骨科常見外科問題之病生理

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創傷骨折之急診處置

- 創傷骨折的傷患要與一般急診傷患一樣，一定要先注意〝ABCD〞，即呼吸道、呼吸、心跳、血壓等各種生命現象及意識狀況；之後，再處理創傷骨折問題
- 依病患之年齡、受傷原因、骨折位置可初步判斷其出血量及受傷之嚴重度

骨折位置及其預判之出血量

- 上肢骨（humerus, radius, ulna）:200 – 300 c.c
- Tibia: 500 c.c
- Femur: 1000 c.c
- Pelvis: > 2000 c.c
- 開放性骨折：出血量更多
- Multiple fracture/pelvic fracture/old age: 要注意有休克的危險性

骨折檢查注意須知

- 理學檢查須包括詳細的**全身檢查**
- 患肢之**血液循環**及**神經功能**
- 未移位之骨折早期之x光片 並不一定能看出來,但一至二週後因骨折癒合之變化會讓再照的x光片 能更清楚的顯現出骨折的情況

骨科常見之急診手術

- **Open fracture**
- **Dislocation**
- **Multiple fracture**
- **Femoral neck fracture in younger age**
- **Pediatric fracture**
- **Compartment syndrome**
- **Major vascular injury**

Open fracture

- 傷口需與骨折處有相通
- Bloody oozing with fat
- 出血的地方以直接壓迫法可以達到較好的止血效果
- 傷口或骨頭外露的地方以乾淨的紗布予以覆蓋，可以防止進一步的污染
- 依**Gustilo & Anderson 分類法**來分類
- 及早使用**抗生素**預防感染
- Golden period: **< 6 hours debridement**

Gustilo Classification					
	I	**II**	**IIIA**	**IIIB**	**IIIC**
Images					
Energy	Low	Moderate	High	High	High
Wound size	≤ 1 cm	1-10 cm	usually >10 cm	usually >10 cm	usually >10 cm
Soft tissue damage	Minimal	Moderate	Extensive	Extensive	Extensive
Contamination	Clean	Moderate	Extensive	Extensive	Extensive
Fracture Comminution	Minimal	Moderate	Severe	Severe	Severe
Periosteal Stripping	No	No	Yes	Yes	Yes
Skin Coverage	Local coverage	Local coverage	Local coverage	**Free tissue flap or rotational flap coverage**	Typically requires flap coverage
Neurovascular Injury	Normal	Normal	Normal	Normal	**Exposed fracture with arterial damage that requires repair**

傷口關不起來
要flap cover

傷口關得起來

血管受傷 不包含神經受傷

Treatment of open fractures

1. Tetanus prophylaxis
2. Using antibiotics (usually cephalosporins)
3. Emergent wound cleaning
4. Debridement
5. Treatment of fracture
6. Closure of the wound

Antibiotic Indications for Open Fr

- Gustillo type I and II
  - 1st cephalosporin
- Gustillo type III
  - 1st cephalosporin + gentamycin
- With farm injury / bowel contamination
  - 1st cephalosporin + gentamycin + PCN
- Duration
  - increased infection rate when antibiotics are delayed > 3 hours from time of injury
  - continue for 24-72 hours after I&D

急症之辨認

1.骨折附近**大血管的受傷**:最常合併大血管受傷之部位包括膝關節脫臼時有30%之機會.大動脈裂傷之特殊症候為受傷後**局部快速腫脹**,患肢**遠端無脈博**,有裂傷處之**脈動性出血**.如無法確定患肢遠端是否還有血液循環時,宜用**doppler** flow meter 及**angiographic** study來確認遠端之血液循環狀態.所有的檢查宜把握時間,記得肢體的warm ischemic time**僅六到八小時**而已.

2.**腔室症候群(compartment syndromes)**受傷後急速腫脹,甚至於動脈受傷修補後,造成肌肉部份壞死,釋放histamine-like substances,接著微血管Permeability增加,**腔室壓力約升高至比舒張壓少30 mmHg時**,就會造成腔室症候群.最常發生在小腿之前、後腔或前臂之深屈肌群.另外**石膏太緊**亦會造成此併發症.當懷疑發生此併發症時,要將石膏及包住患肢之敷料完全移除,並將患肢抬高.此症候群之早期症狀包括**6 “Ps”**

Causes of Acute Compartment Syndrome

- **Fracture: most common**.
  - The most common fractures associated with acute compartment syndrome in adults is **tibial diaphyseal fracture**.
  - **Displaced supracondylar fractures** of the humerus with damage to the brachial artery in **children**.
- Soft tissue injury
- **Crush syndrome**, revascularization, exercise, fluid infusion, arterial puncture, ruptured ganglion cysts, osteotomy, snake bite, nephrotic syndrome, leukemic infiltration, viral myositis, acute hematogenous osteomyelitis, burns, repair of muscle hernia, diabetes, hypothyroidism, bleeding diathesis/anticoagulants
- **Excessive longitudinal traction** in the treatment of femoral shaft fractures in children with resultant arterial spasm.
- **Casting too tightness**

Diagnosis & Treatment

- Intracompartment pressure (ICP): (normal **resting < 10 mm Hg**)
- Suspected compartment syndrome:
  - **ICP > 30-40 mm Hg**
  - **ΔP** (diastolic pressure – compartment pressure) **< 30 mm Hg**

- Fasciotomy
  - fascia and skin should be left open **at least 5-7 days**, then delayed primary closure

Five “P”s

- 按時序排列
- **Pain with passive stretch**
- **Pallor**
- **Paresthesia**
- **Paralysis**
  - 儘早處理不然會有不可逆的神經損傷
- **Pulselessness**

Complications of Fractures

- Immediate complications
  - Skin, vascular, neurological, muscular, visceral injuries; hemorrhagic shock
- Early complications
  - Skin necrosis, gangrene, Volkmann's ischemia (compartment syndrome), gas gangrene, venous thrombosis, visceral complications, septic arthritis (from an open injury), osteomyelitis at fracture site (from an open injury), avascular necrosis of bone
  - Fat embolism, pulmonary embolism, pneumonia, tetanus, delirium tremens

Complications of Fractures

- Late complications
  - Joint stiffness; posttraumatic degenerative arthritis; malunion; delayed union; nonunion; growth disturbance (from epiphyseal plate injury); chronic osteomyelitis; posttraumatic osteoporosis; Sudeck's posttraumatic painful osteoporosis; refracture; posttraumatic myositis ossificans; late rupture of tendons; tardy nerve palsy; renal colic; accident neurosis

Arterial Complications

- Major vascular complications in relation to fractures
  - **Axillary a.**: fracture-dislocation and dislocation of shoulder
  - **Brachial a.**: supracondylar fracture of humerus
  - **Femoral a.**: fracture of femoral shaft
  - **Popliteal a.**: fracture of distal end of femur and proximal end of tibia, dislocation of knee
  - **Dorsalis pedis a.:** fracture of the forefoot

Neurological Complications

- Spinal cord: C- and T-spine fractures and dislocations
- Cauda equina: L-spine fractures and dislocations
- **Sciatic nerve**: posterior dislocations and fracture-dislocations of the hip
- **Common peroneal nerve**: proximal fibular fracture
- Ulnar nerve: avulsion fracture of the medial epicondyle
- Median nerve: supracondylar fractures of the humerus
- **Radial nerve**: fractures of the humeral shaft

Avascular Necrosis of Bone

- **Femoral head**: fracture of femoral neck, dislocation of hip
- Lunate: dislocation of the lunate
- **Scaphoid**: fracture of the scaphoid
- Radial head: fracture of the radial neck
- Lateral condyle (capitellum): fracture of the lateral condyle (especially after excessive soft tissue dissection during open reduction)
- Body of **talus**: fracture of the neck of the talus

Fat embolism syndrome

- Fat Embolism Syndrome is an acute respiratory disorder caused by an inflammatory response to embolized fat globules that may enter the bloodstream as a result of acute long bone fractures or intramedullary instrumentation.
- Patients present with hypoxia, changes in mental status, and petechial rash.

S/S

- **Tachypnea** (≥ 30 / min)
- **Tachycardia** (≥ 140 / min)
- Pulmonary edema or infiltration
- **Hypoxemia**
- Fever (39-40 degrees)
- Petechiae (ant. chest, axilla, neck & conjunctiva)
- **Mental status change**, eg restlessness or delirium
- CNS depression or confusion

PS: normal BP

Fat embolism syndrome

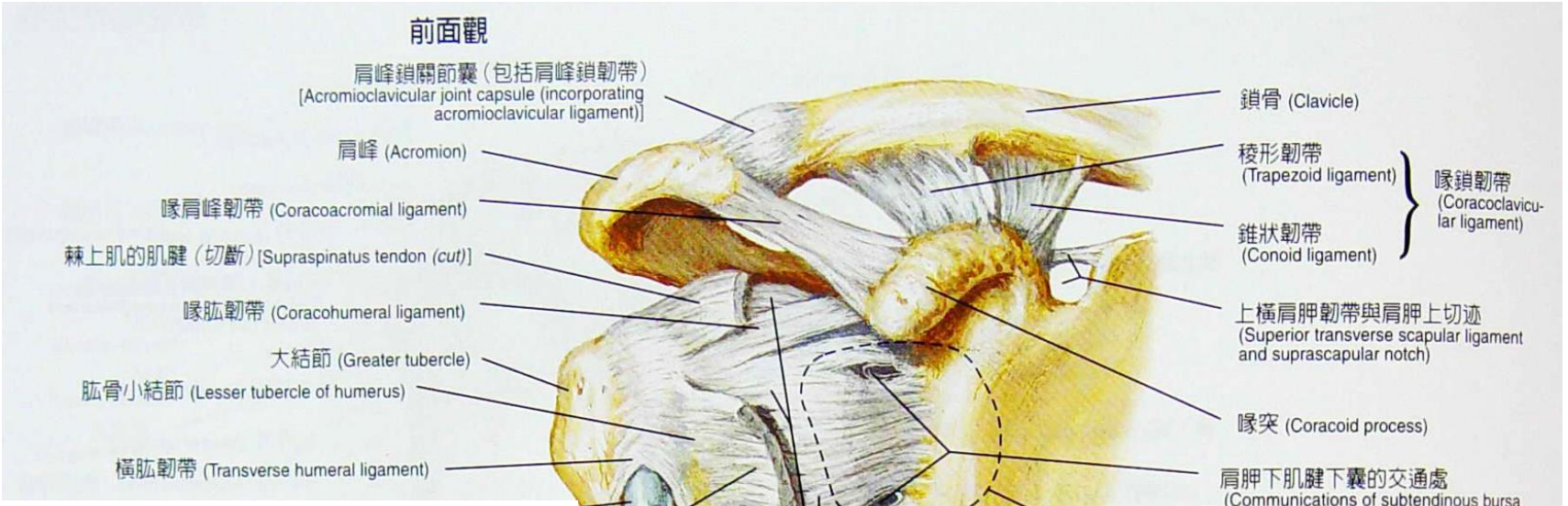
- Diagnosis is made clinically with presence of hypoxemia ($PaO_2 < 60$), CNS depression, petechial rash, and pulmonary edema.

- Treatment is focused on prevention with early stabilization of long bone fractures.
- Mechanical ventilation with high levels of PEEP is the recommended treatment for acute presentation.

Fat Embolism Syndrome

- **Begins 24 to 72 hrs after injury**.
- Most common in **younger age with long bone fracture or multiple fractures**.
- 3-4 % of patients with **long-bone fractures**.
- 10 % of patients with **multiple fractures with unstable pelvic injuries**.
- **10-15 %** of cases: fatal

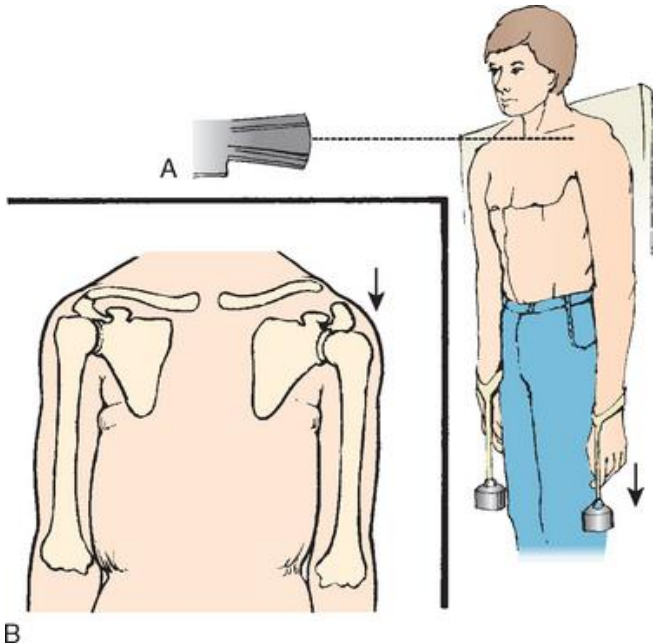
Acromioclavicular Joint Injuries



Acromioclavicular

Anteroposterior Stress Views

- For standard AP stress views, the technical principles and patient positioning are unchanged from routine AP views of the acromioclavicular joint. Stress of 10 to 15 pounds is applied to both upper limbs while the patient is invited to relax as much as possible.



保守治療

Rockwood classification

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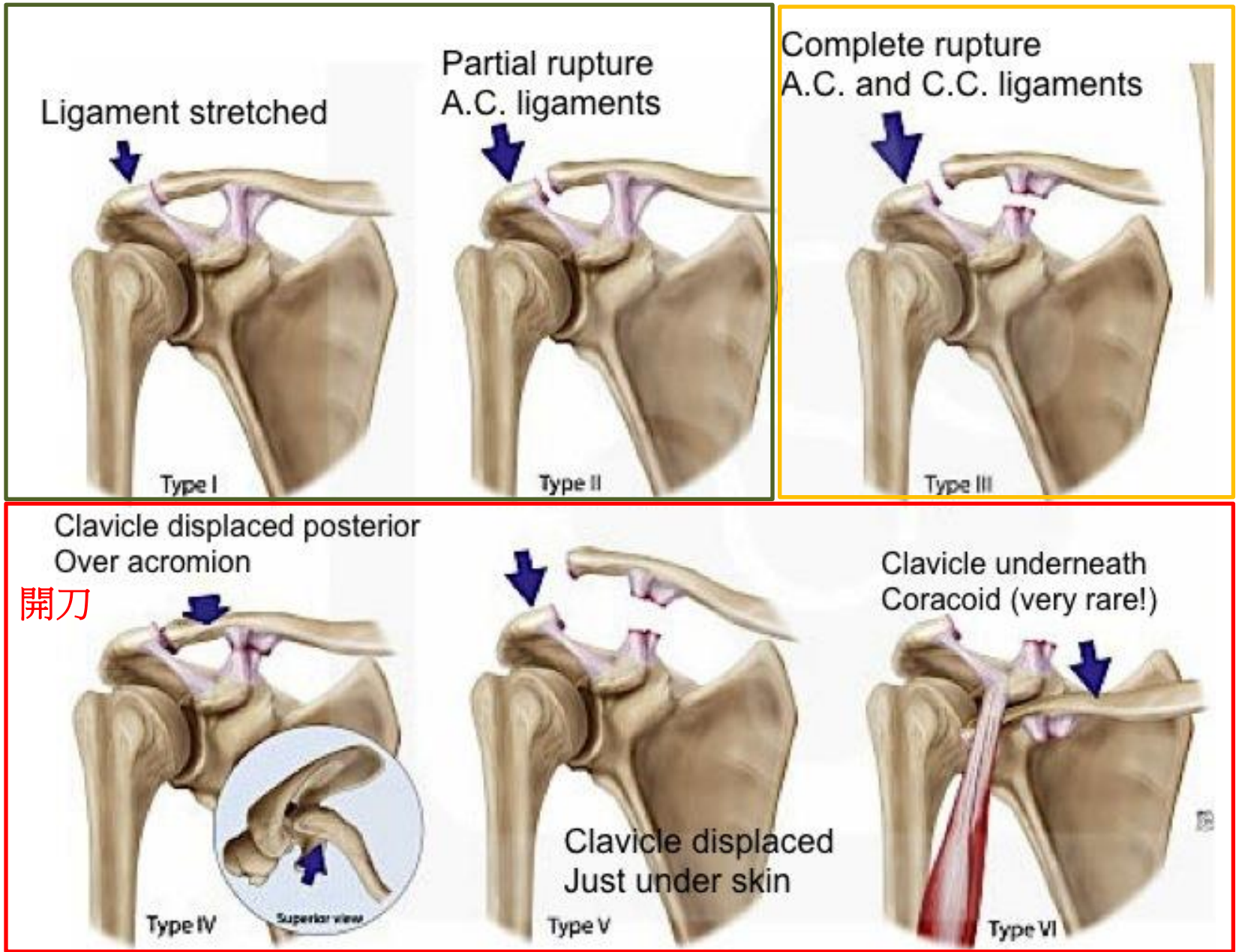
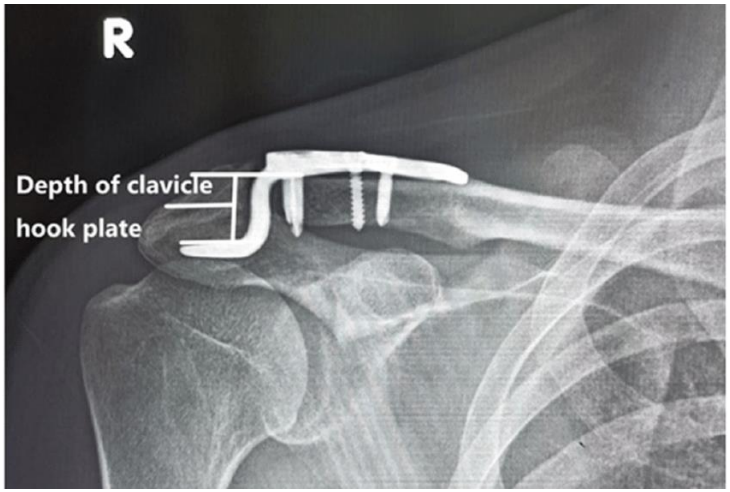
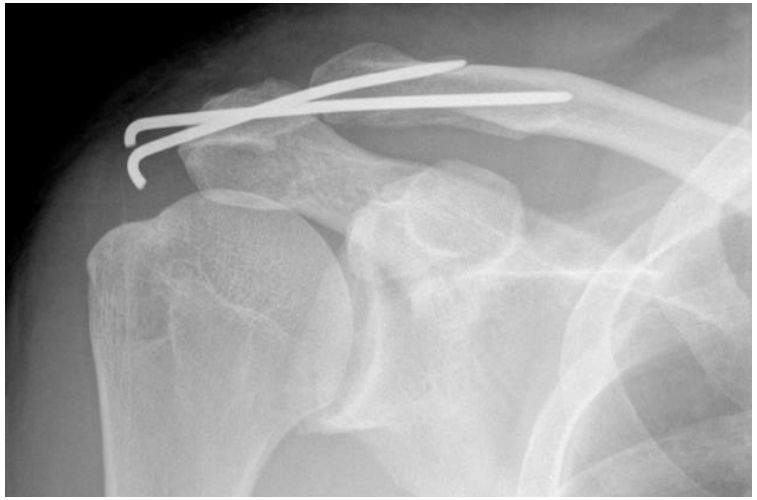
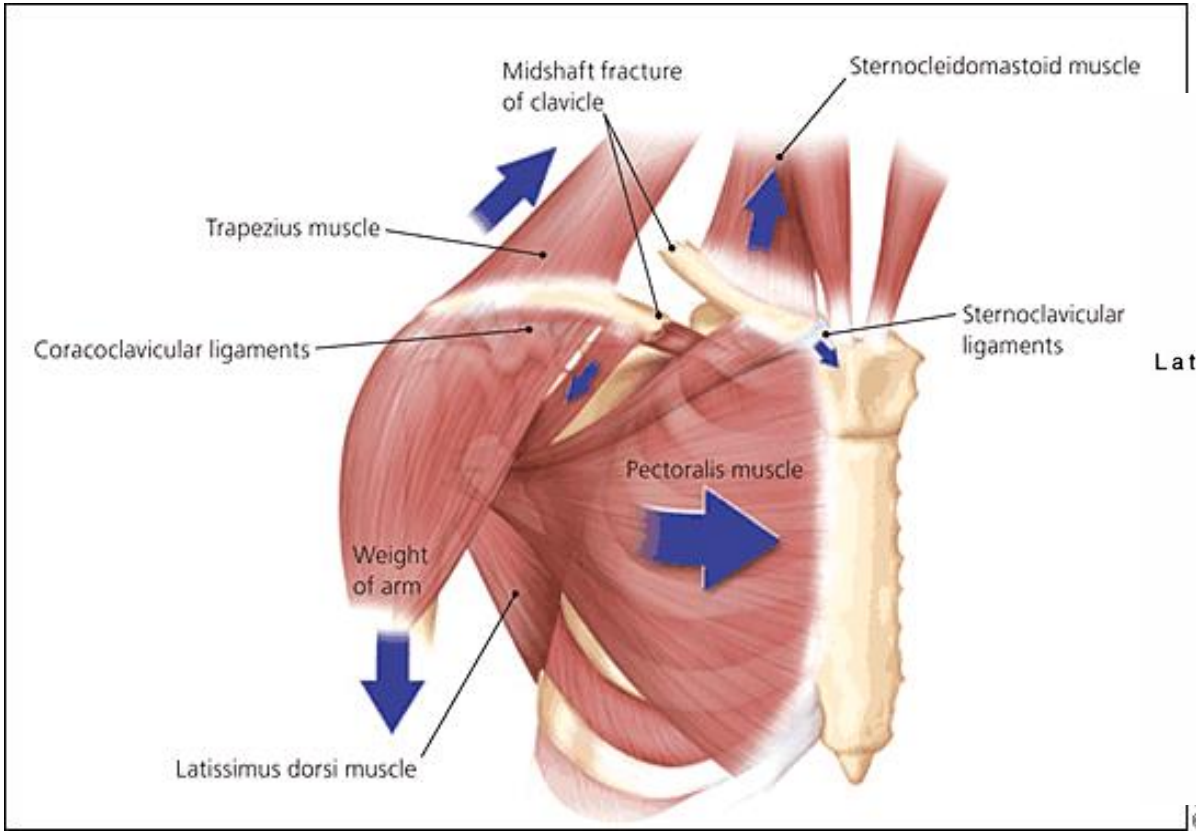


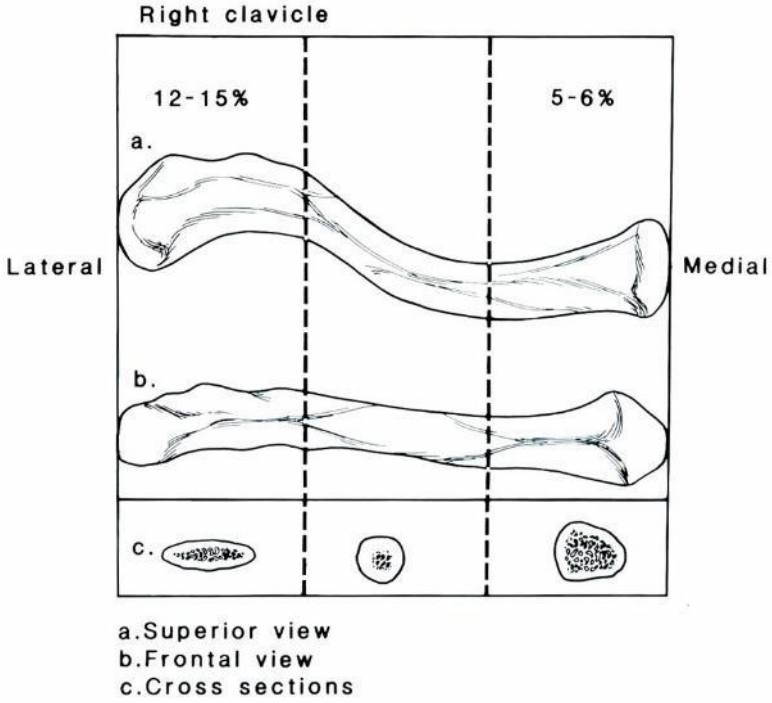
AC Joint Injury, Type V





Clavicle Fractures



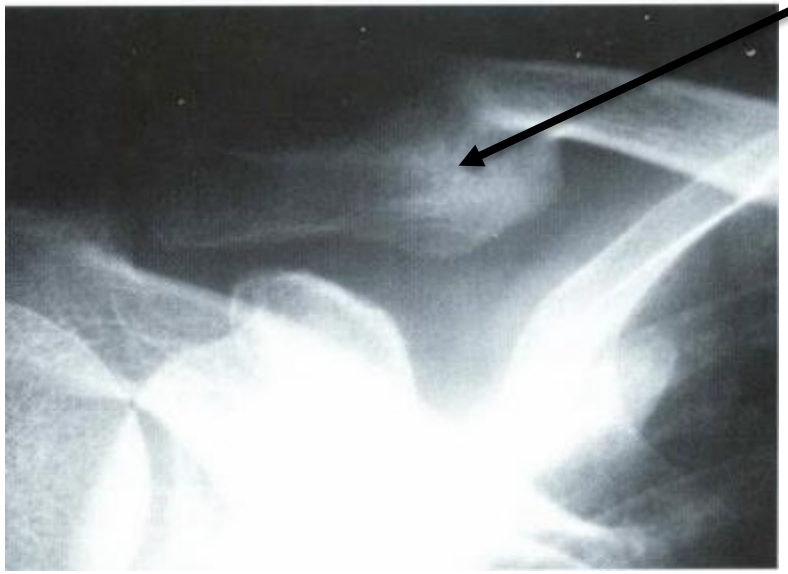


a.Superior view
b.Frontal view
c.Cross sections

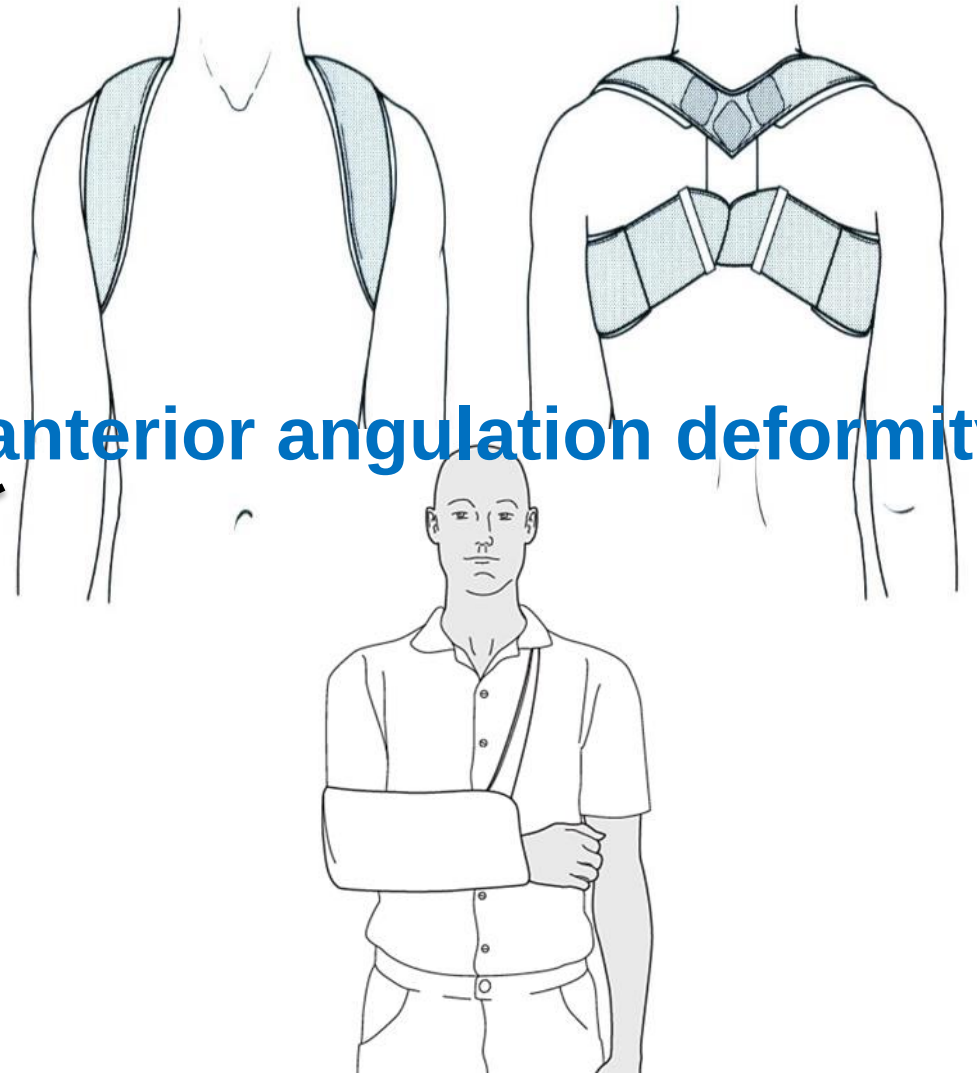
Midshaft Fractures

- Most common, 81%
- Upward displacement of medial fragment
- Anterior and inferior displacement of the lateral fragment

Midshaft Fractures - 保守治療
(Figure-8 bandage / Sling)



anterior angulation deformity

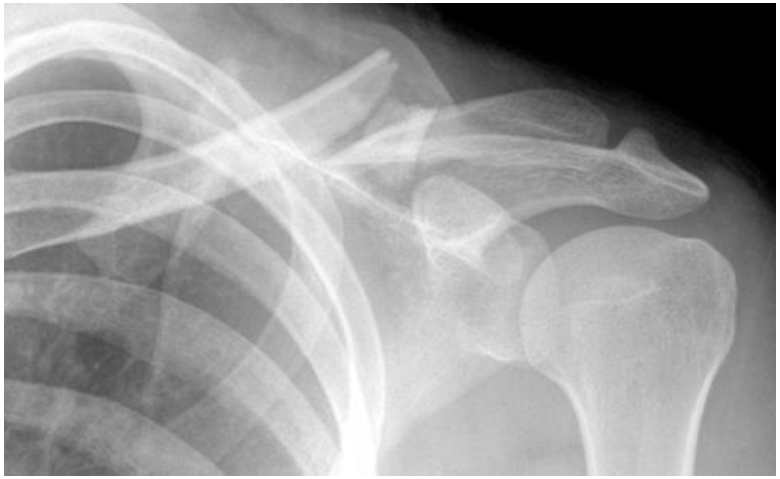


Midshaft Fractures - 手術治療

shortening > 2 cm

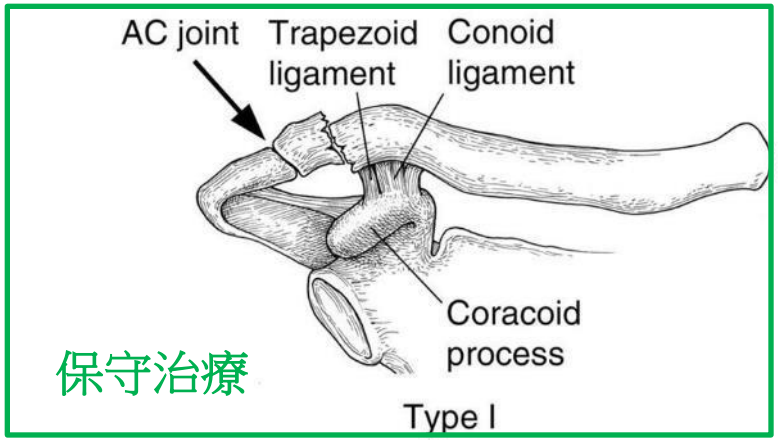
displacement > 2 cm

impending skin disruption

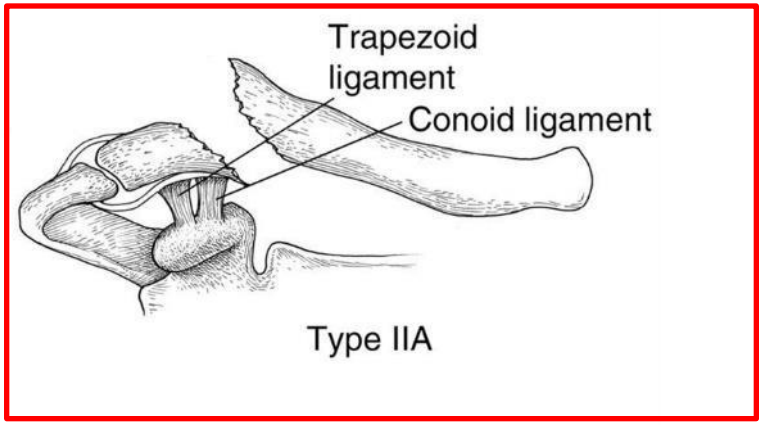


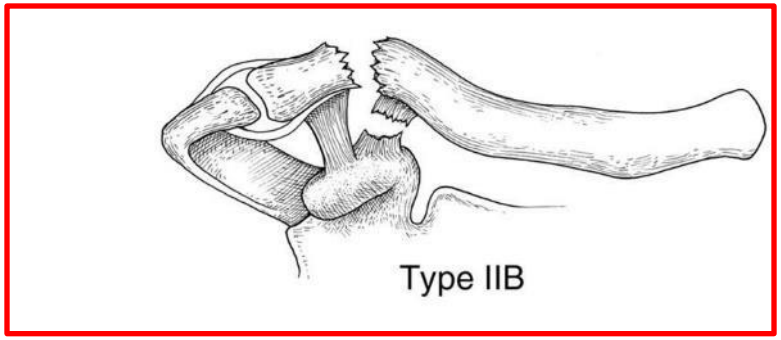
Intramedullary fixation Knowles pin

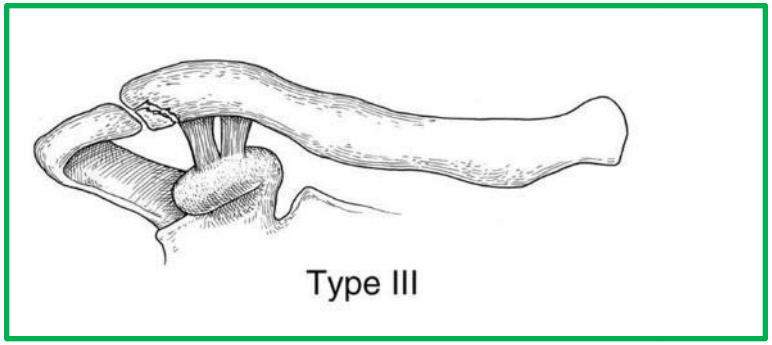
Distal Third Fractures (Neer classification)

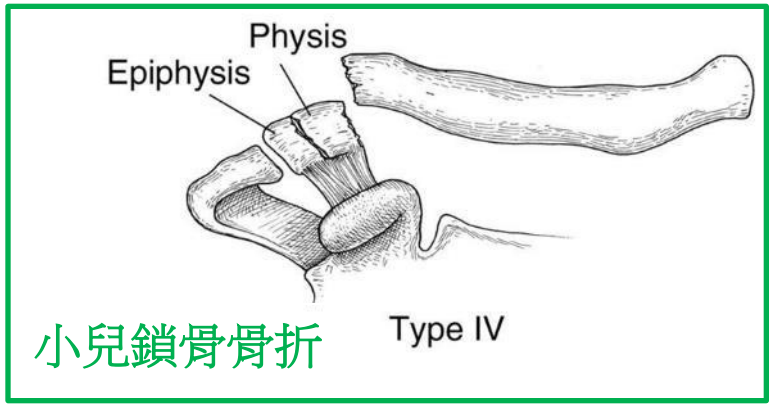


保守治療

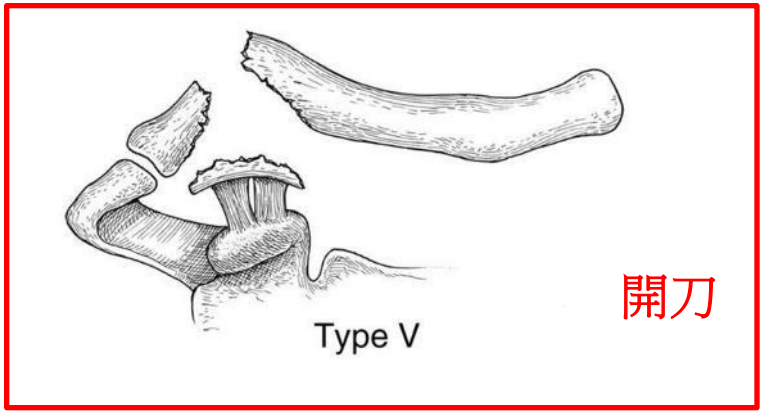








小兒鎖骨骨折



開刀

Superior Shoulder Suspensory Complex

- *Floating shoulder:* This consists of double disruptions of the SSSC.

The SSSC is a bone–soft tissue ring that includes the glenoid process, coracoid process, coracoclavicular ligaments, distal clavicle, acromioclavicular joint, and acromial process (**Fig. 13.5**).

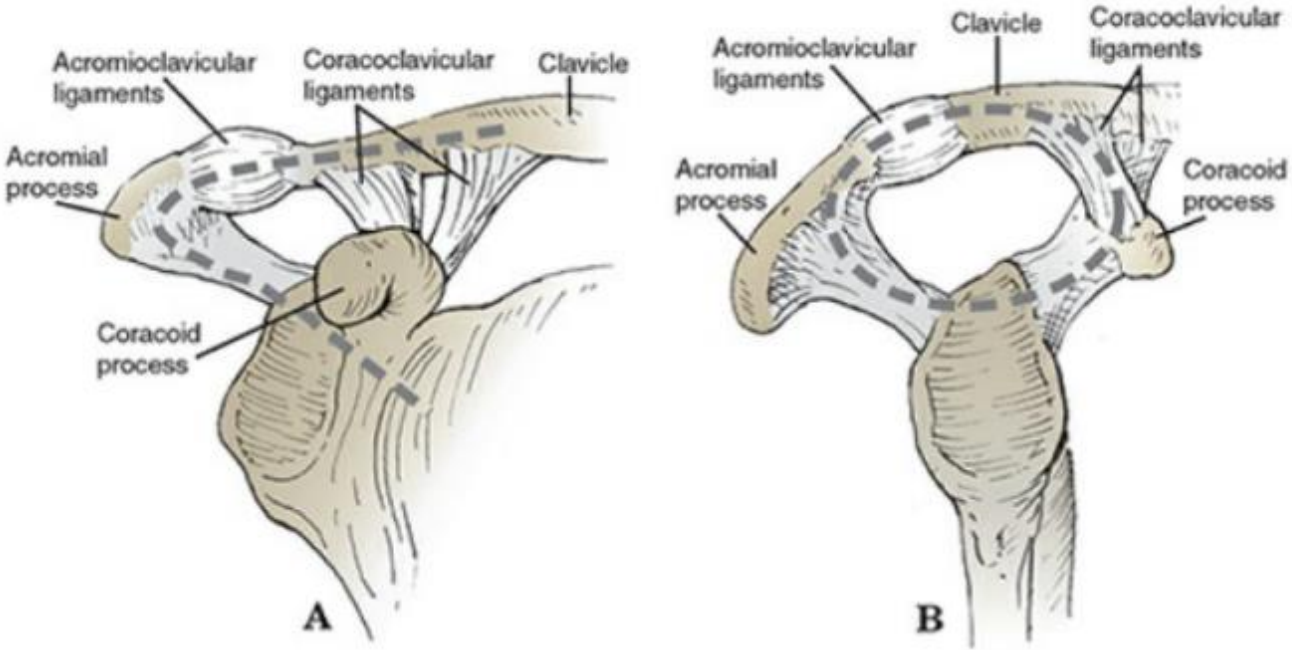


FIGURE 13.5 SSSC. **(A)** Anteroposterior view of the bone–soft tissue ring and superior and inferior bone struts. **(B)** Lateral view of the bone–soft tissue ring. (*From Heyworth BE, Abzug JM. Clavicle and scapula fractures and acromioclavicular and sternoclavicular injuries. In: Waters PM, Skaggs DL, Flynn JM, eds.* Rockwood and Wilkins' Fractures in Children. *9th ed. Philadelphia: Wolters Kluwer; 2020:719–758.*)

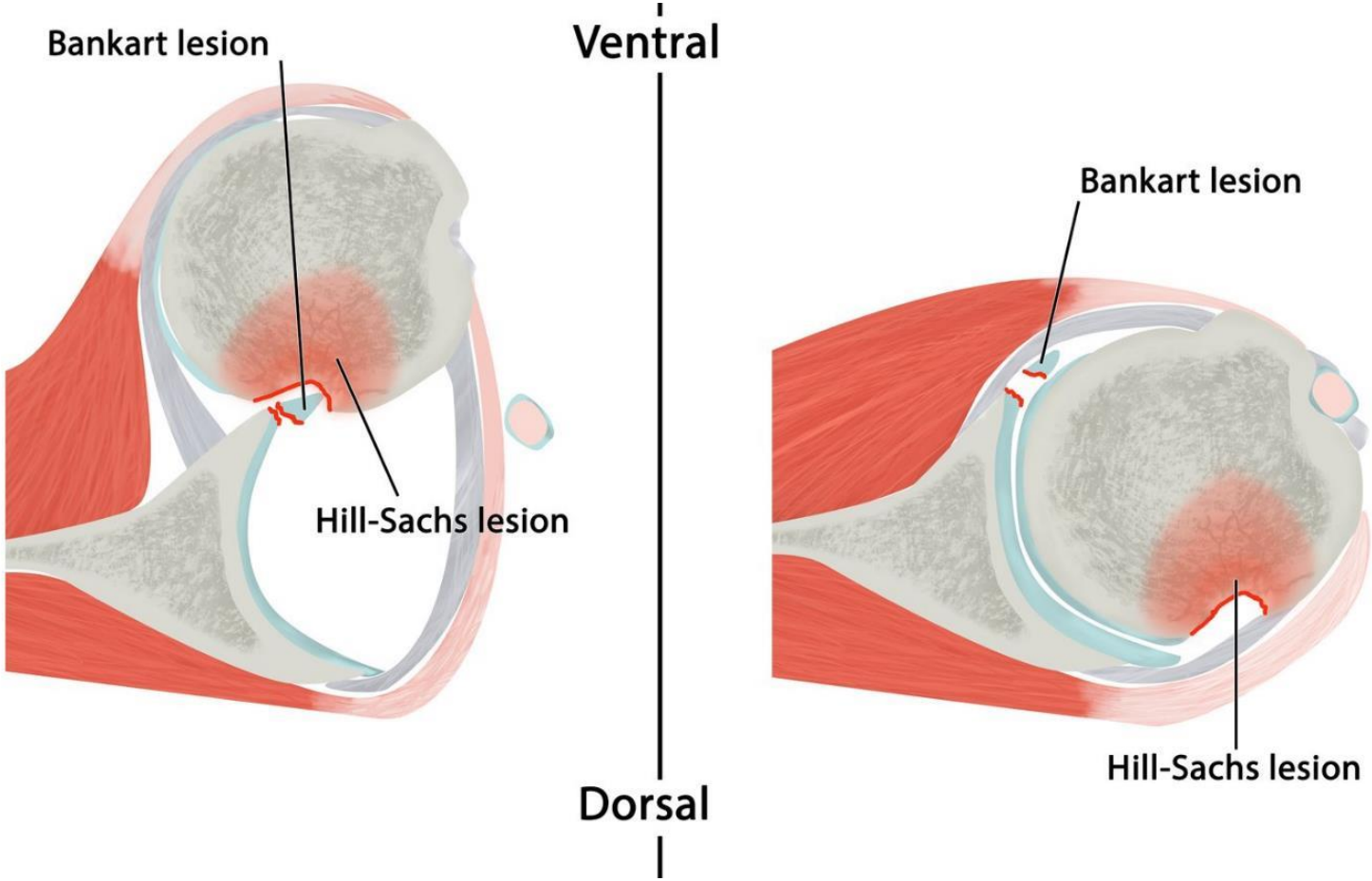
Scapular Fractures

- Injury by large amount of energy
- Associated injury (severe & life-threatening)
  - head injury
  - brachial plexus injury
  - rib fracture (hemopneumothorax)
- Treatment is usually **nonoperative with a sling**.
- **Surgical** management is indicated for intra-articular fractures, displaced scapular body/neck fractures, open fractures, and those associated with glenohumeral instability.

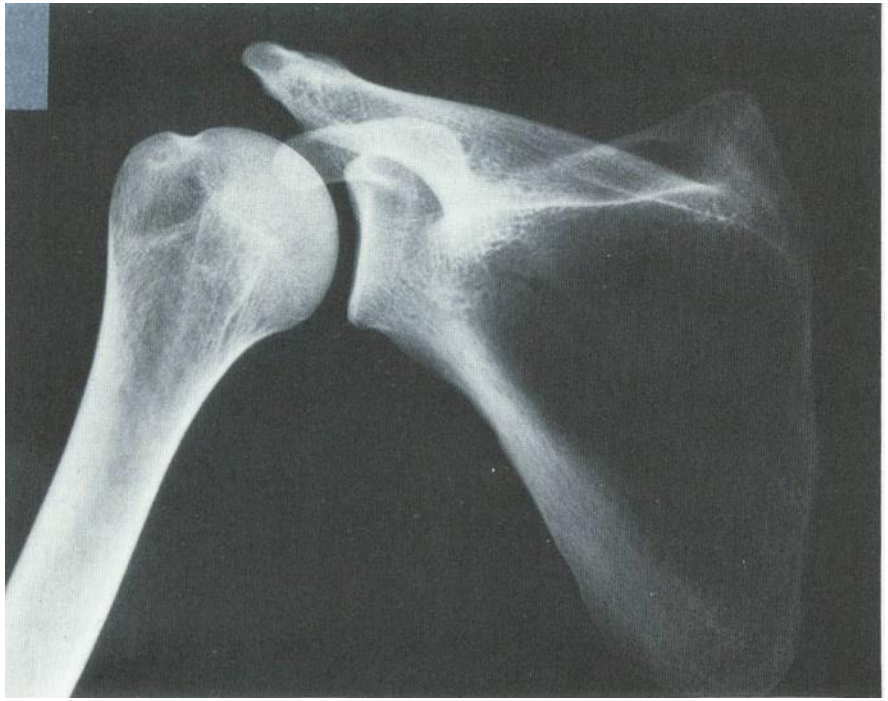
Shoulder Dislocation

- Most common, up to 45% of dislocations.
  - **Anterior** dislocations **96%**
    - **Bankart** and **Hill-Sach** lesion
      - humeral head is driven anteriorly, tearing the shoulder capsule, detaching the labrum from the glenoid, and producing a compression fr. of the humeral head
  - Posterior dislocations 2% to 4%
  - Inferior dislocation (Luxatio erecta) 0.5%
- Recurrence rate in all ages is 50%, almost 89% in the 14 to 20 year age

Bankart and Hill-Sach lesion



Shoulder Trauma Series – Scapular AP View



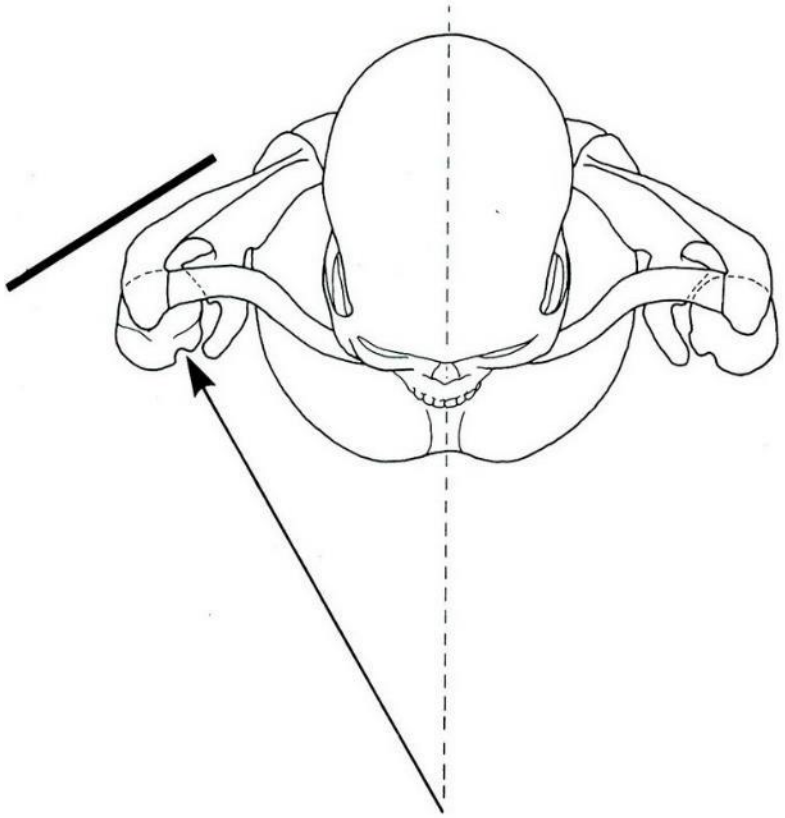


FIGURE 29-3. True anteroposterior view of glenohumeral joint in the plane of the scapula.

