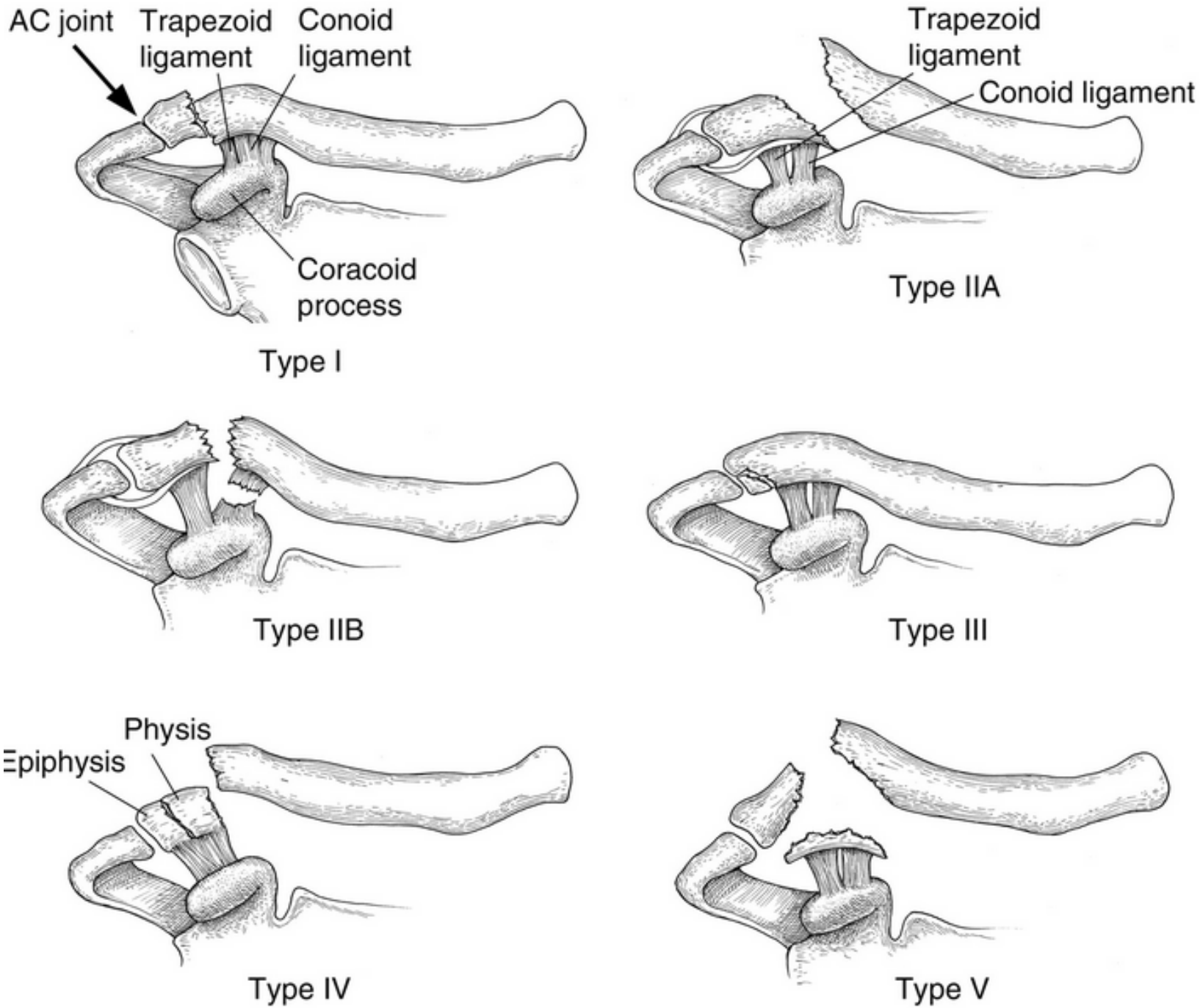
Clavicular fractures

- Medial 1/3 (5%)
  - Usually non-operative, operative if post. displacement
- Middle 1/3 (80%)
  - Non-operative if <100% displacement
  - Operative if >100% displaced
- Lateral 1/3 (10%)
  - Neer classification

http://eorif.com/clavicle-fracture-classification

http://www.orthobullets.com/trauma/1011/clavicle-fractures


MOBILE SUPINE
R



https://www.jaaos.org/content/19/7/392/F1.large.jpg

Clavicular fractures

- Non operative management
  - Sling vs Figure of 8
  - NWB 6 weeks
  - Range of movement exercises 2-4 weeks
- Risks
  - Non union
    - Lateral 1/3 (up to 50%)
    - Fracture displacement/shortening >2cm
  - Decreased shoulder strength

Clavicular fractures

- Operative management
  - Sling 7-10 days, then active range of motion
  - NWB 6 weeks, once union confirmed and pain free range of motion- strengthening
  - Full activity in 3 months
- Benefits
  - Faster union
  - Improved functional outcomes
  - Improved cosmesis
  - Improved shoulder function strength
- Risks
  - Implant removal

Clavicular fractures

Clavicular fractures

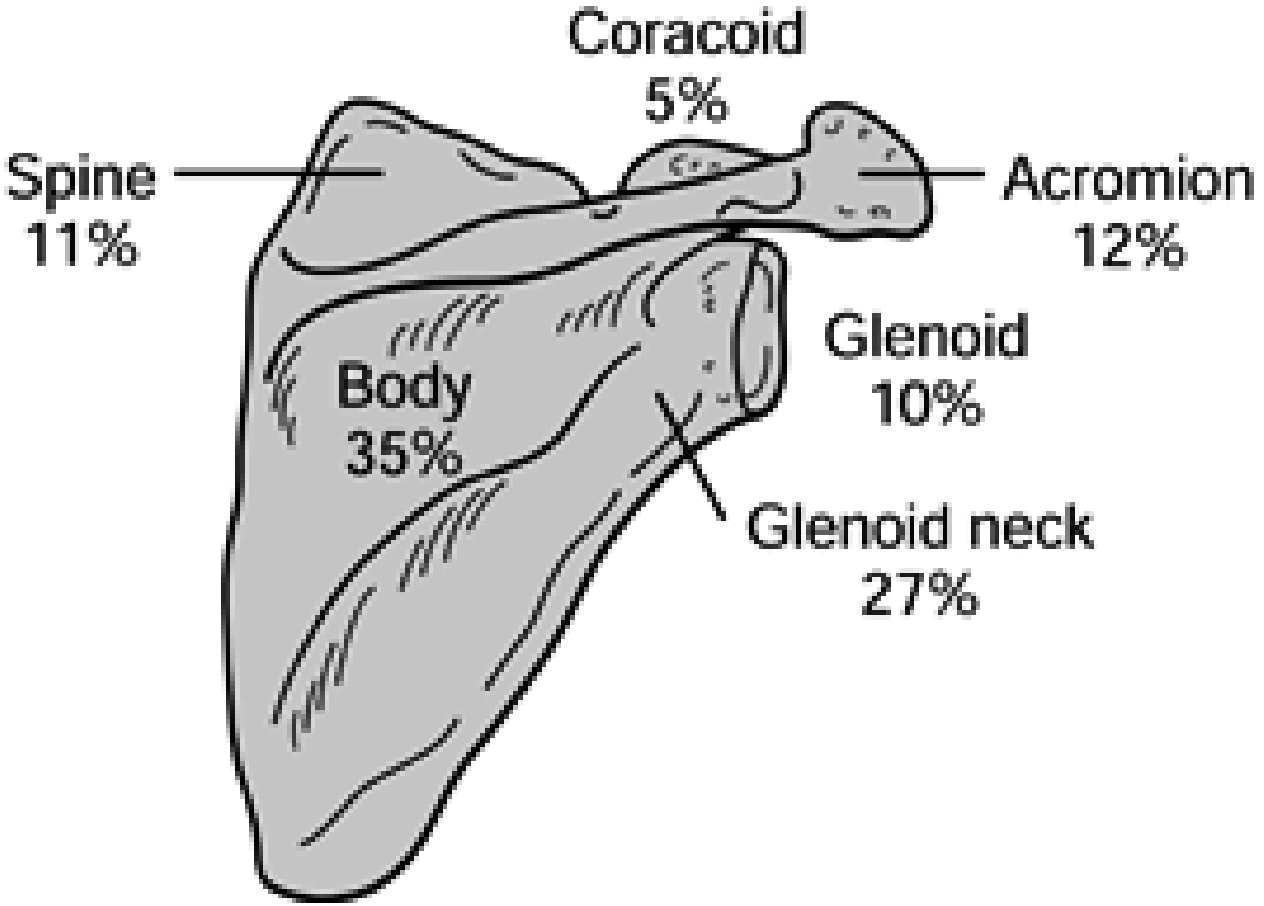
Clavicular fractures

Clavicular fractures

Scapular fractures

- Usually high energy mechanism
- Location
  - Acromion
  - Corocoid process
  - Neck of scapula
  - Body of scapula

Scapular fractures



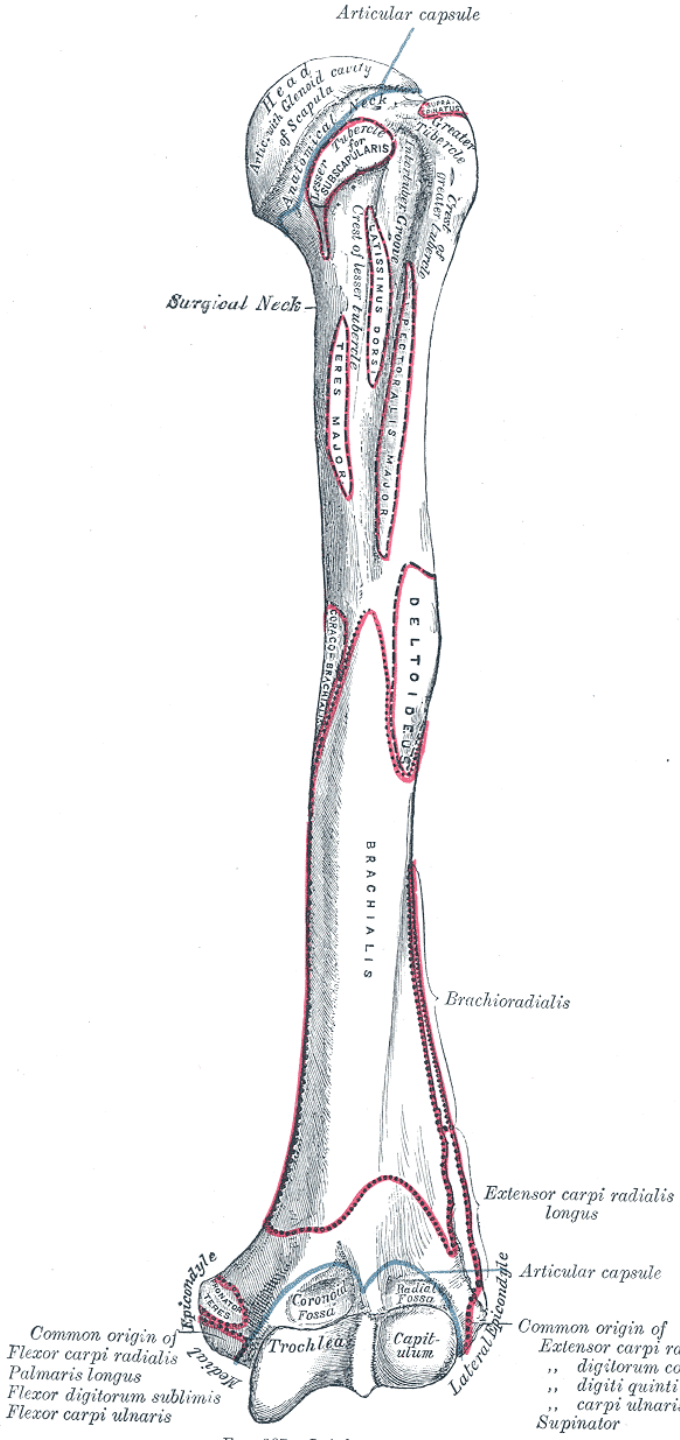
http://a248.e.akamai.net/7/248/432/20120426151227/www.msdlatinamerica.com/ebooks/ChapmansOrthopaedicSurgery/files/023489cd701b474692bcdaec6c52f9a8.gif

Scapular fractures

- Non operative management
  - 2 weeks sling, early motion
- ORIF
  - Glenohumeral instability
    - >25% glenoid
    - >5mm step-off
    - Medialisation of glenoid
  - Open fracture
  - Scapula neck (>40 degrees, 1cm)
  - Coracoid >1cm displacement

Humerus fractures

- Location
  - Proximal
  - Shaft
  - Distal



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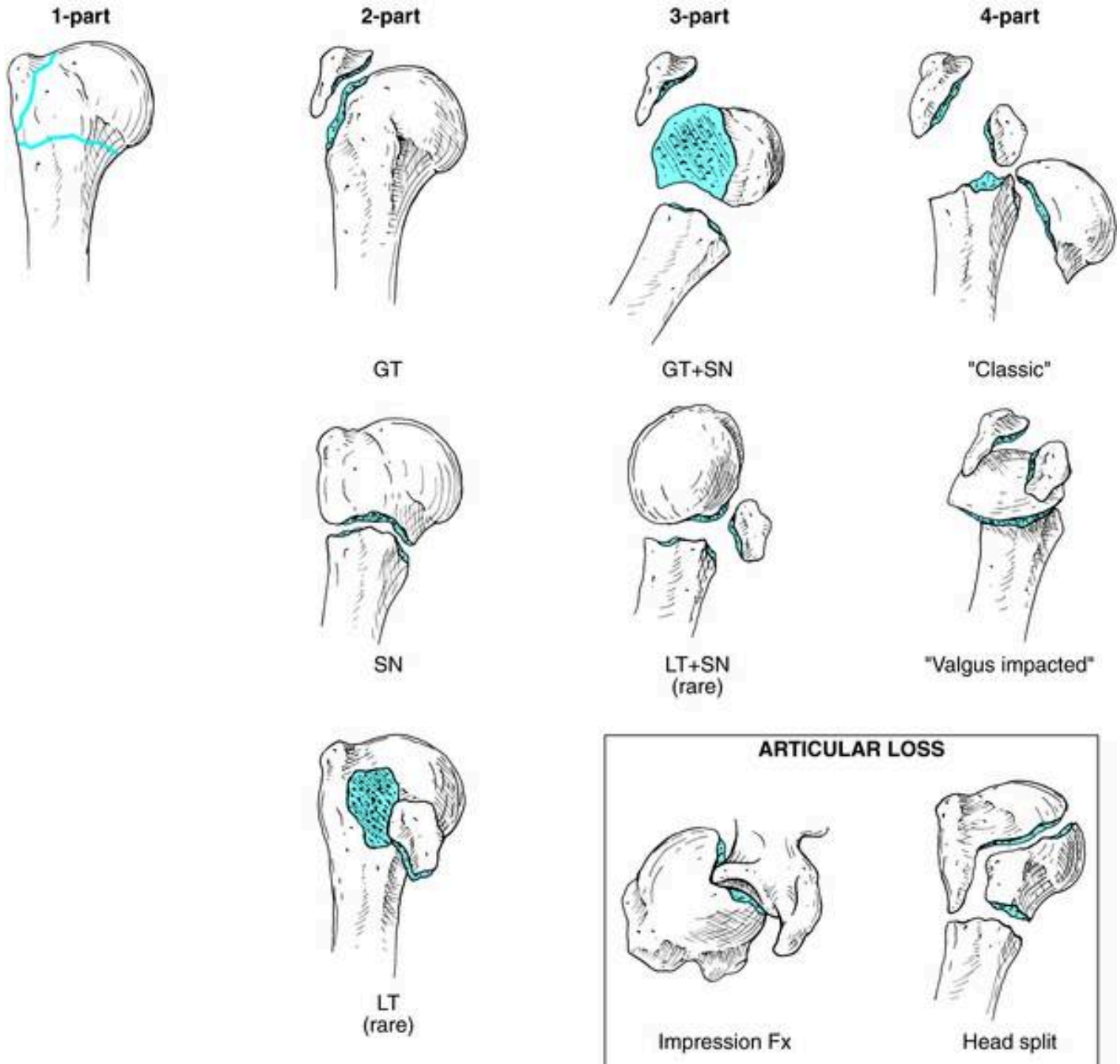