Shoulder Trauma Series – Scapular Lateral (Y-View)

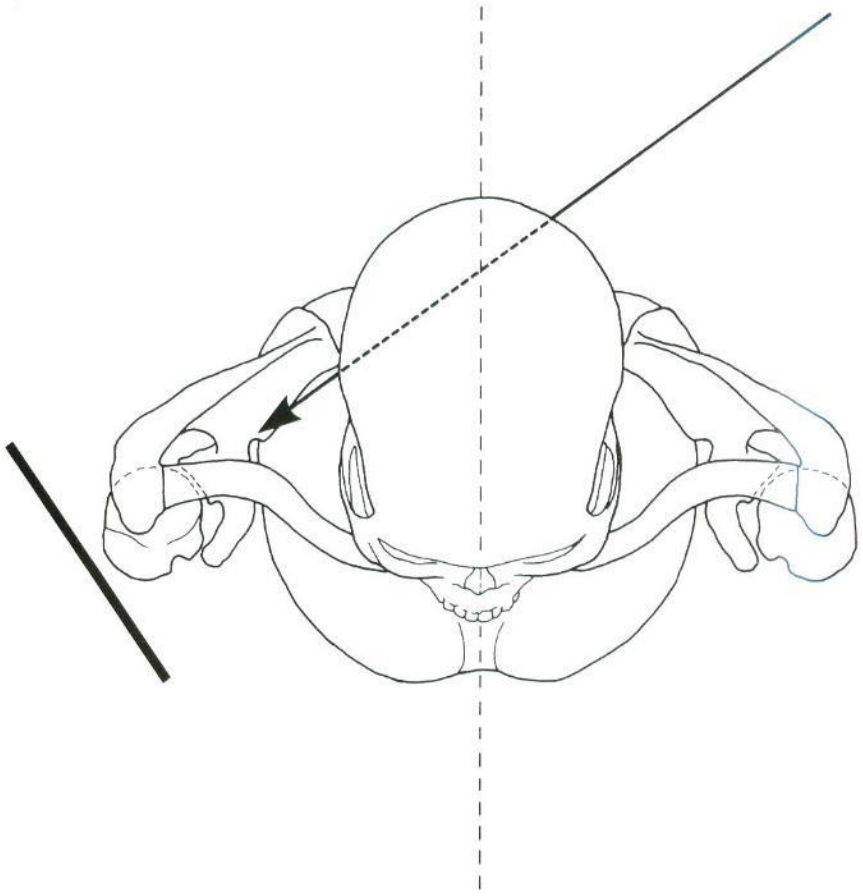
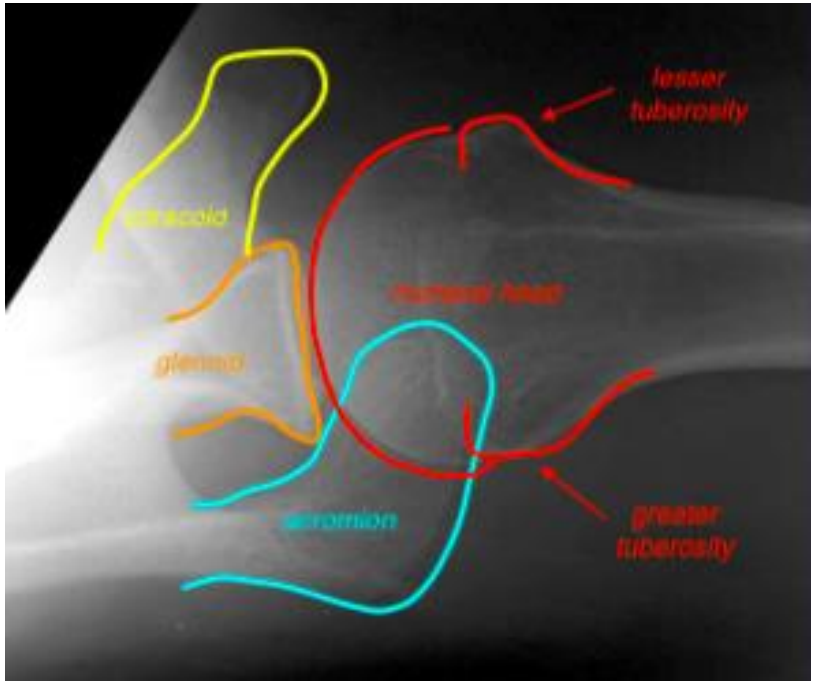
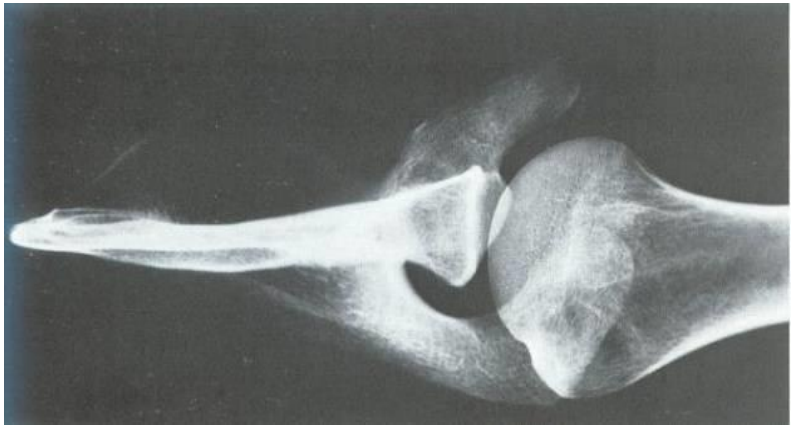


FIGURE 29-4. Lateral scapula "Y" view of glenohumeral joint.

Shoulder Trauma Series – Axillary View





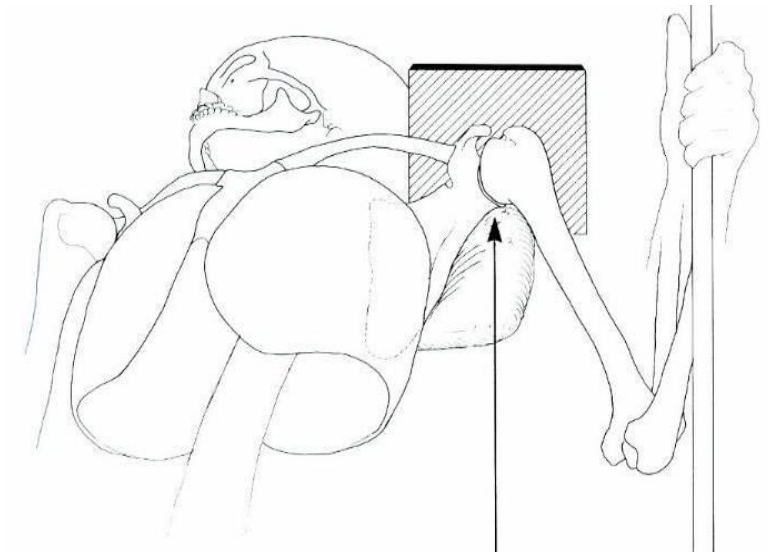
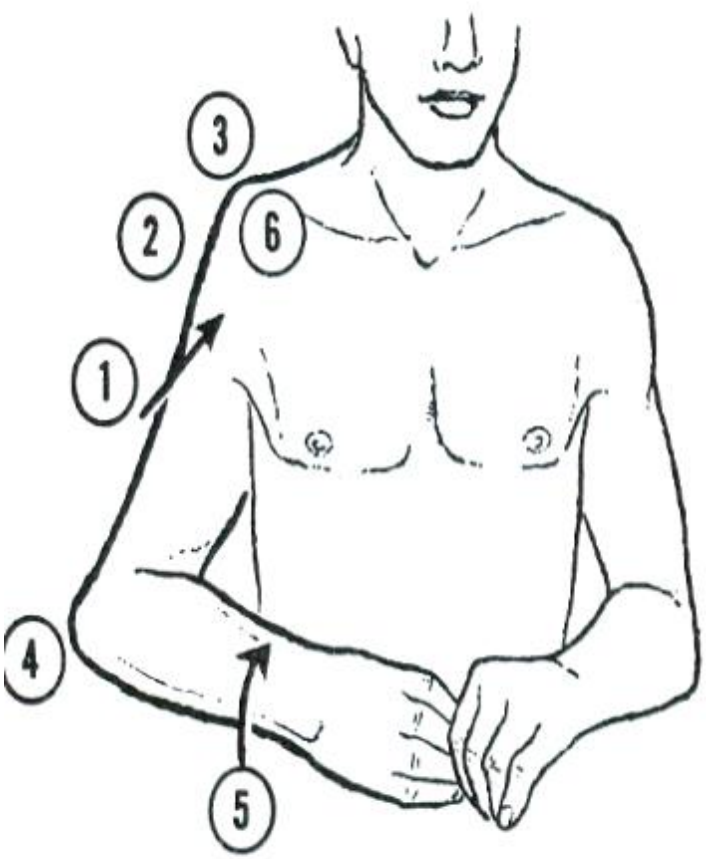


FIGURE 29-5. An "emergency" axillary view of the glenohumeral joint can be obtained by having the patient hold on to an IV pole.

Anterior Shoulder Dislocation (Subcoracoid Type)



1. arm is fixed in slight abduction and directed upward and inward
2. shoulder is flattened
3. acromion process is unduly prominent
4. elbow is flexed
5. forearm is rotated internally
6. abnormal prominence exists in the subcoracoid region

Anterior Dislocation

- ***Traction–countertraction***

Hippocratic Method

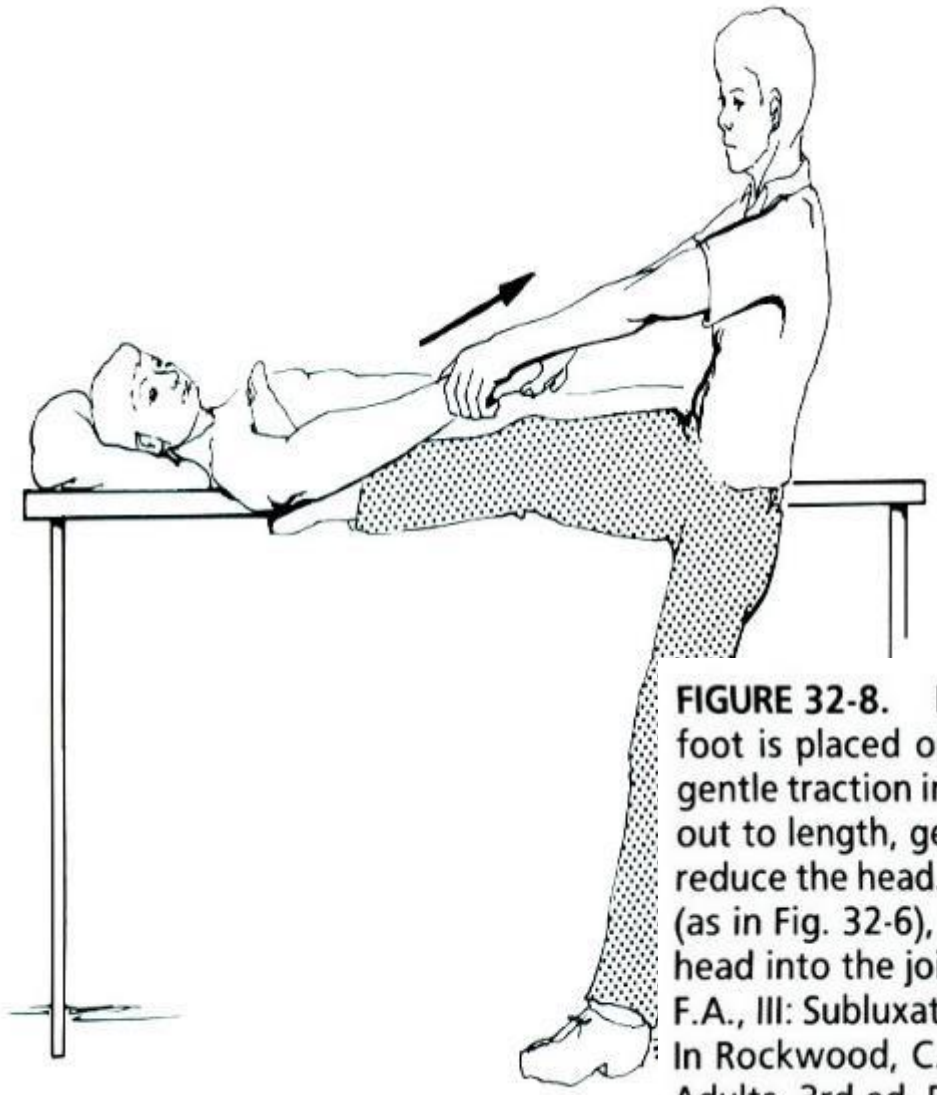


FIGURE 32-8. Hippocratic technique with one man. The surgeon's foot is placed on the chest wall, not in the axilla. Use steady and gentle traction in 45° of abduction. After the head has been brought out to length, gently adduct the arm, using the foot as a fulcrum to reduce the head. This technique can also be done with two surgeons (as in Fig. 32-6), and a third surgeon can be used to lift the humeral head into the joint. (Rockwood, C.A., Jr., Thomas, S.C., and Matsen, F.A., III: Subluxations and Dislocations about the Glenohumeral Joint. In Rockwood, C.A., Jr., Green, A.P., and Bucholz, R.W.: Fractures in Adults, 3rd ed. Philadelphia, J.B. Lippincott Co., 1991:1088.)

Modified Stimson Method

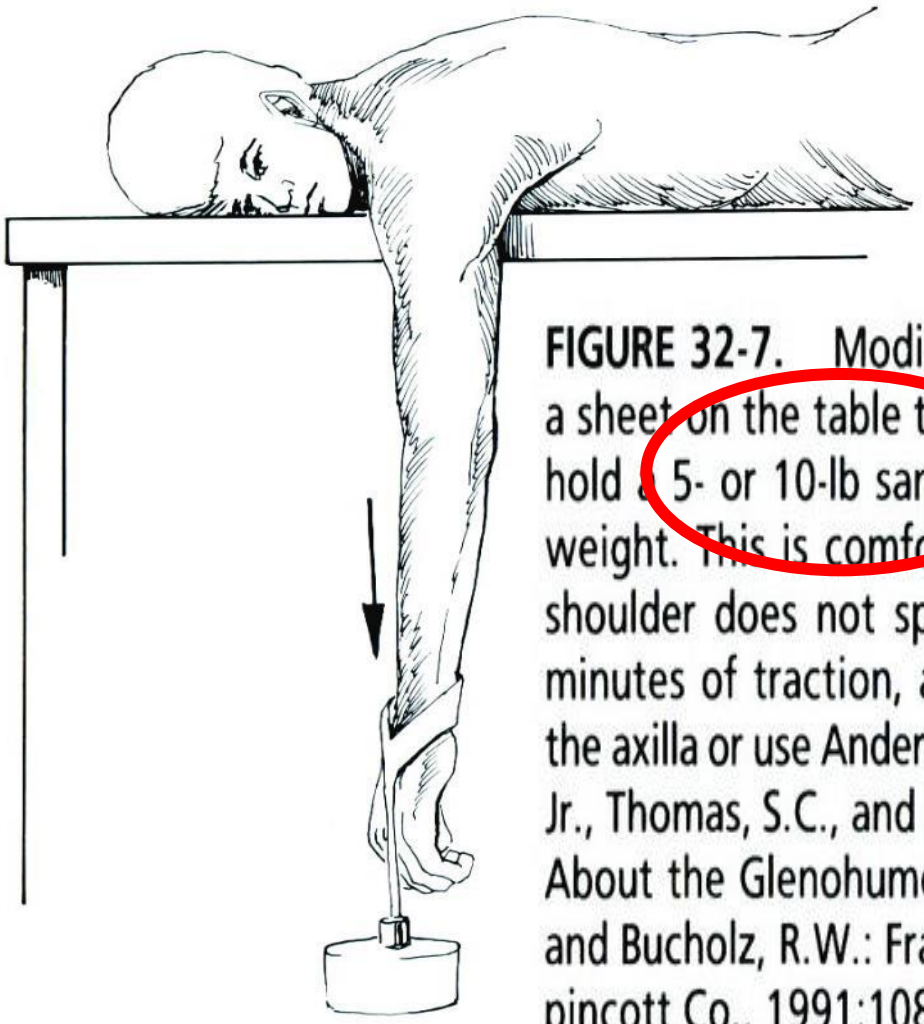
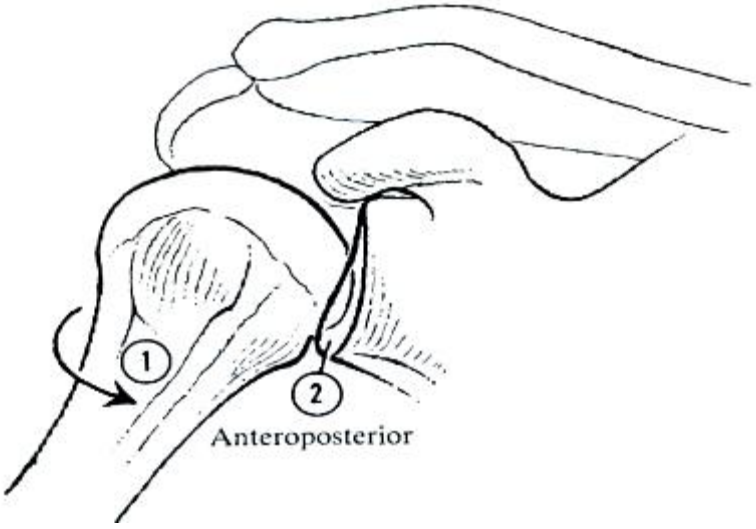


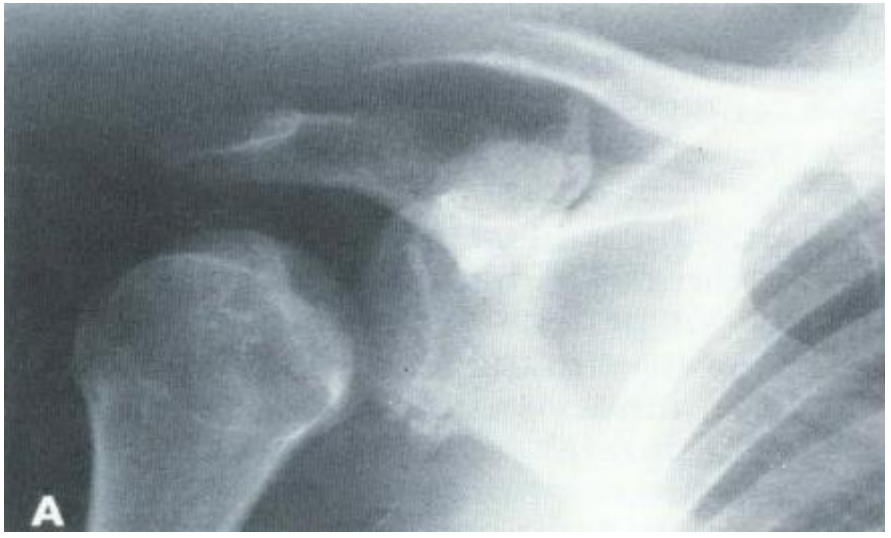
FIGURE 32-7. Modified Stimson method. Pad the chest wall with a sheet on the table top. Rather than a wrist loop, have the patient hold a 5- or 10-lb sandbag in the hand. Tape the hand around the weight. This is comfortable and allows the patient to relax. If the shoulder does not spontaneously relocate after sedation and ten minutes of traction, apply gentle outward traction with a hand in the axilla or use Anderson's scapular manipulation.[1a] (Rockwood, C.A., Jr., Thomas, S.C., and Matsen, F.A., III: Subluxations and Dislocations About the Glenohumeral Joint. In Rockwood, C.A., Jr., Green, A.P., and Bucholz, R.W.: Fractures in Adults, 3rd ed. Philadelphia, J.B. Lippincott Co., 1991:1089.)

Care After Reduction

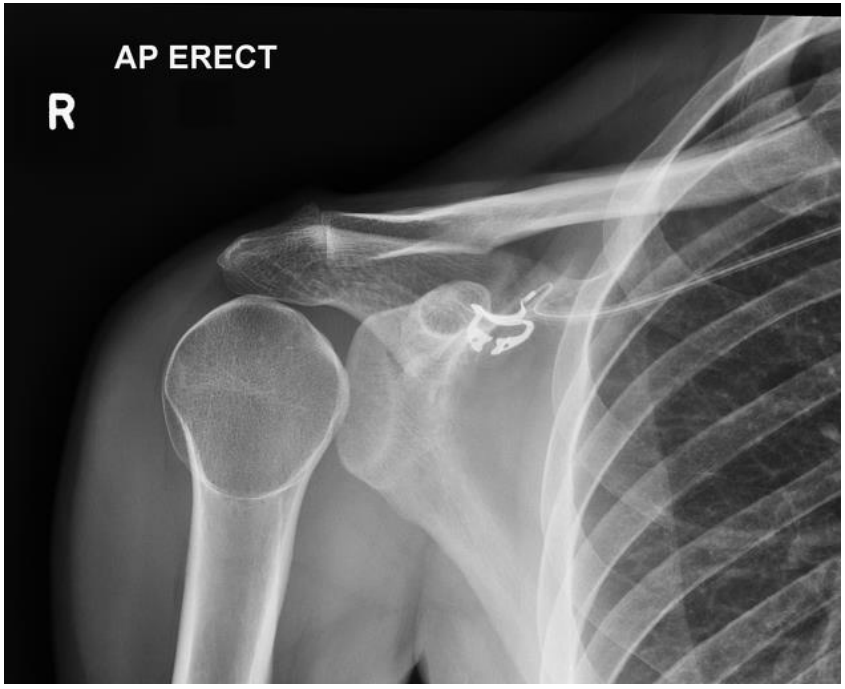
- Studies have not shown any benefit of **immobilization > 1 week** for decreasing recurrence rates
- Some studies show immobilization in **external rotation** decreases recurrence rates in patients < 40

Posterior Shoulder Dislocation

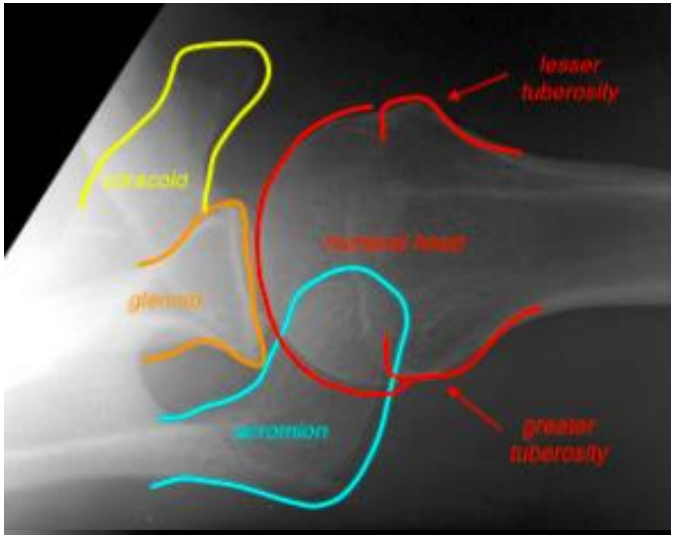


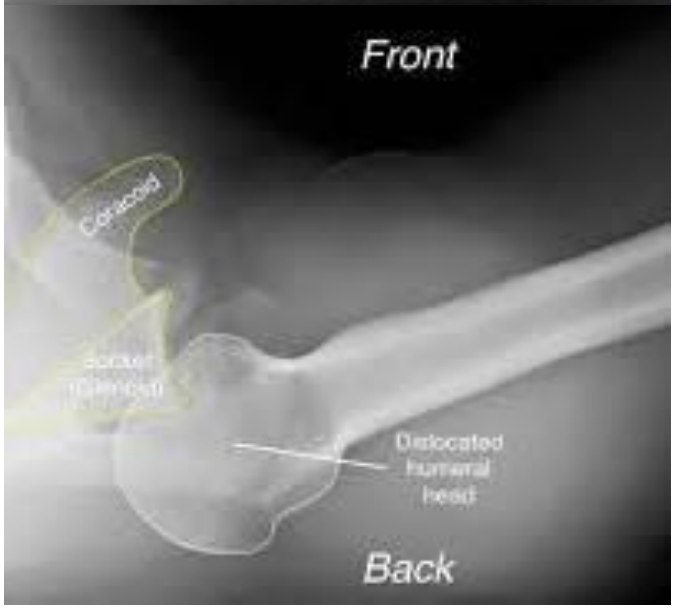


Light bulb sign



Posterior Shoulder Dislocation





Posterior Shoulder Dislocation

- Closed reduction requires full muscle relaxation, sedation, and analgesia
- **In-line traction** on the affected arm, which lies internally rotated and adducted.
- Not be forced into **external rotation**

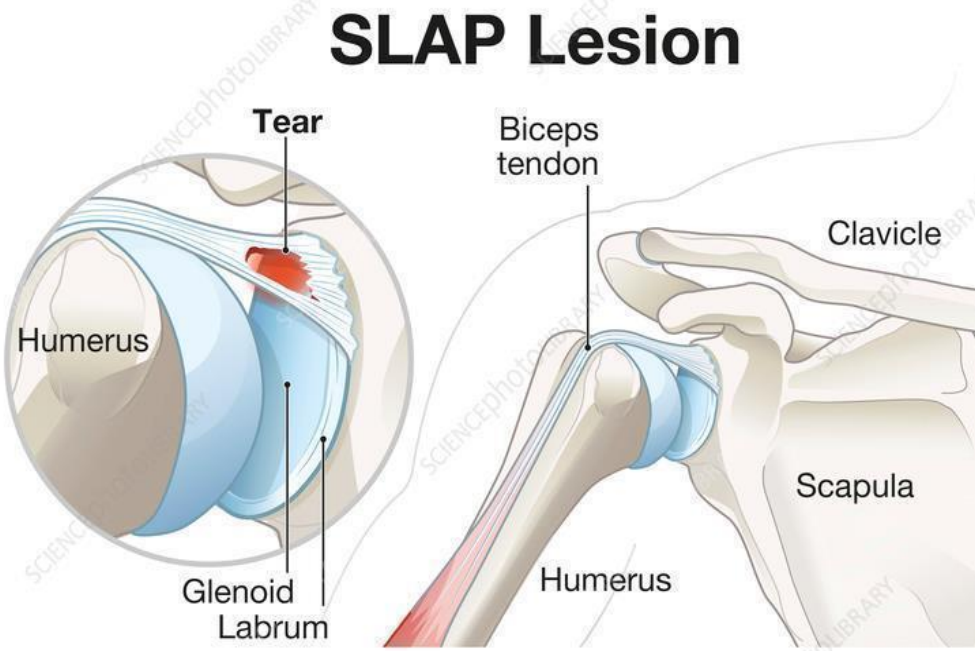
Inferior Dislocations (Luxatio Erecta)

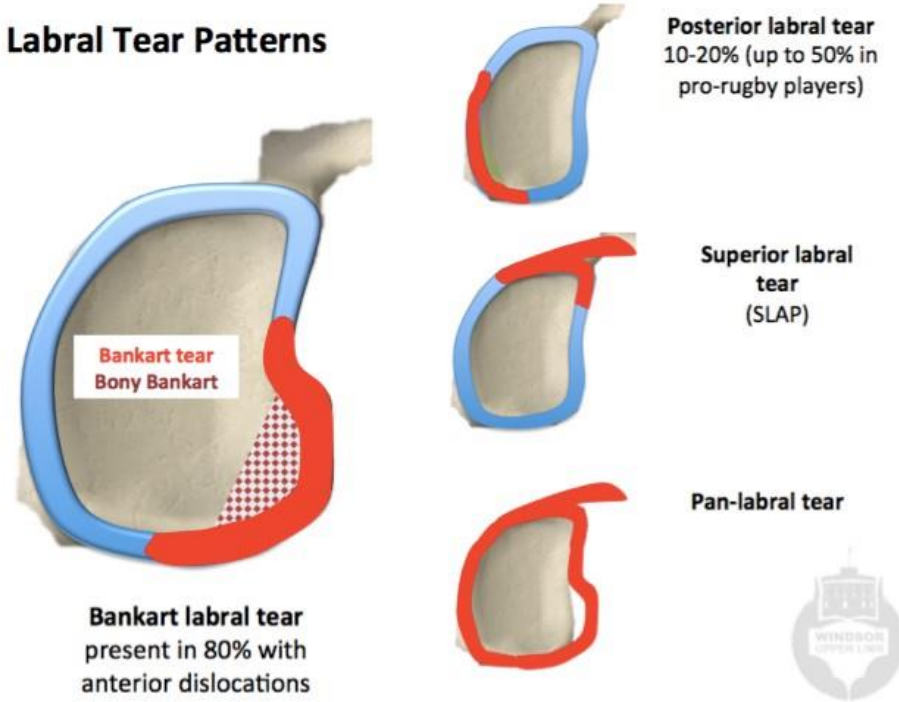
Luxatio Erecta (Inferior Glenohumeral Joint Dislocation)

Exam Review

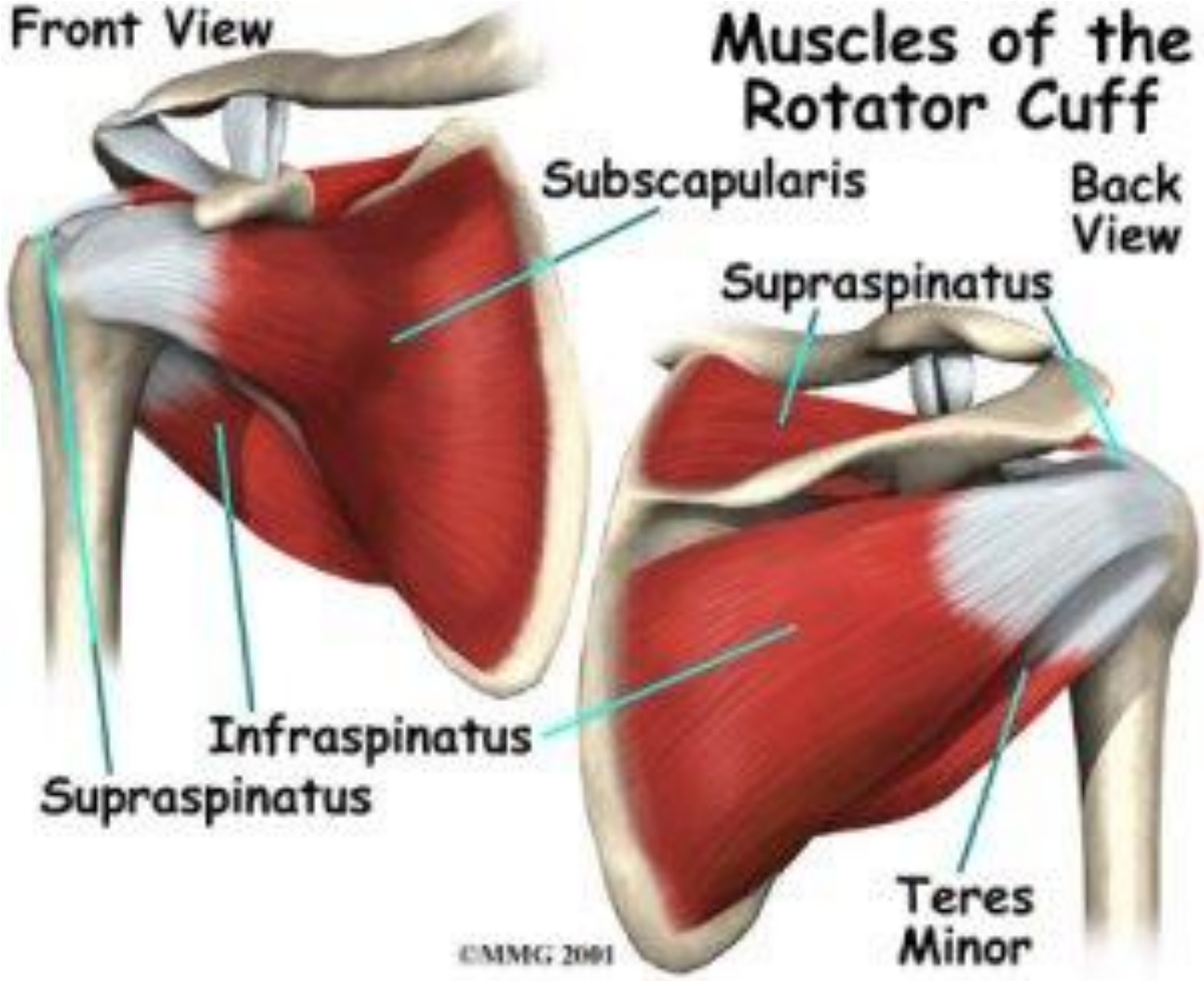
SLAP vs Bankart

- Superior labrum anterior to posterior
- **Biceps tendon long head**
- **MRI**





Rotator cuff 組成



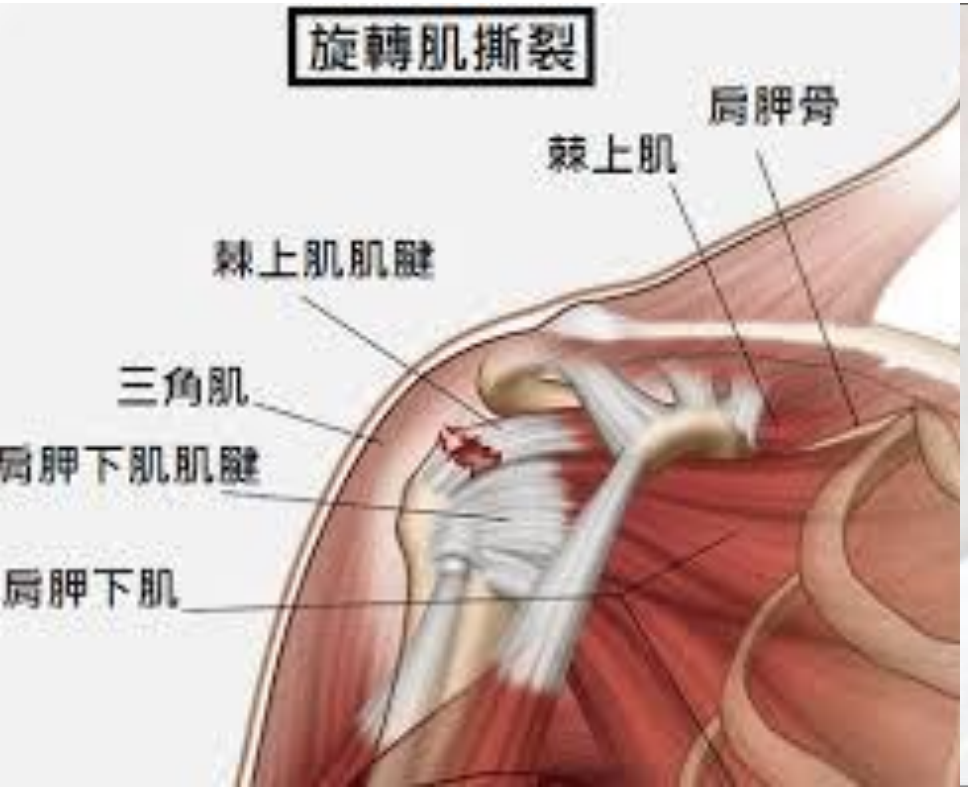
Etiology of RCT

- Long-term degenerative process: older age

- Single traumatic episode: younger age

Rotator cuff tear 最常發生位置

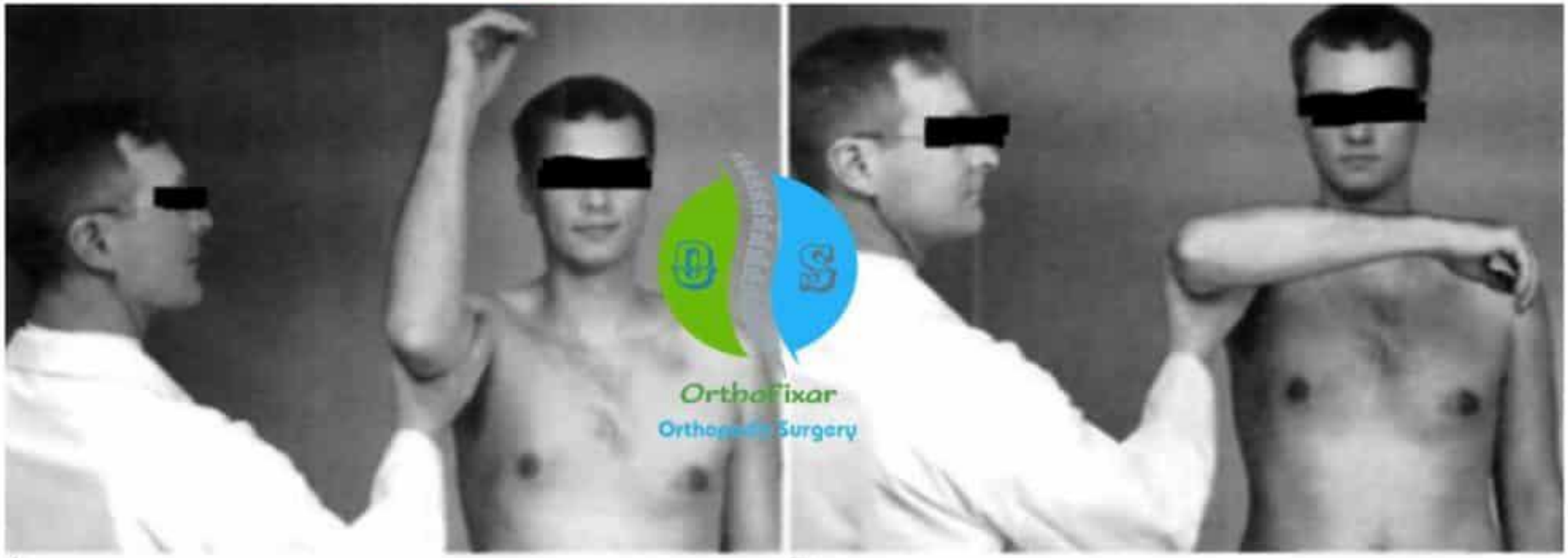
supraspinatus tendon insertion area at great tuberosity of humerus



Subacromial Impingement & Cuff Pathology

Teres minor

Hornblower sign



A Normal

B Abnormal

Image

- X-ray
- Sono
- MRI (Gold standard)

Treatment

- Physical therapy, NSAIDS, subacromial corticosteroid injections
- Subacromial decompression and rotator cuff debridement alone
- Rotator cuff repair (arthroscopic or mini-open)
- Tendon transfer
- Superior capsular reconstruction
- Reverse total shoulder arthroplasty

Frozen shoulder (Adhesive capsulitis)

- Functional loss of **both passive and active** shoulder motion commonly associated with diabetes, and thyroid disease.
- More common among women
- Ages 40-60 years
- **Diagnosis** is made **clinically** with marked reduction of both active and passive range of motion of the shoulder.

Frozen shoulder (Adhesive capsulitis)

CLASSIFICATION

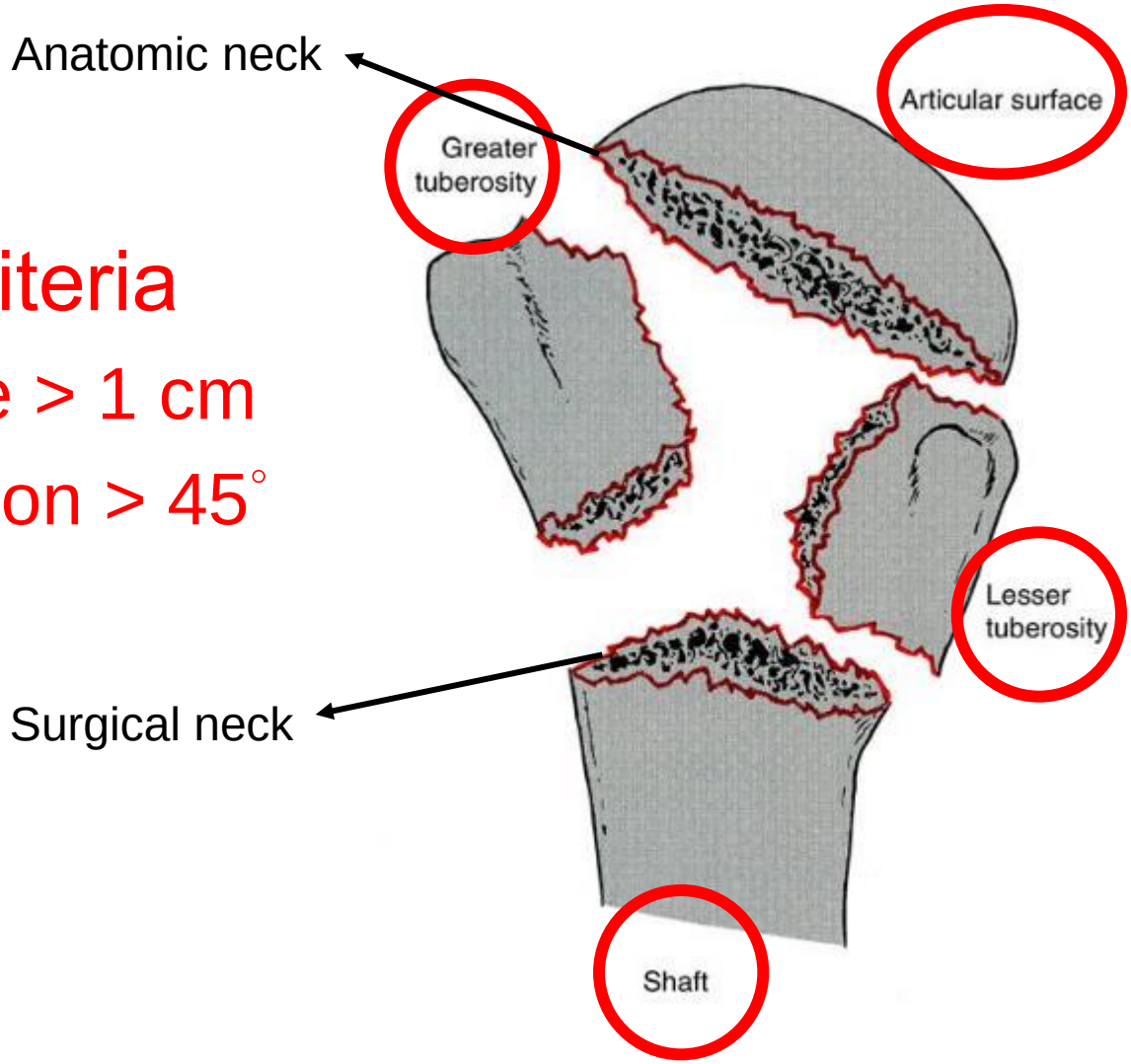
Clinical Stages	
Freezing/Painful	Gradual onset of diffuse pain (6 wks to 9 months)
Frozen/Stiff	Decreased ROM affecting activities of daily living (4 to 9 months or more)
Thawing	Gradual return of motion (5 to 26 months)

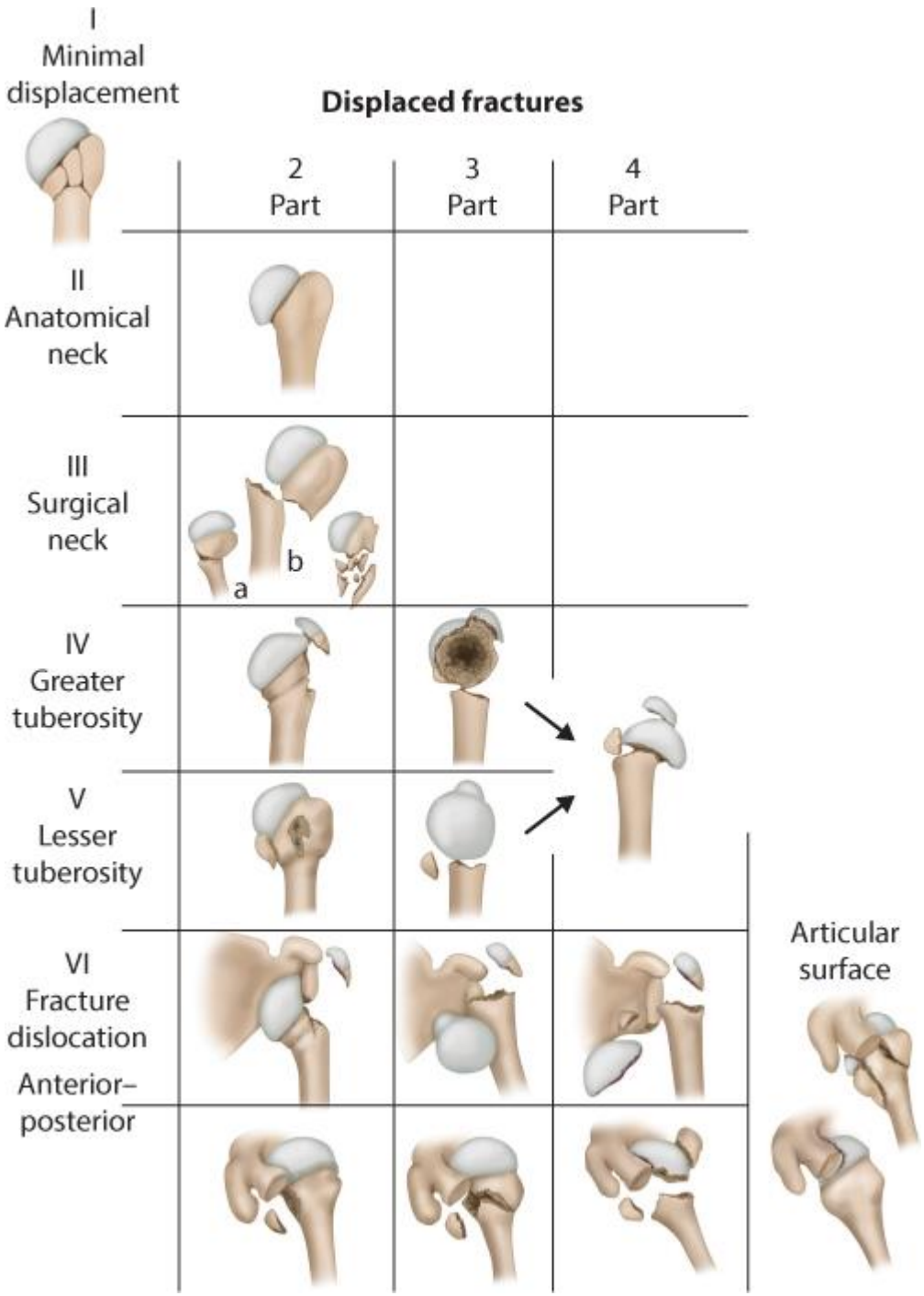
Frozen shoulder (Adhesive capsulitis)

- Treatment is a prolonged course of aggressive physical therapy and medical management of underlying disease if present (i.e diabetes, thyroid disorder).
- Manipulation under anesthesia or arthroscopic capsular release is indicated in patients with progressive loss of motion having failed a prolonged course of physical therapy.