1-part
2-part
3-part
4-part
GT
GT+SN
"Classic"
SN
LT+SN
(rare)
"Valgus impacted"
LT
(rare)
ARTICULAR LOSS
Impression Fx
Head split

Humerus fractures- proximal

- Non operative management
  - Minimally displaced surgical neck (1,2,3)
  - Greater tuberosity <5mm displacement
  - Consideration for age, bone quality
  - Early range of motion in 14 days

- Operative management
  - CRPP
  - ORIF
  - IM rod
  - Hemi arthroplasty
  - Total shoulder arthroplasty

http://eorif.com/Shoulderarm/Images/proxhmcpp3.jpg

http://www.eorif.com/Shoulderarm/Images/prxhmorif3.jpg

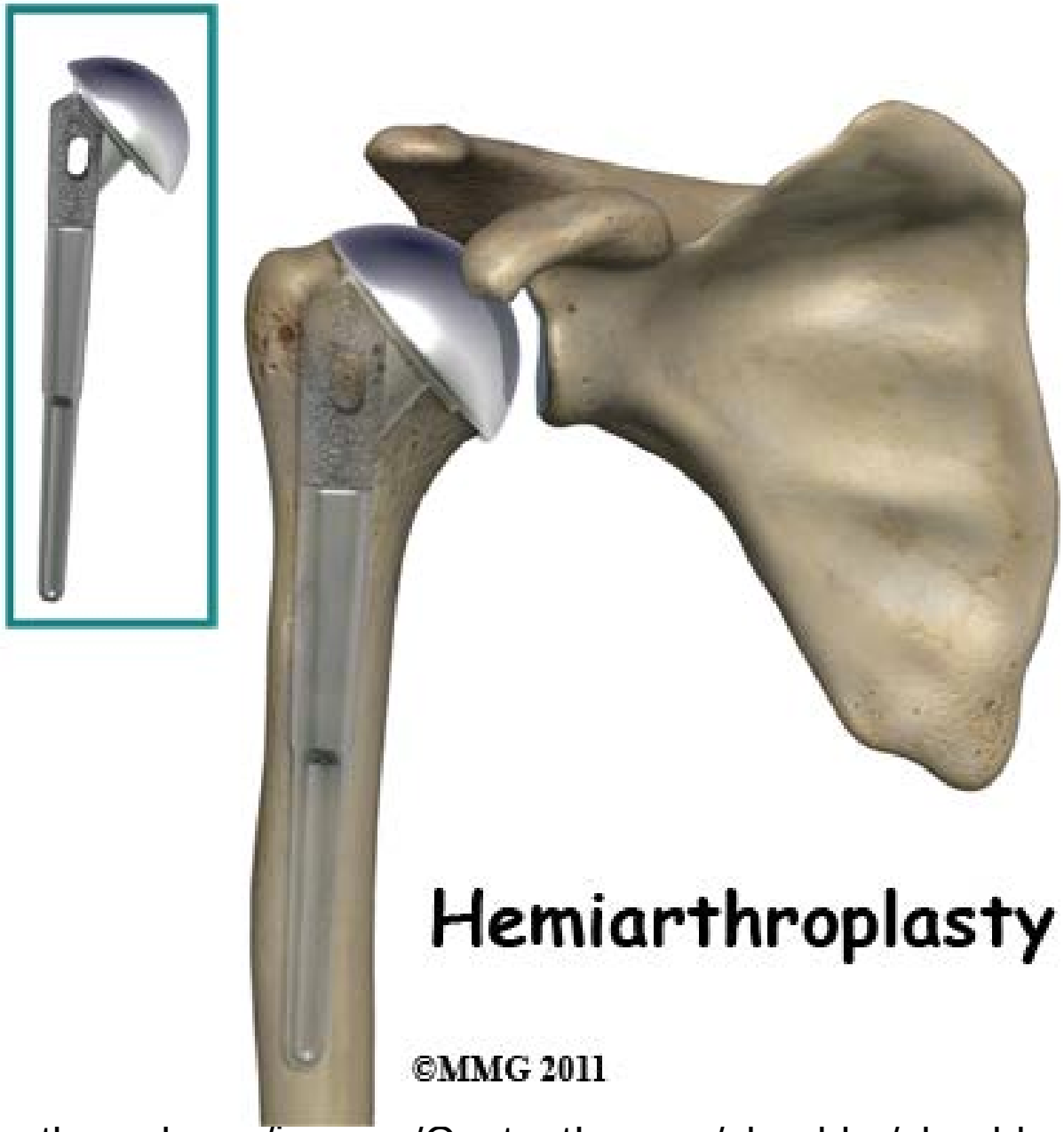
MISS LC
PROKSİMAL HUMERUS
Plak

LOW PROFİLE
PROKSİMAL HUMERUS
Sağ ve Sol

LOW PROFİLE
HUMERUS (Cloverleaf)
Sağ ve Sol

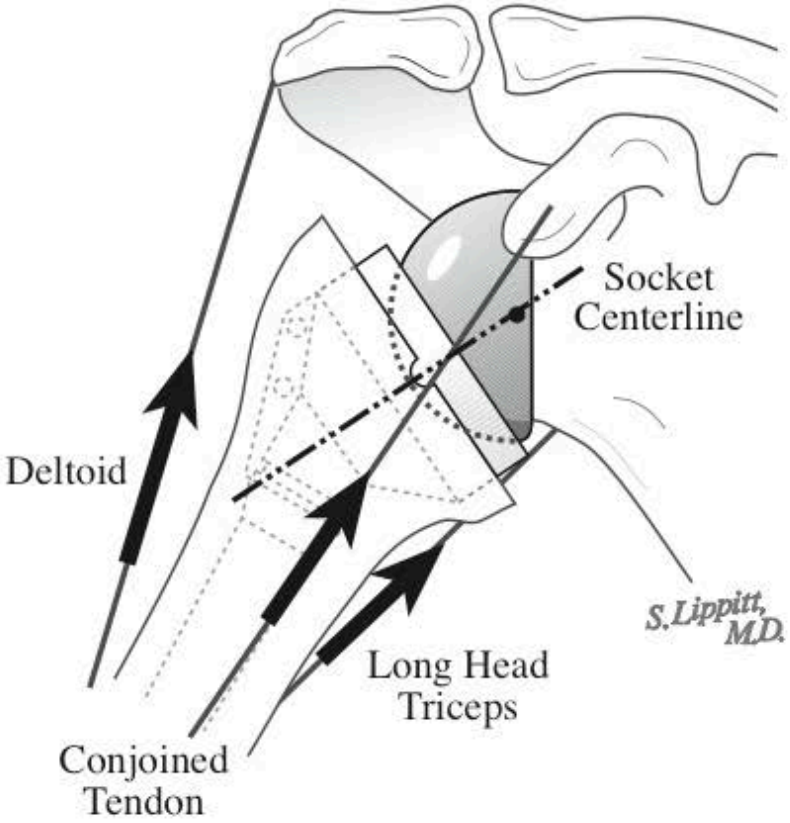
http://www.tstsan.com/resimler/urun/b_Porx_Humerus_web2.jpg