Proximal Humeral Fractures

- Neer's criteria
  - displace > 1 cm
  - angulation > 45°



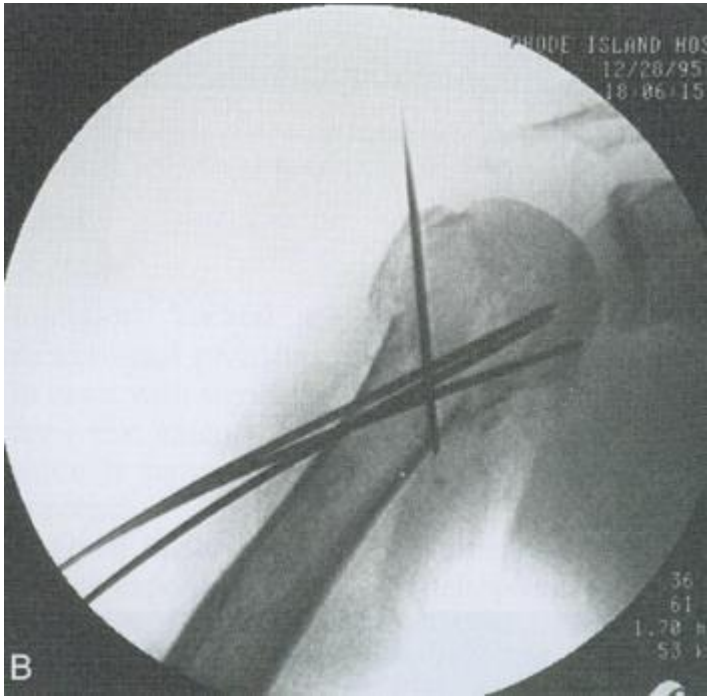

I
Minimal displacement
Displaced fractures
2 Part
3 Part
4 Part
II Anatomical neck
III Surgical neck
a
b
IV Greater tuberosity
V Lesser tuberosity
VI Fracture dislocation
Anterior–posterior
Articular surface

Two-Part Surgical Neck Fractures

- most common fracture of proximal humerus
- extra-capsular, adequate blood supply, low incidence of AVN
- upper fragment is usually abducted & externally rotated by rotator cuff muscle
- lower fragment displaces medially and anteriorly by pectoralis major muscle

Two-Part Surgical Neck Fractures

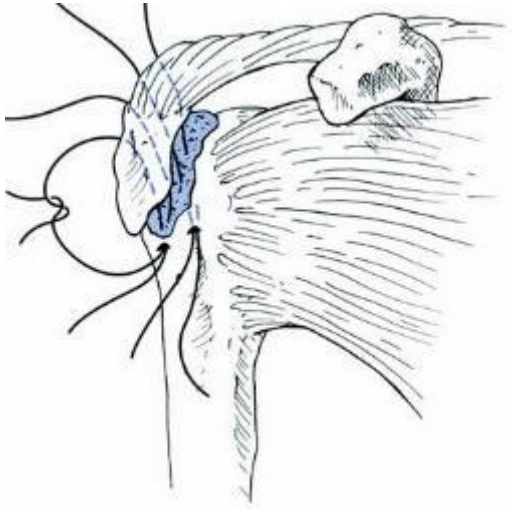
- closed reduction and percutaneous pinning
- open reduction with buttress plate

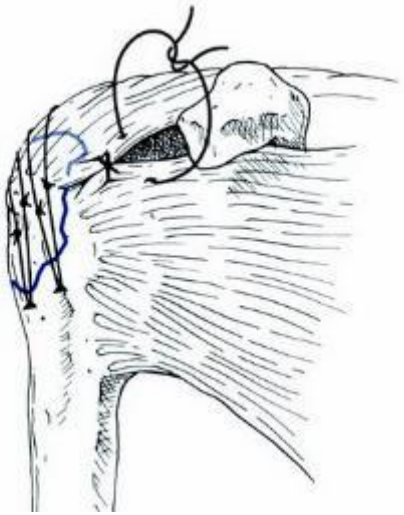


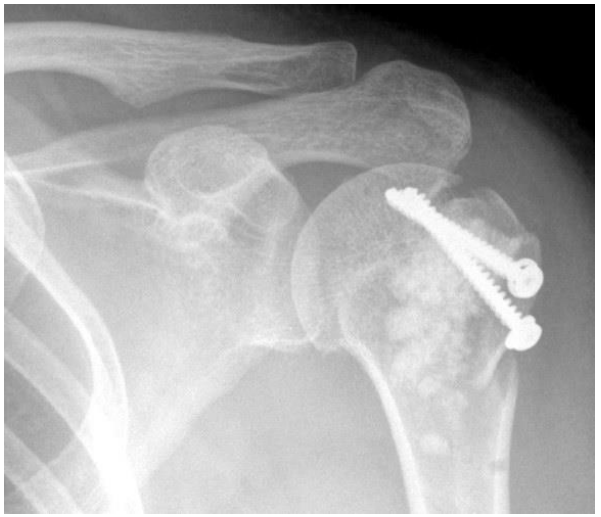
Two- Part Greater Tuberosity Fractures

- displaced posteriorly and superiorly
- 5% to 15% of anterior shoulder dislocation
- rotator cuff tear
- displaces **> 5 mm** requires ORIF to prevent impingement

Two- Part Greater Tuberosity Fractures



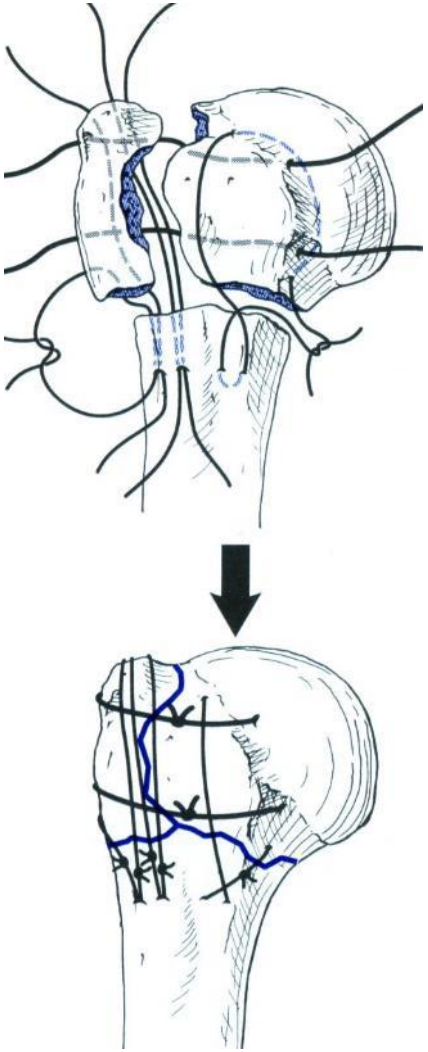




Three-Part Fractures

- displaced tuberosity fragment & surgical neck fragment
- poor bone contact will lead to delayed union or nonunion

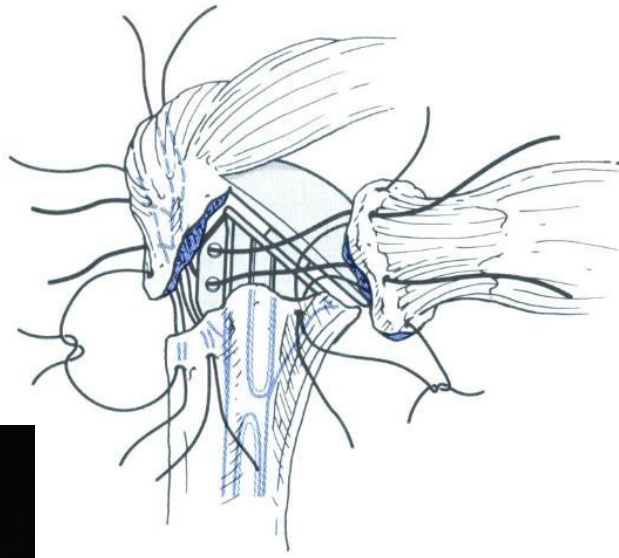
Three-Part Fractures

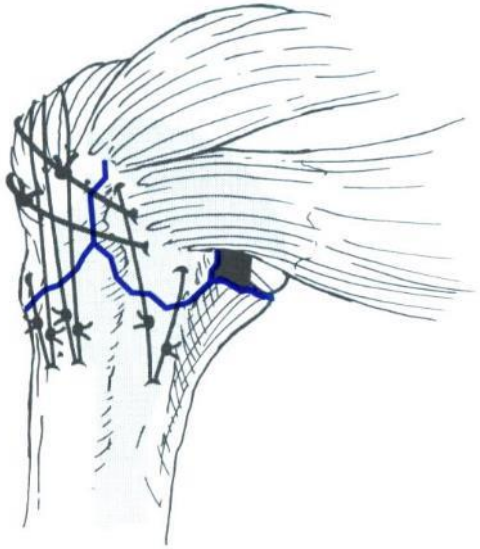


Four-Part Fractures

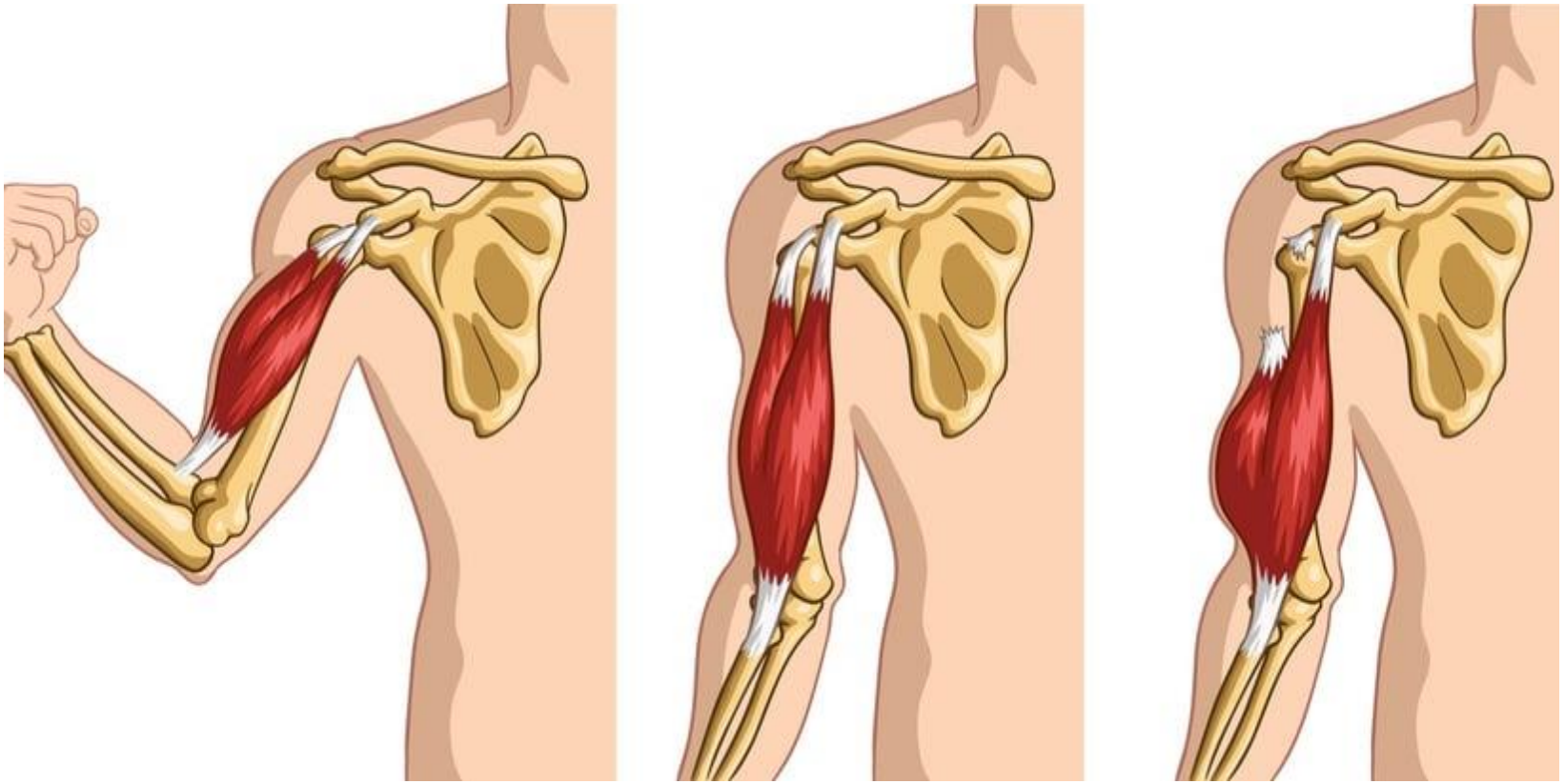
- **Osteonecrosis** of humeral head, 21% to 75%
- young, good bone quality, ORIF
- osteoporosis, arthroplasty

Four-Part Fractures





Proximal Biceps Tendon Rupture (Long head)



Popeye sign

Proximal Biceps Tendon Rupture (Long head)

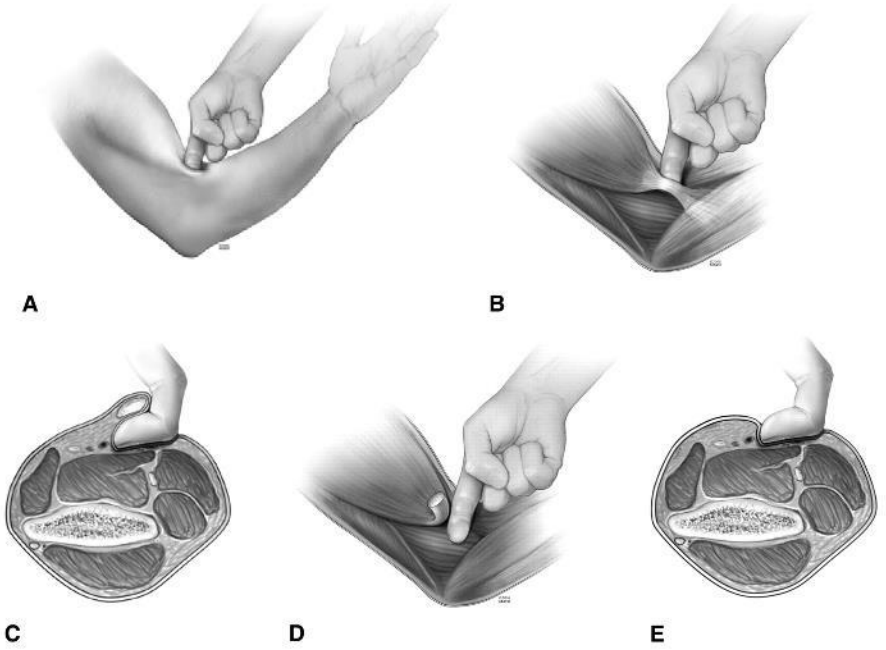
- Usaully conservative Tx, especillay elderly
- Most p’ts will become aymptomatic after 4-6 weeks.

- Tenodesis

Distal Biceps Avulsion

- Distal biceps tendon rupture represents about 10% of biceps ruptures.

Reverse Popeye sign



Hook test

Distal Biceps Avulsion

- MRI
  - complete tear vs. partial tear
  - muscle substance vs. tendon tear
  - degree of retraction

Distal Biceps Avulsion

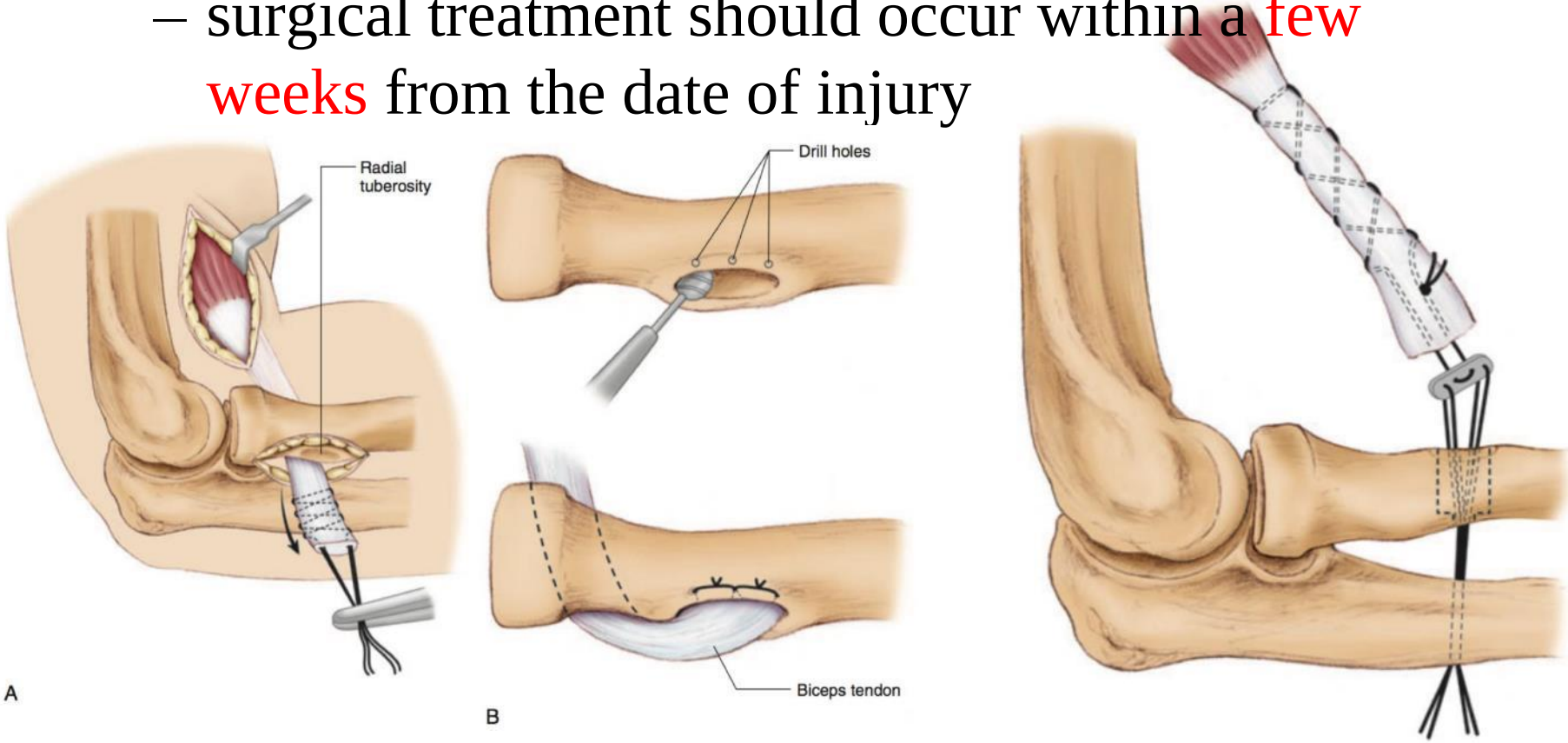
- Treatment can be nonoperative or operative
  - patient age
  - patient activity demands
  - chronicity of tear
  - degree of tear

Distal Biceps Avulsion

- Supportive treatment followed by physical therapy (elderly)
  - lose 50% sustained supination strength
  - lose 40% supination strength
  - lose 30% flexion strength
  - lose 15% grip strength

Distal Biceps Avulsion

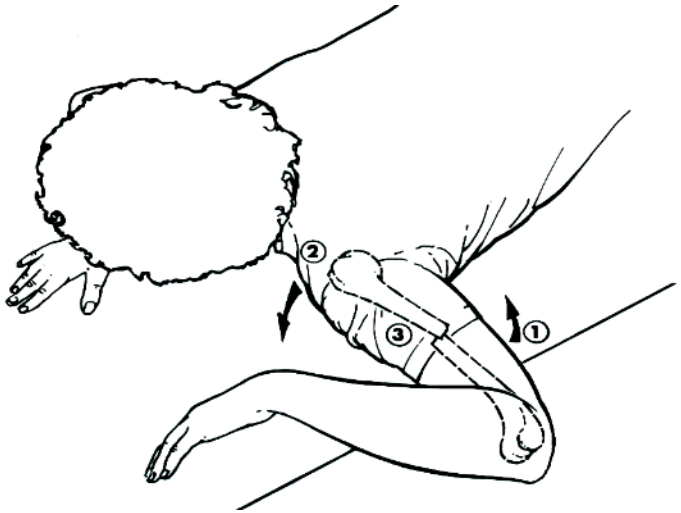
- Surgical repair of tendon to tuberosity (young)
  - surgical treatment should occur within a few weeks from the date of injury



Humeral Shaft Fracture

■ Indirect Torsional Mechanisms

1. A rotational injury may occur with vigorous sports such as arm wrestling.
2. The forceful external rotation of the elbow causes the spiral oblique fracture with a typical external rotational pattern.

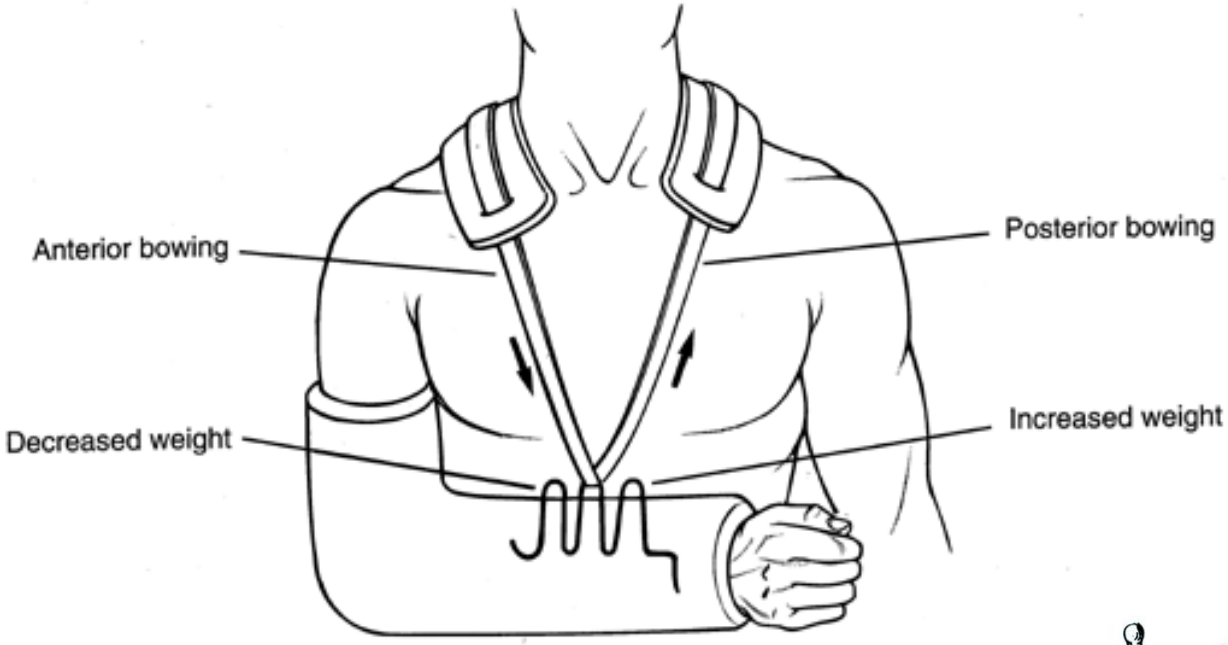


■ Direct Mechanisms

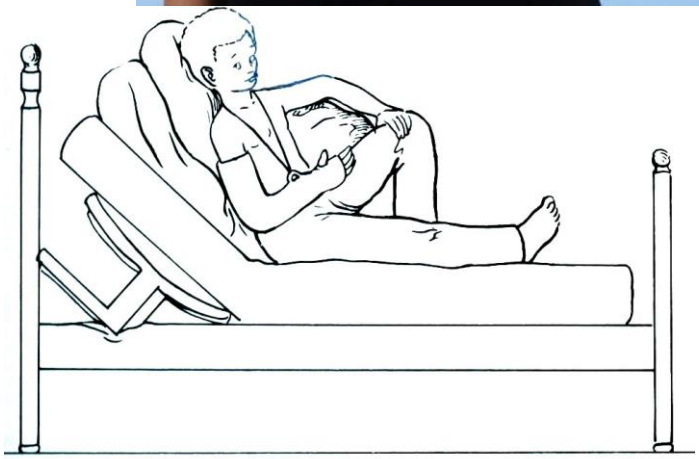
Bending Fractures

1. The victim falls on the distal humerus and forcefully abducts the arm.
2. The proximal humerus is locked in the glenoid.
3. The bending moment produces a typical transverse fracture of the midshaft of the humerus.

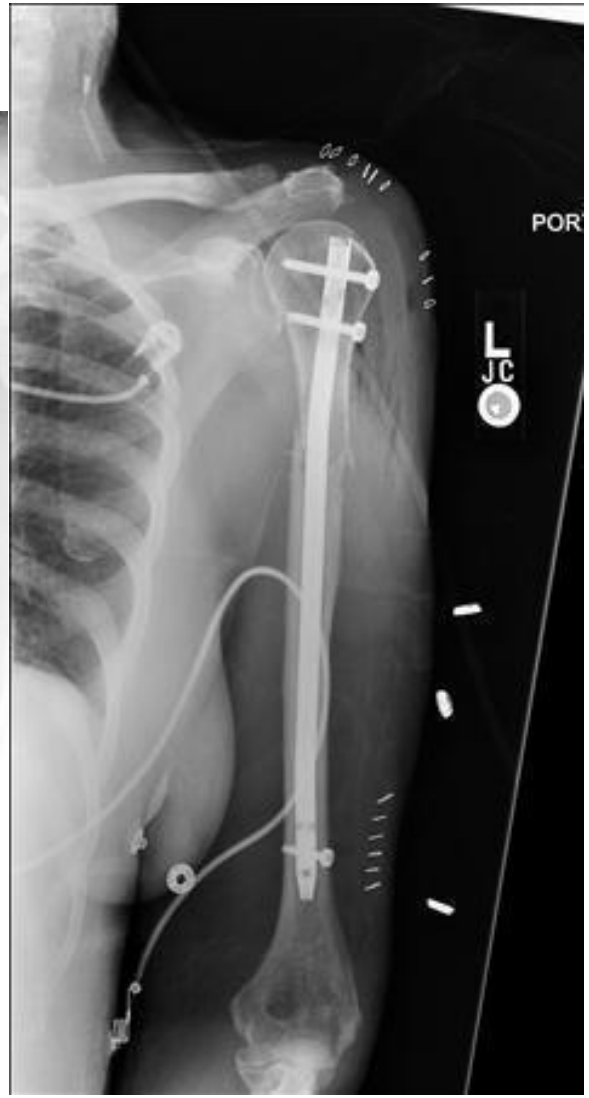
Hanging Cast / Functional Brace



- < 20° anterior angulation
- < 30° varus/valgus angulation
- < 30° of rotational malalignment
- < 3 cm shortening

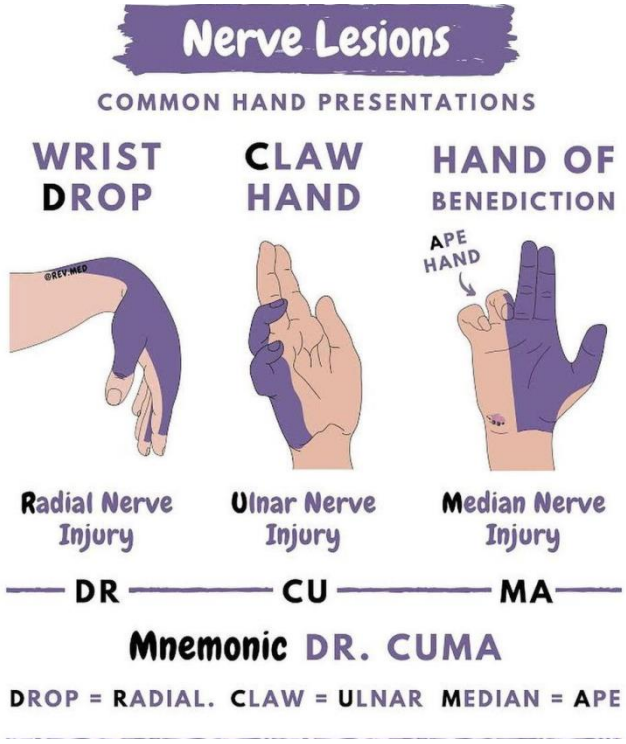


Surgical Treatment



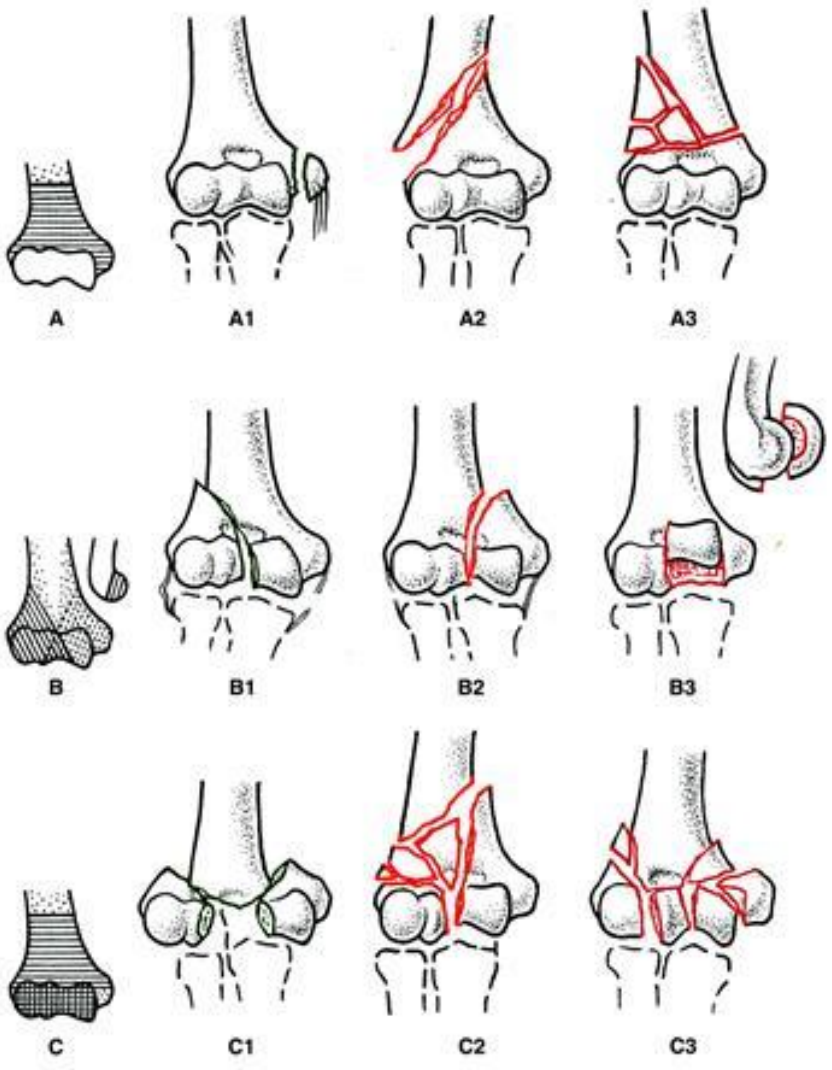
• Radial Nerve Injury

- Up to 22% of humeral shaft fracture
- Most common with middle third fractures
- Loss of wrist and finger extension and grip strength (drop wrist)
- Function should return within 3 to 4 months



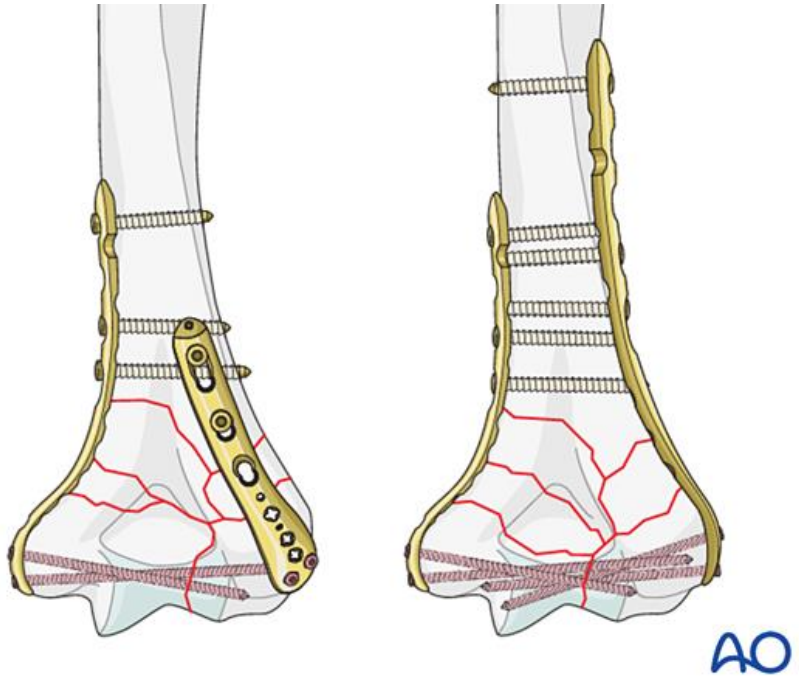
Distal Humerus Fractures

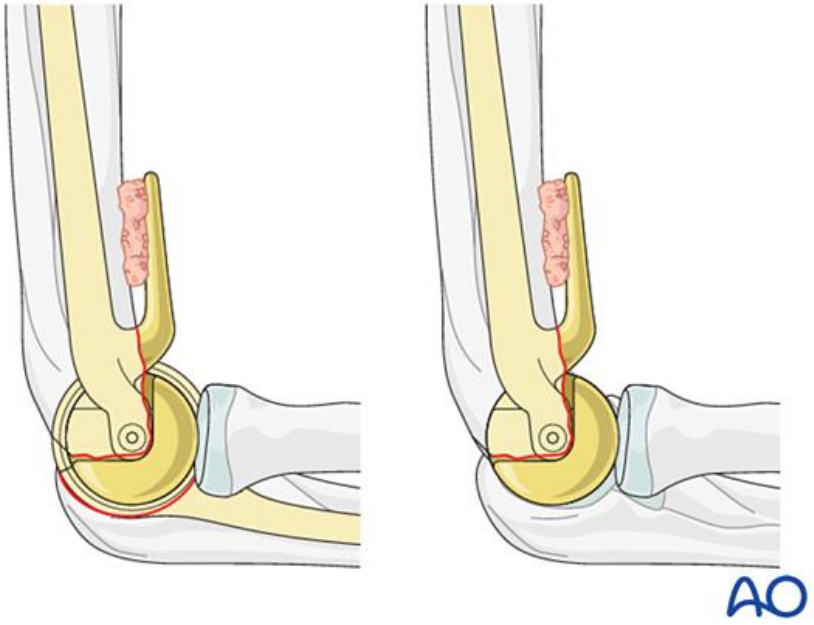
- Supracondylar fractures
- Single column (condyle) fractures
- Bicolumnar fractures
- Coronal shear fractures



Distal Humerus Fractures

- ORIF vs Arthroplasty TEA/hemiarthroplasty



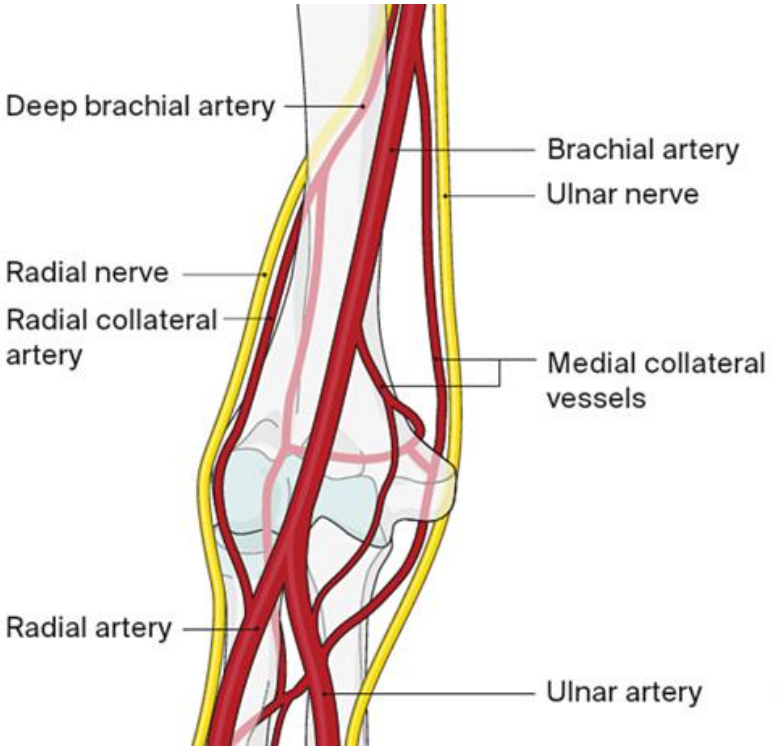


Distal Humerus Fractures

- Elbow stiffness: most common (3-42%)
- Heterotopic ossification : seen in 8%
- Nonunion / Malunion : 0-11%
- Posttraumatic Arthritis

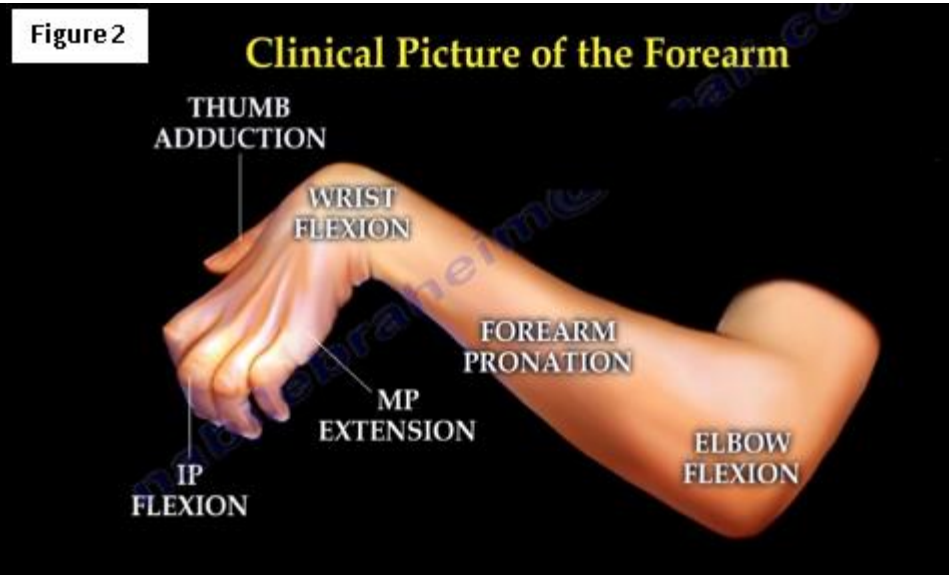
Distal Humerus Fractures

- Neurologic injury (up to 15%): The ulnar nerve is most commonly injured during surgical exposure.