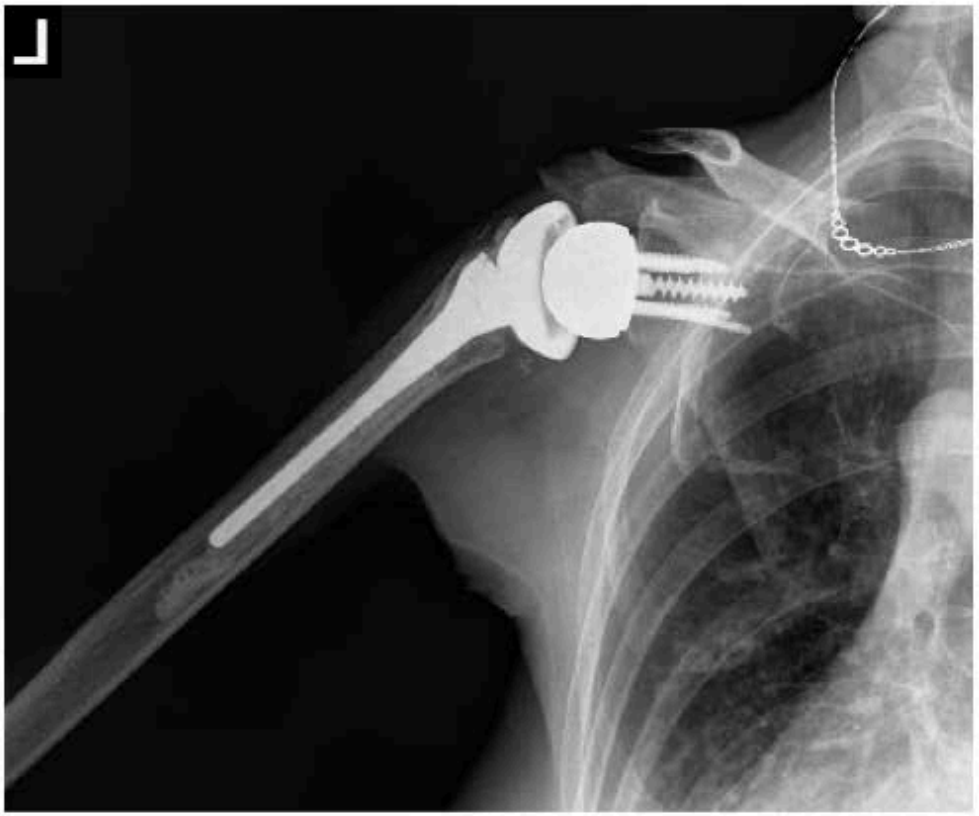
http://www.synthes.com/sites/NA/Products/Trauma/IntramedullaryNailingSystems/PublishingImages/MultiLoc_309.jpg



http://www.eorthopod.com/images/ContentImages/shoulder/shoulder_humeral_head_osteonecrosis/humeral_head_osteonecrosis_hemiarthroplasty.jpg

http://www.lima.it/repository/fck/image
/Special%20edition%20usa%202012/
protesi-smr-america.jpg





http://www.orthop.washington.edu/orthodev/drupal/sites/default/files/Portals/21/LiveContent/8149/Images/figure6.jpg

Humerus fractures- shaft

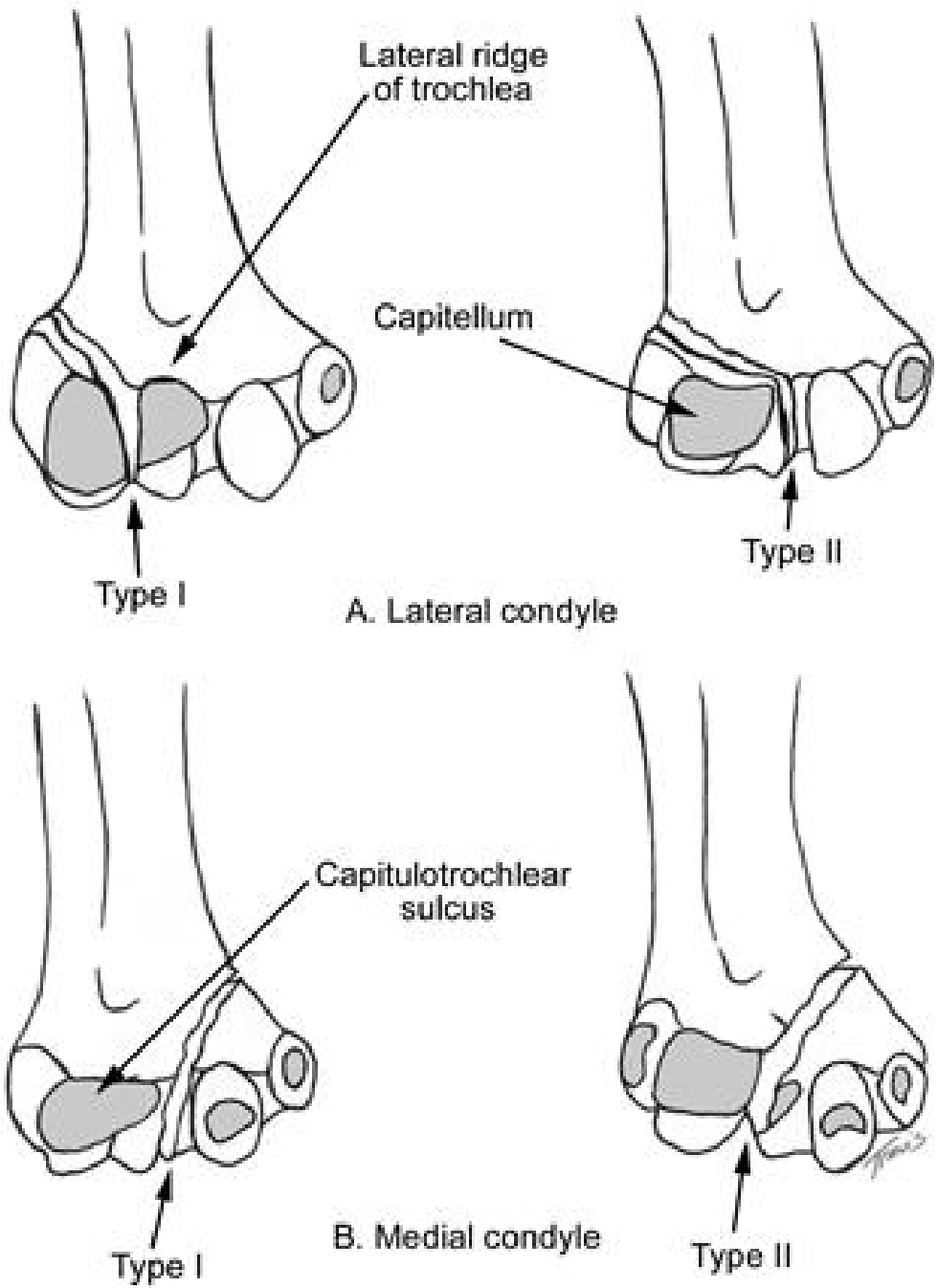
- Non operative management
- Splint then functional bracing
  - <20 degrees anterior angulation
  - <30 degrees varus/valgus angulation
  - <3cm shortening
- ORIF or IM nail
  - Brachial plexus injury
  - Open fracture
  - Pathological fracture
  - Spiral/oblique

Humerus fractures- distal

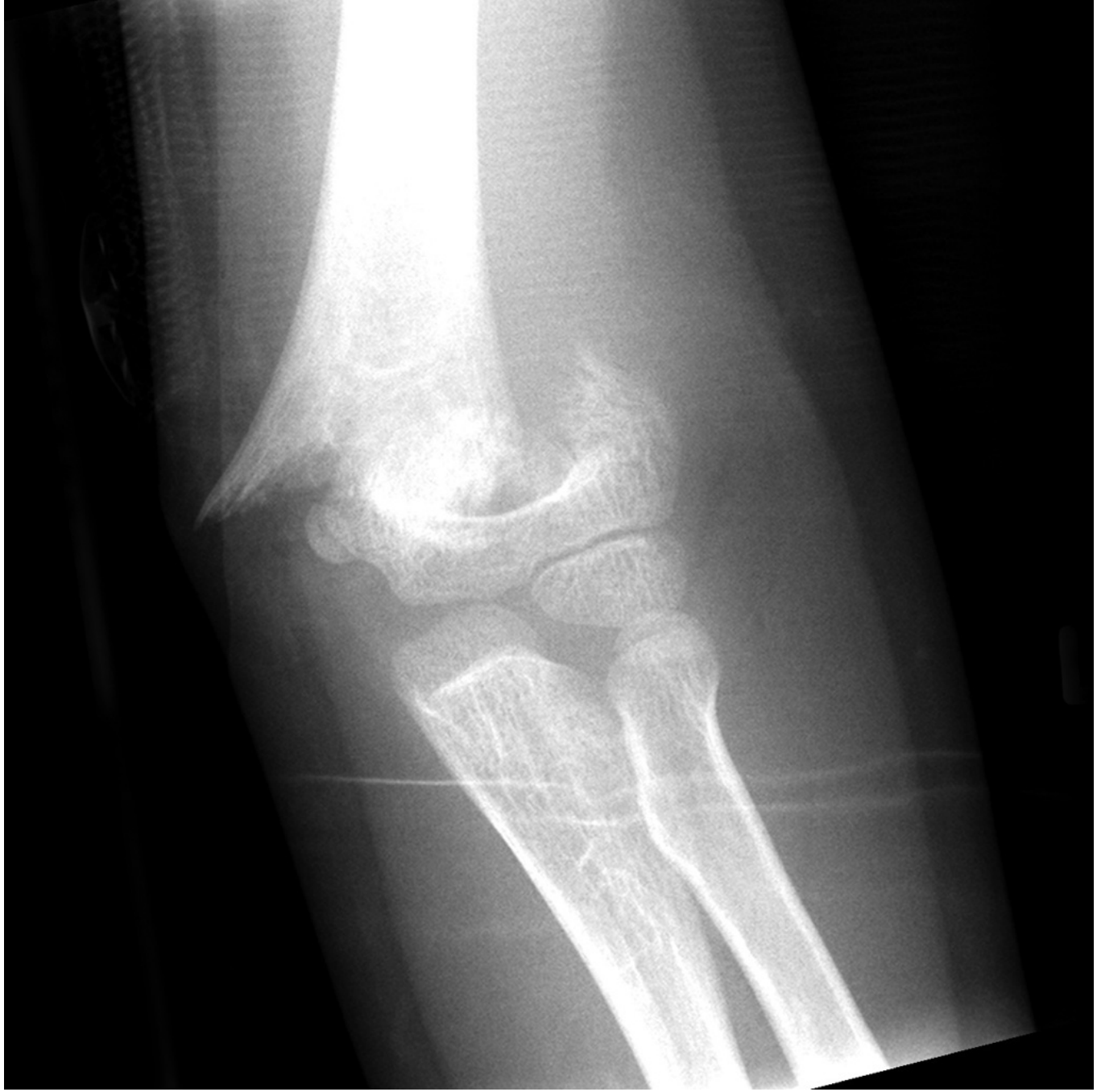
- Supracondylar
- Single/double column fracture

- Non operative
  - Non displaced single column

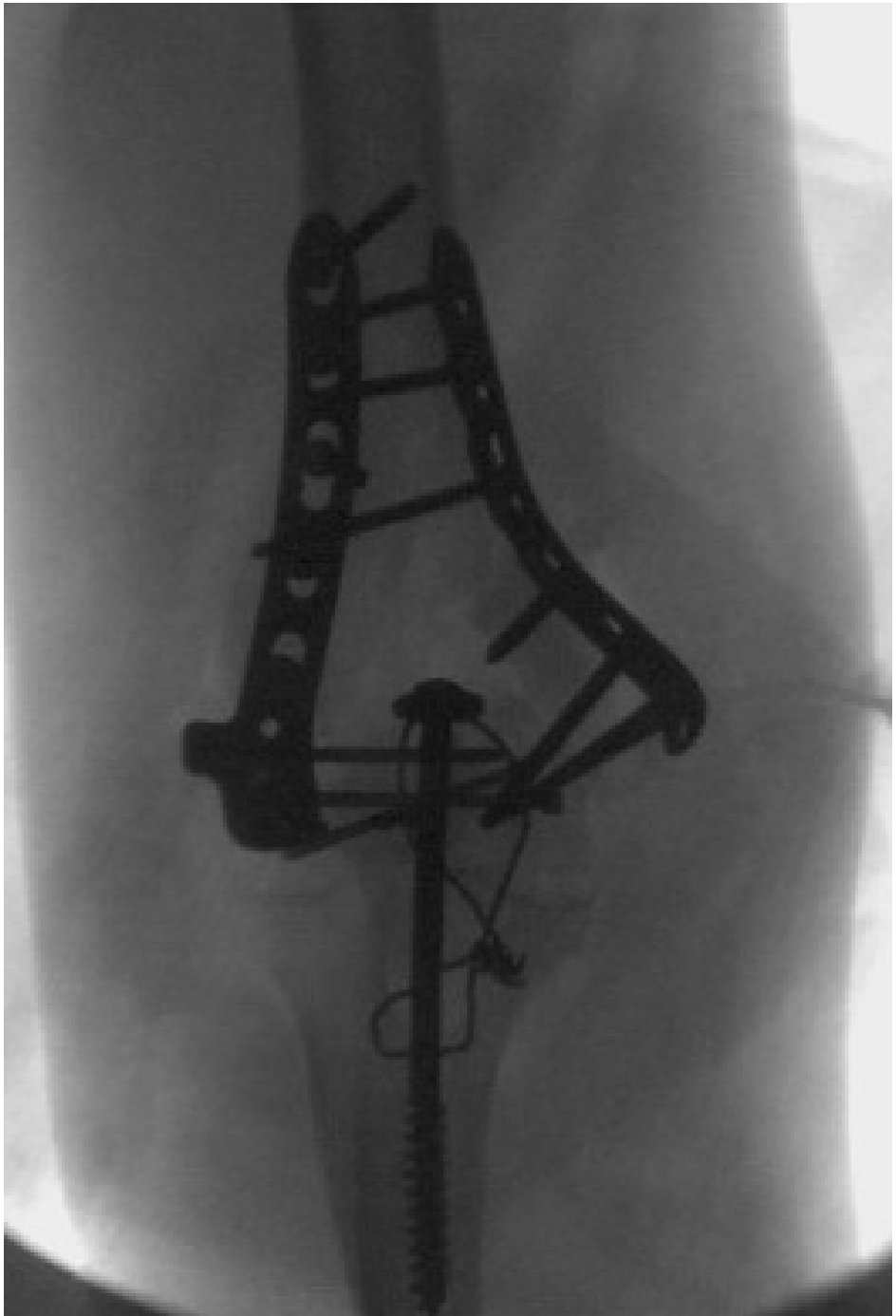
- Operative
  - CRPP
  - ORIF
  - Total elbow arthroplasty
- Risks
  - Heterotropic ossification
  - Joint stiffness
  - Degenerative joint disease
  - Cubital valgus/varus