Distal Humerus Fractures

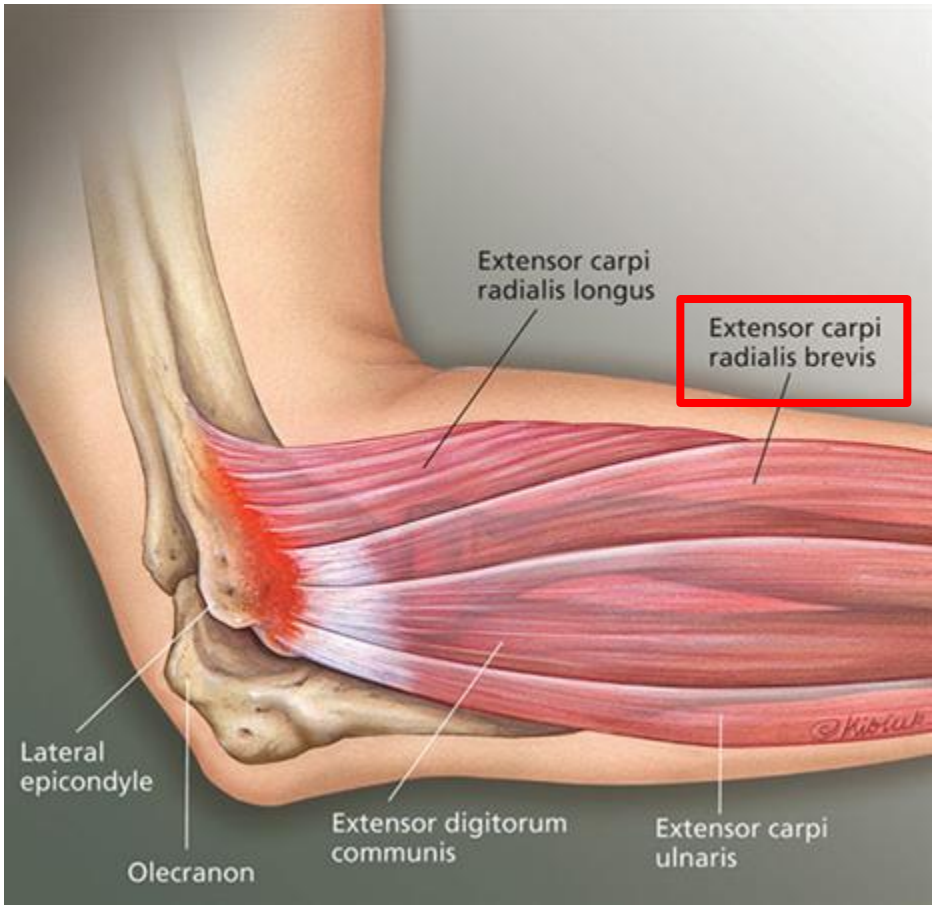
- Volkmann ischemic contracture (rare):
  - unrecognized compartment syndrome with subsequent neurovascular compromise



Tennis elbow – lateral epicondylitis

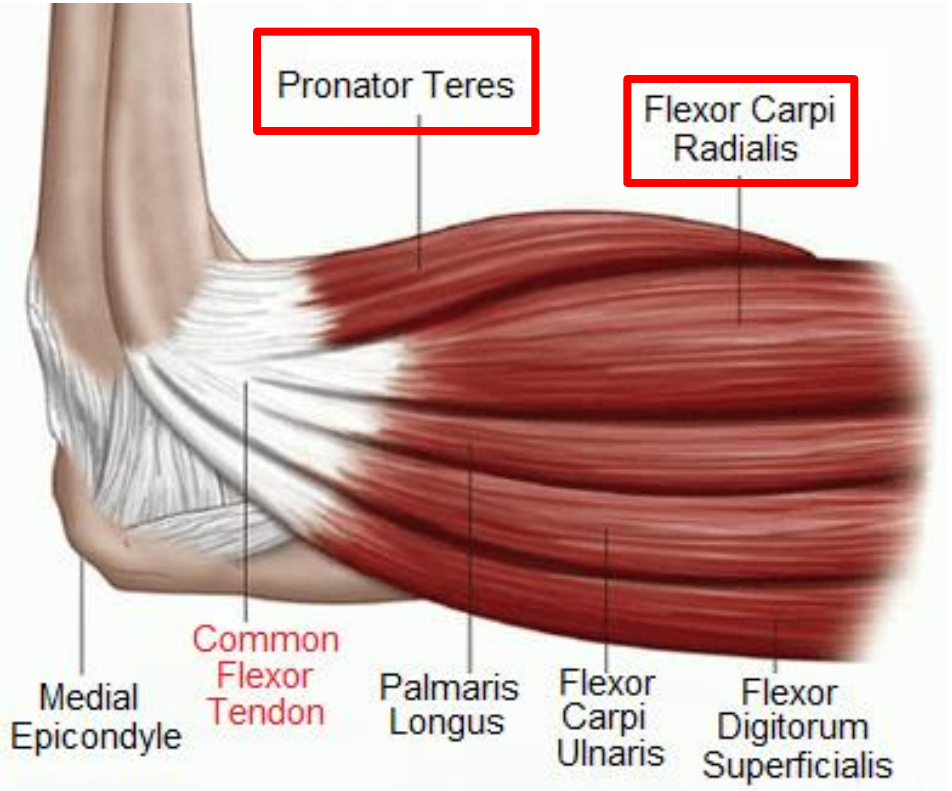
- Affects the origin of extensor tendons of forearm at the lat epicondyle (**ECRB**)

- Pain is exacerbated with resisted wrist dorsiflexion and MF extension , esp with the elbow in full extension



Golfer elbow – medial epicondylitis

- Less common and more difficult to treat than lateral epicondylitis
- Affected area is at the **pronator teres-FCR interface**



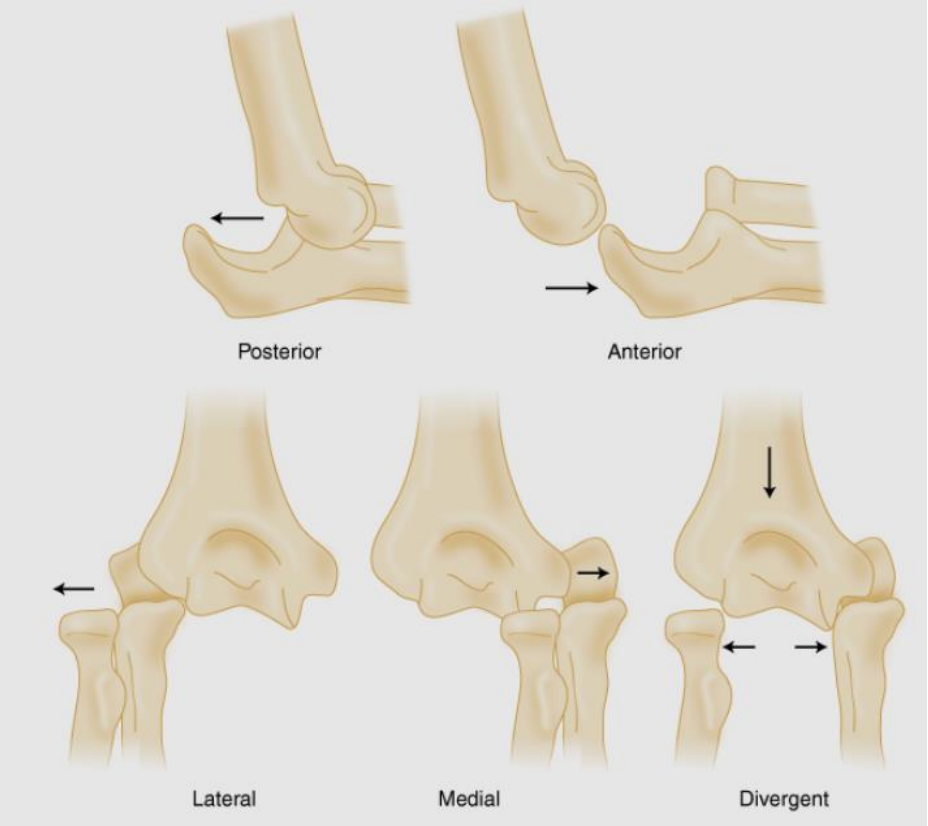
Treatment

- Rest, ice, activity modification, physical therapy, NSAIDS
- Extracorporeal shockwave therapy (ESWT)
- Corticosteroid / PRP injections
- Acupuncture

- Open debridement

Elbow Dislocation

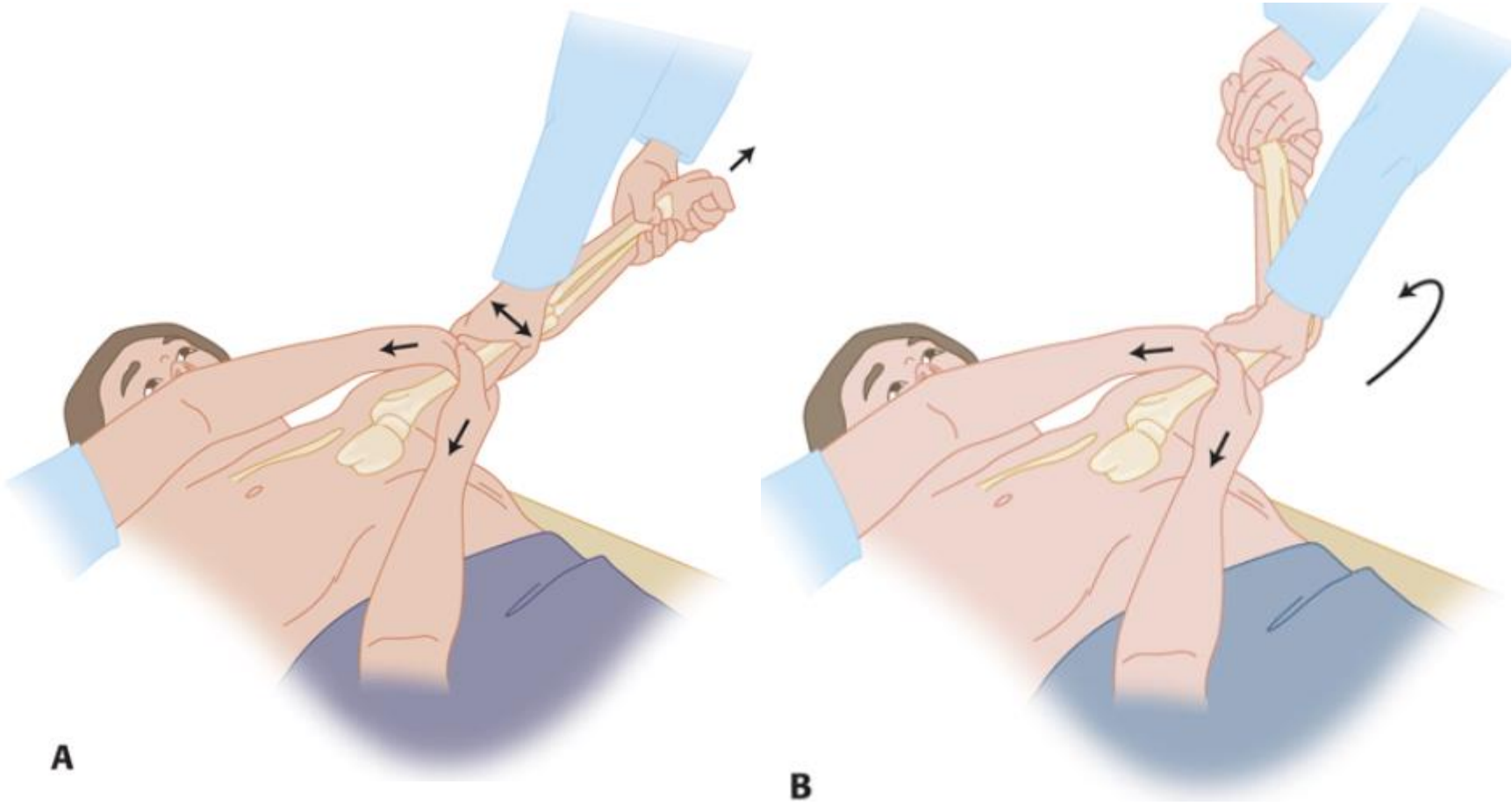
- Accounts for 11% to 28% of elbow injuries.
- Posterior dislocation is most common, 80-90%



Elbow Dislocation

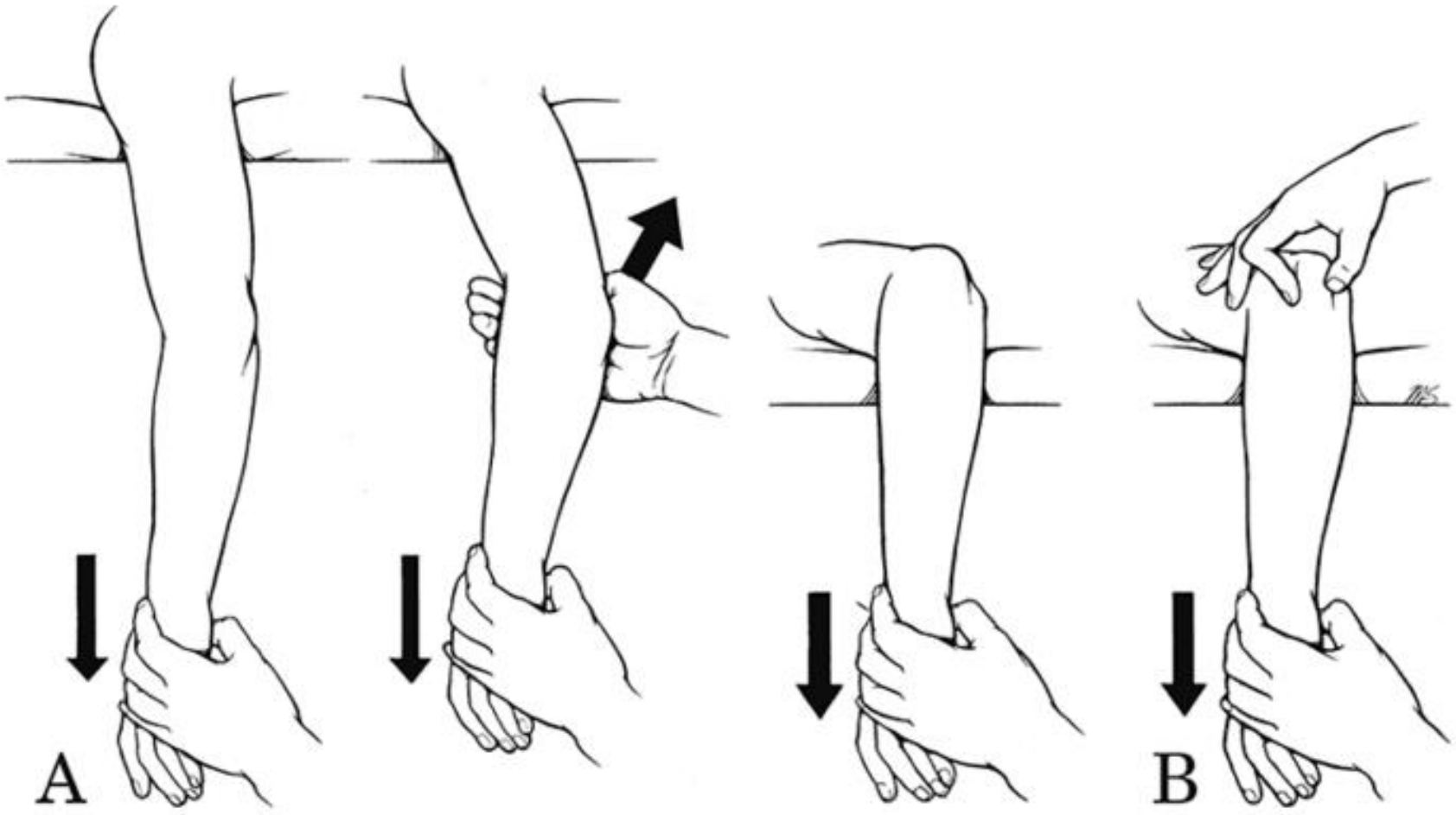
- Reduction maneuver
  - Inline traction to correct coronal displacement
  - Supination to clear the coronoid beneath trochlea
  - Flexion of elbow while placing pressure on tip of olecranon

Elbow Dislocation



Elbow Dislocation

Parvin's method **Meyn and Quigley's method**



Elbow Dislocation

- Assess post reduction stability
  - Elbow is often unstable in extension
    - If LCL is disrupted than usually more stable in pronation
    - If MCL is disrupted than usually more stable in supination

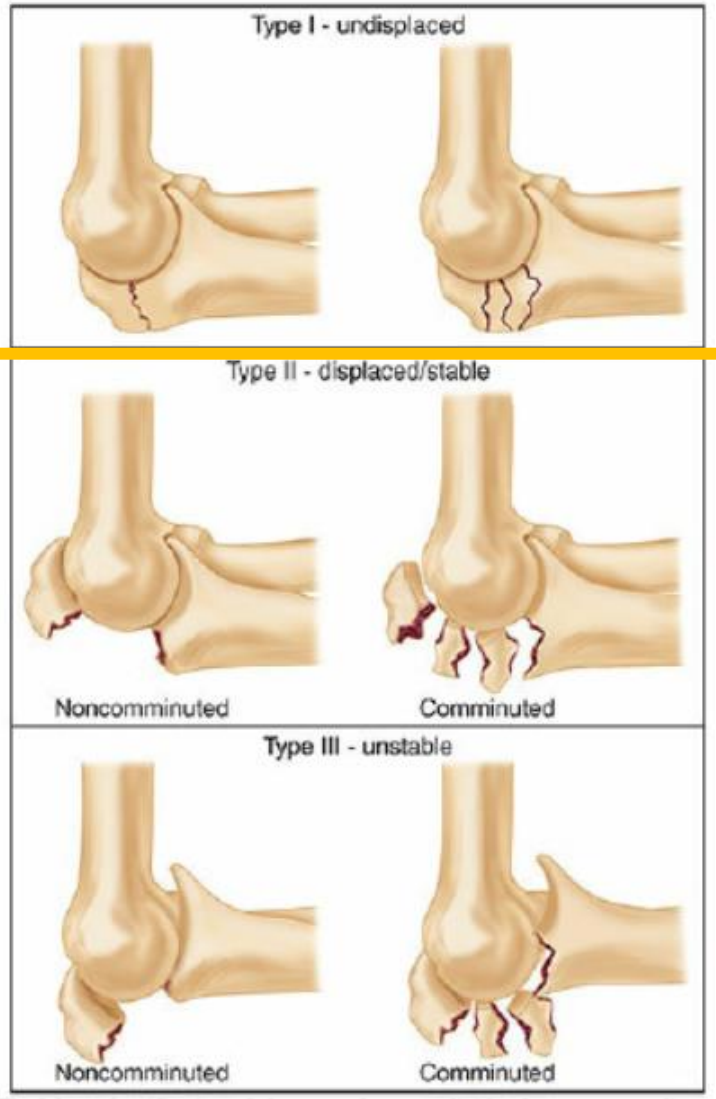
Elbow Dislocation

- Immobilize and obtain post-reduction radiographs
  - Check for concentric reduction of joint
  - If concentric then immobilize (5-7 days) and start early therapy

Elbow Dislocation

- Loss of elbow motion (stiffness)
- Recurrent instability
- Compartment syndrome (Volkmann contracture)
- Vascular injury
  - open dislocations, brachial artery is disrupted by forcible hyperextension
- Nerve injury
  - neuropraxia is occurs in 20%, usually involving ulnar or median n (AIN branch)
  - ulnar nerve palsy is much higher in pediatric dislocations with an associated medial epicondyle fracture
  - most neurologic deficits are transient
  - entrapment of median nerve with elbow joint after manipulation is more common in pediatric dislocations

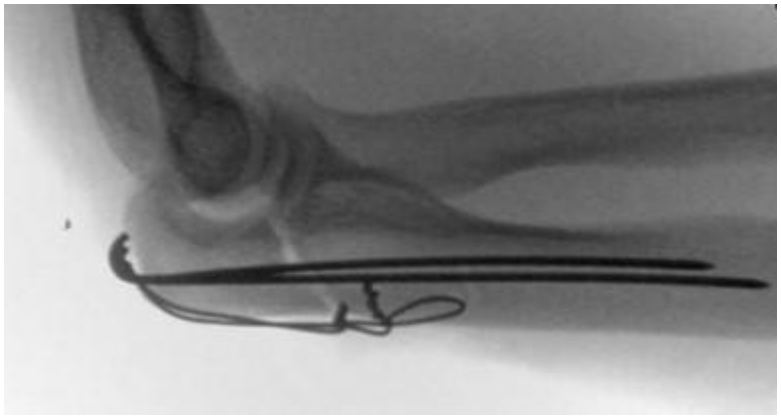
Olecranon fracture

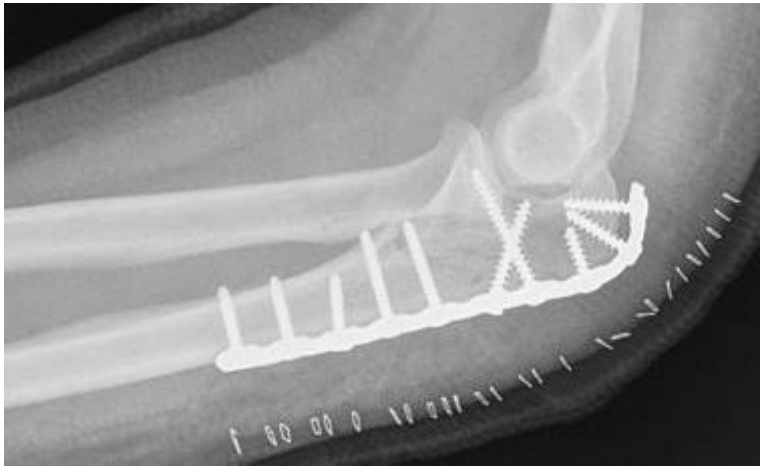


- Cast immobilization in 45-90 degree, ROM at 1 week.

- ORIF
  - TBW
  - Plate fixation
  - intramedullary fixation (IMN)

Olecranon fracture





Radial Head Fracture

- most common fracture of elbow in adults
- fall on an outstretched hand
- associated injuries
  - fracture of the capitellum
  - dislocation of the DRUJ (Essex Lopresti Fracture)
  - Valgus instability (MCL rupture)
  - elbow dislocation

Radial Head Fractures

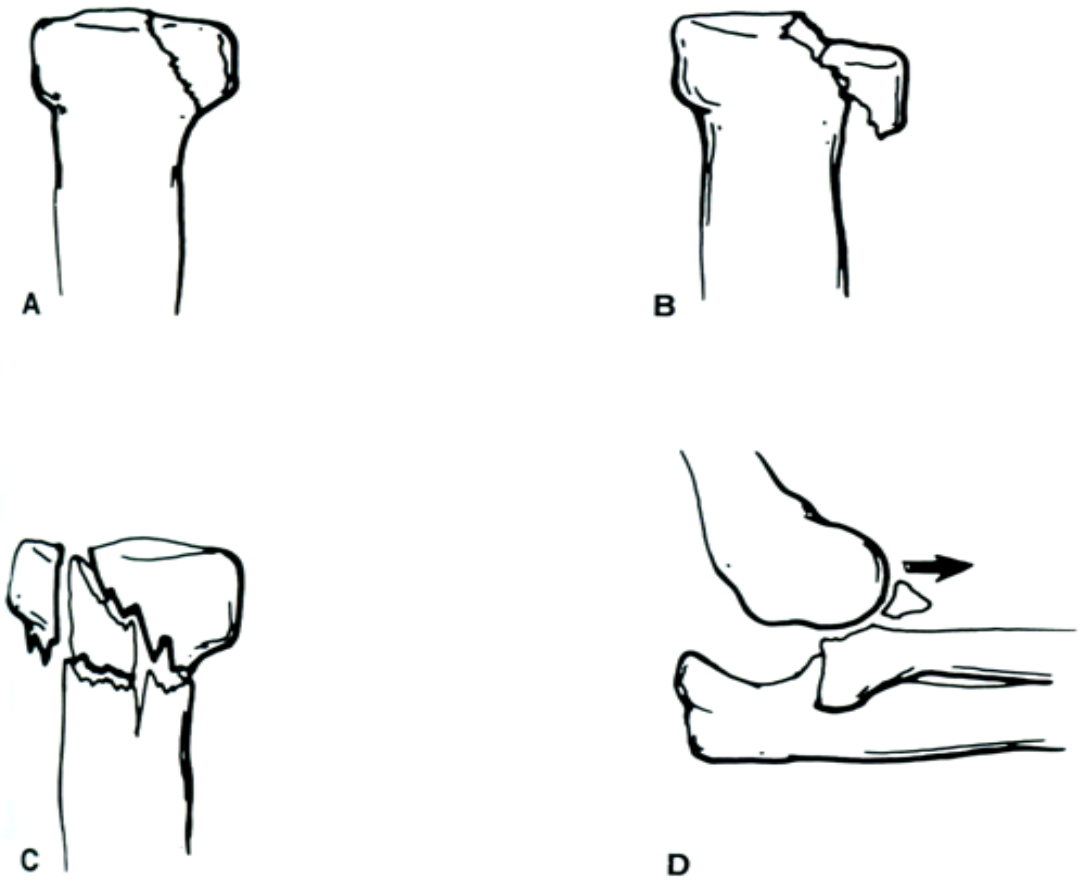


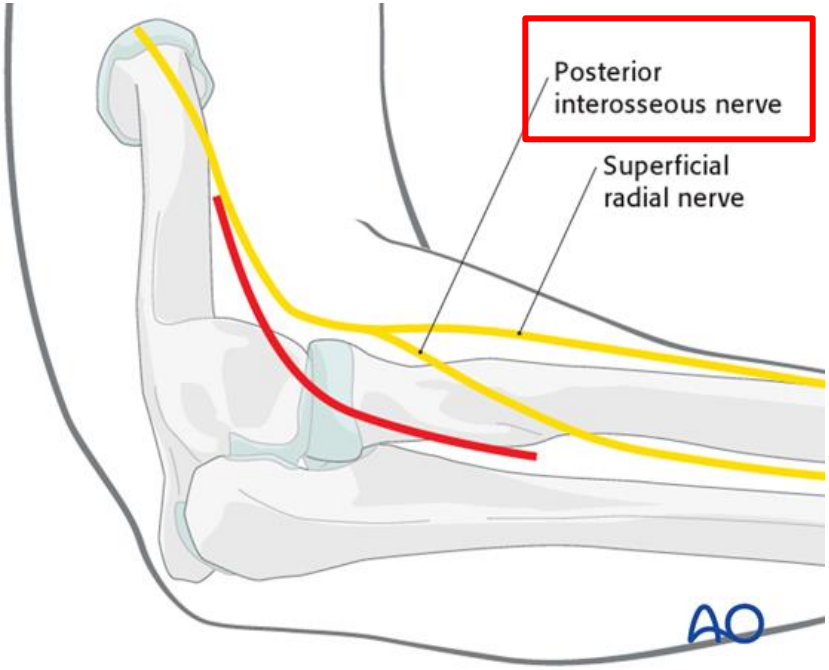
FIGURE 33-6. Classification of radial head fractures. (**A**) Type I radial head fracture, nondisplaced. (**B**) Type II injury with marginal fracture and displacement. (**C**) Type III radial head fracture demonstrating comminution of the entire head. (**D**) Type IV injury is a radial head fracture in association with an elbow dislocation.

Treatment for Non-Displaced

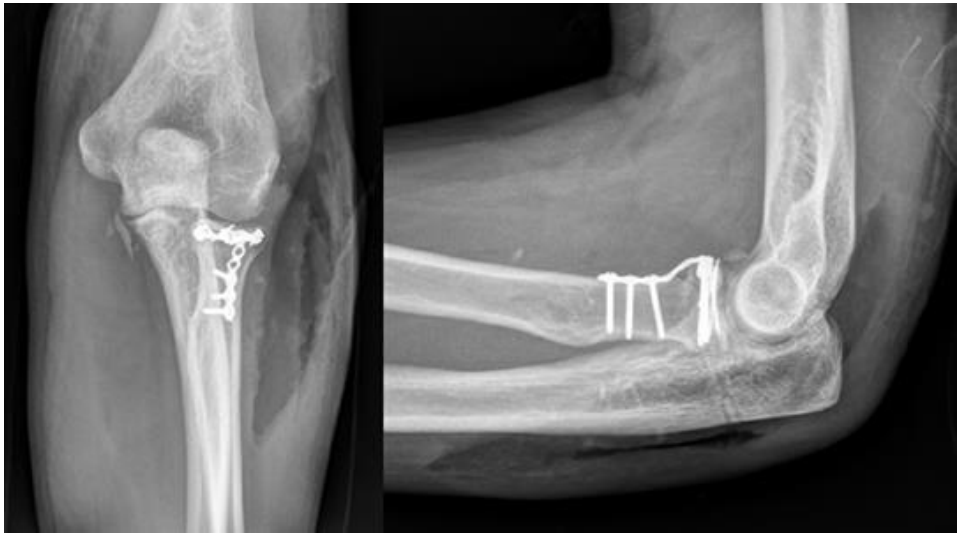
- early motion and functional rehabilitation
  - displaced < 2mm
  - involve articular surface < 25%
  - without mechanical block or associated injuries

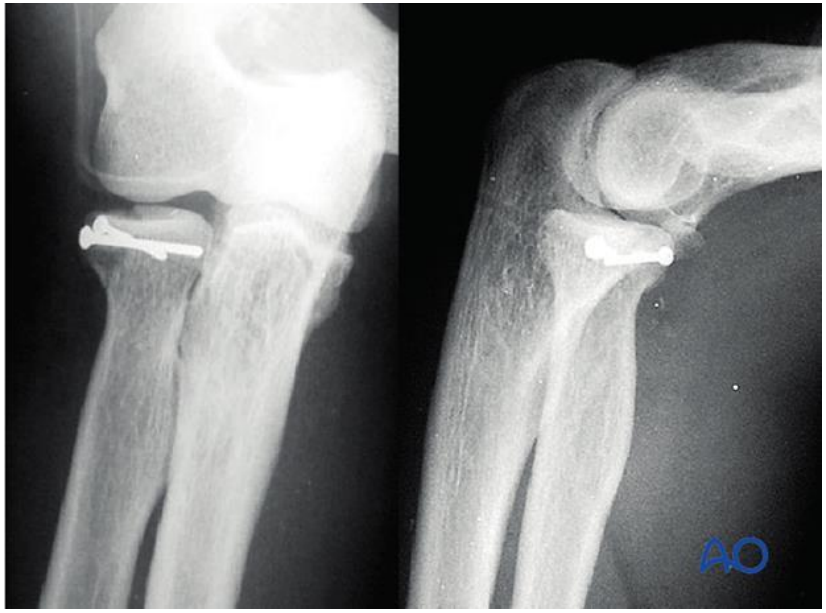
Surgical Treatment

- ORIF
  - > 2mm articular step-off
  - fracture involve >25% articular surface
  - bony block to motion
  - associated injuries
- Radial head excision
- Radial head prosthetic replacement



易傷及PIN, radial nerve 分支

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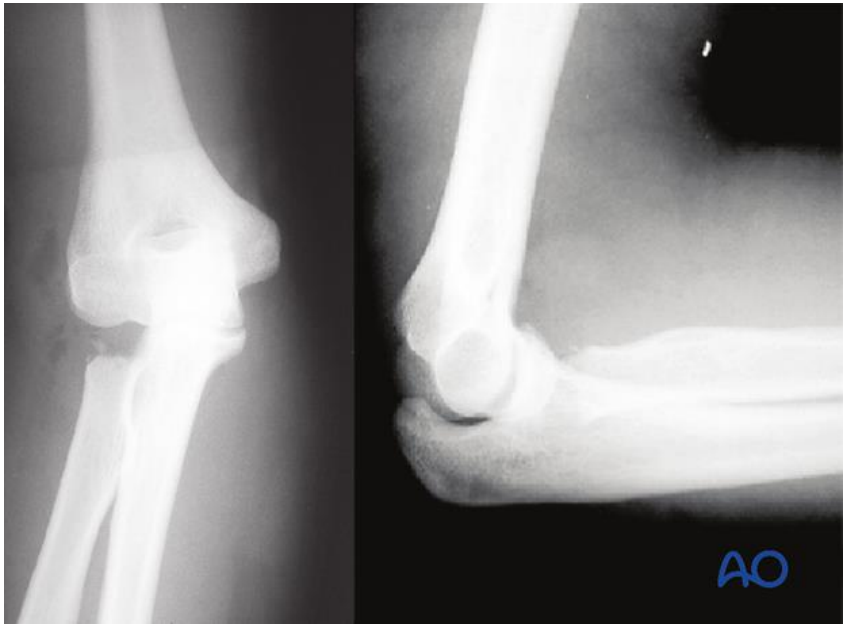
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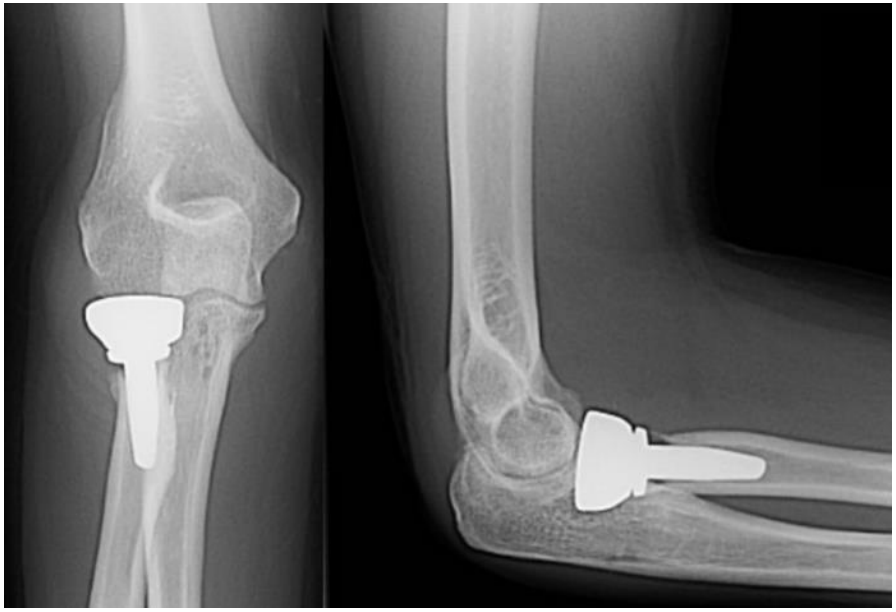
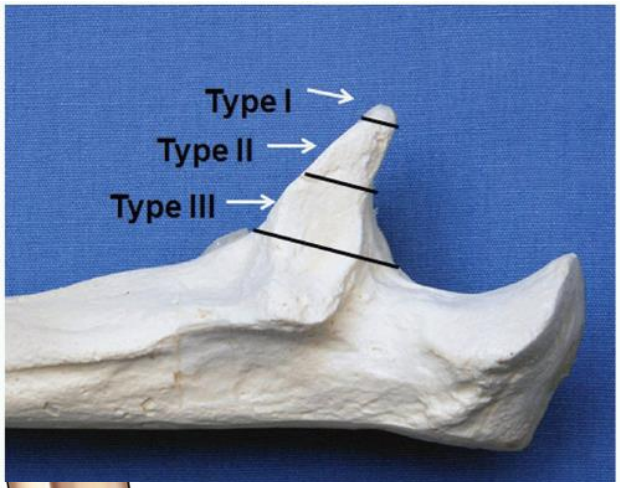
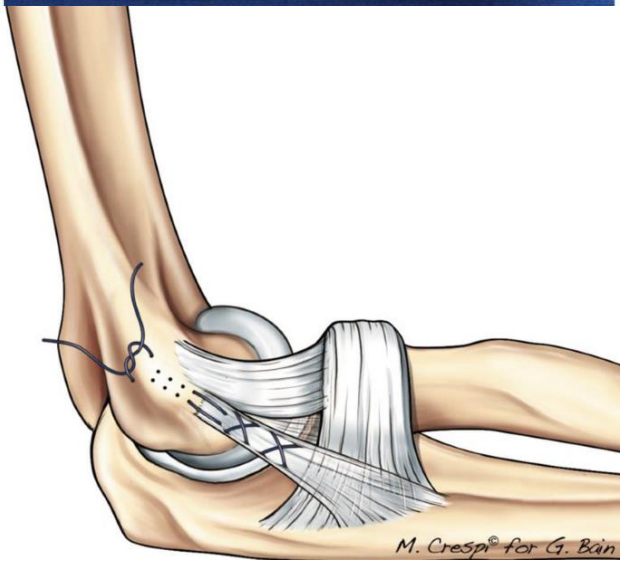


Terrible Triad
Fracture-dislocation

- Fracture of the radial head
- Coronoid fracture
- Dislocation of the elbow



- ORIF of radial head and coronoid + reduction of elbow + LUCL repair



Fractures of Radius & Ulna

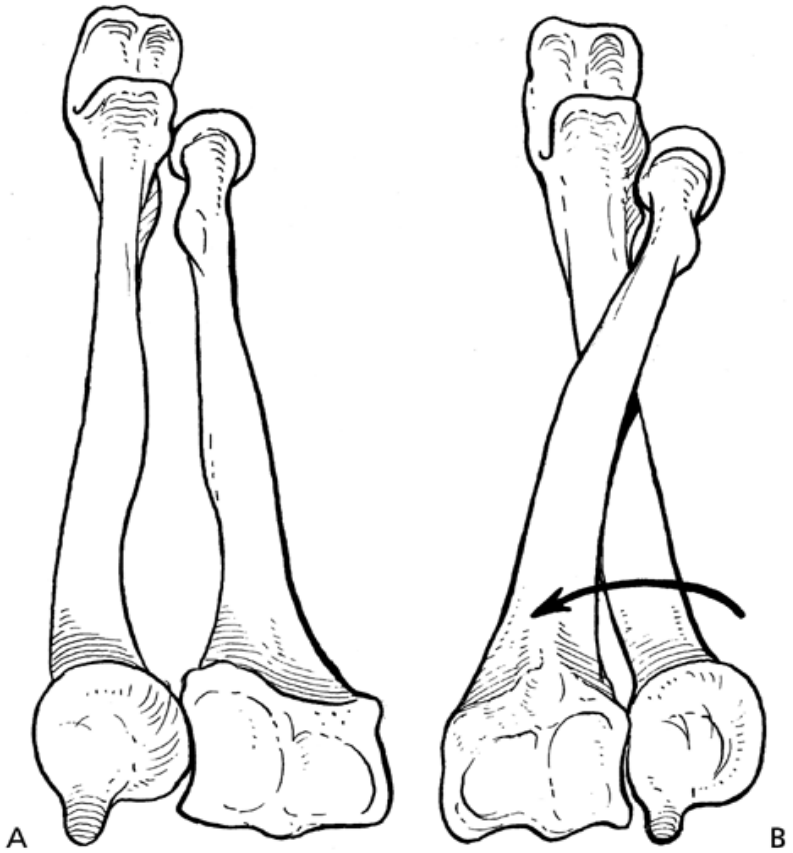


FIGURE 19-10. **A:** In supination, the ulnar head rests against the volar rim of the sigmoid notch. **B:** In pronation, the ulnar head rests against the dorsal lip of the sigmoid notch.

Fractures of Radius & Ulna

- Ulna Nightstick fractures
  - direct trauma to the ulna
  - a victim attempts to protect the head from assault
- Monteggia fractures
  - proximal 1/3 ulna fracture + radial head dislocation
- Galeazzi Fractures
  - distal 1/3 radial shaft fracture + distal radioulnar joint (DRUJ) injury

Monteggia Fracture-Dislocation

- Dislocation of radial head with fracture of proximal 1/3 of ulna
- Mechanisms: direct blow, hyperpronation, hyperextension of elbow
- Associated nerve injury
  - paralysis of deep branch of radial nerve (posterior interosseous nerve, PIN) is most common

Monteggia Fracture-Dislocation

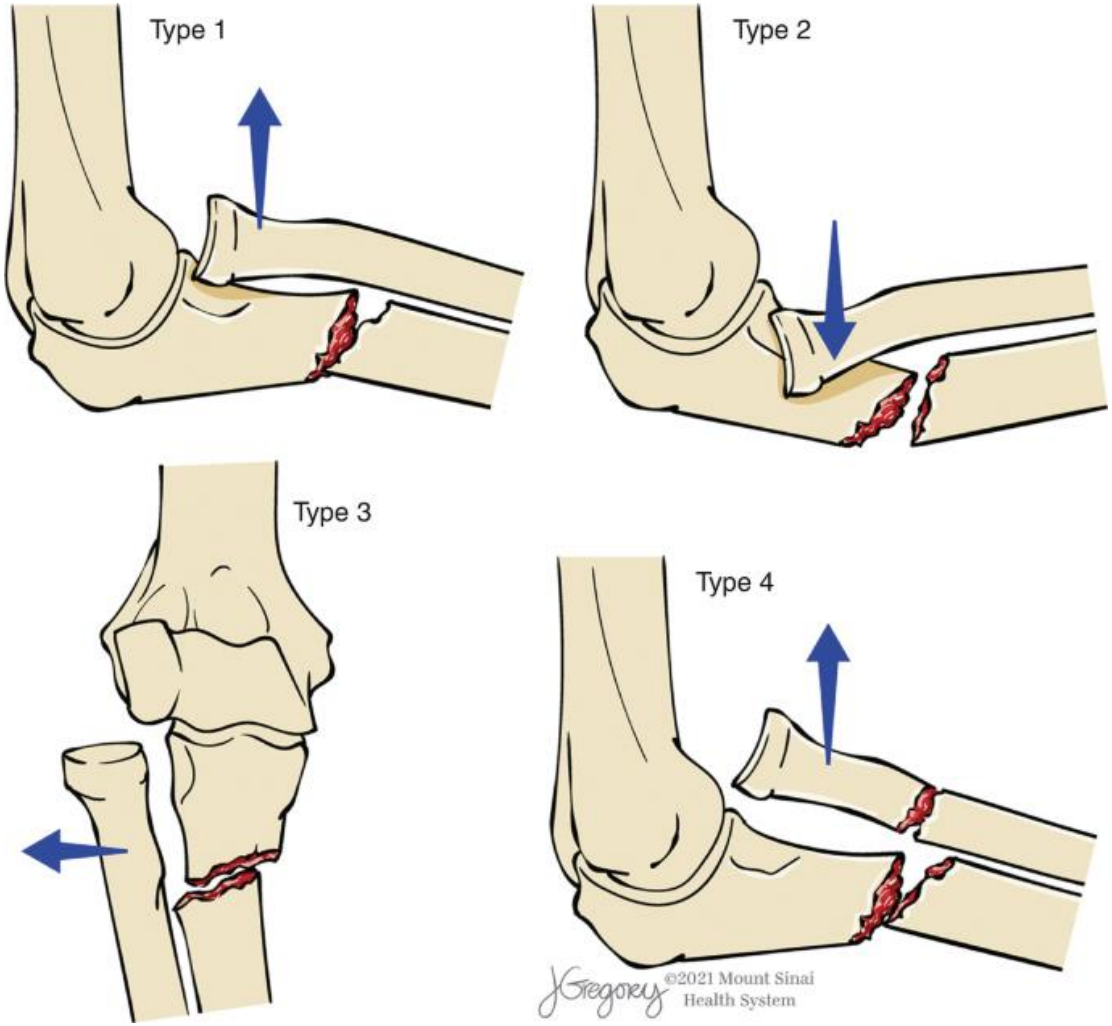
前後外橈尺都斷

Type	Description	Frequency, %*
I	Fracture of the middle or proximal third of the ulna and anterior dislocation of the radial head	65
II	Fracture of the middle or proximal third of the ulna and posterior dislocation of the radial head	18
III	Ulnar fracture distal to the coronoid process with lateral radial head dislocation	16
IV	Fracture of the proximal or middle third of the ulna with an anterior dislocation of the radial head and fracture of the proximal third of the radius	1

* Bado Classification of Monteggia Fracture-Dislocation (adapted from Resnick, 2002). Radial head fractures are classified based on Mason's classification. Type I is non-displaced, Type II is displaced, and Type III is comminuted fracture.

Monteggia Fracture-Dislocation

PIN injury



Treatment of Monteggia Fracture

- Closed reduction and immobilization
  - more common and successful in children
  - cast in supination for Bado I and III
- ORIF of ulna + CR/OR of radial head via supination & direct pressure in adult.
  - key is to obtain length and alignment, which then allows the radial head to be reduced

Treatment of Monteggia Fracture

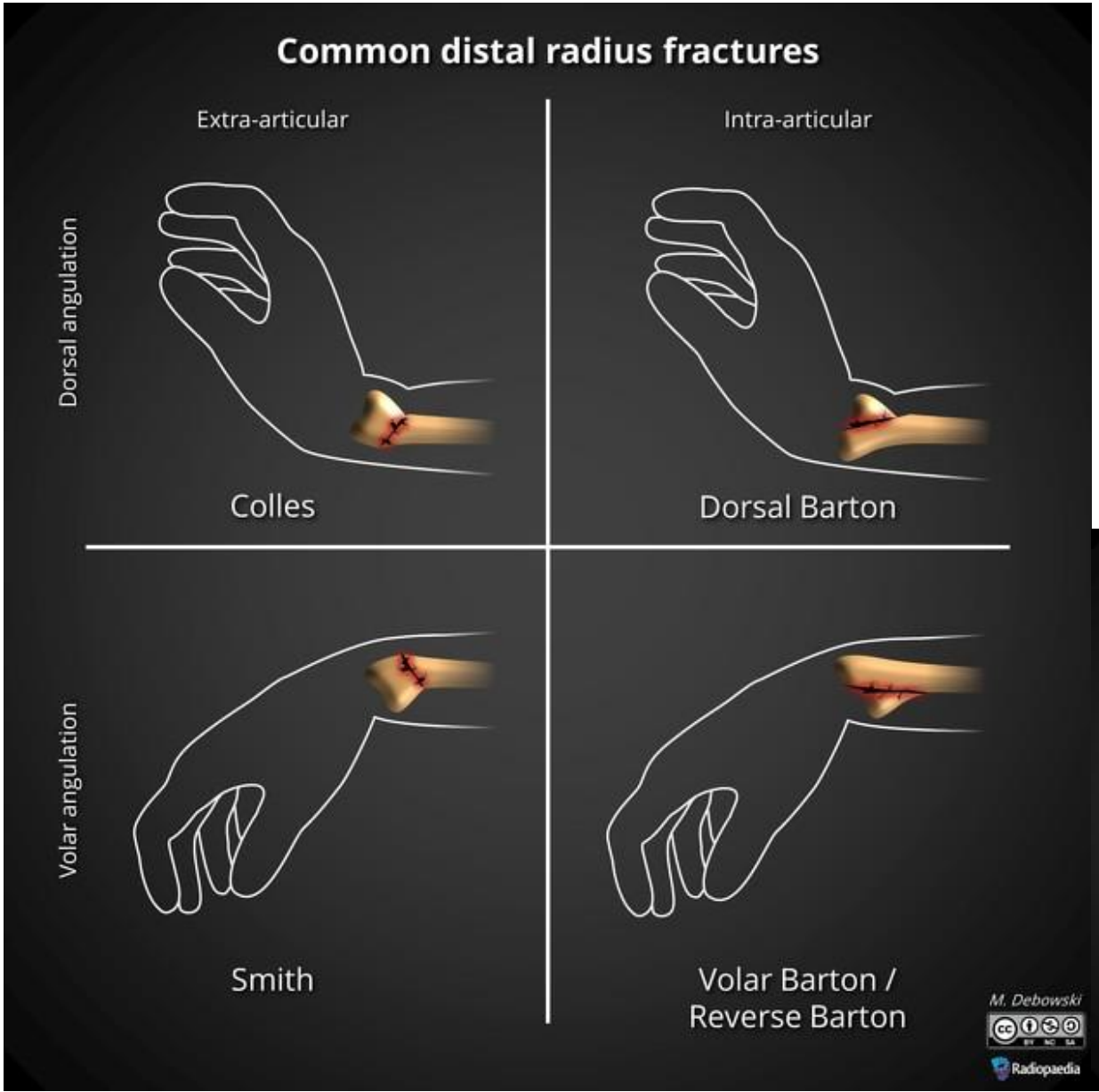
Galeazzi Fracture-Dislocation

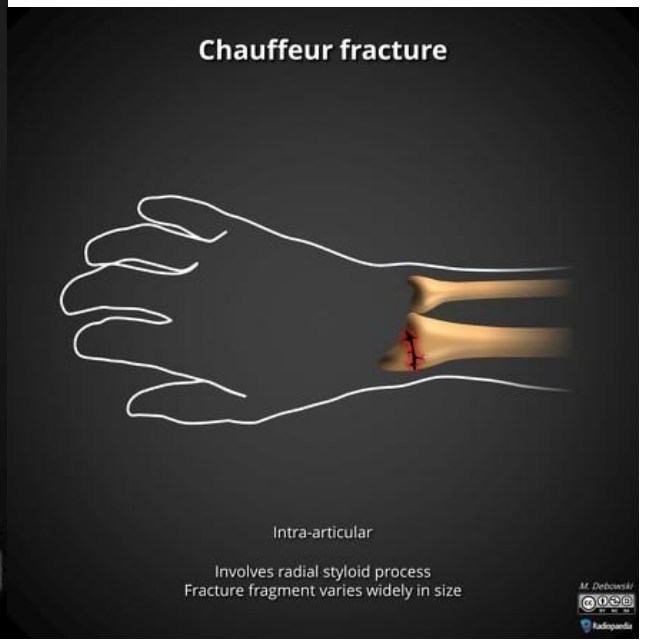
- Fracture of radial shaft (between middle and distal third) & dislocation of distal radioulnar joint
  - usually the dislocation is dorsal
- mechanism: direct blows and falls

Treatment of Galeazzi Fracture

- ORIF of radius + reduction of DRUJ (+/- pin or tightrope)
- Immobilization in long arm cast with forearm in full supination for 6 weeks