http://www.orthobullets.com/trauma/1017/distal-humerus-



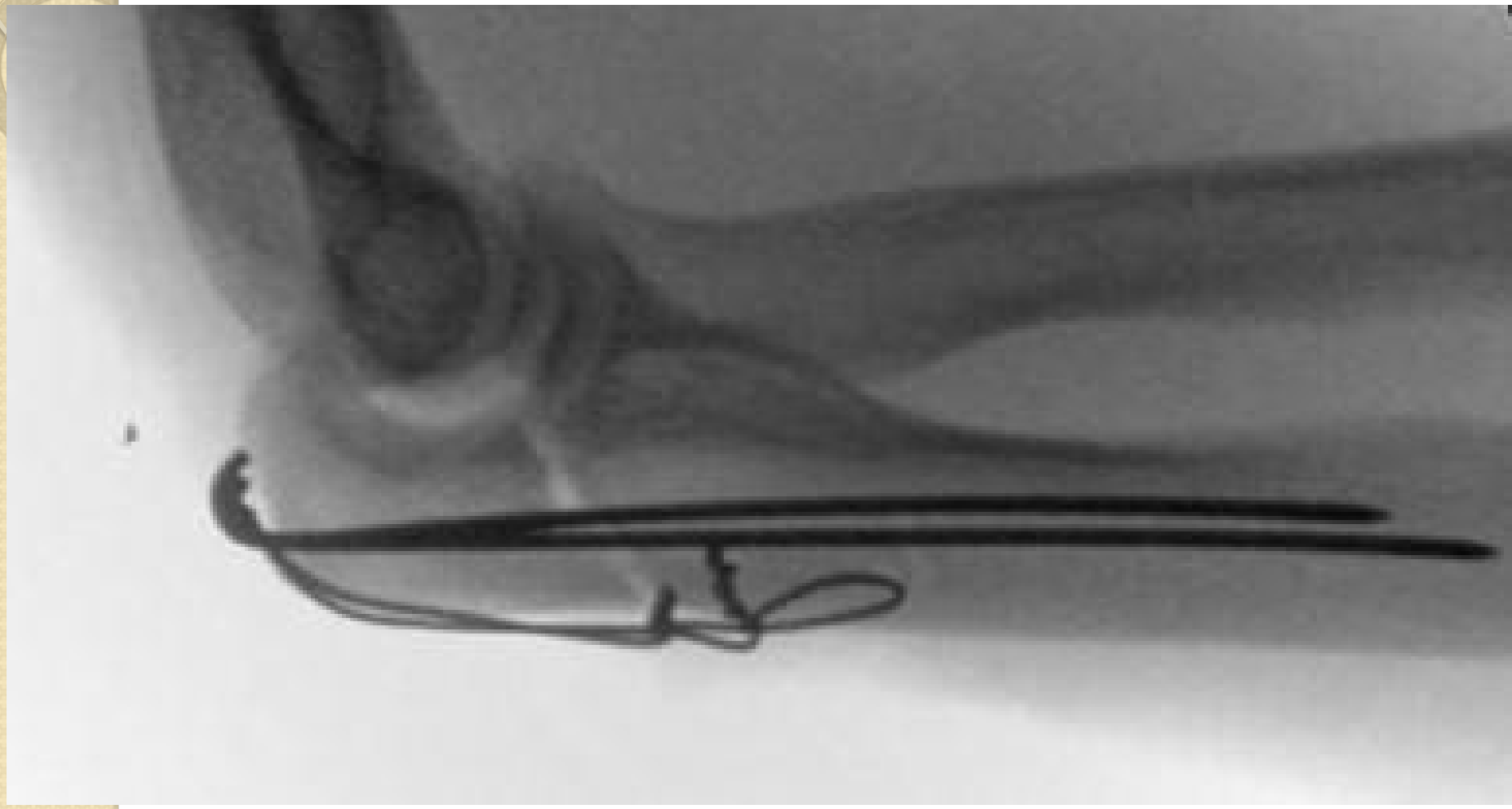
http://images.radiopaedia.org/images/535540/fa226724fc4371512eda2a95de



http://www.tornier-us.com/upper/elbow/elbrec001/images/latitude-back.jpg

Olecranon fractures

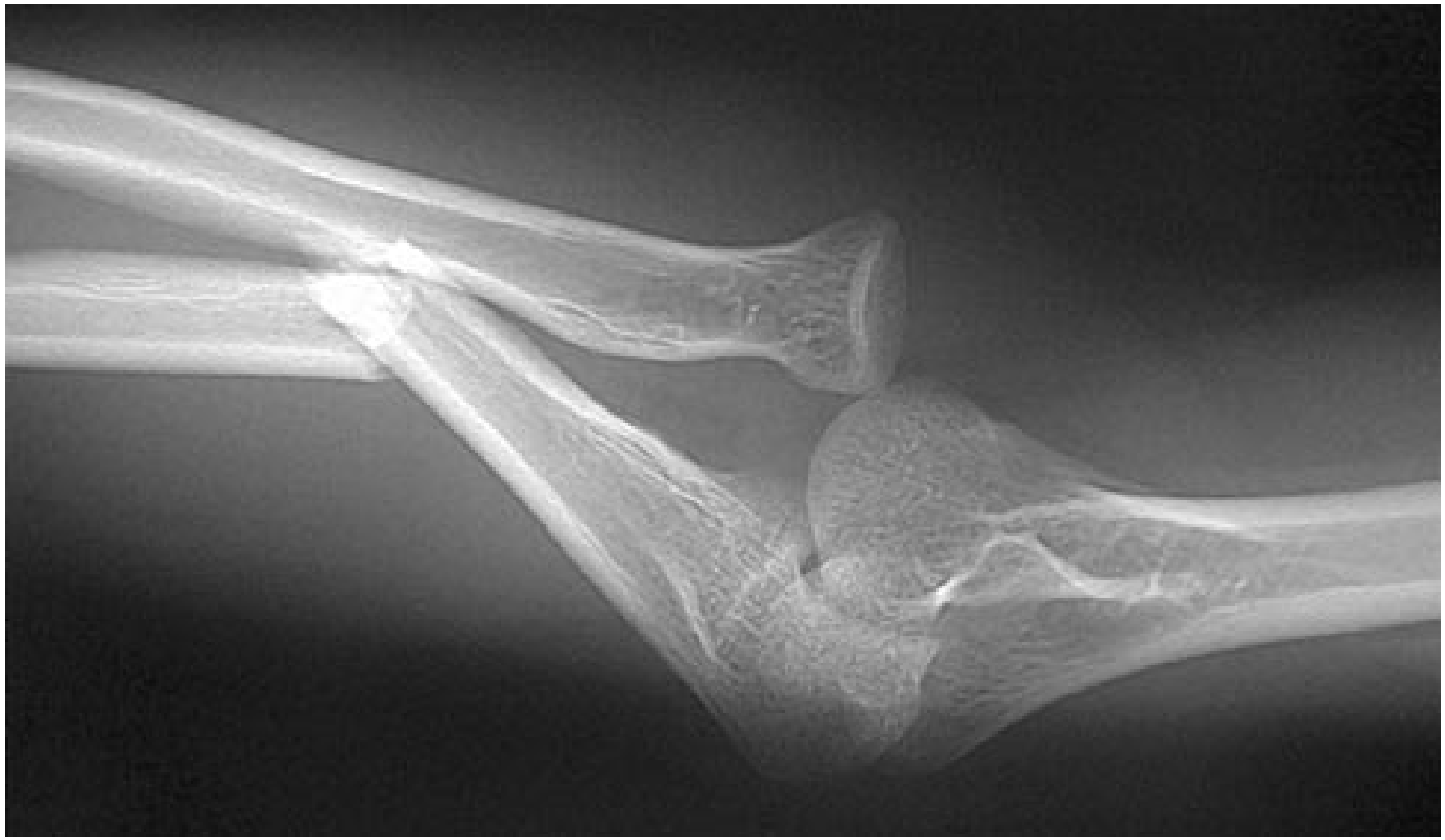
- Non operative
  - Non displaced fractures
  - Immobilisation in 45-90 degrees of flexion, for 3 weeks, then mobilise
- Operative
  - TBW
  - IM fixation
  - Plate and screw fixation
  - Fragment excision and triceps advancement



http://www.orthobullets.com/trauma/1022/olecranon-fractures

http://www.orthobullets.com/trauma/1022/olecranon-fractures

Monteggia fractures



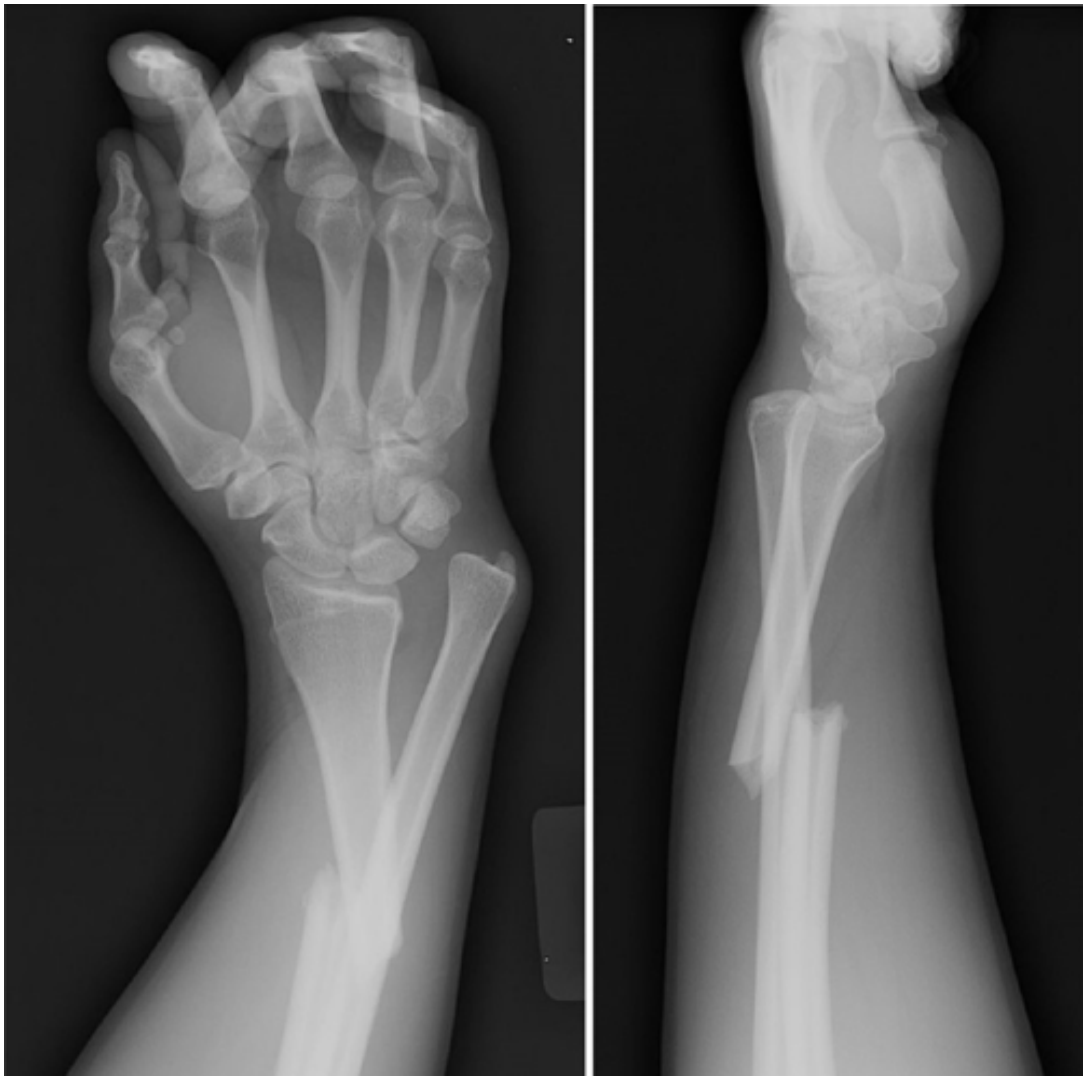
http://www.orthobullets.com/trauma/1024/monteggia-fractures

Monteggia fractures

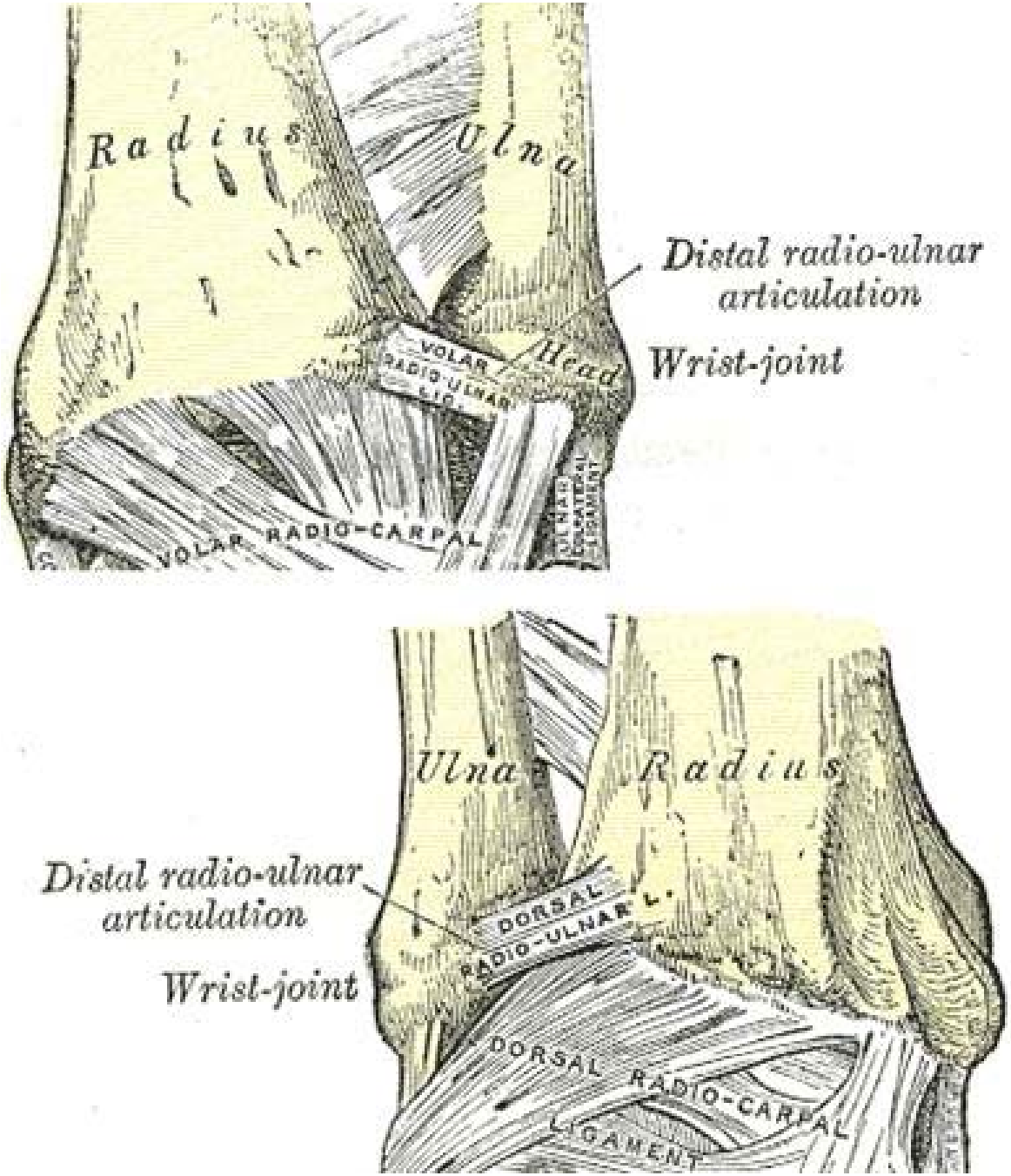
- Non operative- closed reduction
  - More common in children
  - Casting with forearm supination

- Operative- ORIF ulnar +/- open radial head reduction
  - Comminuted ulna
  - Unable to reduce radius

Galeazzi fractures



http://www.orthobullets.com/trauma/1029/galeazzi-fractures



http://www.orthobullets.com/trauma/1029/galeazzi-fractures

Galeazzi fractures

- Operative all cases
  - ORIF radius, stabilisation of DRUJ

- DRUJ
  - If stable- cast in supination 6 weeks
  - Percutaneous pin fixation
  - Open reduction- ECU
  - ORIF ulnar styloid

http://upload.orthobullets.com/topic/1029/images/galeazzi%20fracture%20orif.jpg

http://a248.e.akamai.net/7/248/432/20120426191700/www.msdlatinamerica.com/ebooks/HandSurgery/files/ed13b53e950d1a4efdb3aef6853269cf.gif