Distal Radius Fractures

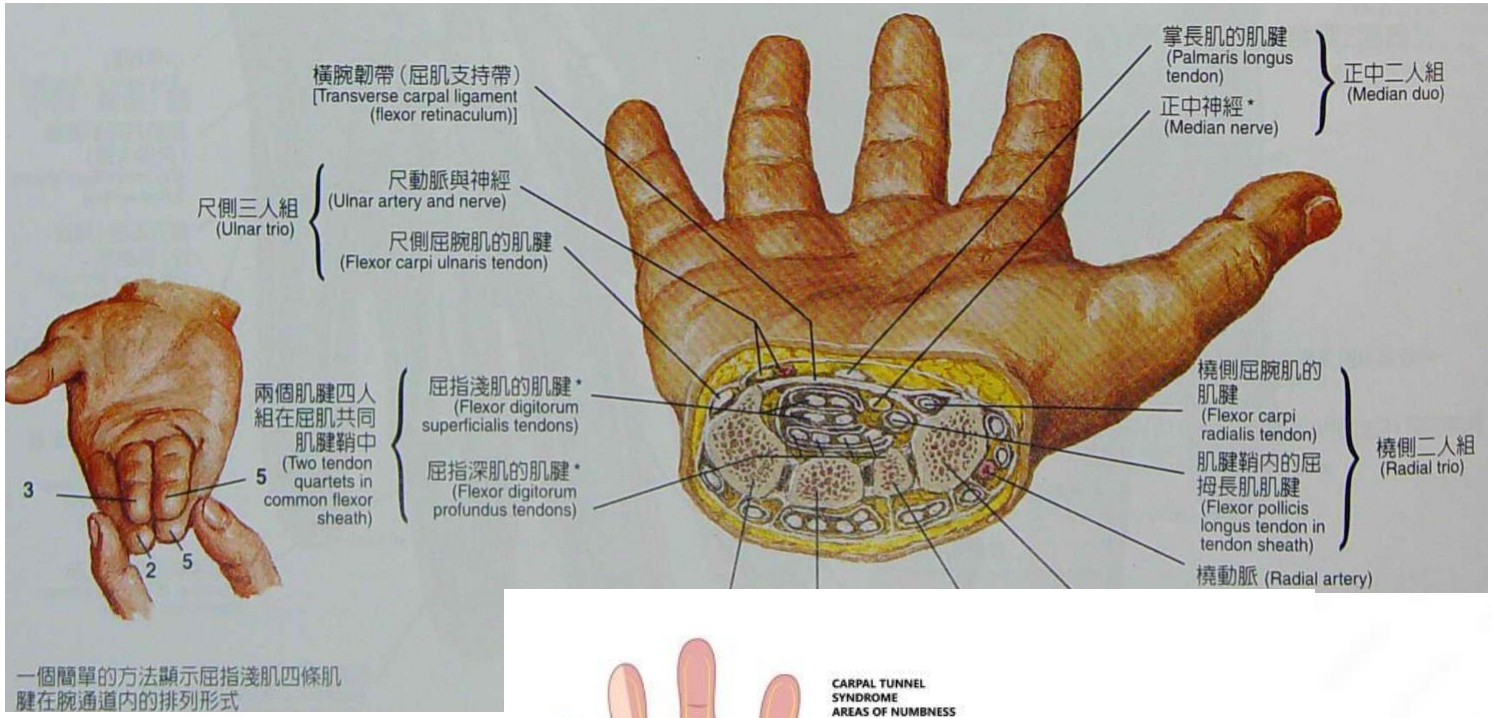




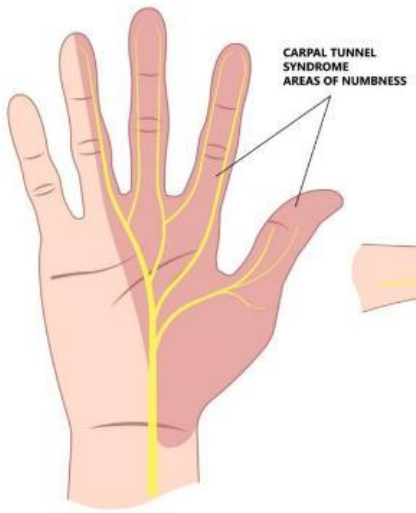
Carpal tunnel syndrome

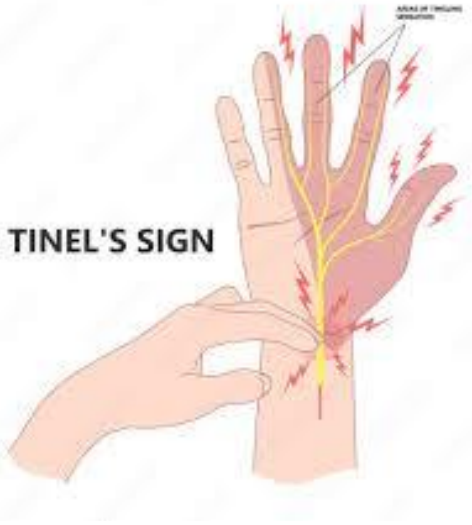
- The most common compressive neuropathy in the U/E
- Contents of carpal tunnel: **median nerve, FPL, FDPs, FDSs** (No: palmaris longus, FCR)
- Median nerve compression
- Diagnosed exam: NCV & EMG
- Special PE: Tinel's sign, Phalen's test

Carpal tunnel syndrome



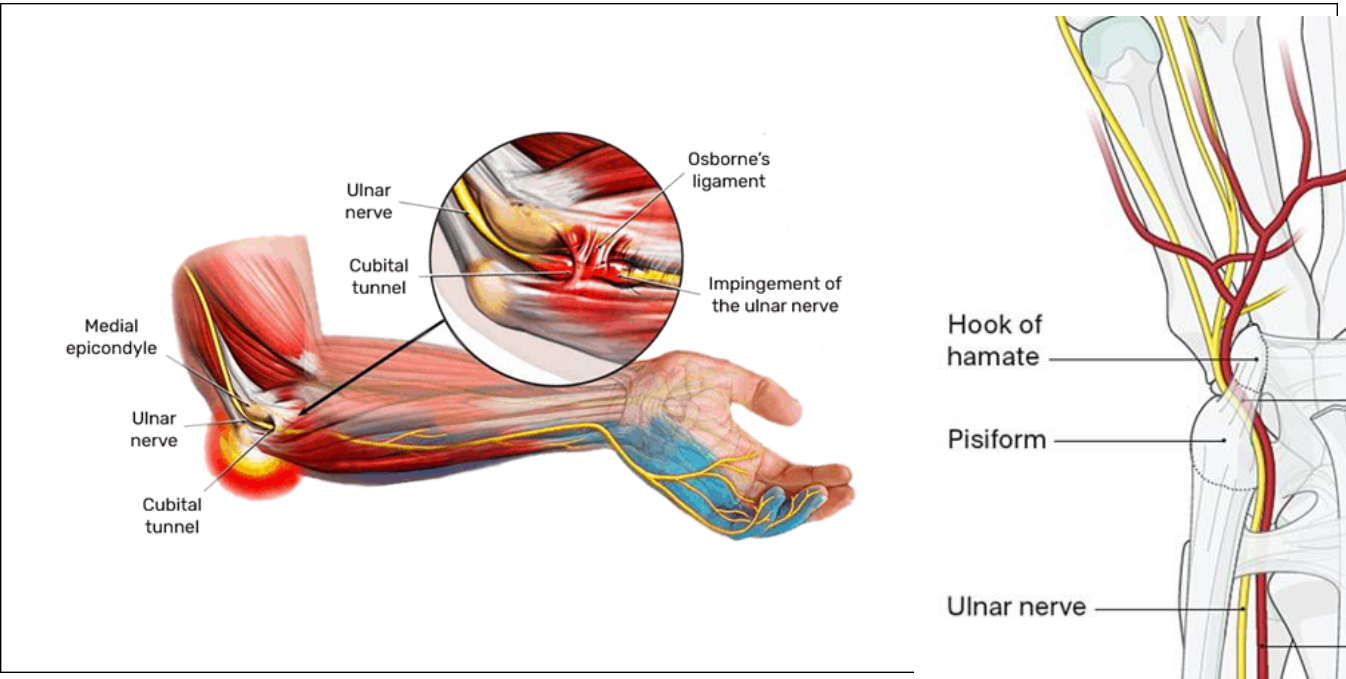
一個簡單的方法顯示屈指淺肌四條肌腱在腕通道內的排列形式

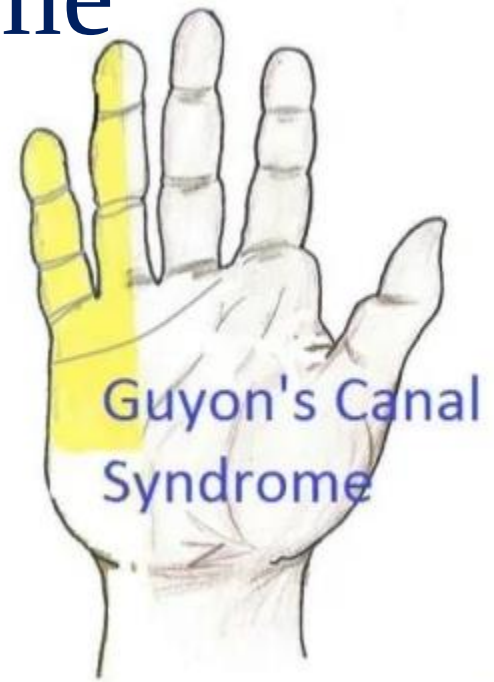


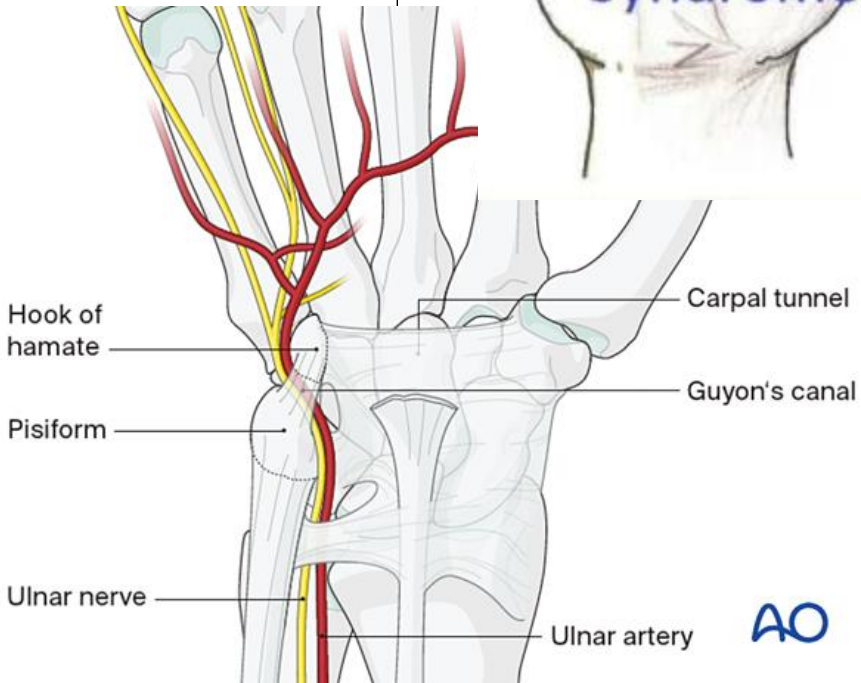


Cubital tunnel syndrome

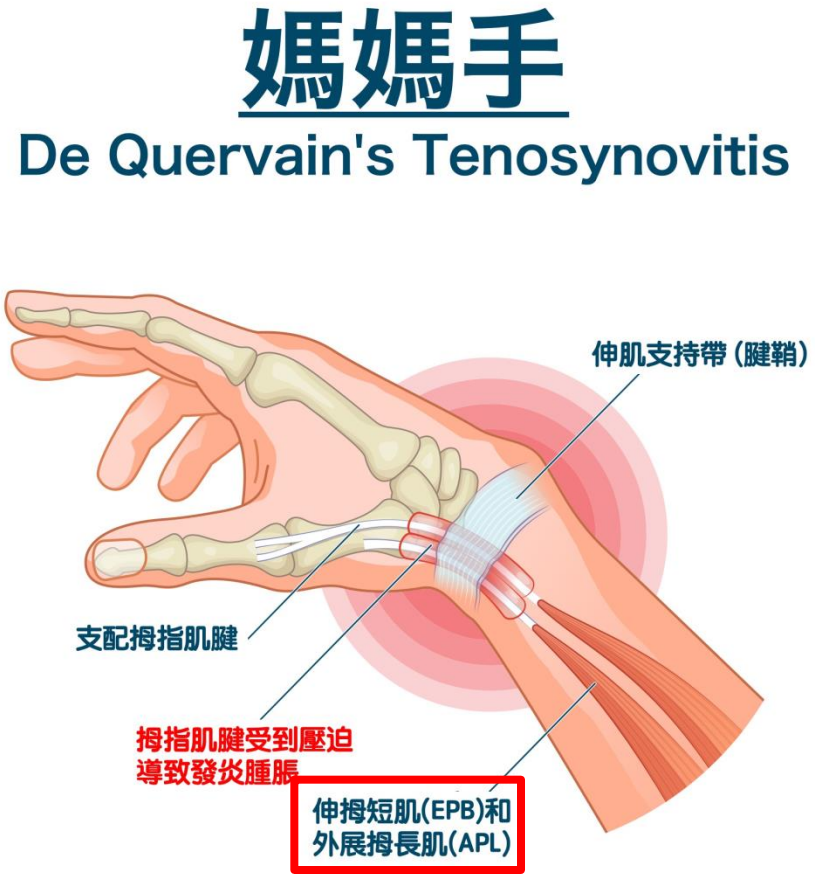
- Ulnar nerve compression
  - Cutibtal tunnel
  - Guyon's canal







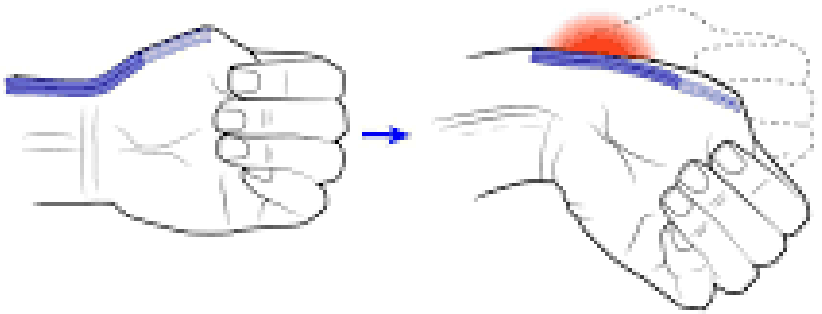
deQuervain's Disease



1st dorsal compartment

- Higher incidence in women
- Splinting is not always helpful, but corticosteroid injection.

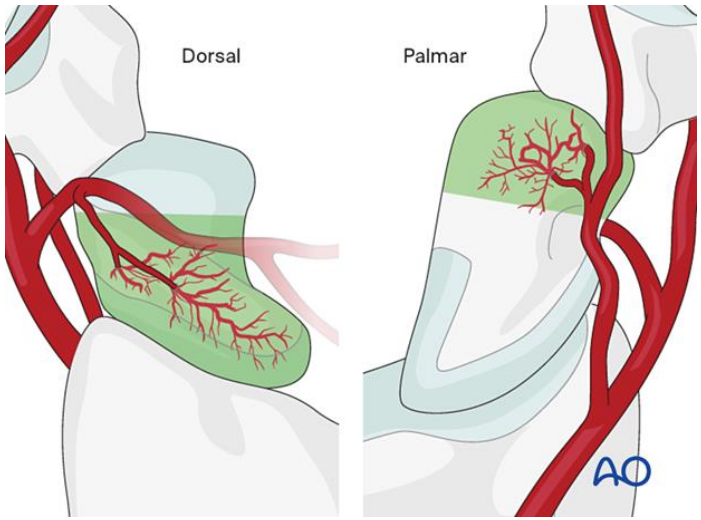
Finkelstein Test



Scaphoid fracture

	Location
	Distal Third 10 %
	Middle Third 70 %
	Proximal Third 20 %

- **Expected time to union**
  - **Distal third:** 6 to 8 weeks
  - **Middle third:** 8 to 12 weeks
  - **Proximal third:** 12 to 24 weeks



Healing rates with nonoperative treatment depends on fracture location.

Tuberosity and distal third	100%
Waist	80% to 90%
Proximal pole	60% to 70%

Scaphoid fracture

Scaphoid fracture

- Scaphoid Nonunion
  - 5-10% following immobilization, higher rates for proximal pole fractures
  - Tx: Vascularized bone grafting or ABG
- Osteonecrosis
  13-50% of all scaphoid fractures

Osteonecrosis of carpal bone

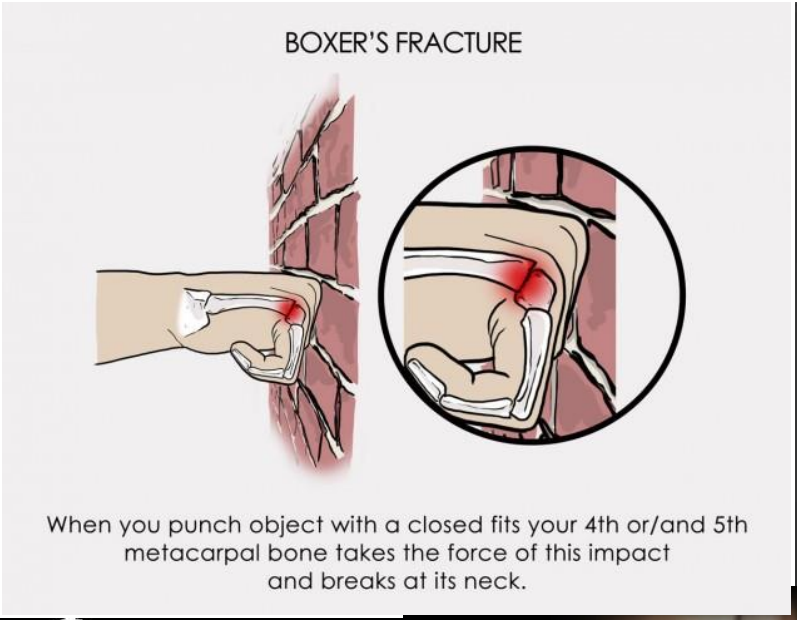
- Preiser's disease
  - Idiopathic avascular necrosis (AVN) of the scaphoid
- Kienbock's disease
  - Avascular necrosis of the lunate

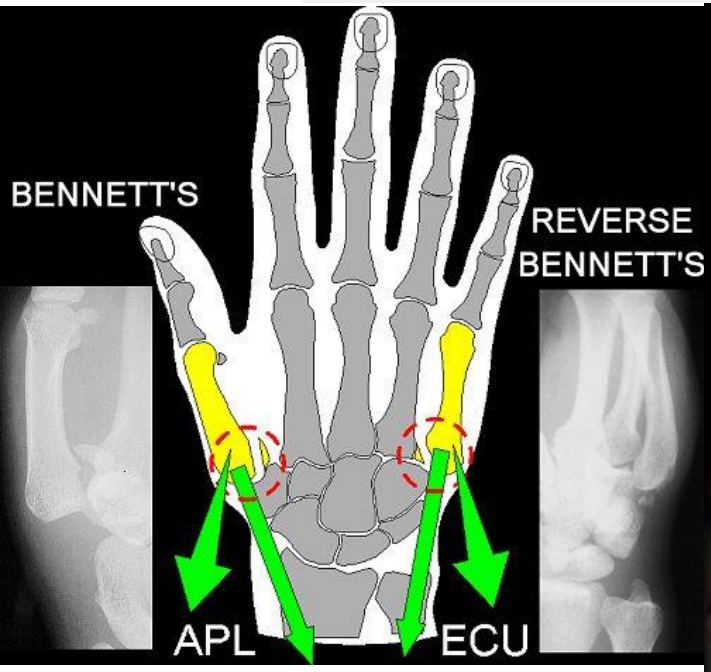
Metacarpal bone (MCB) fracture

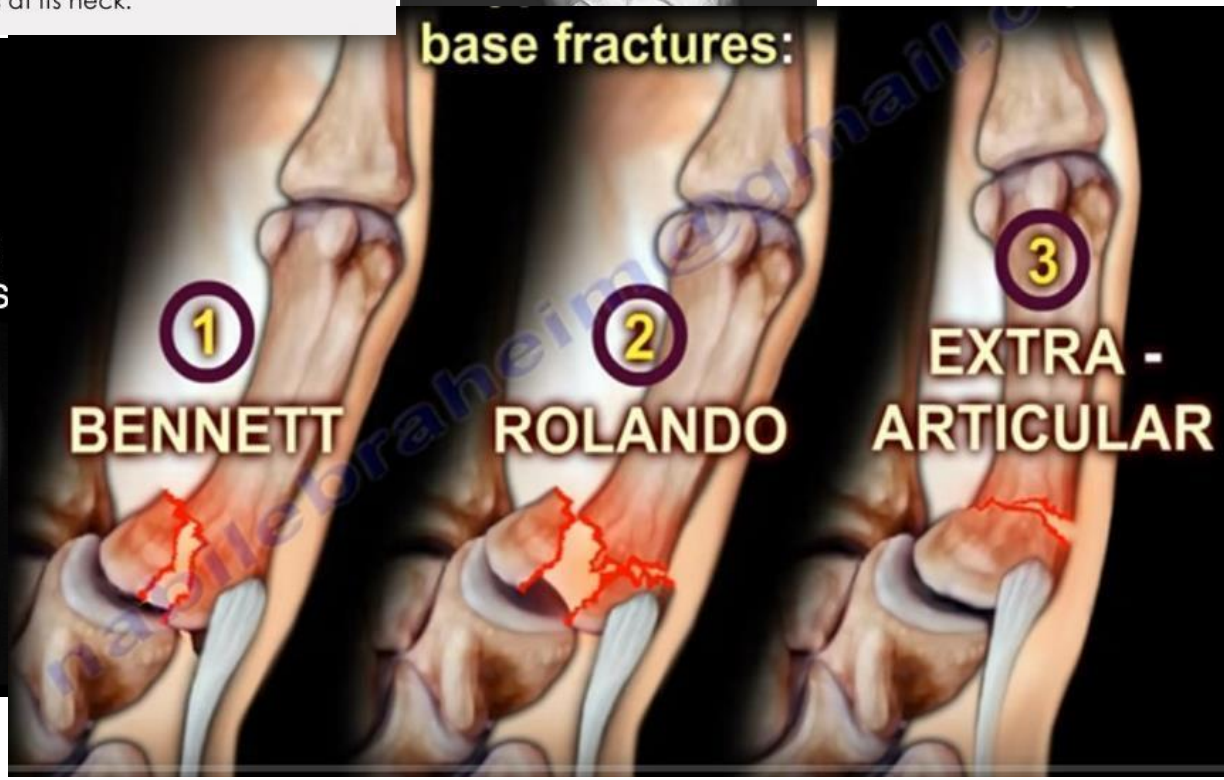
Acceptable nonoperative criteria			
	Acceptable shaft angulation (degrees)	Acceptable shaft shortening (mm)	Acceptable neck angulation (degrees)
Index & Long finger	10-20	2-5	10-15
Ring finger	30	2-5	30-40
Little finger	40	2-5	50-70

Metacarpal bone (MCB) fracture

- Bennett fracture
  - partial intra-articular of 1st MCB base
- Rolando fracture
  - complete intra-articular of 1st MCB base
- Reverse Bennett fracture
  - partial intra-articular of 5th MCB base
- Boxer fracture
  - 5th MCB neck fracture



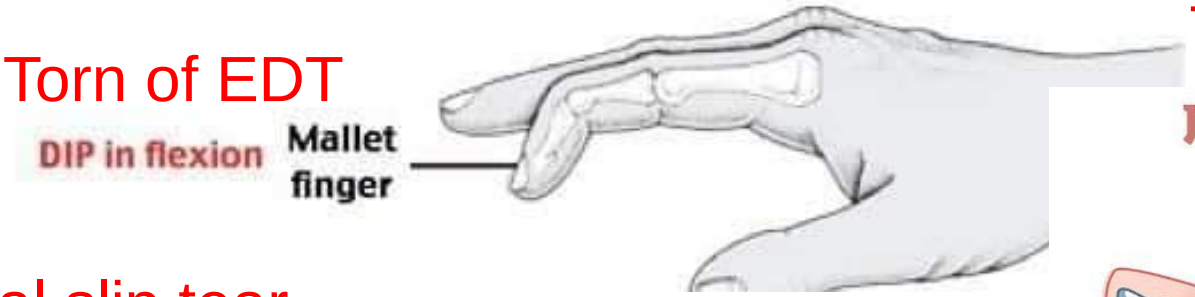




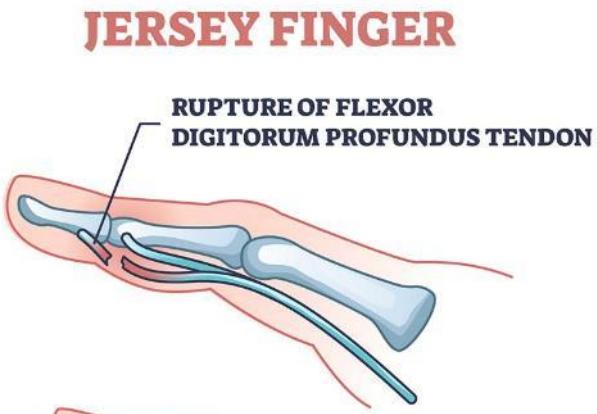
APL 外展姆長肌
ECU 尺側伸腕肌

Finger trauma

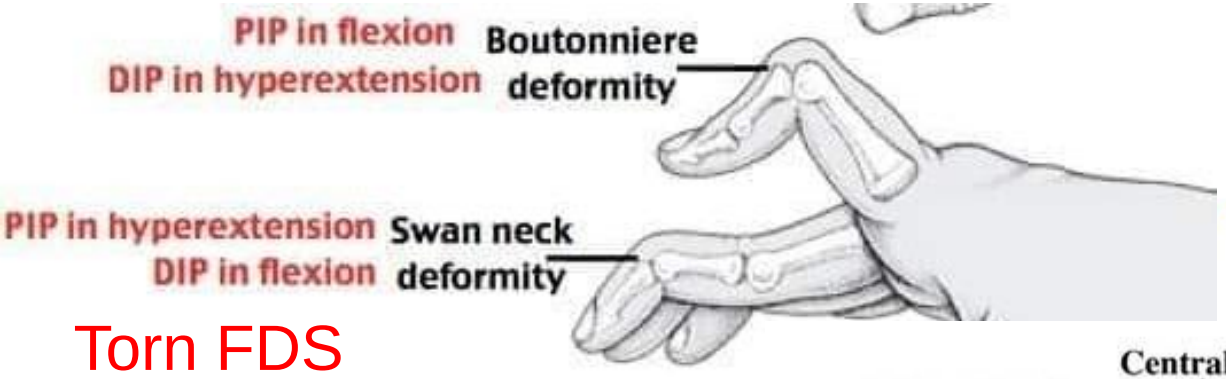
Torn of EDT

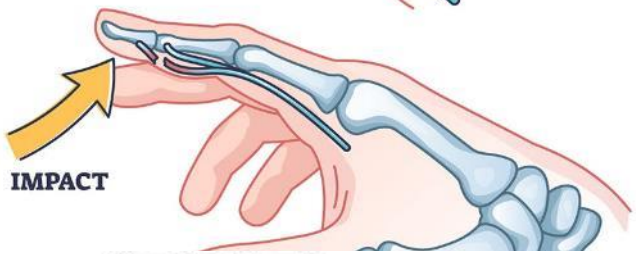


Torn of FDP

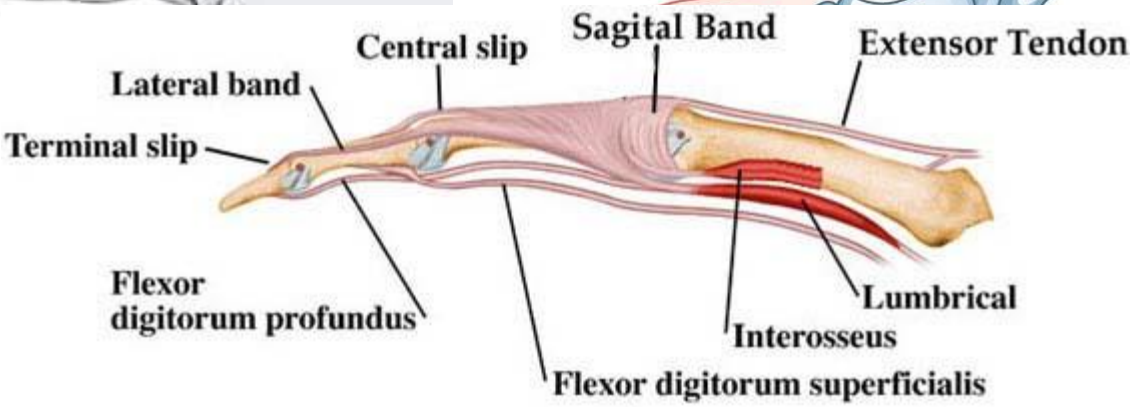


central slip tear
lateral band volar subluxation





Torn FDS
Rheumatic arthritis



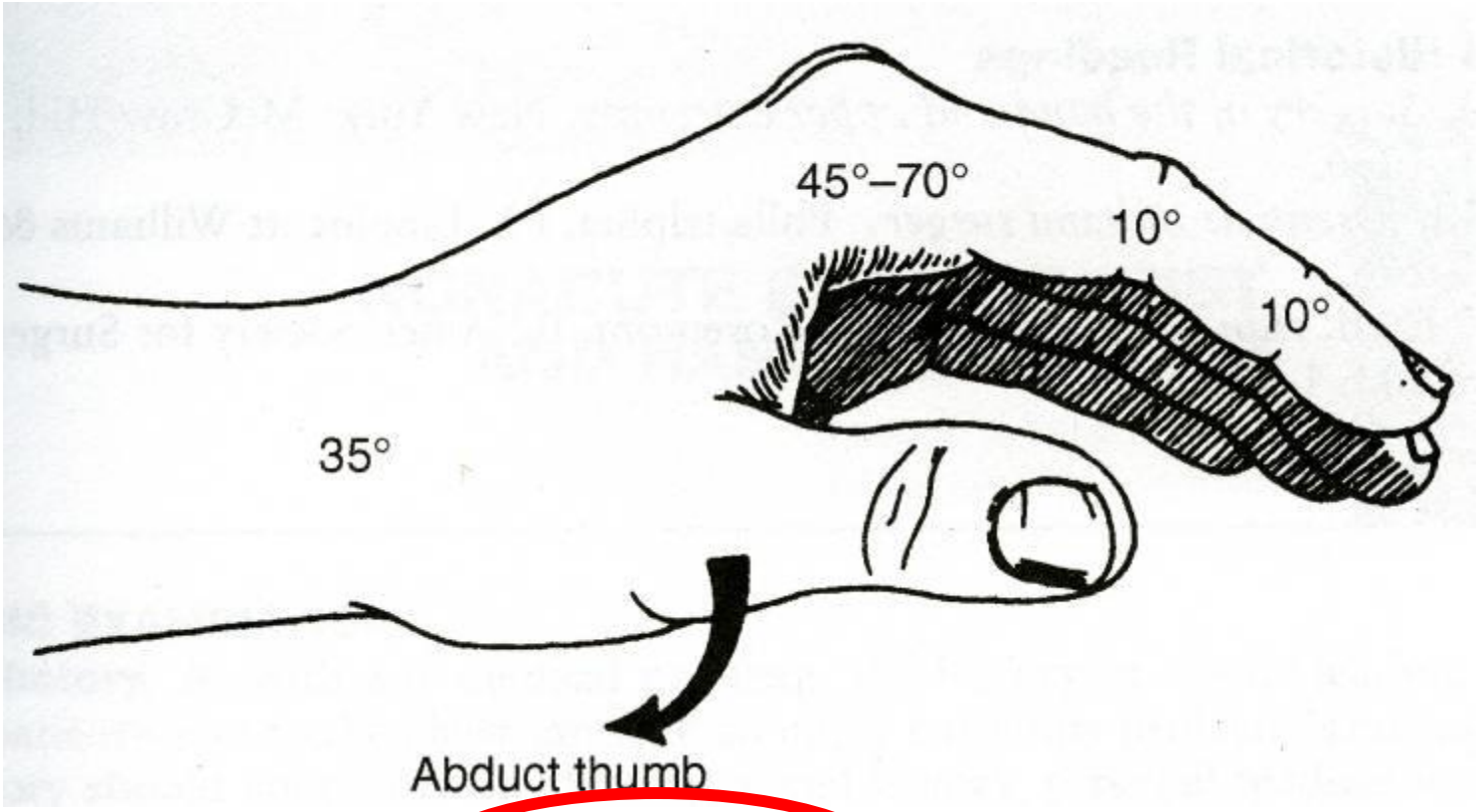


Fig. Hand dressing: "safe" position of fingers. (From Seiler JG III. *Essentials of hand surgery*, Lippincott Williams & Wilkins, Philadelphia, PA, 2002, with permission)

骨盆骨折介紹

流行病學

- 在美國，骨盆骨折的發生率估計為每年**37例/10萬人口**。
- 大多數年輕患者發生的骨盆骨折是由**高能量機制**引起的。
- 老年族群持續的骨盆骨折是由於輕微的創傷而發生的，比如**跌倒**。

臨床評估

- **ATLS**，執行患者初步評估**ABCDE**
- 仔細評估遠端神經血管，識別可見四肢和骨盆的所有損傷。
- 骨盆不穩定的 **AP-LC 測試**應僅進行**一次**(包含骨盆內旋及外旋)。
- 所有**骨盆環骨折**患者應進行**會陰部視診/直腸指檢/女性陰道檢查**。
  - 骨盆環損傷**合併直腸或陰道穿孔->50%死亡率**
  - **腸造口**

相關損傷

- **胸部損傷** 可高達**63%**
- 長骨骨折 50%
- 頭部及腹部損傷 40%
- 脊椎骨折 25%
- 泌尿生殖系統 **男 21%** > 女 8%
  - 常見症狀為**血尿/High riding prostate**
  - **不可放尿管，先做逆行性尿路攝影**
  - 性功能障礙 高達 50%

血流動力學狀態

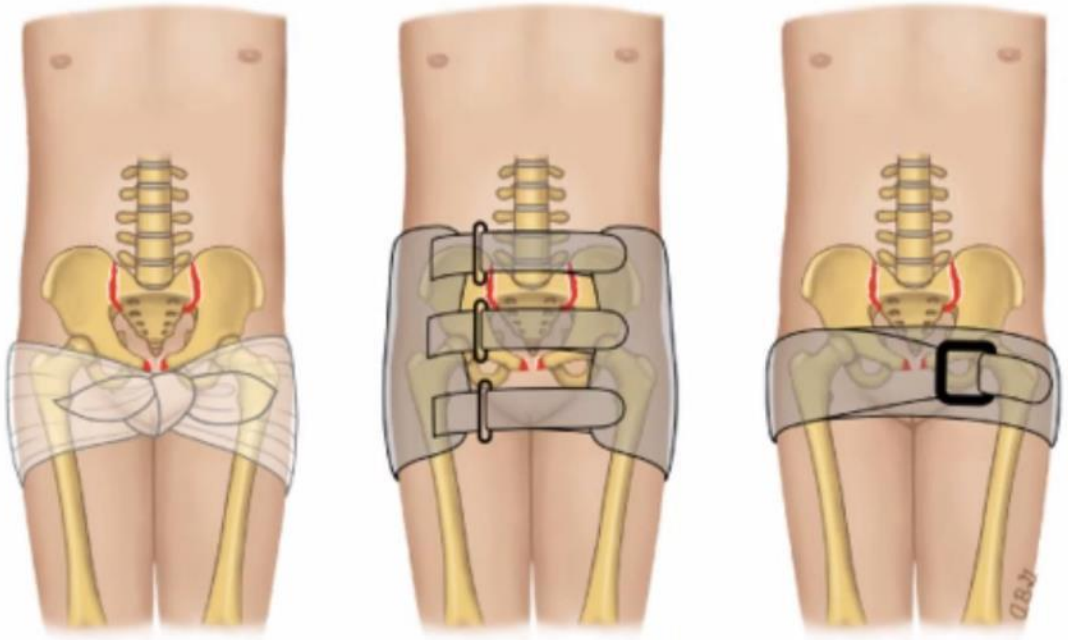
- 出血來源
  - **腹腔內出血（高達 40% ）**
  - 胸腔內出血
  - 後腹腔出血
  - 四肢骨折/開放性傷口
  - **骨盆**
    - **靜脈叢出血 80%**
    - **動脈出血10-20% (臀上動脈/內陰動脈/閉孔動脈)**

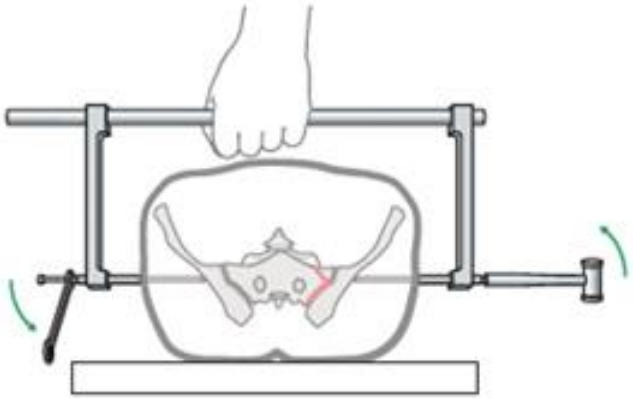
血流動力學狀態

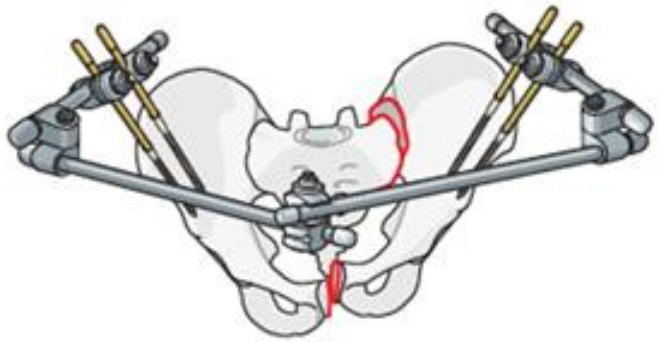
- **輸血復甦**
  - PRBC:FFP:Platelets ideally should be transfused **1:1:1**
  - **Tranexamic Acid 1000mg iv stat**
- **骨盆固定帶**
- 外固定
- 腹膜外骨盆腔填塞
- 血管栓塞

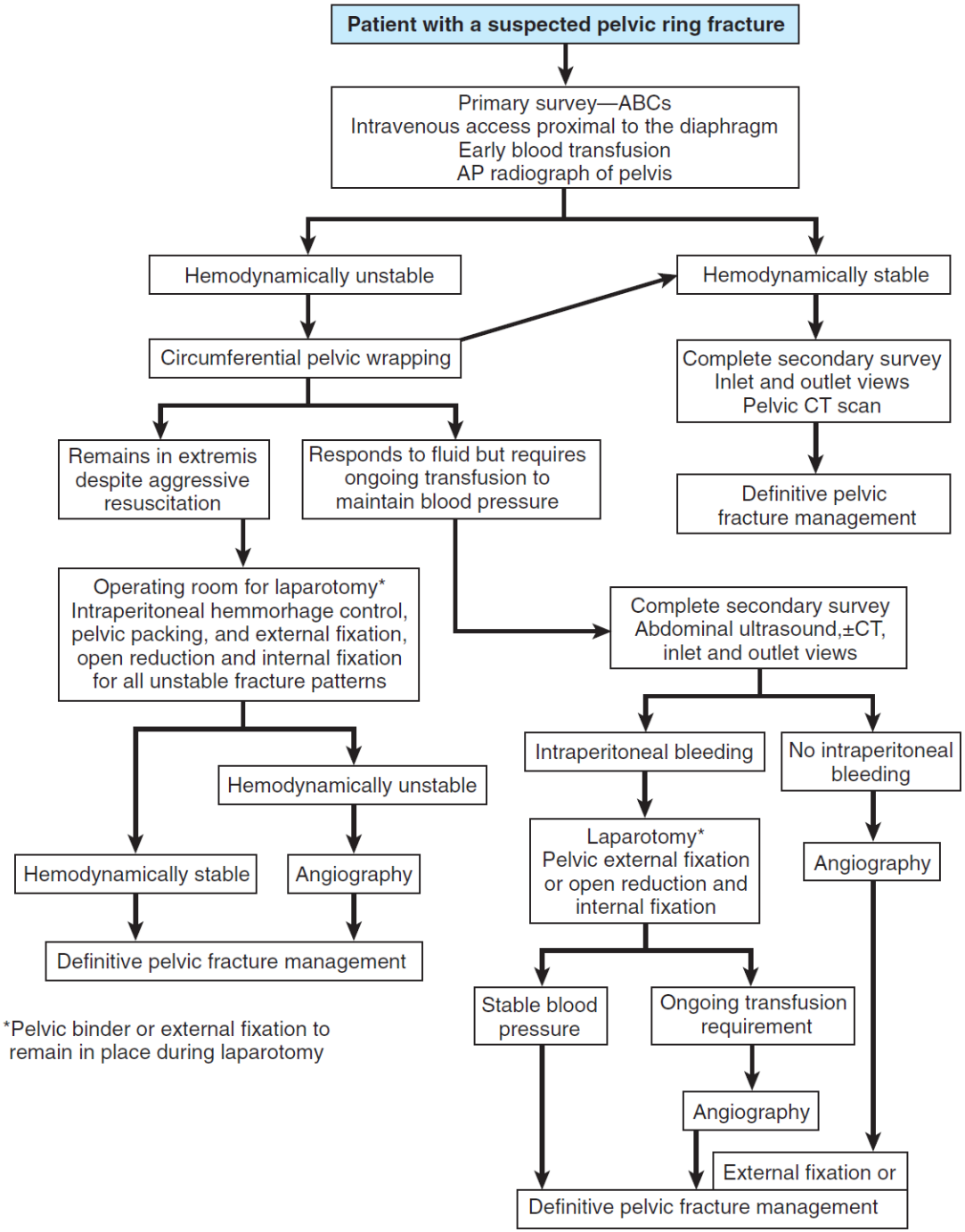
Binder types

T-POD Pelvic Stabilization Device

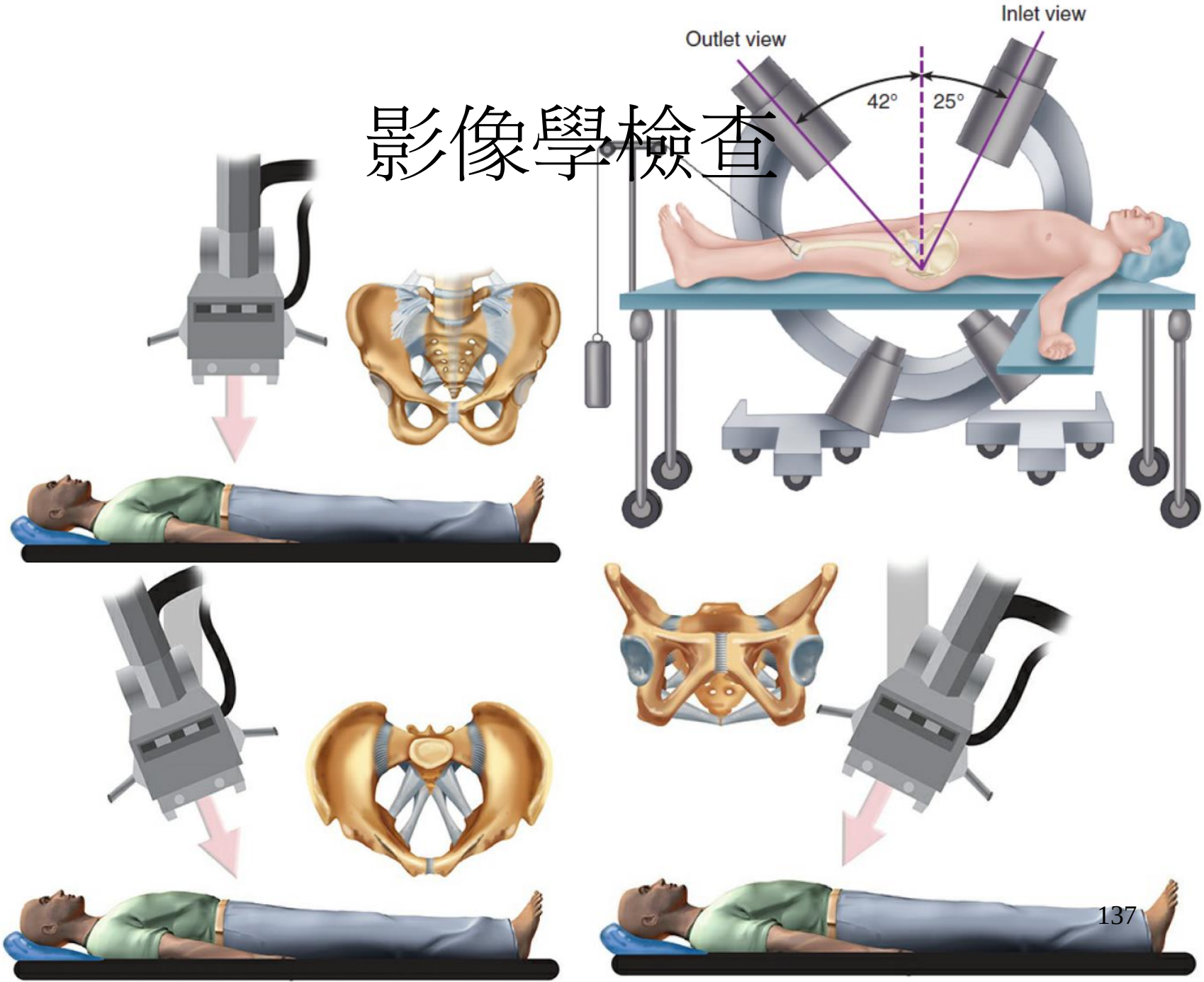






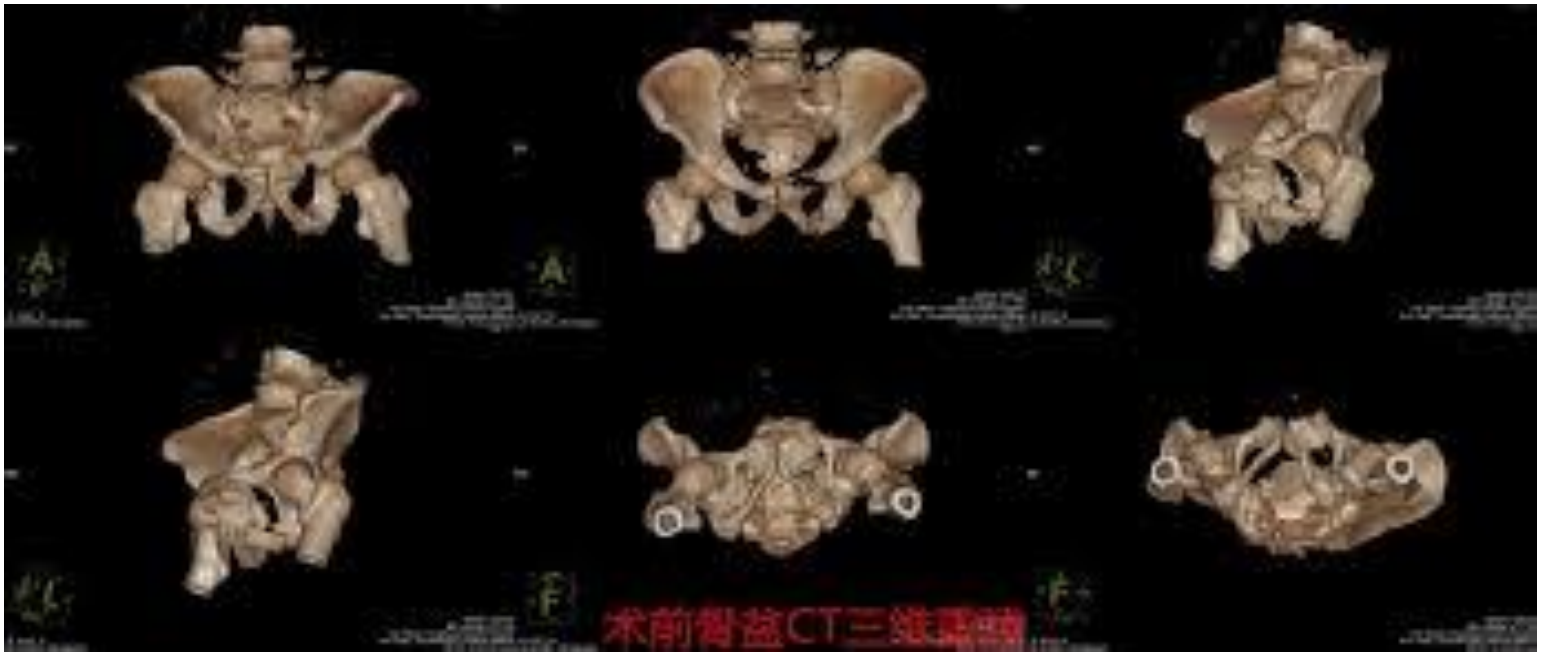

Patient with a suspected pelvic ring fracture
Primary survey—ABCs
Intravenous access proximal to the diaphragm
Early blood transfusion
AP radiograph of pelvis
Hemodynamically unstable
Hemodynamically stable
Circumferential pelvic wrapping
Complete secondary survey
Inlet and outlet views
Pelvic CT scan
Remains in extremis despite aggressive resuscitation
Responds to fluid but requires ongoing transfusion to maintain blood pressure
Definitive pelvic fracture management
Operating room for laparotomy*
Intraperitoneal hemmorhage control, pelvic packing, and external fixation, open reduction and internal fixation for all unstable fracture patterns
Complete secondary survey
Abdominal ultrasound,±CT,
inlet and outlet views
Hemodynamically unstable
Intraperitoneal bleeding
No intraperitoneal bleeding
Hemodynamically stable
Angiography
Laparotomy*
Pelvic external fixation or open reduction and internal fixation
Angiography
Definitive pelvic fracture management
Stable blood pressure
Ongoing transfusion requirement
Angiography
External fixation or
Definitive pelvic fracture management
*Pelvic binder or external fixation to remain in place during laparotomy