Forearm fractures

- Non operative
  - Distal 2/3 ulna (nightstick)
    - <50% displacement, <10degrees angulation
- ORIF
  - Proximal 1/3 ulnar
  - All radial shaft fractures
  - Both bone fractures

http://fprmed.com/Medical/Ortho/Nightstick%20fx.jpg

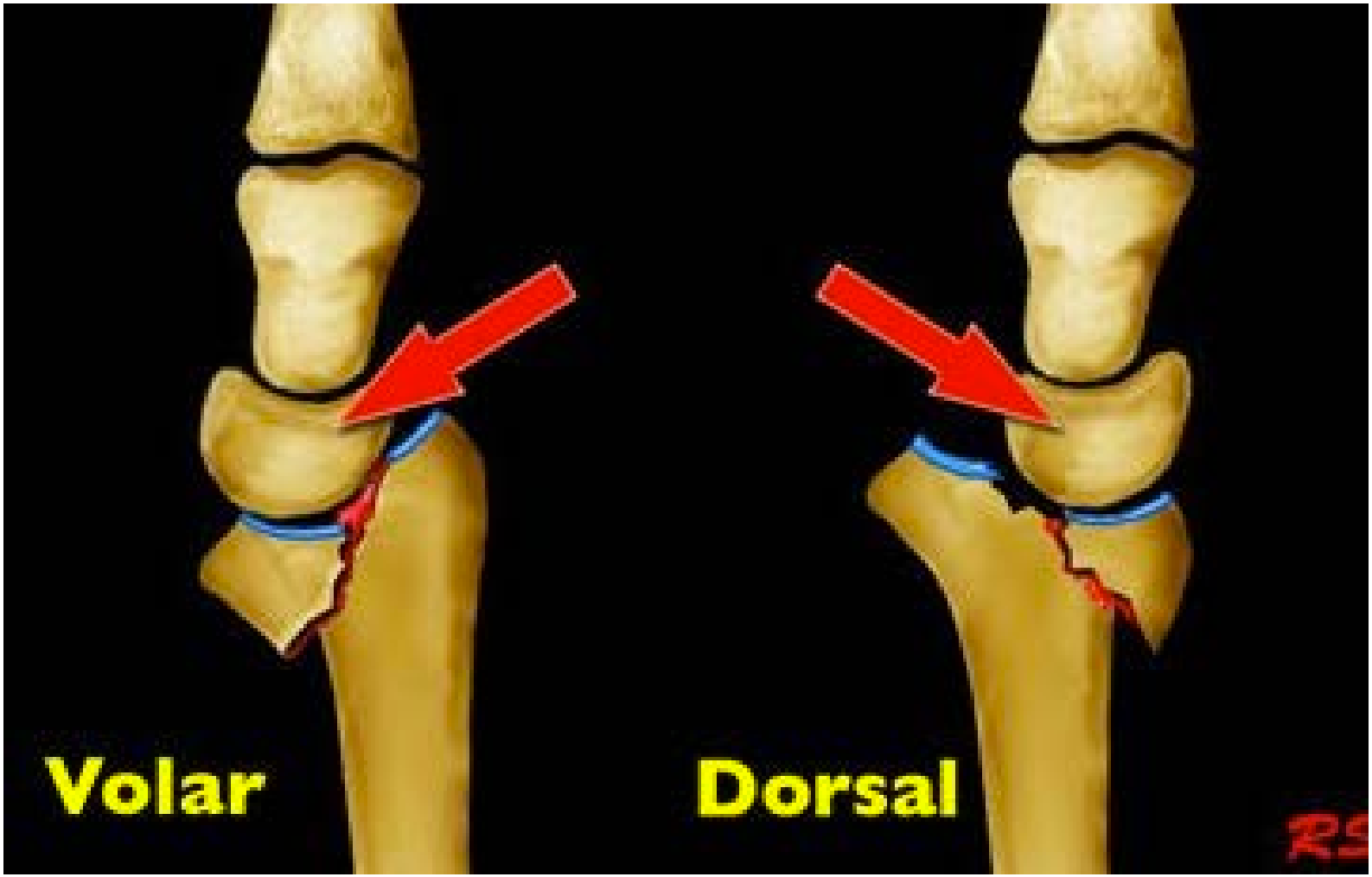
Distal radius fractures

http://img.medscape.com/pi/emed/ckb/radiology/336139-398406-7418.jpg

Distal radius fractures

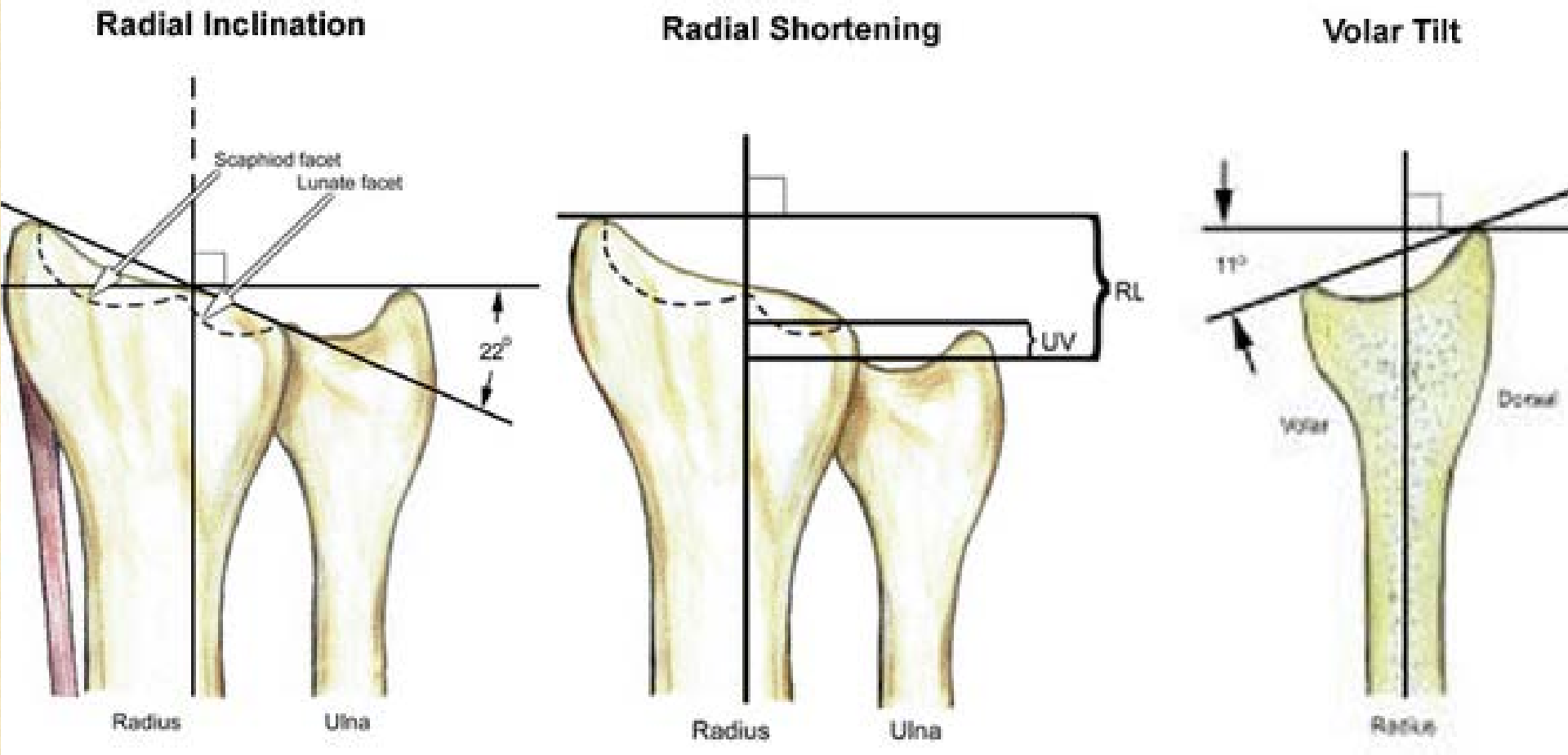
http://www.orthobullets.com/trauma/1027/distal-radius-fractures#4713

Distal radius fractures



http://rad.desk.nl/images/thmb_477a59f6ebe6fTEK-Barton2x.jpg

Distal radius fractures



http://www.orthobullets.com/trauma/1027/distal-radius-fractures#4713

Distal radius fractures

- Non operative
  - Extraarticular
  - <5mm shortening
  - Dorsal angulation <5degrees**
- Surgical fixation
  - Displaced/intraarticular- >2mm step
  - Comminution
  - Loss of volar tilt and radial length after casting
  - >5mm shortening, >5 degrees dorsal angulation**


a


b


c


d

Summary

- Management plan for upper limb fractures based on AO principles:
  - Restoration of anatomy
  - Stable fracture fixation
  - Preservation of blood supply
  - Early mobilisation of limb and patient

Acknowledgements

- https://aotrauma.aofoundation.org
- Orthobullets
  - http://www.orthobullets.com/
- Wheeless' Textbook of Orthopaedics
  - http://www.wheelessonline.com/