影像學檢查

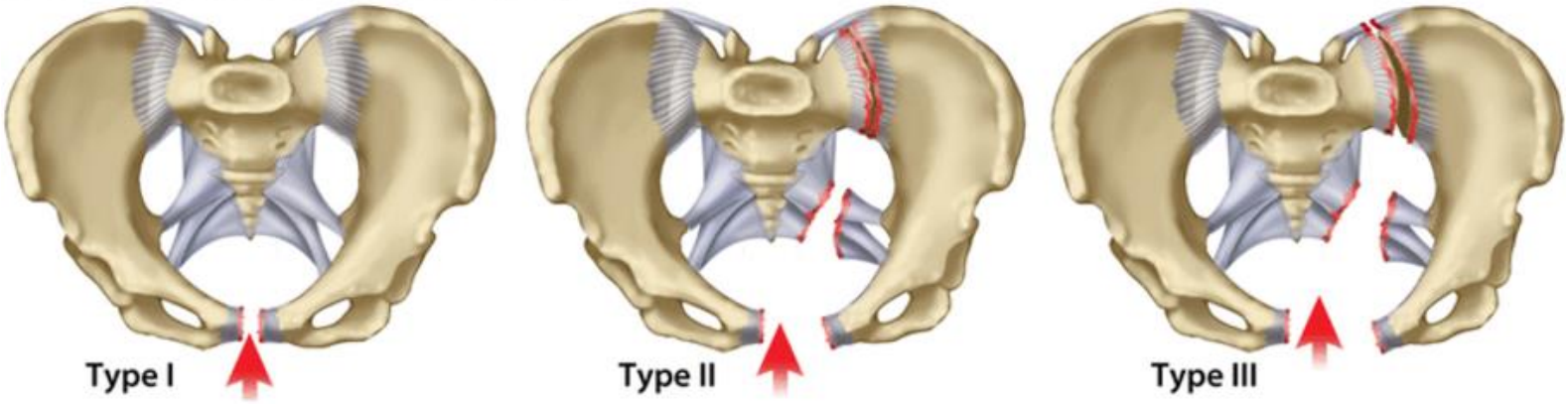


影像學檢查

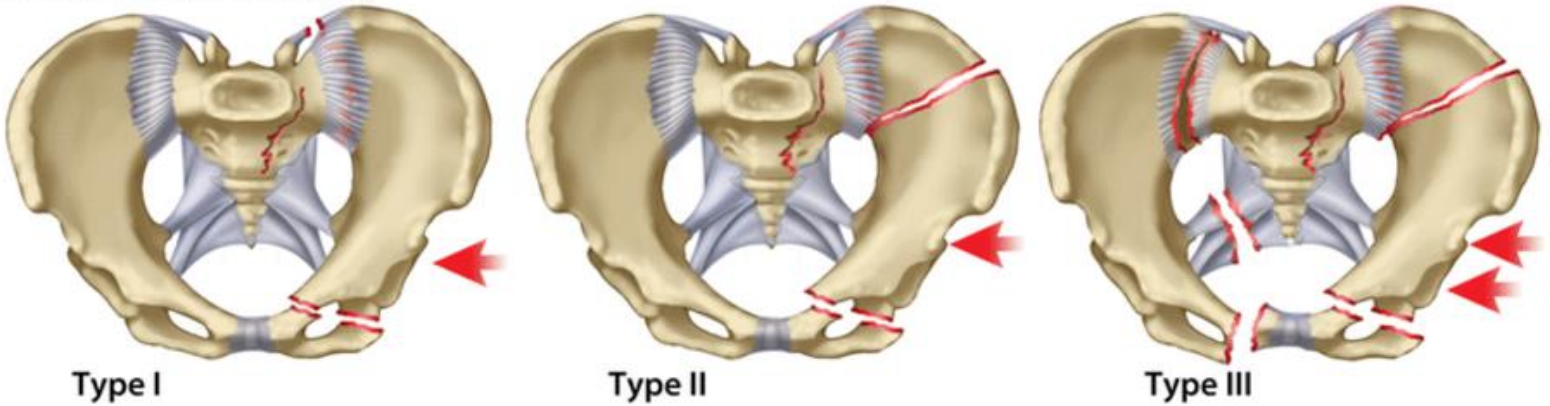
- 電腦斷層
  - 3D CT
- 核磁共振



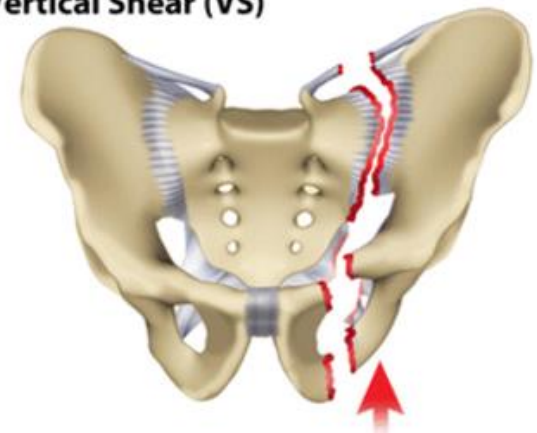
Anterior Posterior Compression (APC)

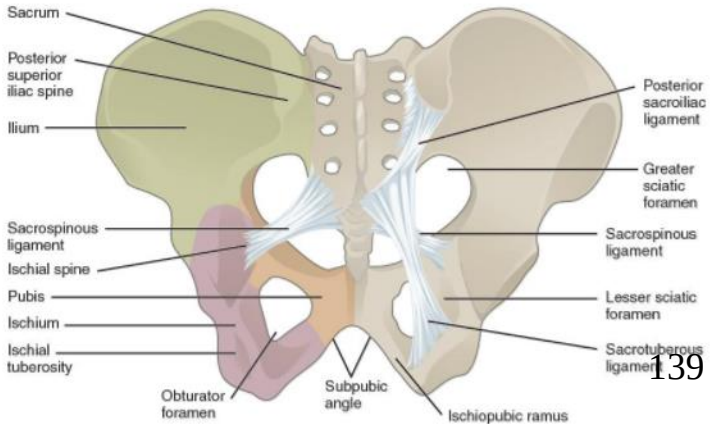


Lateral Compression (LC)

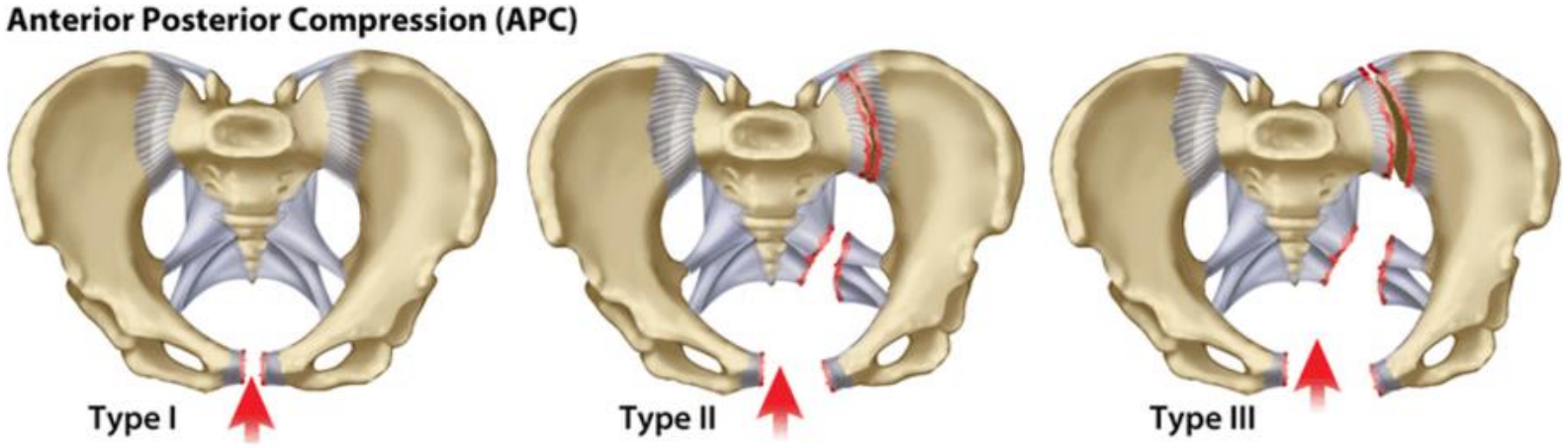


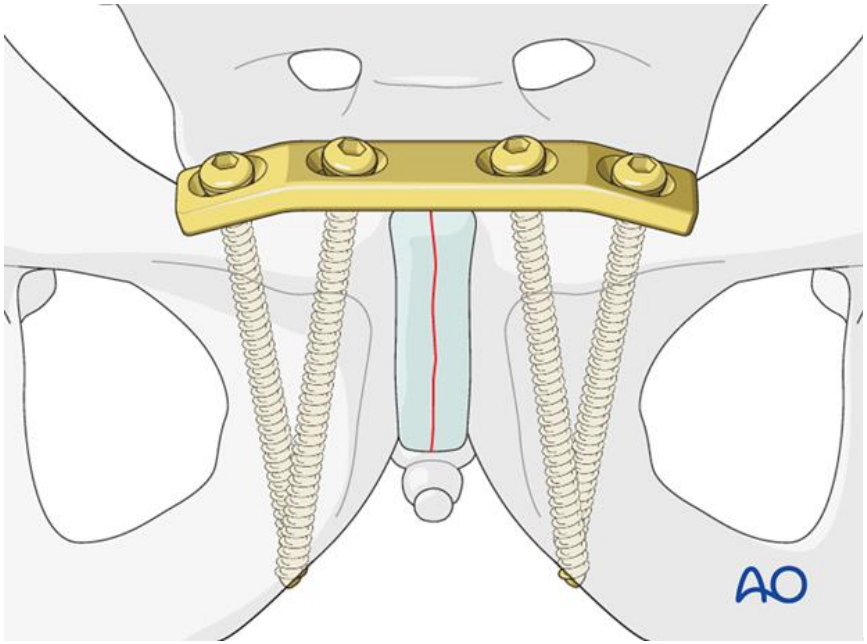
Vertical Shear (VS)





手術方式


Anterior Posterior Compression (APC)
Type I
Type II
Type III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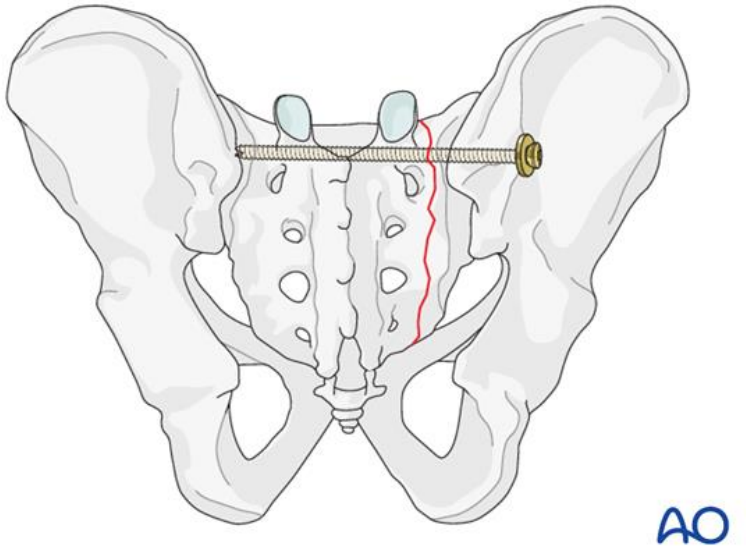
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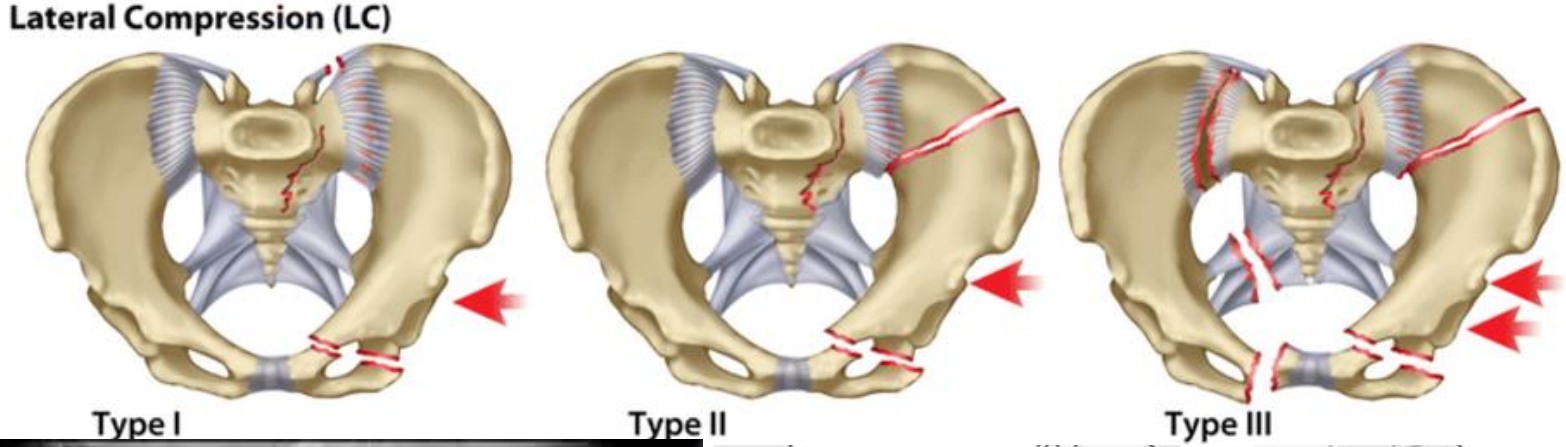

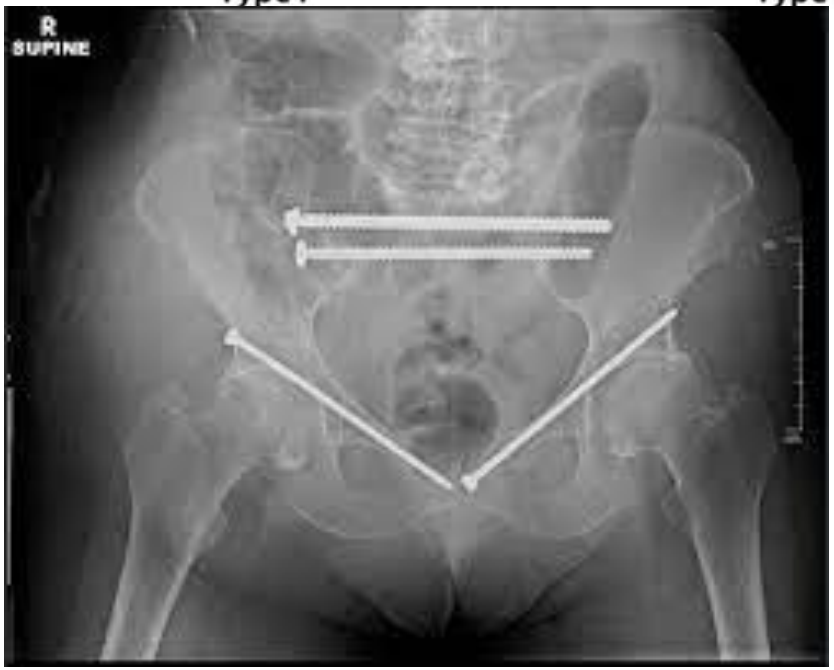

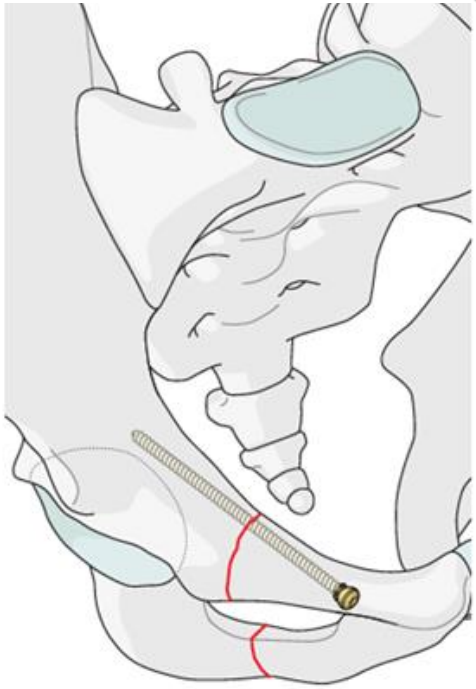

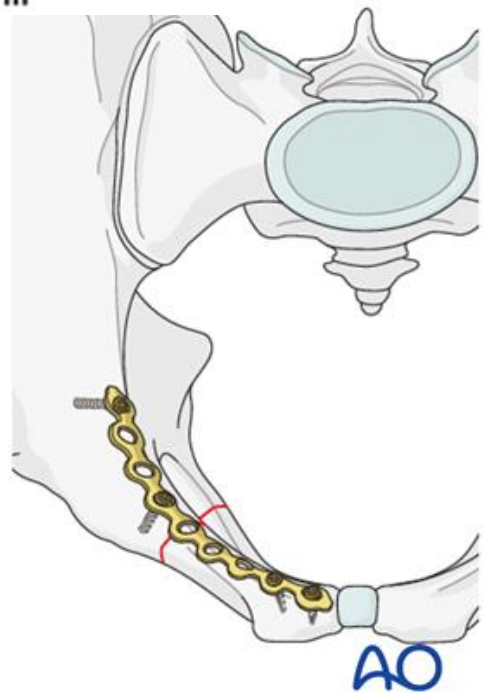

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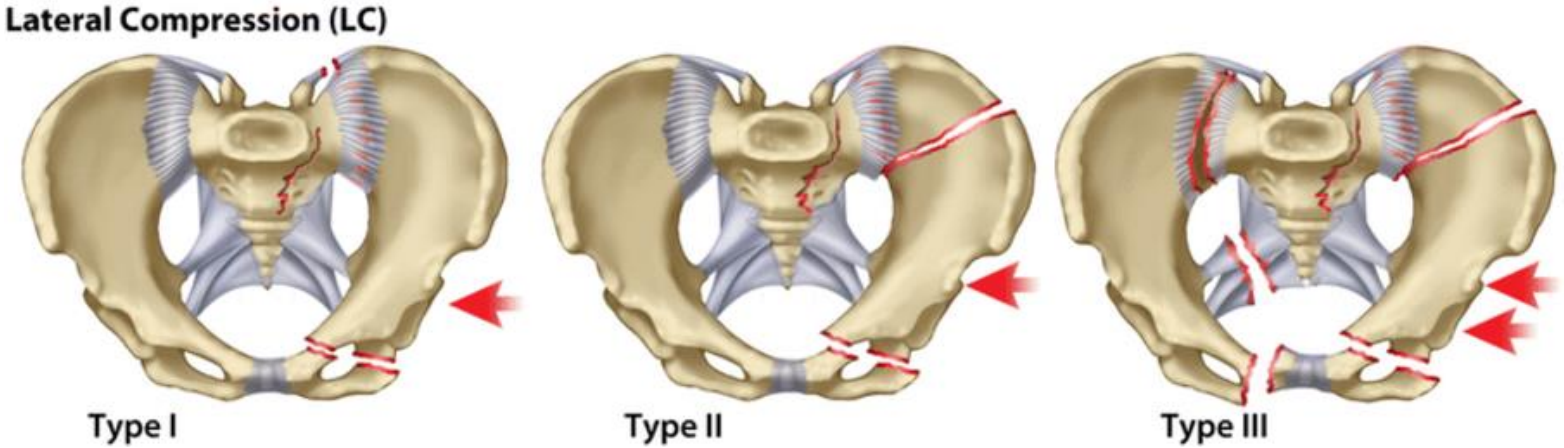

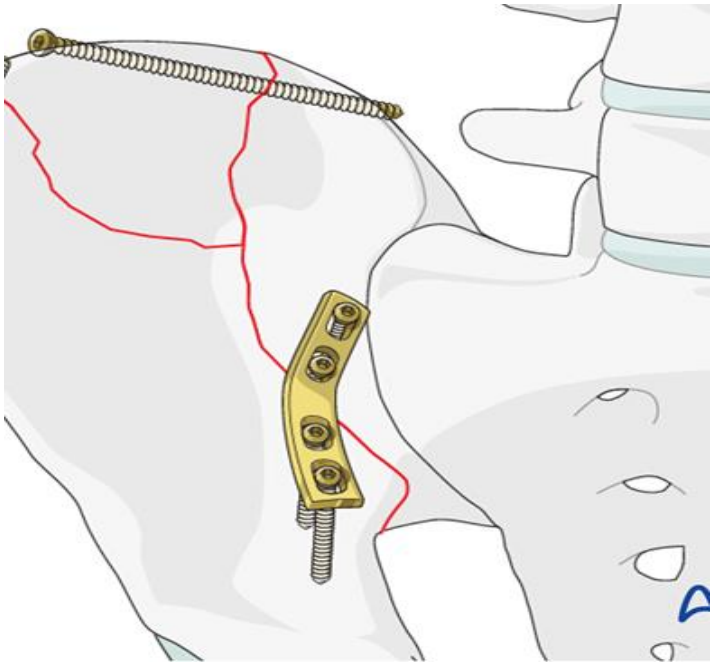

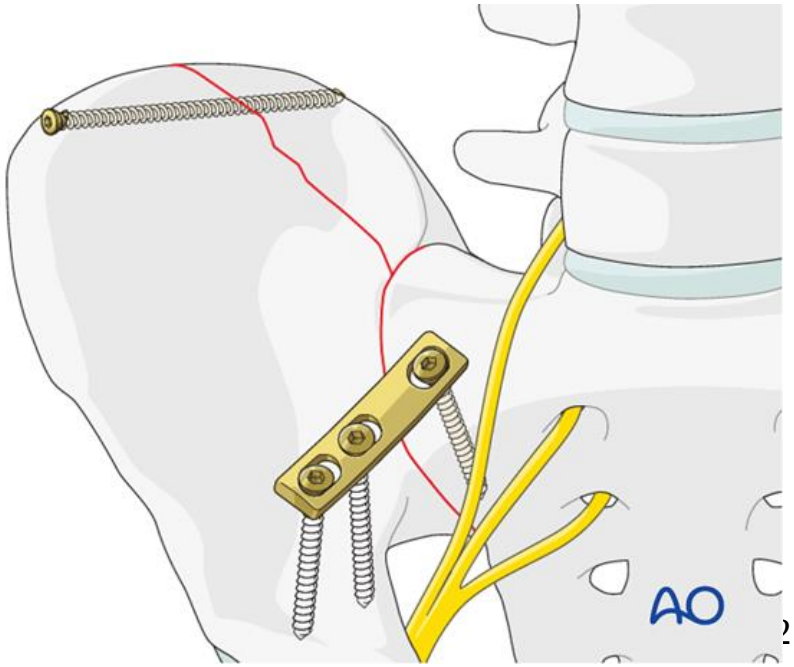

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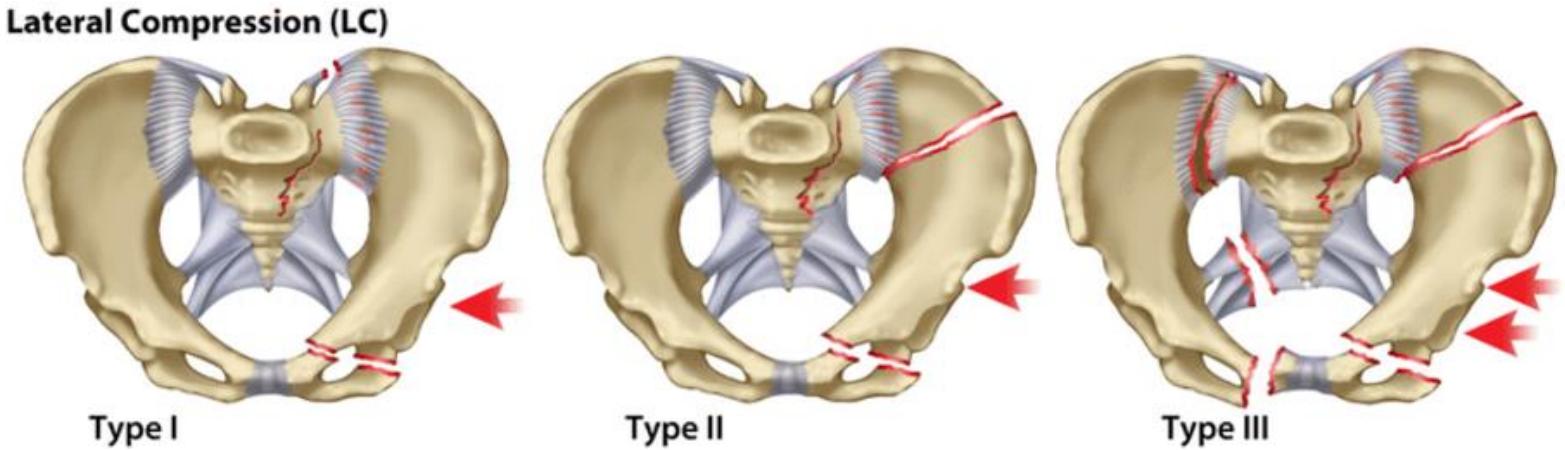

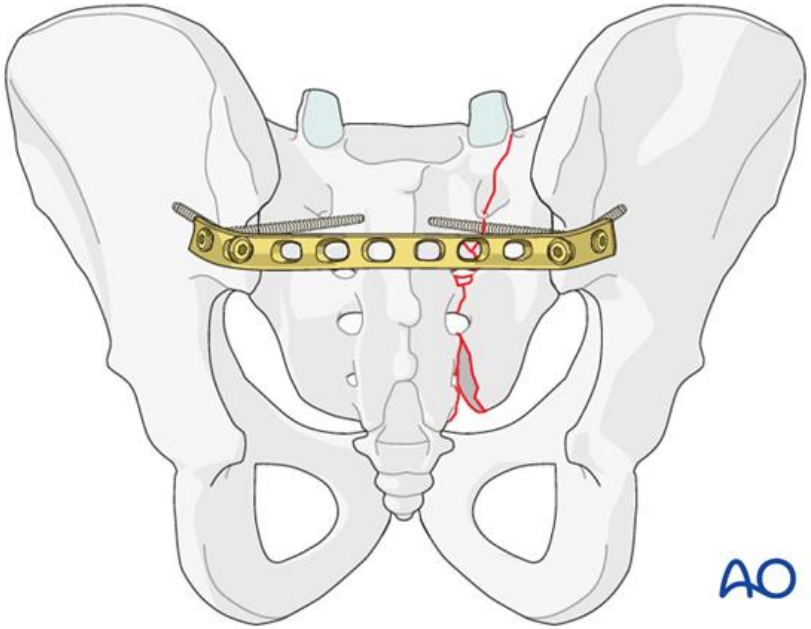

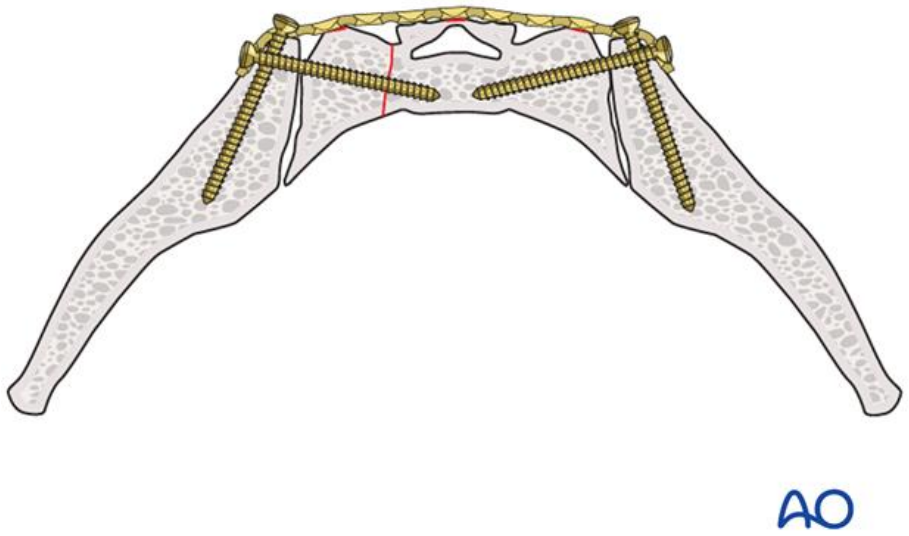

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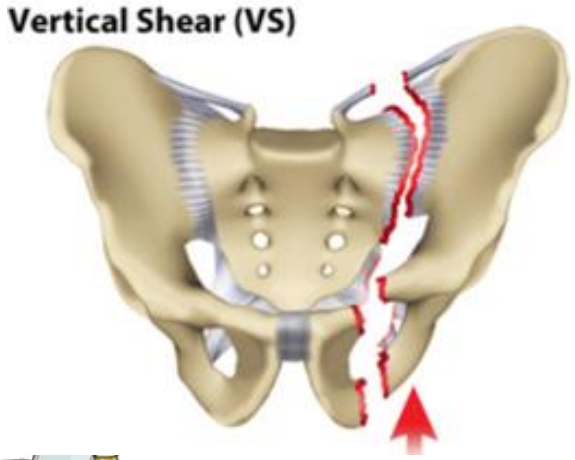
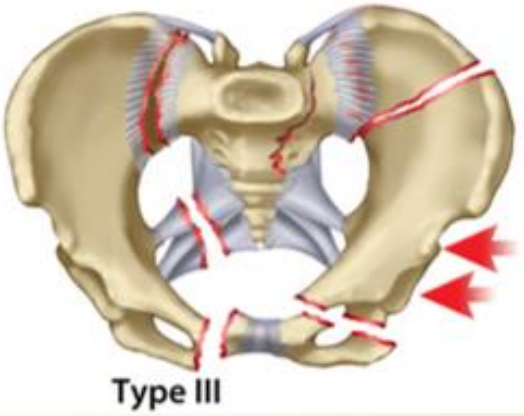
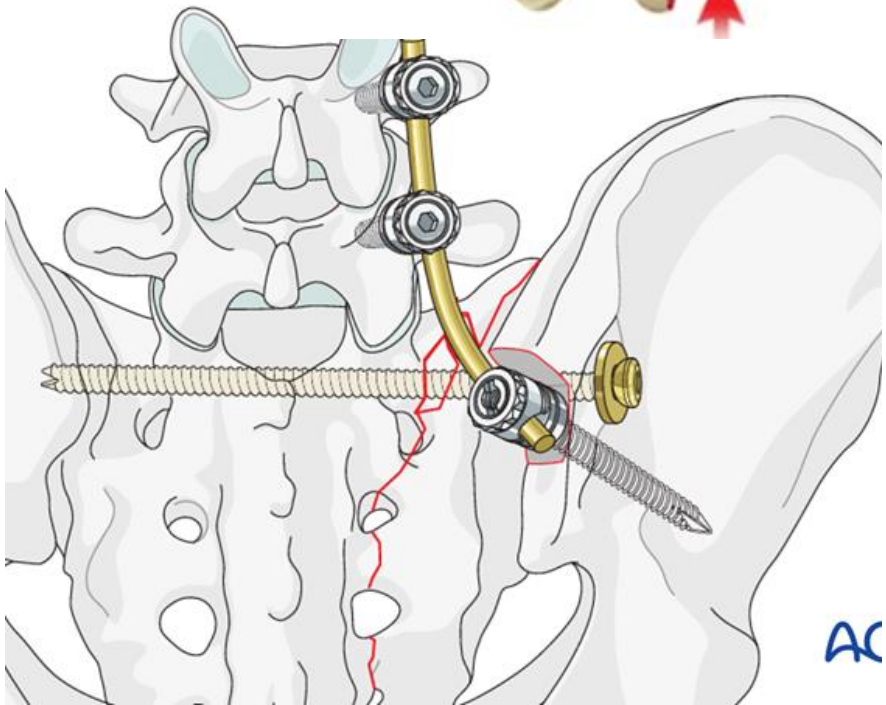
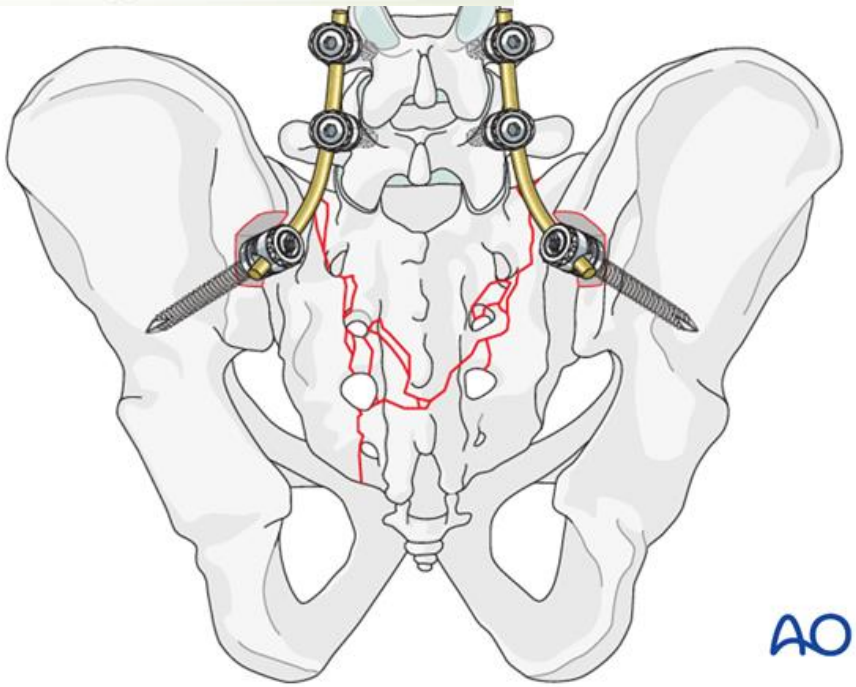




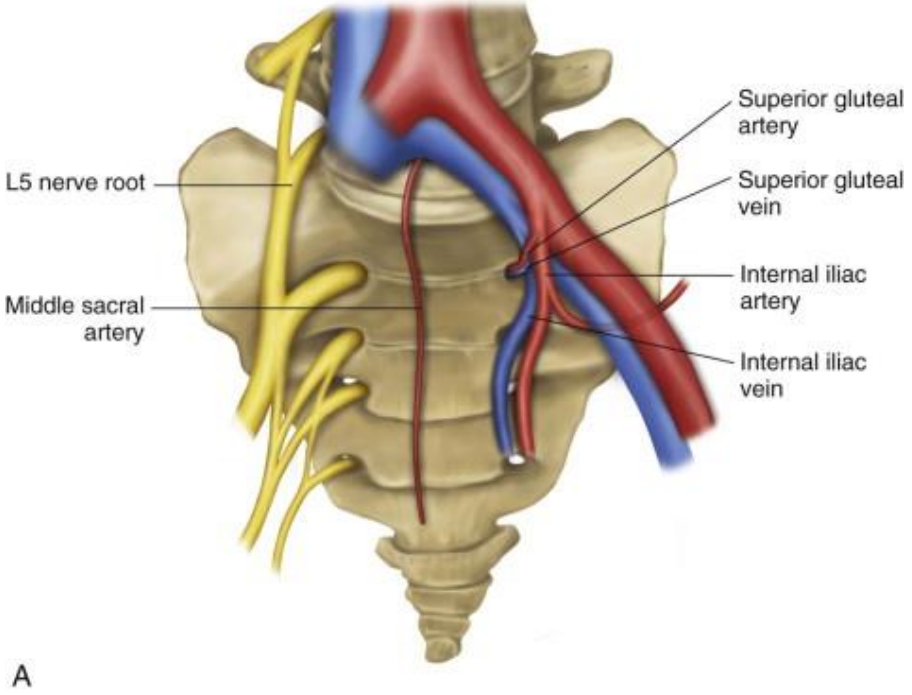


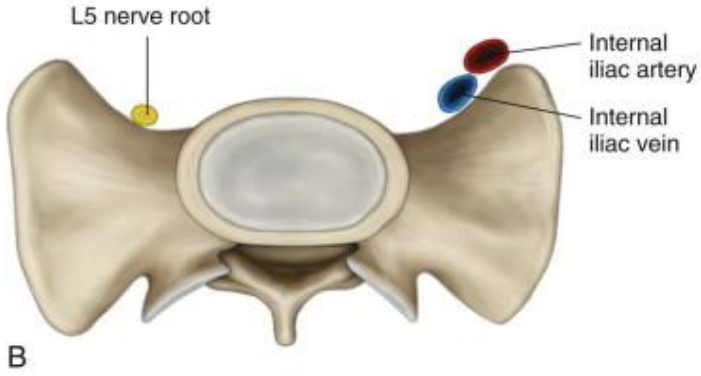


併發症-泌尿生殖系統

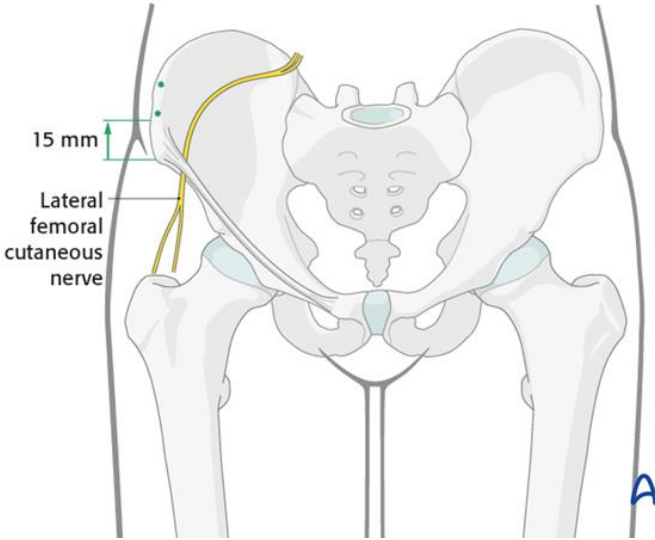
- 長期併發症很常見。(**高達35%**)
  - **尿道狹窄 – 最常見**
  - 陽痿
  - 前骨盆環感染
  - 失禁
  - 分娩併發症 (如剖腹產???)

併發症-神經學損傷



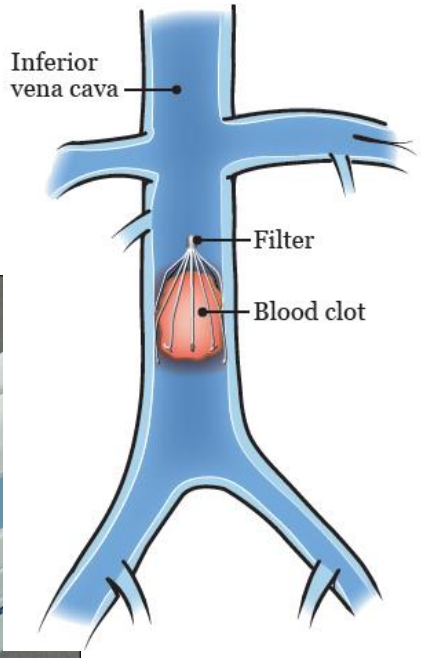


- **L5/S1 神經根**受傷
  - 薦椎骨折相關 6%/28%/57%
- **股外側皮神經**及股神經



併發症-下肢靜脈栓塞及肺栓塞

- **下肢靜脈栓塞**約 **60%**
- **肺栓塞**約 **27%**, **致命性肺栓塞**約 **2%**
- 預防做法
  - 機械性加壓
  - **藥物預防 LMWH / Clexane**
  - 下腔靜脈過濾器



併發症-感染

- 風險因素包括：
  - 肥胖
  - 糖尿病
  - 手術時間長
  - ICU 住院時間長
  - 大量輸血
  - 合併泌尿生殖系統與腹部創傷
  - 開放性骨折
  - 手術前血管栓塞(爭議)

併發症-骨癒合不良或不癒合

- 可能引起：
  - 慢性疼痛
  - 肢體長度不等
  - 步態障礙
  - 坐立困難
  - 腰痛
  - 骨盆出口狹窄

預後

- 閉鎖性骨折死亡率為 1-15%
- **開放性骨折**死亡率高達 **50%**
- **出血**是整體死亡的主要原因
- 死亡率風險因子
  - 就診時收縮壓<90
  - 年齡>60歲
  - ISS分數高
  - 需要輸血 > 4 單位
  - APC III / VS 損傷

Hip Dislocation

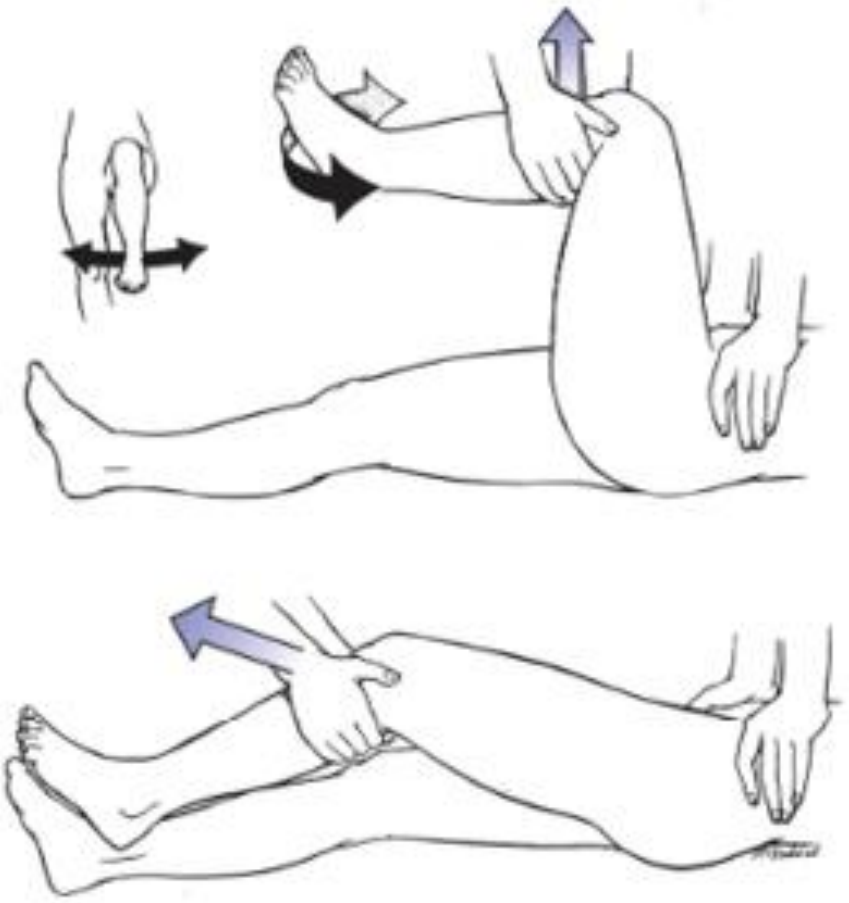
- Posterior dislocation 85-90%
- Anterior dislocations 10-15%
- The long-term prognosis (AVN, OA, Sciatic nerve injury) worsens if reduction (closed or open) is delayed >12 hours (6 hours).

Hip Dislocation

- Anterior dislocation
- Posterior dislocation

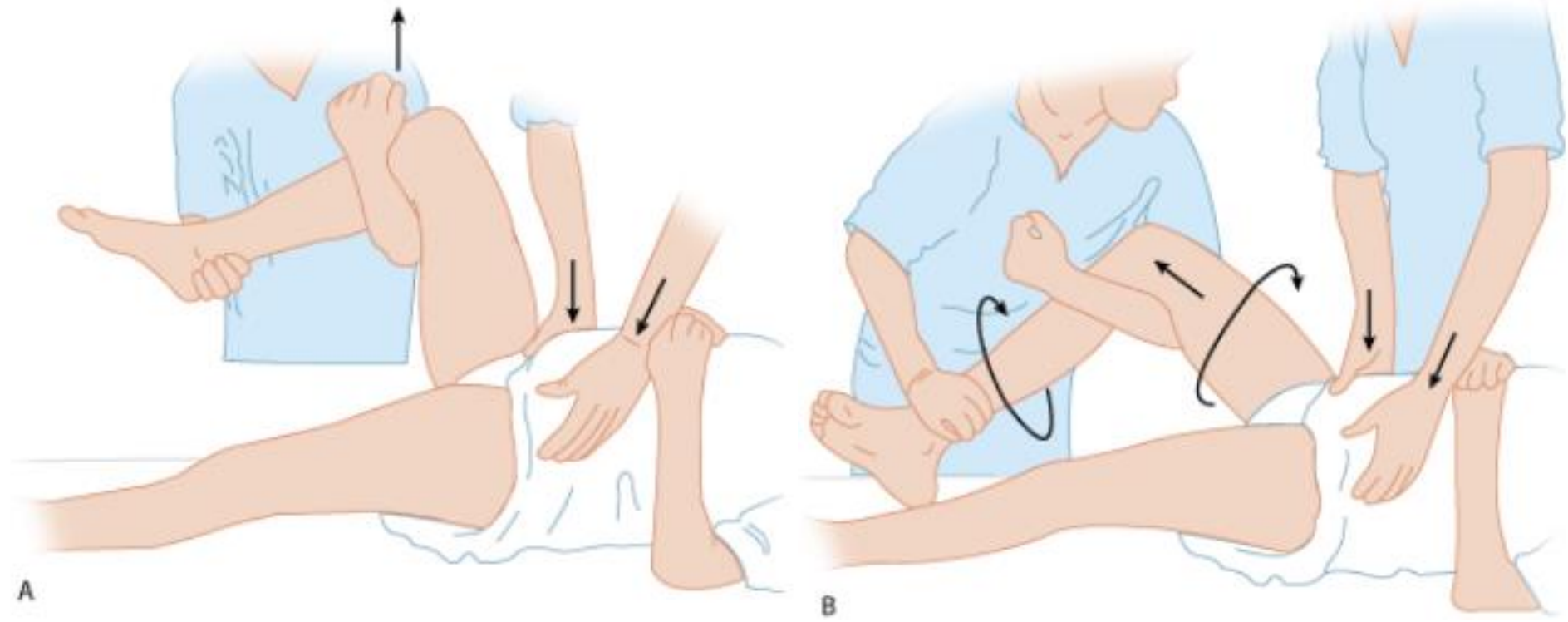
Hip Dislocation

- **Allis maneuver** for posterior hip dislocation



Hip Dislocation

- **Bigelow maneuver** for posterior hip dislocation



Hip Dislocation

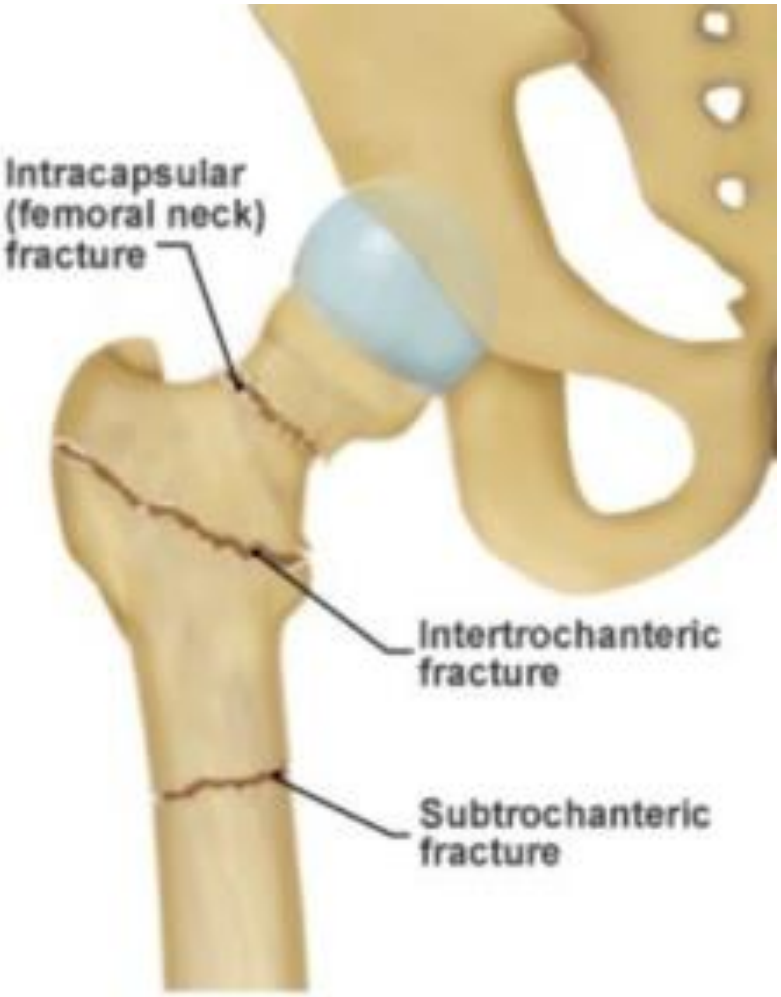
- **Allis maneuver** for anterior hip dislocation

Hip Dislocation

- Post reduction CT scan required to R/O
  - Femoral head fractures
  - Intra-articular loose bodies/incarcerated fragments
  - Acetabular fractures
- Post-reduction
  - for simple dislocation, follow with protected weight bearing for 4-6 weeks

Hip fracture

- Femoral head fr
- Femoral neck fr
- Basal neck fr
- Intertrochanter fr
- Subtrochanter fr



Femoral neck fracture

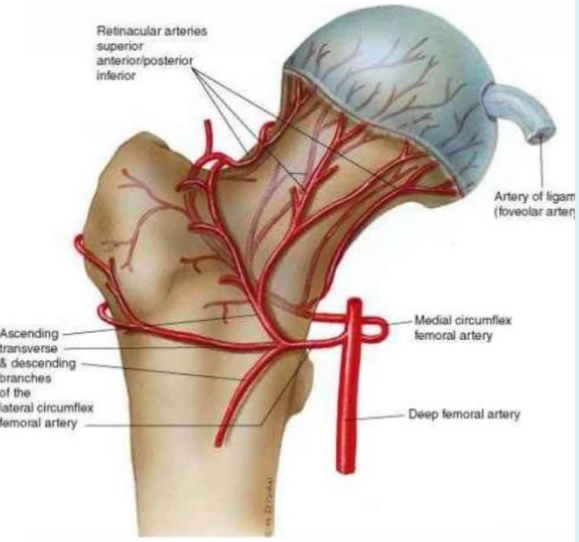
- **Garden classification**
  - Type I: incomplete fr or impacted fr
  - Type II: complete fr , but nondisplaced

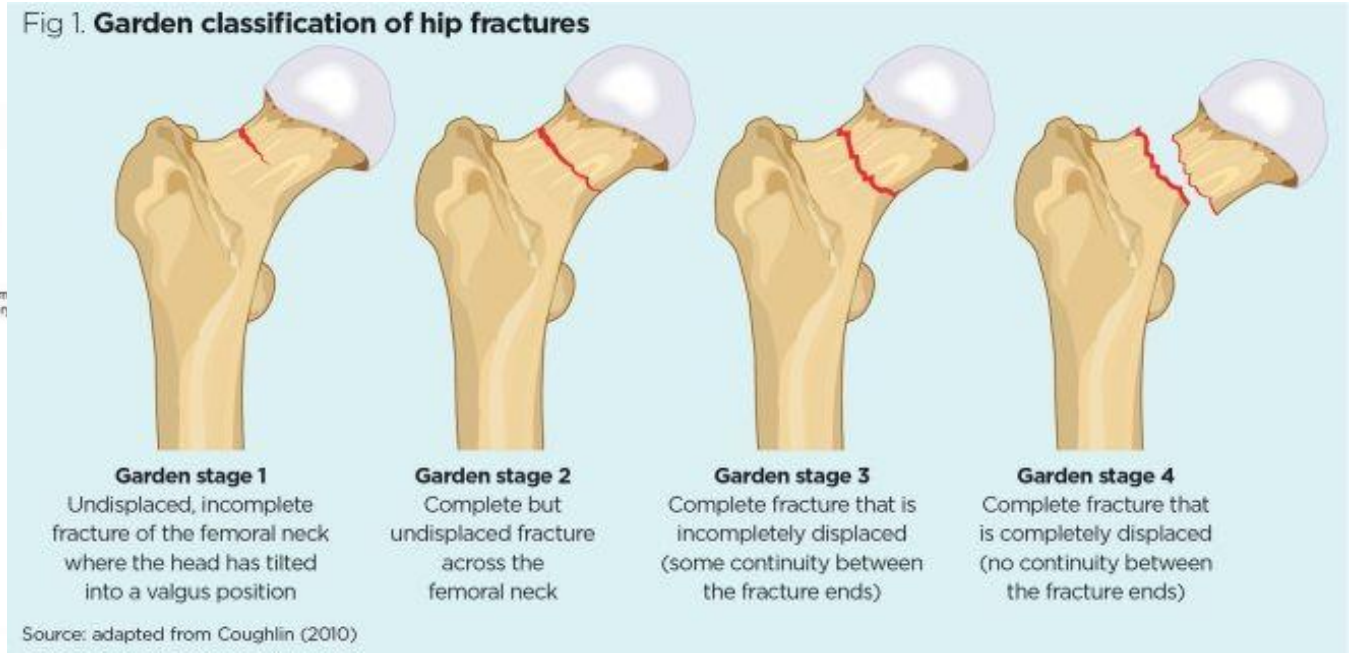
    (Type I,II: ORIF Tx)
  - Type III: partial displaced fr
  - Type IV: fully displaced fr

    (Type III,IV: < 60 y/o ORIF;

    > 60 Y/O: hip arthroplasty)

Femoral neck fracture





Medial circlumflex femoral artery

ORIF

< 60 y/o ORIF
> 60 Y/O: hip arthroplasty

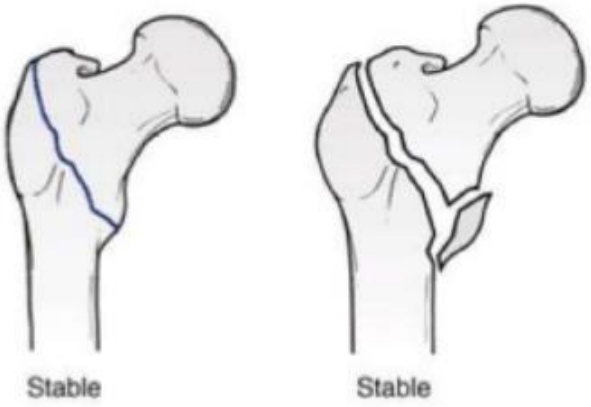
Femoral neck fracture

- **Nonunion (ORIF)**
  - 5% of nondisplaced fractures, up to 25% of displaced fractures
- **Osteonecrosis (ORIF)**
  - 10% of nondisplaced fractures, up to 30% of displaced fractures
- **Dislocation (replacement)**
  - 1% to 2%
  - posterior approach → posterior dislocation

Intertrochanteric fr of femur

Evans Classification

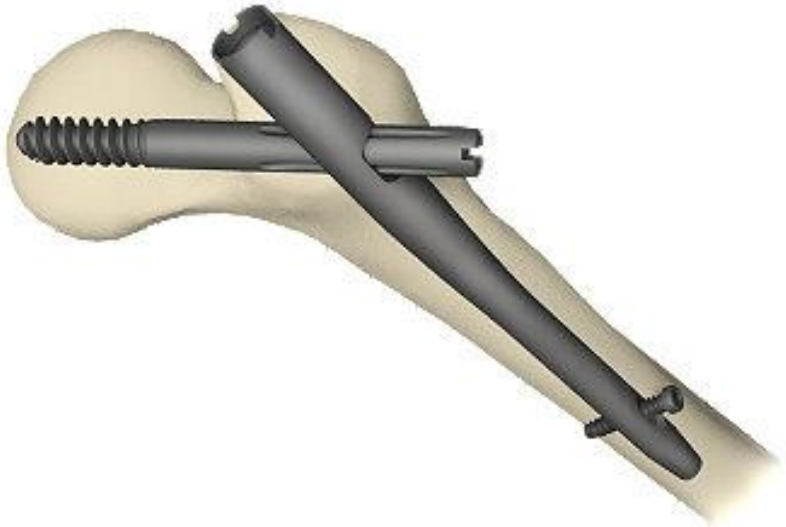
DHS, short Gamma nail



DHS, long Gamma nail

Reverse oblique
骨鬆治療有關

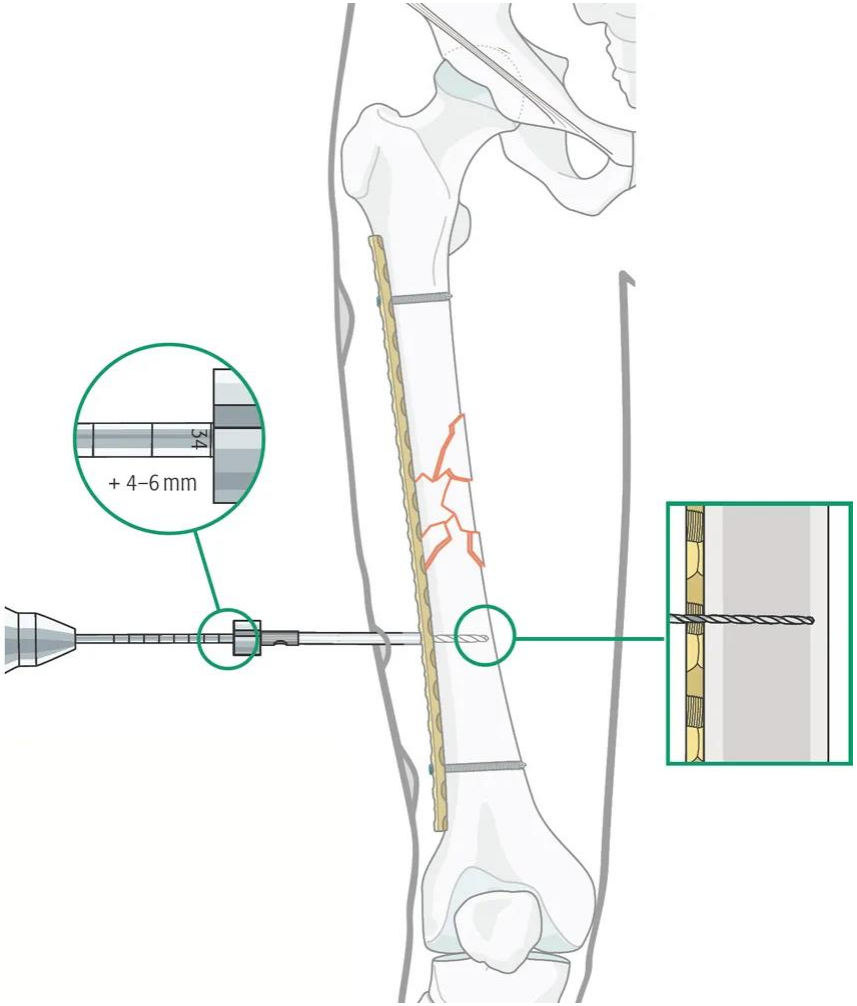
Intertrochanteric fr of femur



Subtrochanteric fr of femur

- Fractures occur below the lesser trochanter to 5 cm distally in the shaft of the femur.
- Young age: high energy
- Old age: osteoporosis
- Tx: ORIF with long nail

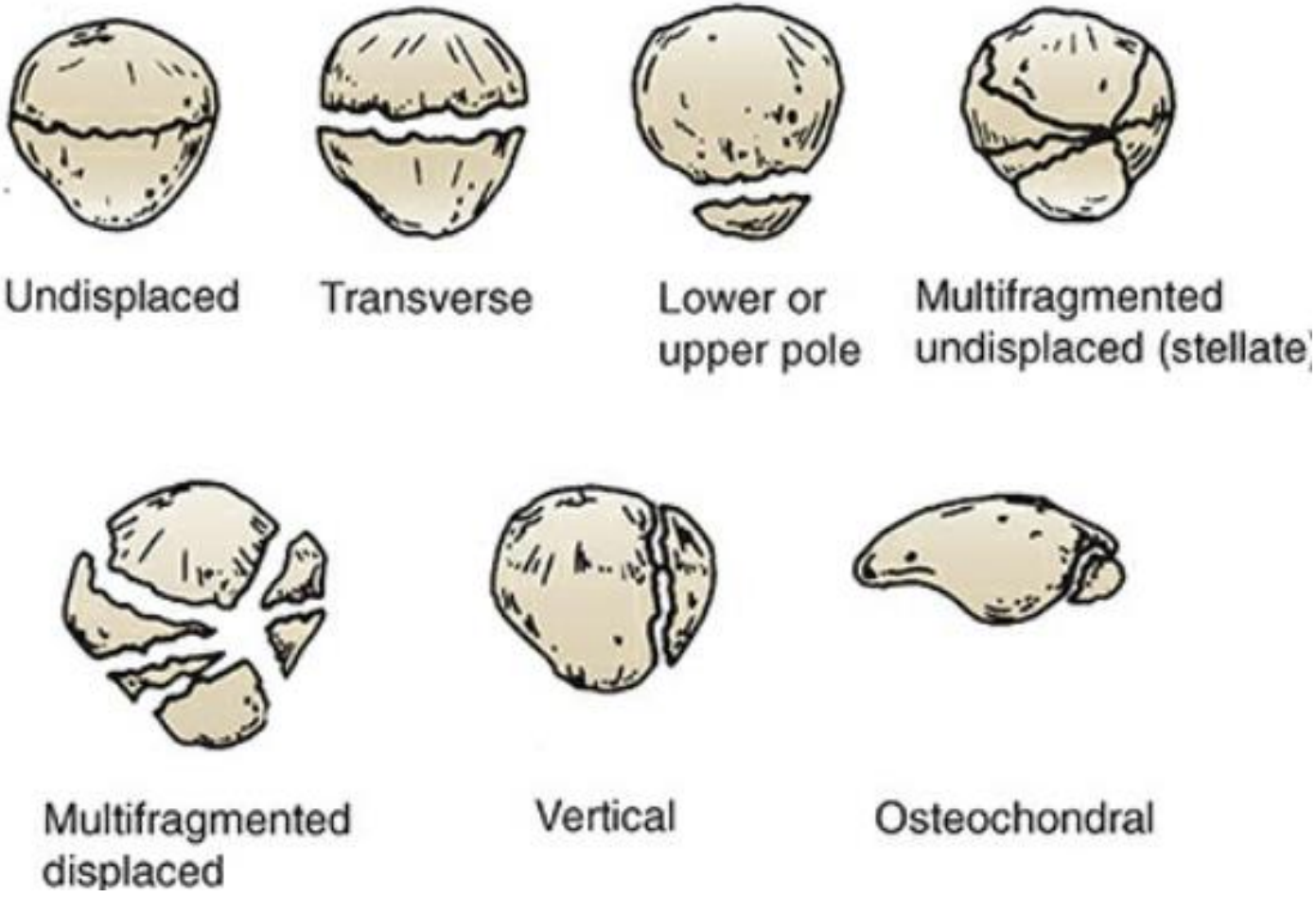
Femoral shaft fracture



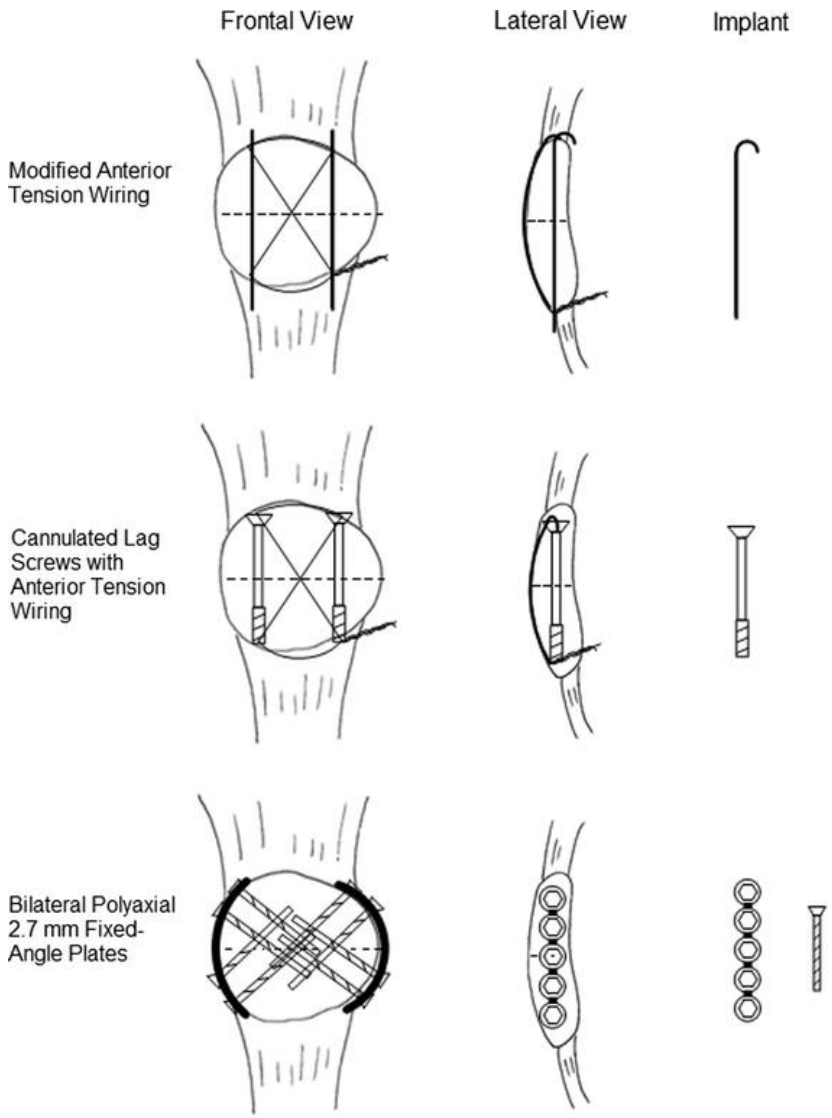
Femoral shaft fracture

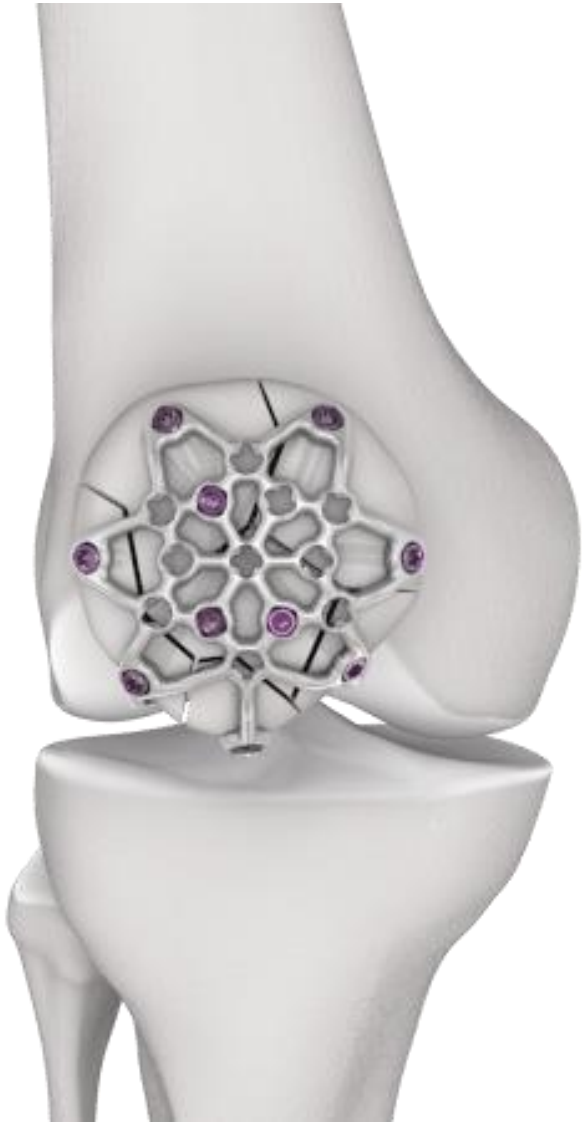
- **Nerve injury:** This is uncommon because the femoral and sciatic nerves are encased in muscle throughout the length of the thigh. Most injuries occur as a result of traction or compression during surgery.
- **Vascular injury:** This may result from tethering of the femoral artery at the adductor hiatus.

Patella fracture



Patella fracture





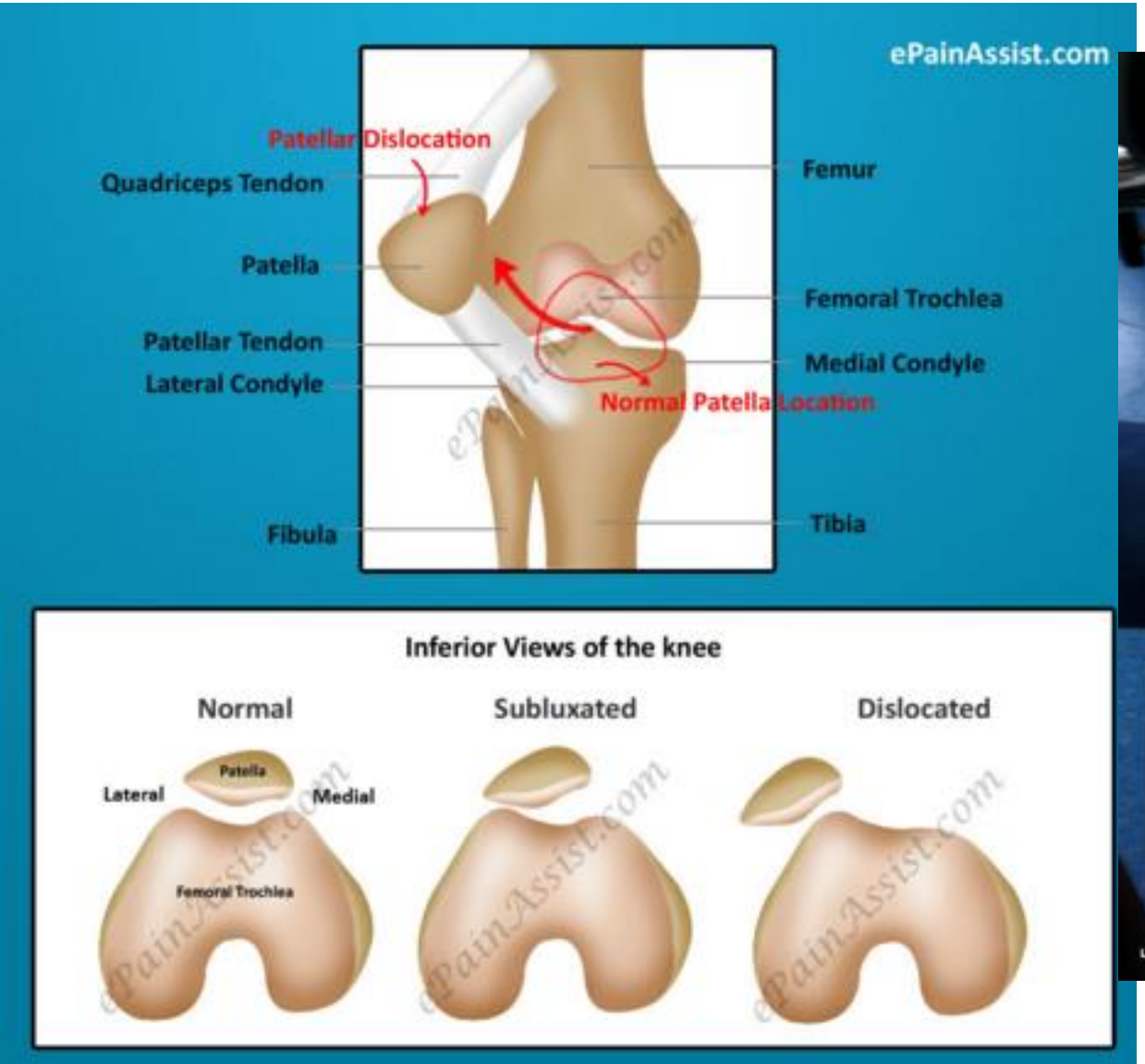
Patellofemoral pain syndrome
跑者膝

- 髕骨股骨症候群
- 髂脛束症候群
- 鵝足腱發炎
- 髕骨軟化症
- 髕腱炎(跳躍膝)

Patellofemoral pain syndrome
跑者膝

Activity	Force	% Body Weight	Pounds of Force
Walking	850 N	½ x BW	100lbs
Bike	850 N	½ x BW	100lbs
Stair Ascend	1500 N	3.3 x BW	660lbs
Stair Descend	4000 N	5 x BW	1000lbs
Jogging	5000 N	7 x BW	1400lbs
Squatting	5000 N	7 x BW	1400lbs
Deep Squatting	15,000 N	20 x BW	4000lbs

Patella Dislocation




Reducing the Dislocated Patella
Flex knee to relax quadriceps
1:04 / 1:49


Reducing the Dislocated Patella
Lift and push patella medially


Reducing the Dislocated Patella
Extend Knee
1:11 / 1:49

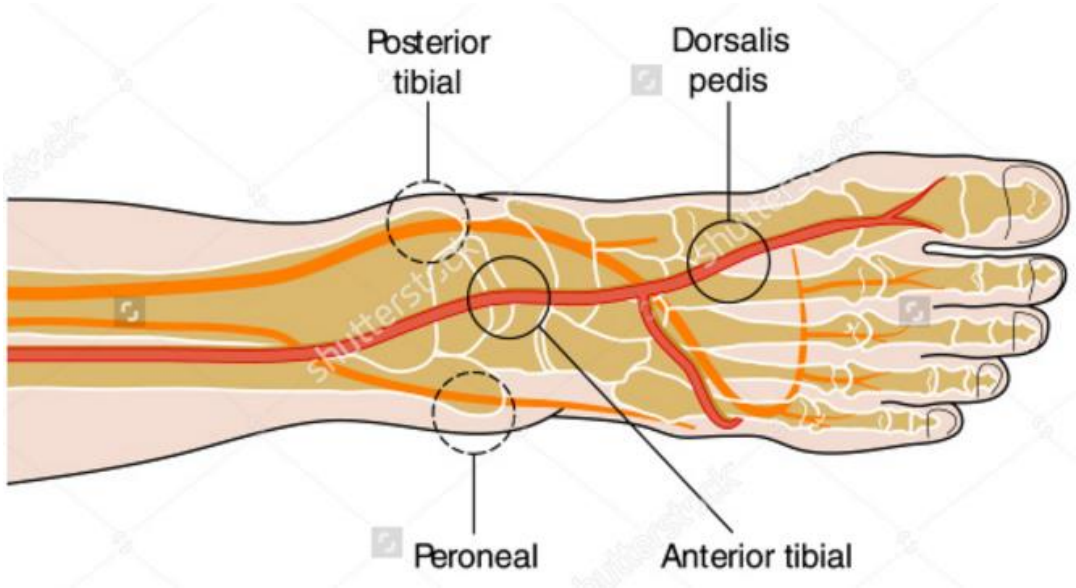

Reducing the Dislocated Patella
1:21 / 1:49

Patella Dislocation

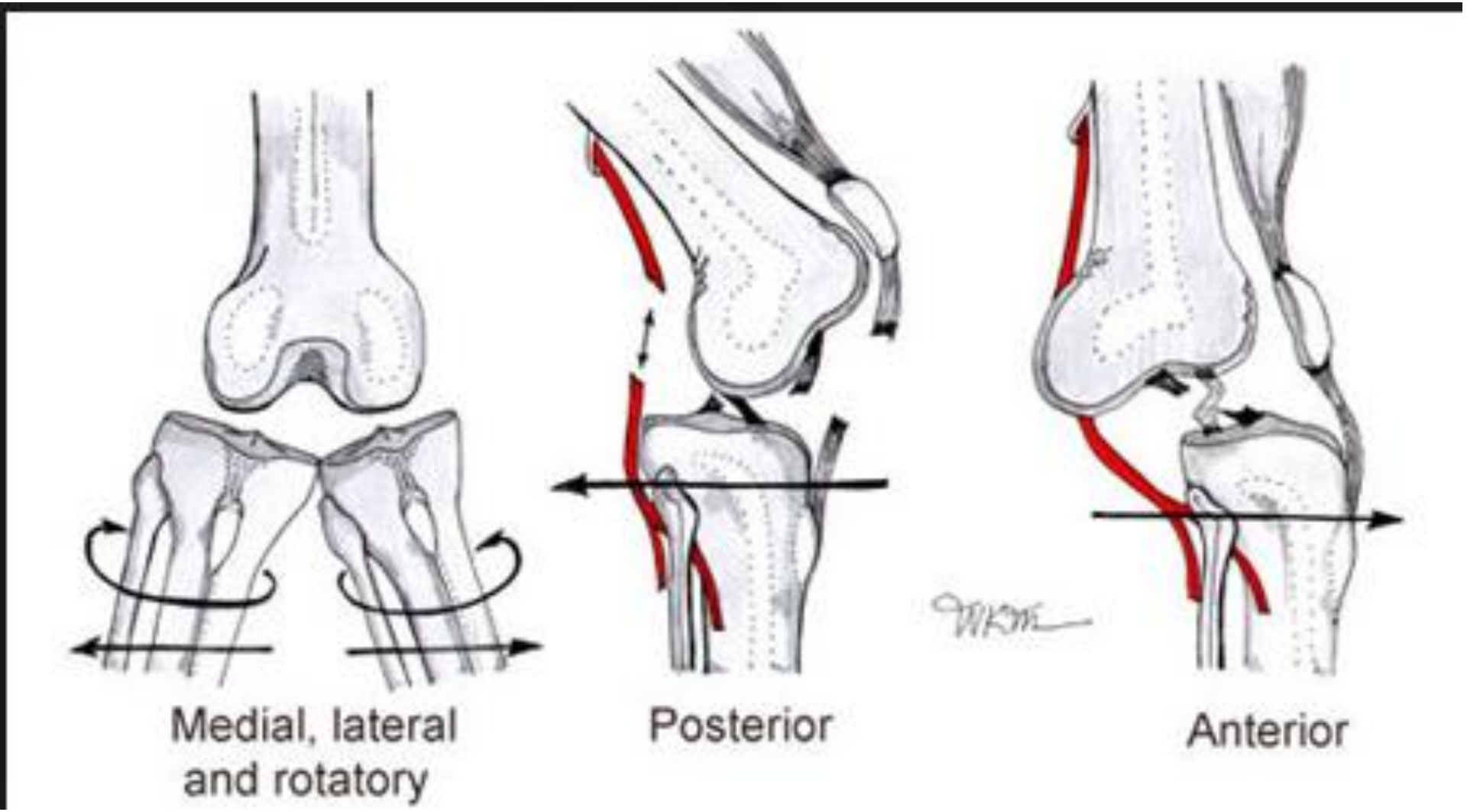
- Immobilization of the knee in extension for 1 to 2 weeks
- Permitted to fully weight bear in the immobilizer

Knee Dislocation

- Orthopedic emergency
- Vascular injury—popliteal artery disruption (20% to 60%)
- Neurologic injury—peroneal nerve (10% to 35%)
- Fractures 60%



Knee Dislocation



Knee Dislocation

- Anterior (30-50%)
  - most common type of dislocation
  - due to hyperextension injury
  - usually involves tear of PCL
  - arterial injury is generally an intimal tear due to traction
  - the highest rate of peroneal nerve injury

- Posterior (25%)
  - 2nd most common type due to axial load to flexed knee (dashboard injury)
  - highest rate of complete tear of popliteal artery

Knee Dislocation

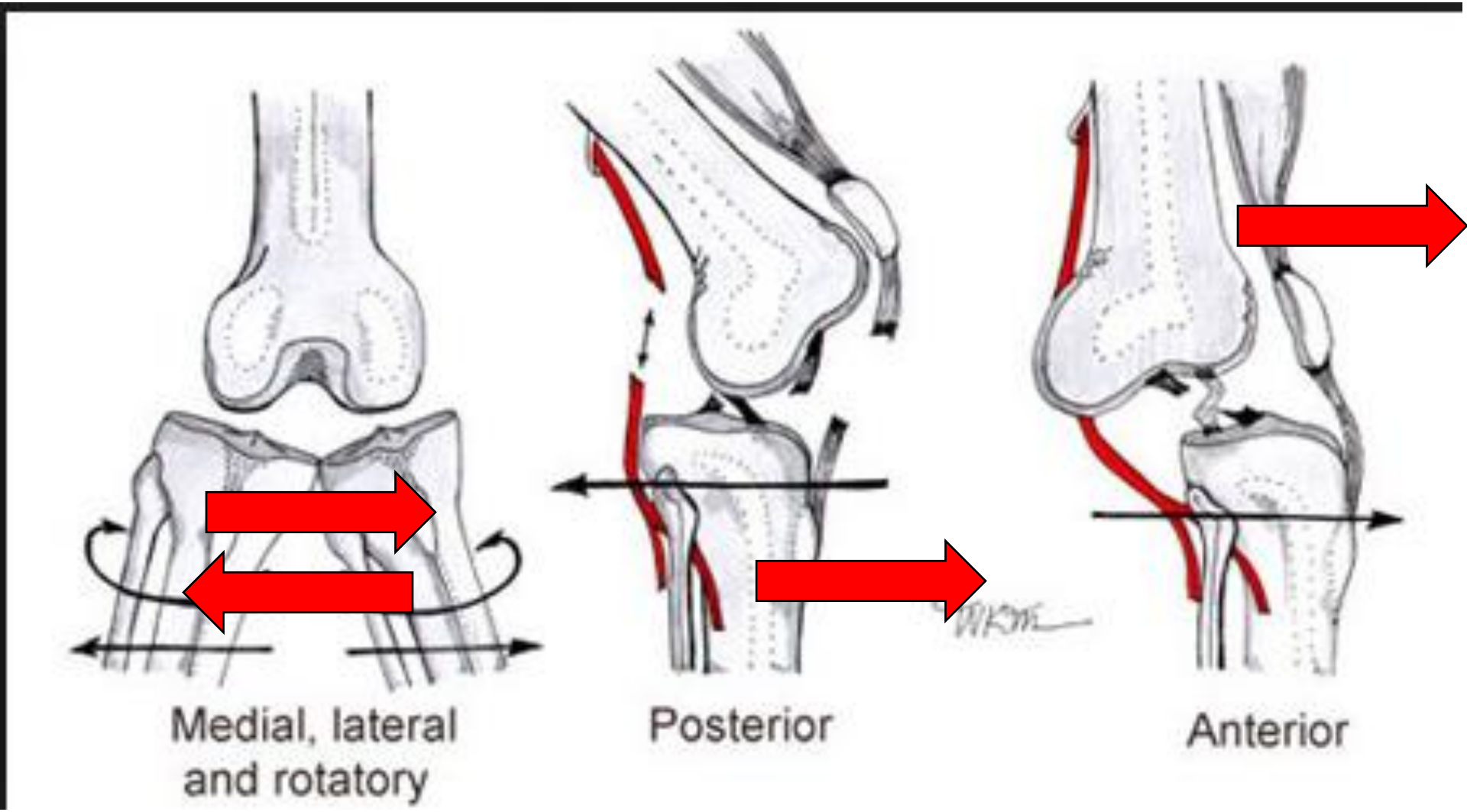
- Lateral (13%)
  - due to a varus or valgus force
  - usually involves tears of both ACL and PCL
- Medial (3%)
  - varus or valgus force
  - usually disrupted PLC and PCL
- Rotational (4%)
  - usually irreducible
  - posterolateral is most common rotational dislocation

Knee Dislocation

- Schenck Classification
  - based on a pattern of multiligamentous injury of knee dislocation (KD)

	Schenck Classification (based on the number of ruptured ligaments)
KD I	Multiligamentous injury with the involvement of the ACL or PCL
KD II	Injury to ACL and PCL only (2 ligaments)
KD III	Injury to ACL, PCL, and PMC or PLC (3 ligaments). KDIIIM (ACL, PCL, MCL) and KDIIIL (ACL, PCL, PLC, LCL).
KD IV	Injury to ACL, PCL, PMC, and PLC (4 ligaments) Has the highest rate of vascular injury (5-15%)
KD V	Multiligamentous injury with periarticular fracture

Knee Dislocation

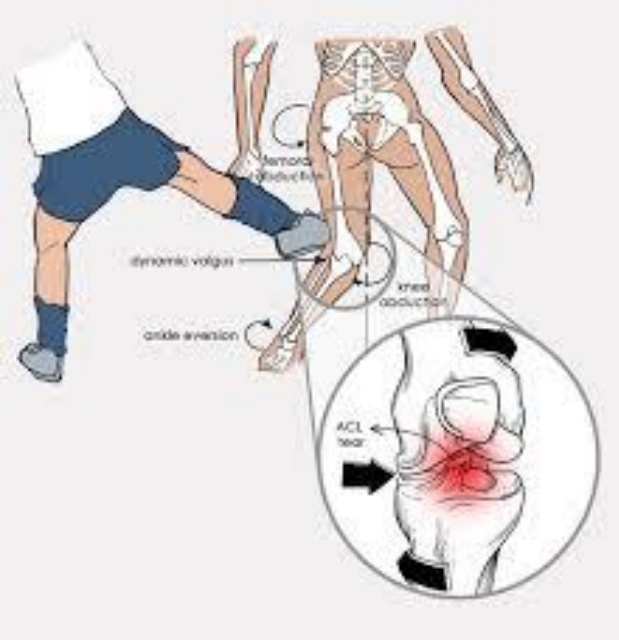


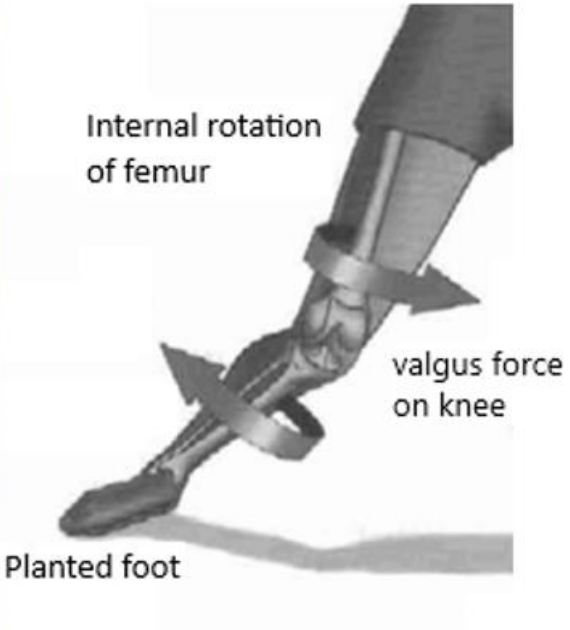
Knee Dislocation

- Splint knee in 20-30 degrees of flexion
- Re-examine vascular status (Consult CVS if any problem)
- Confirm reduction is held with repeat radiographs in brace/splint

ACL injury

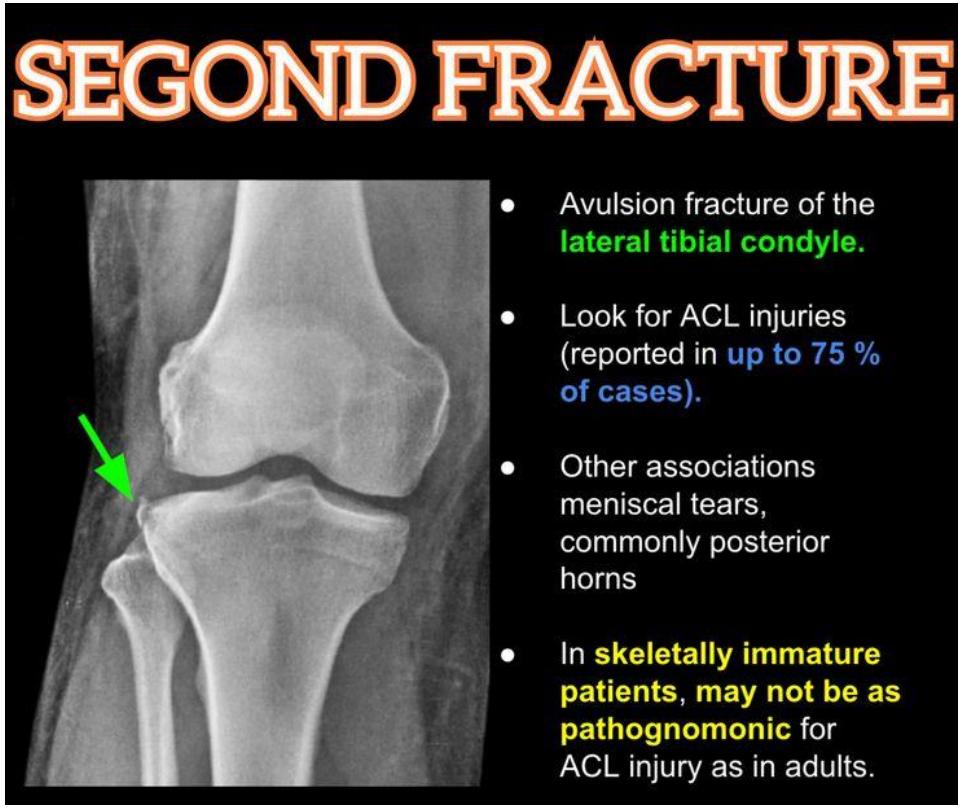
- **Lachman test (for Acute stage)**
- **Anterior drawer test**
- **Pivot shift test**





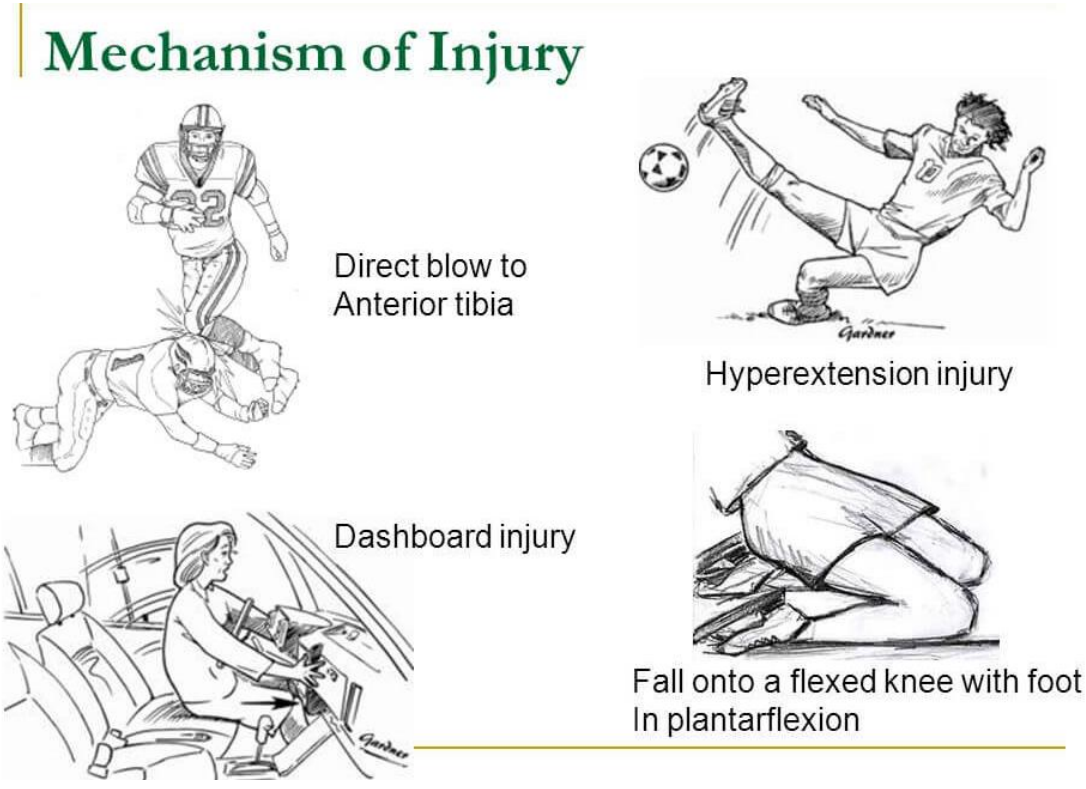
ACL injury

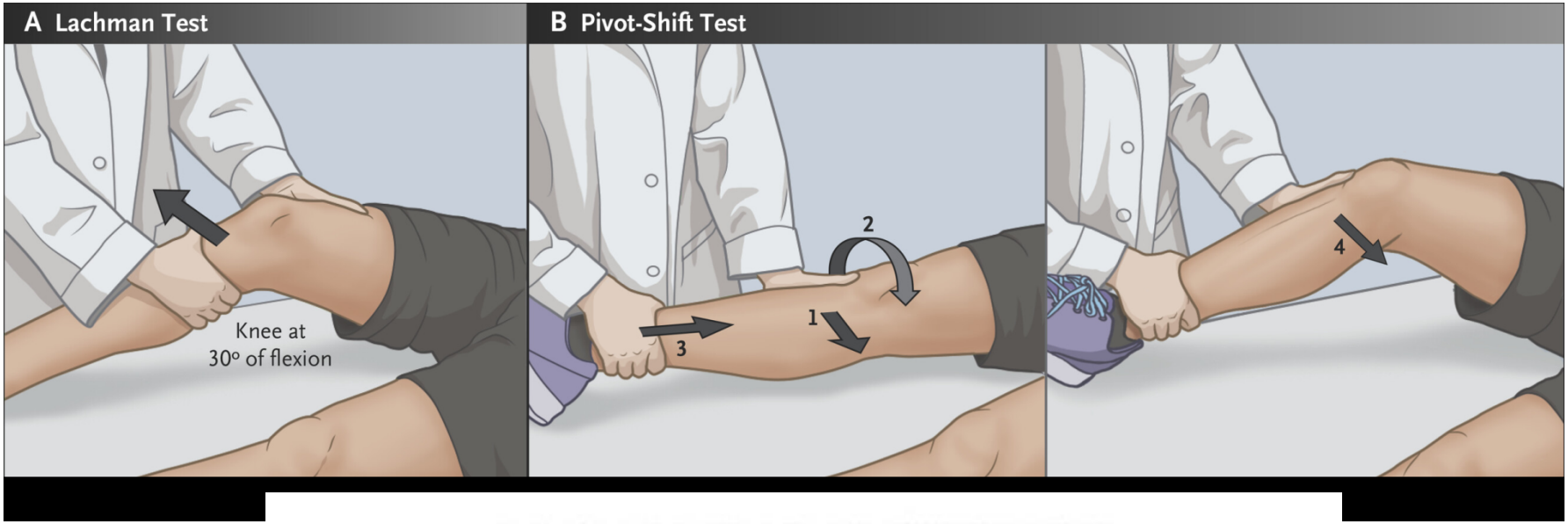
- Associate injury
  - Meniscal tears
    - lateral meniscal tears in 54% of acute ACL tears
    - medial in chronic cases
  - PCL, MCL, LCL/PLC injuries



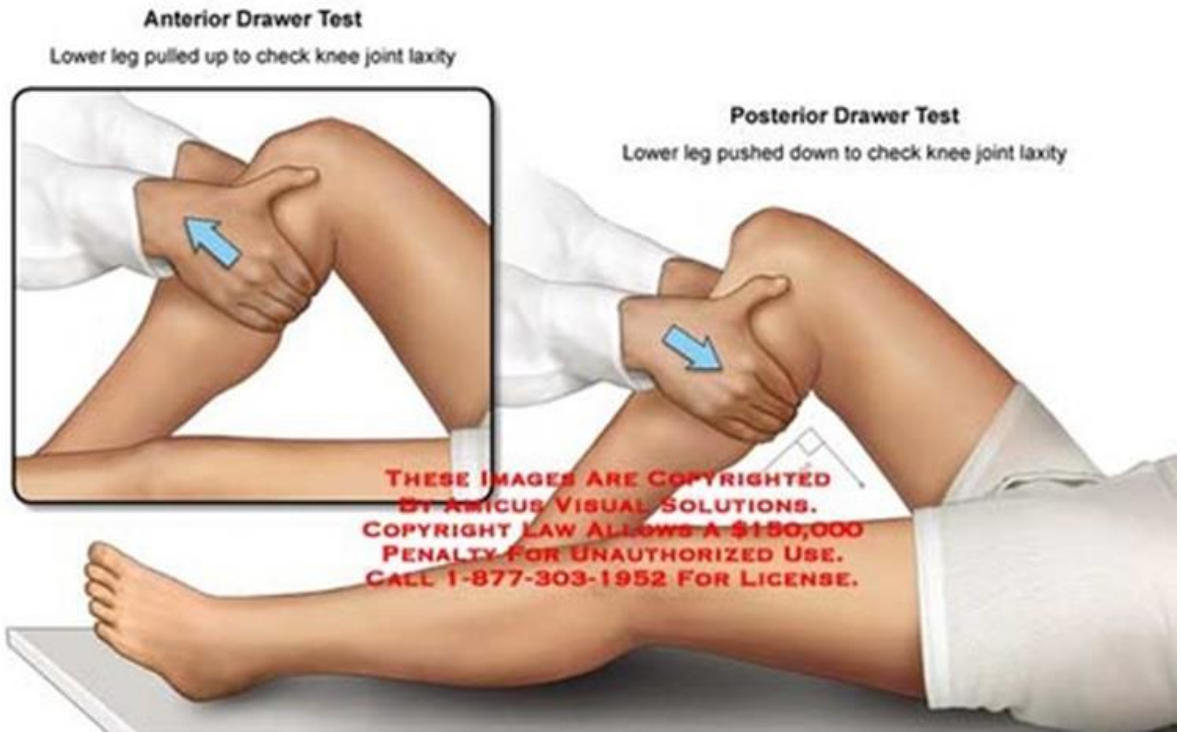
PCL injury

- **Lachman test (for Acute stage)**
- **Posterior drawer test**





Anterior and Posterior Drawer Tests



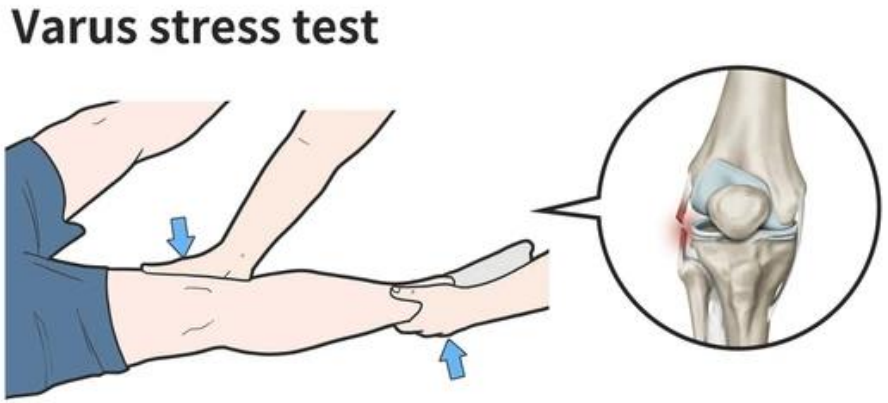
Stability Test (for collateral lig.)

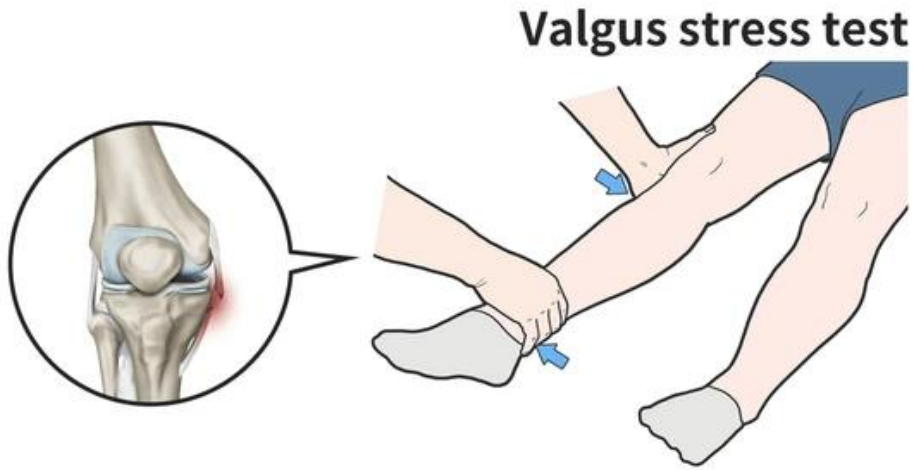
- **LCL**

  Varus stress test

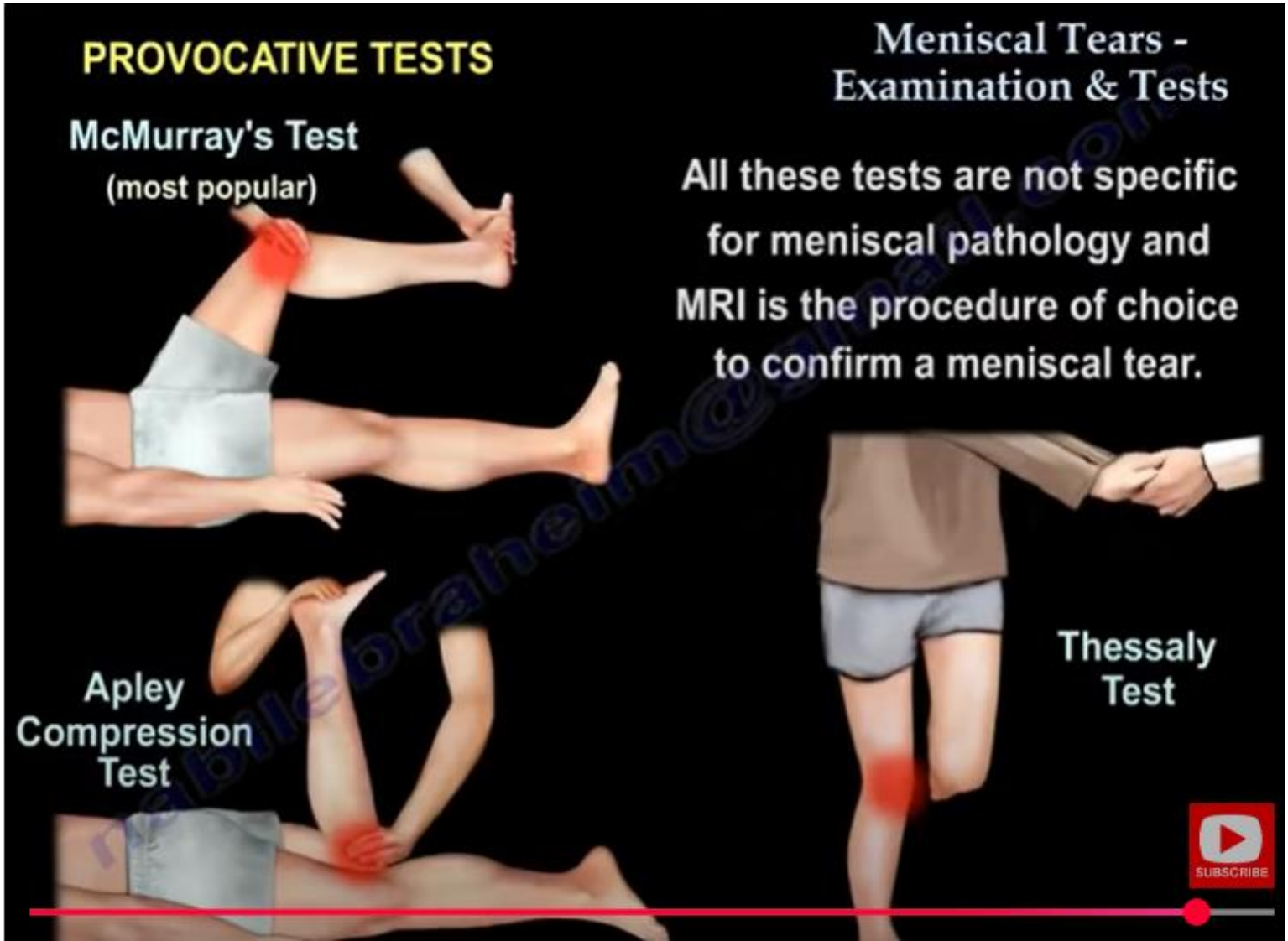
- **MCL**

  Valgus stress test

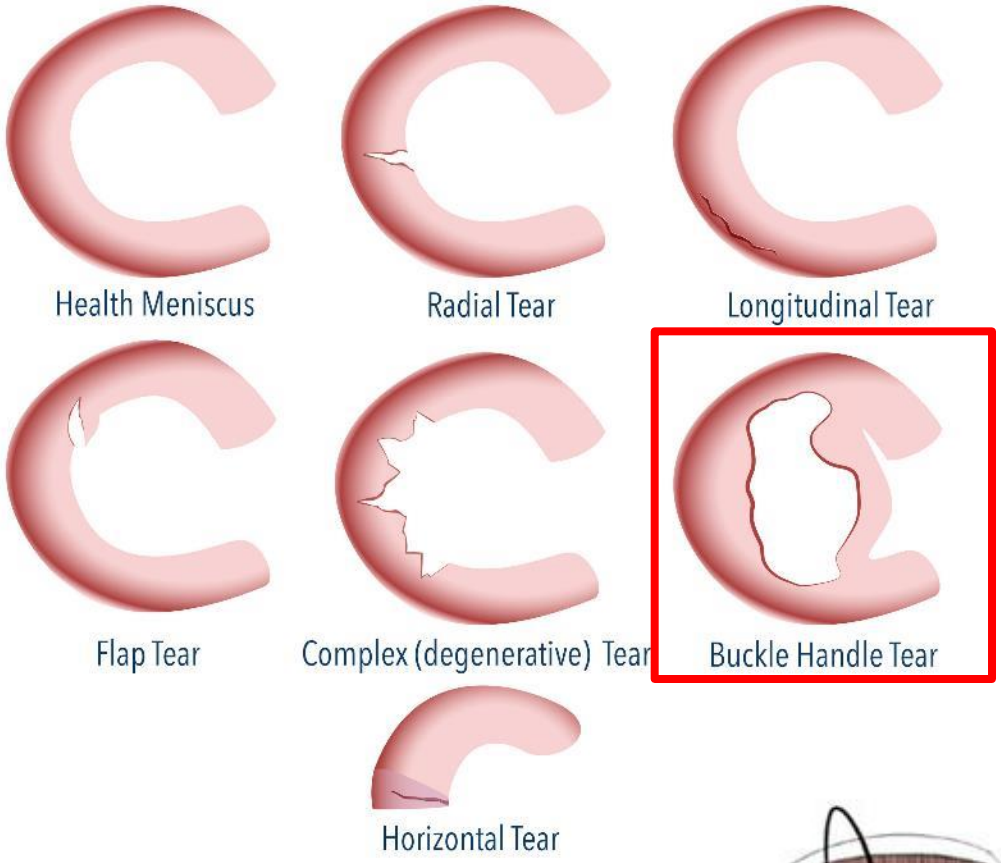




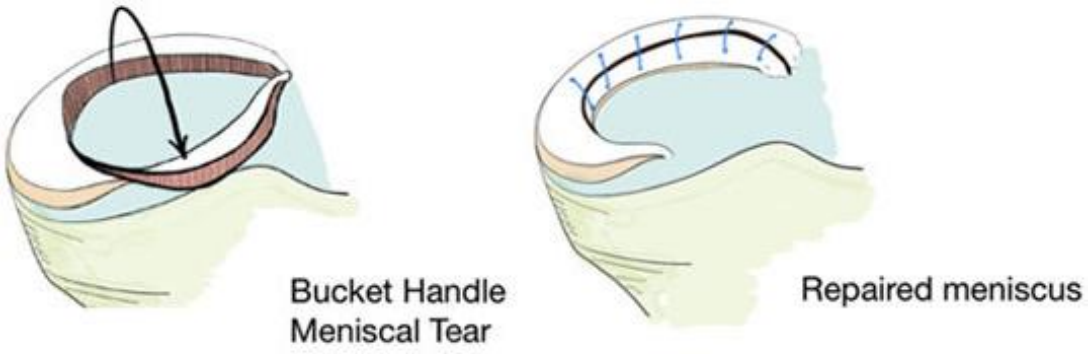
Meniscus


PROVOCATIVE TESTS
Meniscal Tears -
Examination & Tests
McMurray's Test
(most popular)
All these tests are not specific
for meniscal pathology and
MRI is the procedure of choice
to confirm a meniscal tear.
Apley
Compression
Test
Thessaly
Test
SUBSCRIBE

Types of Meniscus Tear

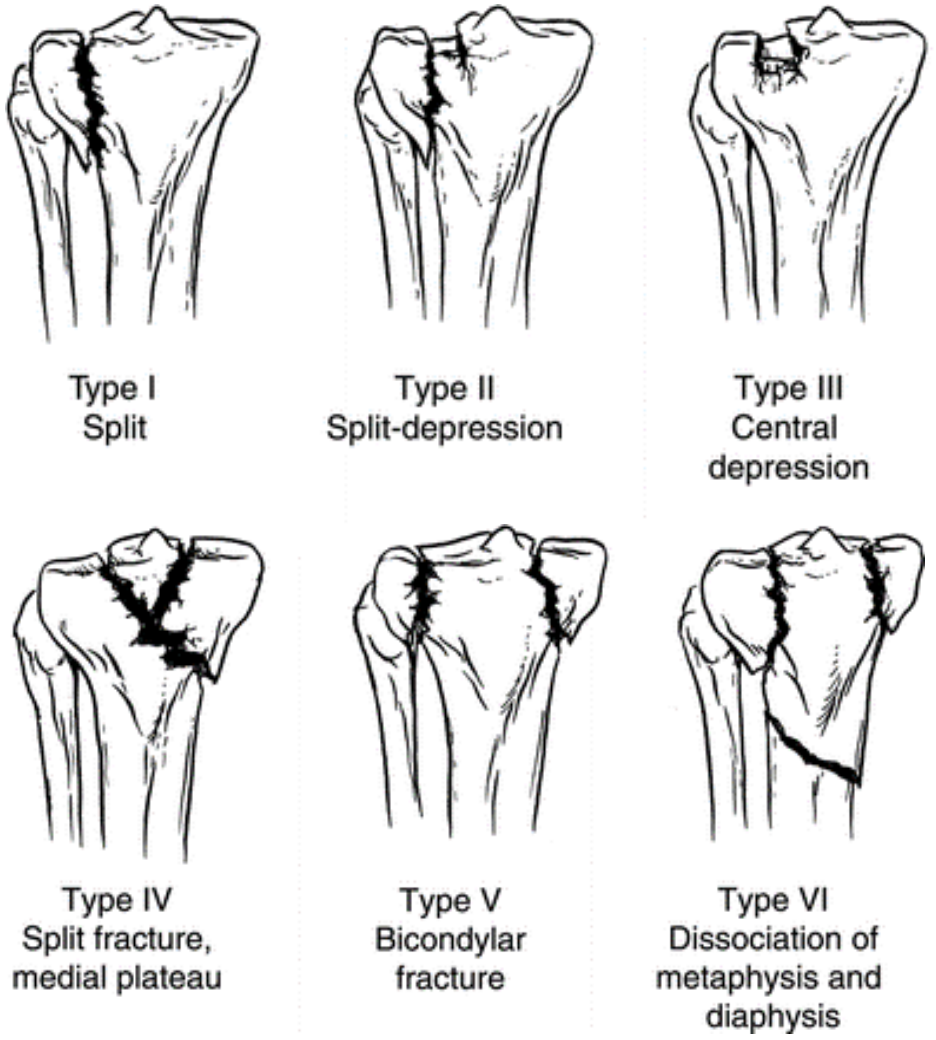


Knee pain. Knee locking, catching or feeling like you can't move your knee



Tibial plateau fracture (**Schatzker** classification)

- I: split fr of lat T. plateau
- II: split depression fr of lat T. plateau
- III: depression fr of lat T. plateau
- IV: med T. plateau fr
- V: bicondylar fr
- VI: bicondylar fr with diaphyseal extension



Tibia and fibula shaft fracture

- Diaphyseal tibial fractures are the most common long bone fr.
- Tibia fracture - ORIF
  - > 5° varus-valgus angulation
  - > 10 ° anterior/posterior angulation
  - < 50% cortical apposition
  - > 1 cm shortening
  - > 10 ° rotational malalignment
- Isolated fibula shaft fracture
  - Conservative Tx

Ankle fracture

- Uni-malleolar fracture (外/内)
- Bi-malleolar fracture (外+内)
- Tri-malleolar fracture(外+後+内)
- Plafond (Pilon) fracture (關節面粉碎性)

- Maisonneuve fracture (近端腓骨+内)

Ankle fracture

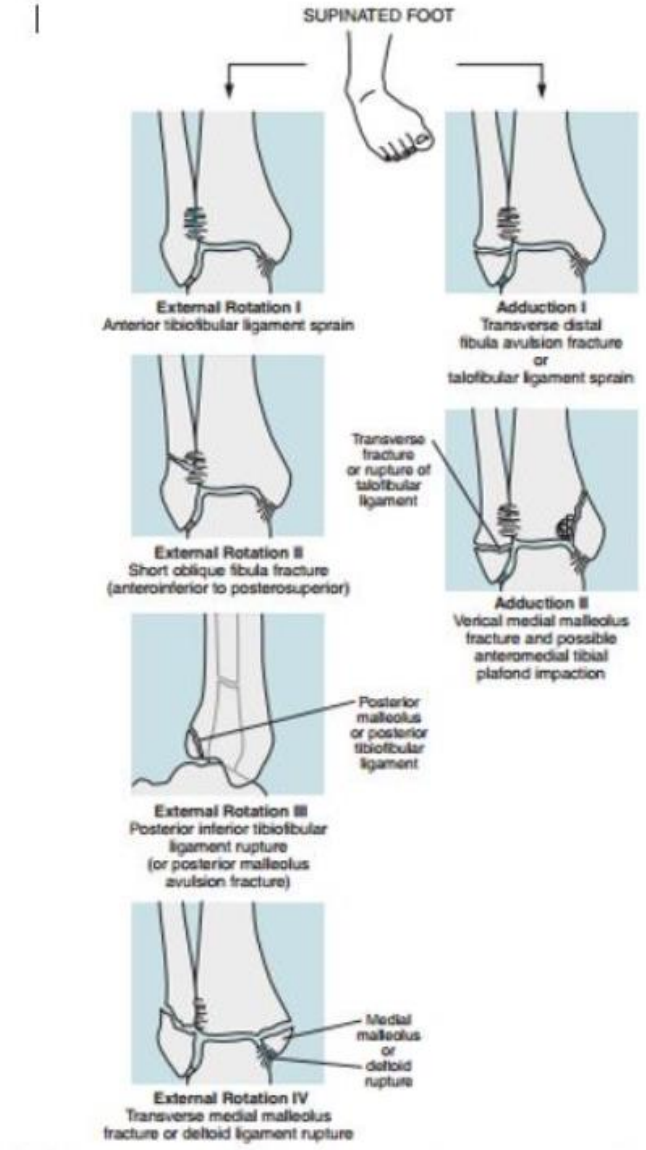


Figure 12–3. Lauge-Hansen classification of ankle fractures: 4 common sequences of injury occur based on the position of the foot at the time of injury (supination versus pronation) and the direction of the force applied (adduction with supination, abduction with pronation).

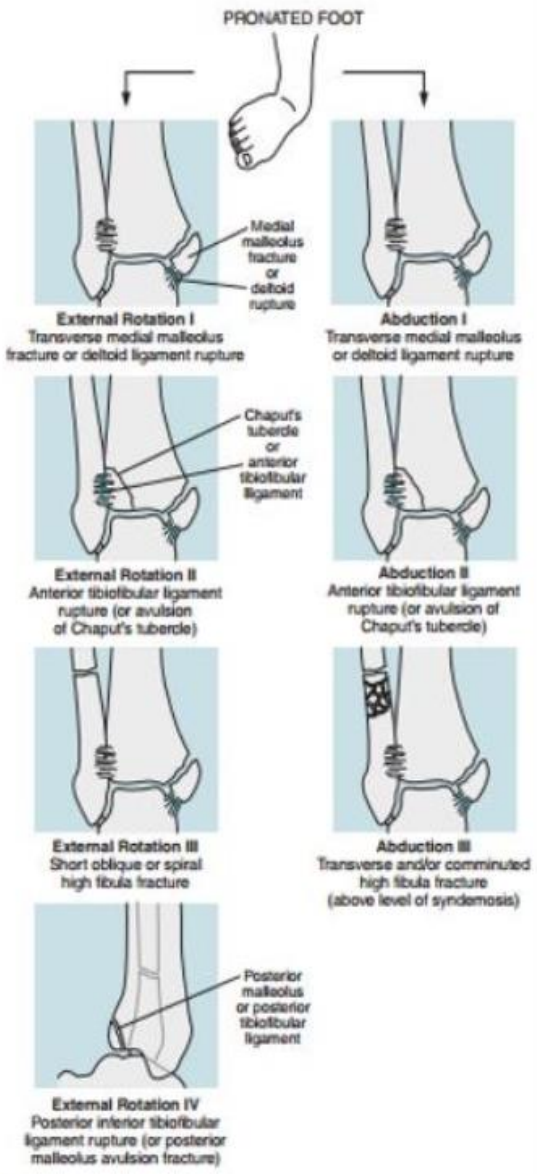


Figure 12–3. (*Continued*)

Plafond (Pilon) fracture

- Most challenging fracture
- Def.: distal tibia fracture with intra-articular comminution
- Often associated with soft tissue injury

Plafond (Pilon) fracture

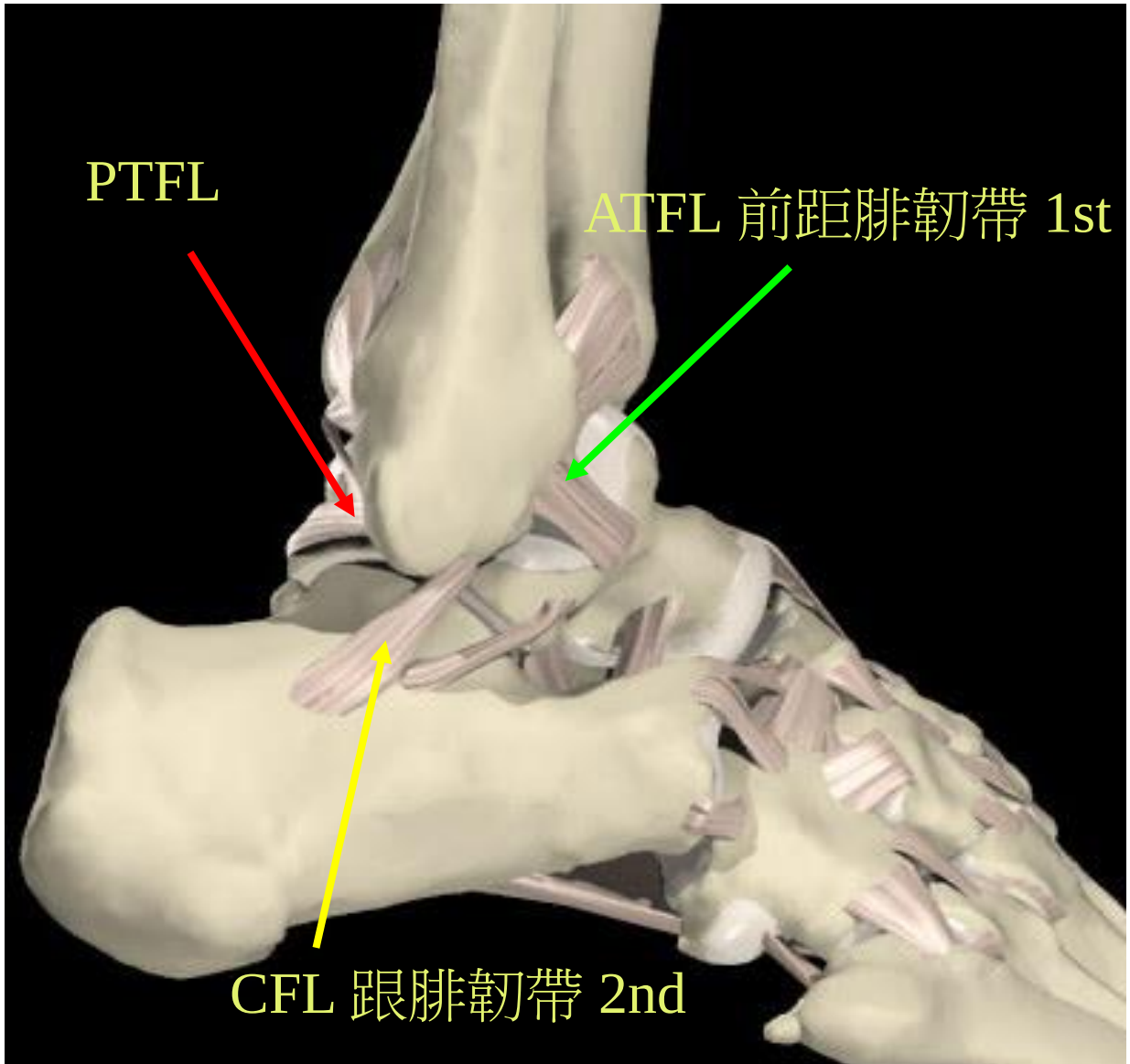
Plafond (Pilon) fracture

- Mechanism: vertical loading that drives the talus into distal tibia
- Damage to articular surface
- Extensive comminution of distal tibia
- Fragile soft tissue
- Increased risk of complications (wound dehiscence, wound infection, neuro-vascular compromise, compartment syndrome, nonunion or malunion, ankle joint stiffness or traumatic arthritis)

Plafond (Pilon) fracture

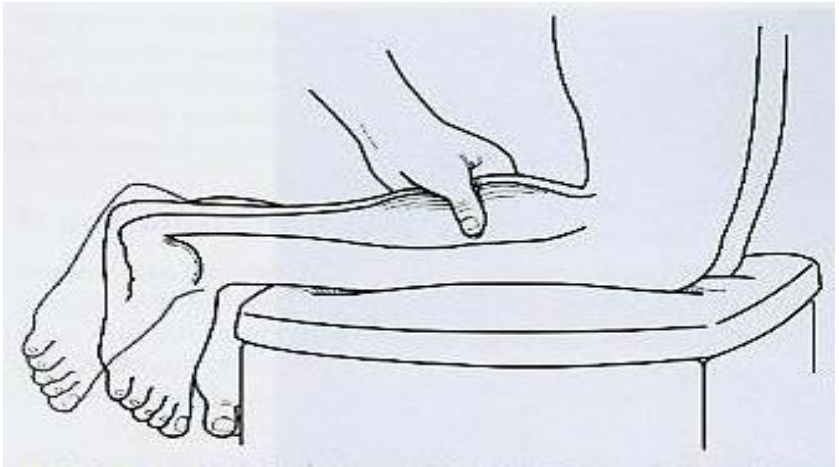
- Full assessment is aided by CT to complete define the anatomy of the fractures
- Identification of anatomy is critical to planning the surgical approach because plain films are unable to provide sufficient information to guide placement of fixation devices.

人體最常扭傷造成韌帶斷裂:



Achilles Tendon Rupture

- Largest tendon of the human body
- Often occur during sports activities (70-80%): badminton, football, skiing, and basketball
- The information provided by the patient of a “ pop “ and sudden pain is indicative of rupture.
- A palpable gap in the tendon is felt in the acute phase.
- **Thompson squeeze test** (+) : **failure in plantar flexion** when the soleus muscles are squeezed.

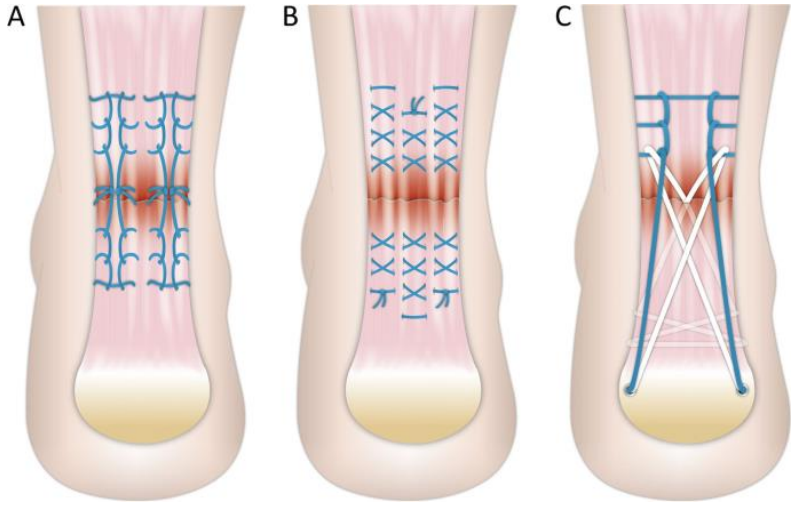


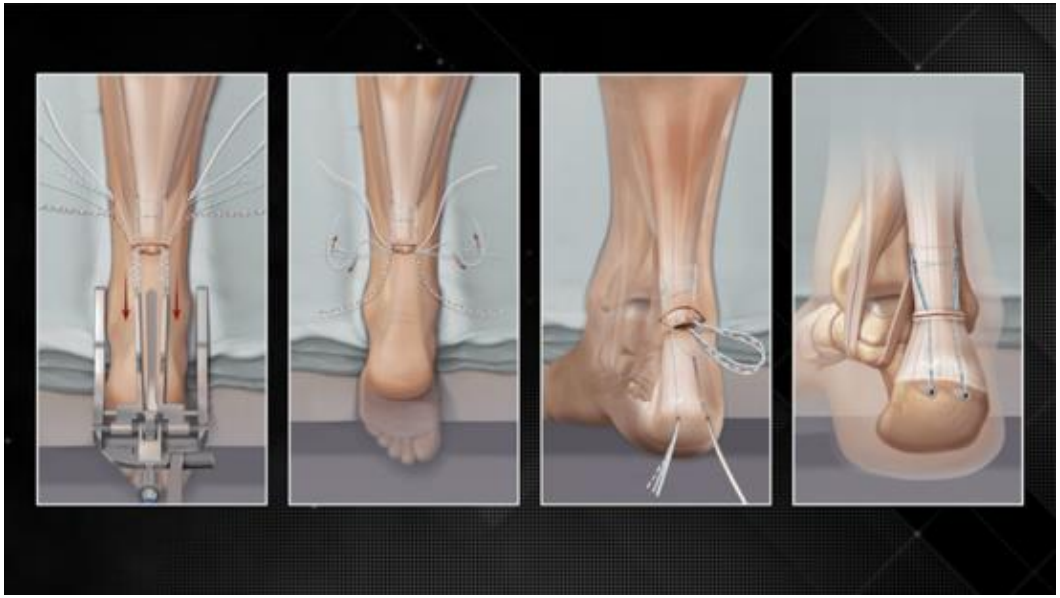
Achilles Tendon Rupture

- **Functional bracing/casting in resting equinus**

Achilles Tendon Rupture

- **End-to-end achilles tendon repair**
- **Percutaneous achilles tendon repair**
- **Reconstruction with VY advancement**





Achilles Tendon Rupture

- Re-rupture
  - Incidence higher with non-operative management (~10-40% vs 2%)

Lisfranc injury

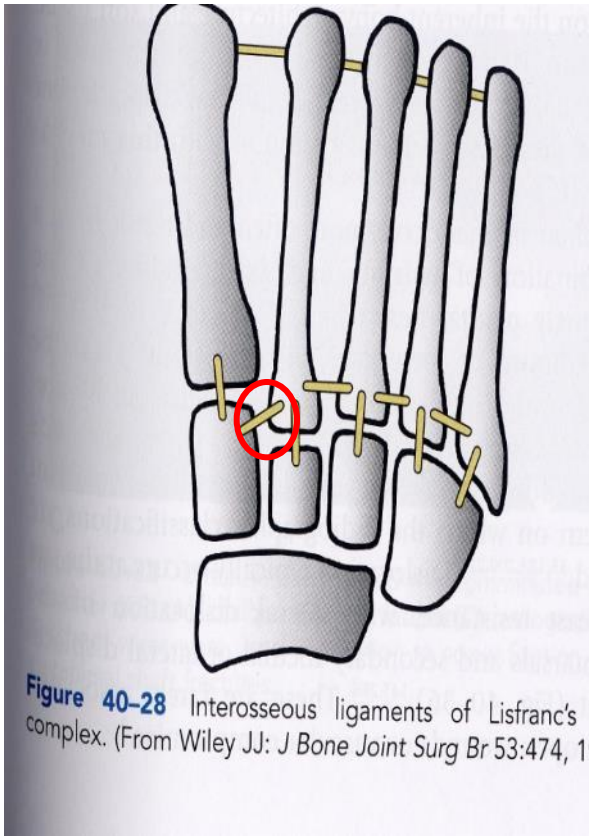
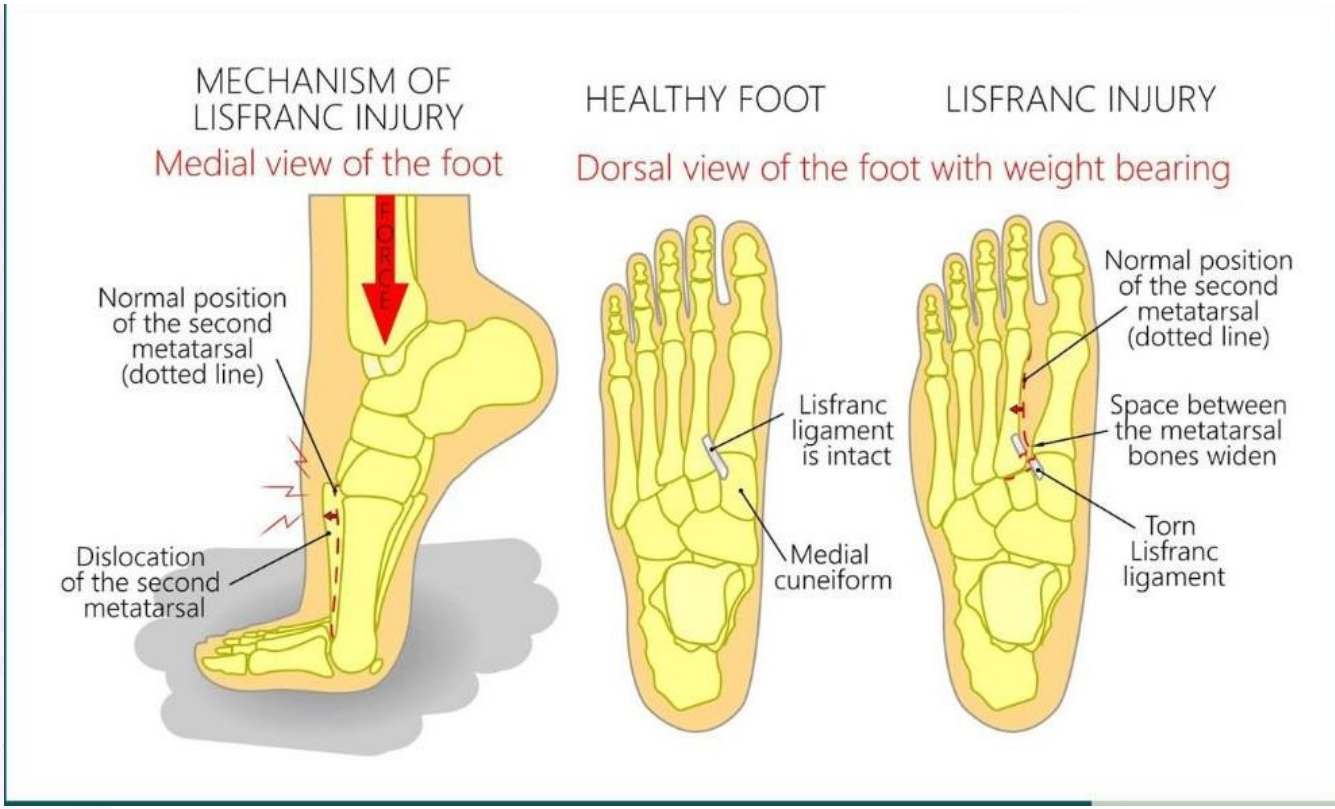
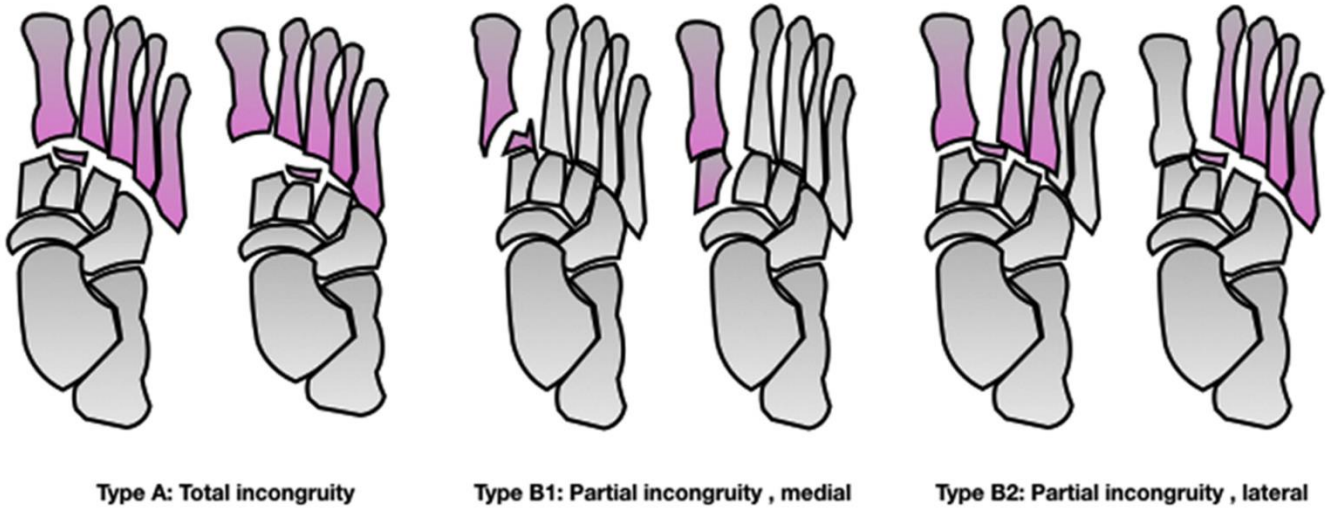


Figure 40–28 Interosseous ligaments of Lisfranc's complex. (From Wiley JJ: *J Bone Joint Surg Br* 53:474, 1



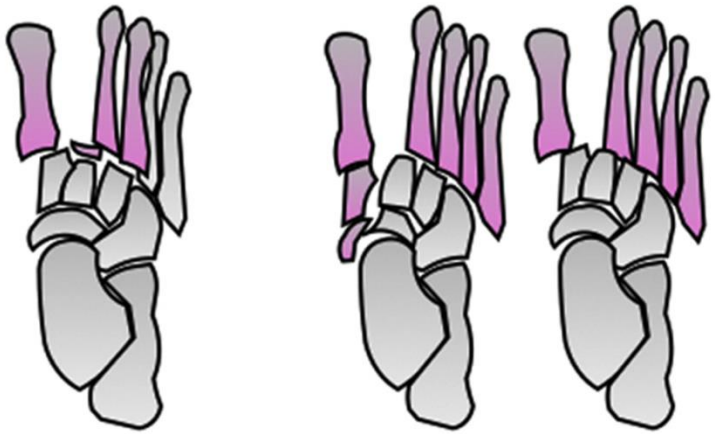
Lisfranc injury



Type A: Total incongruity

Type B1: Partial incongruity , medial

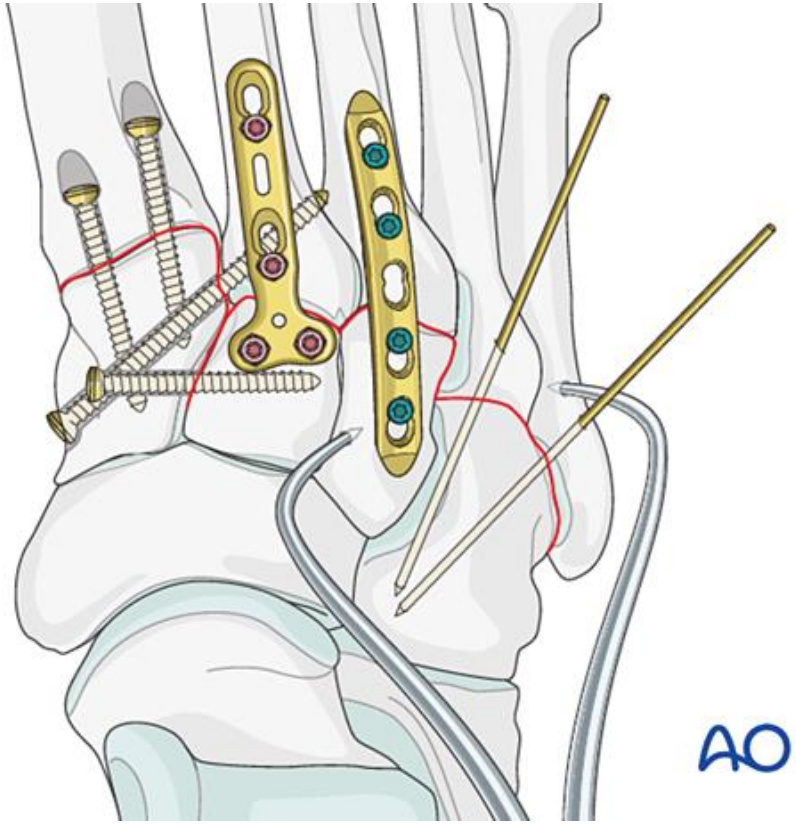
Type B2: Partial incongruity , lateral



Type C1: Divergent, partial

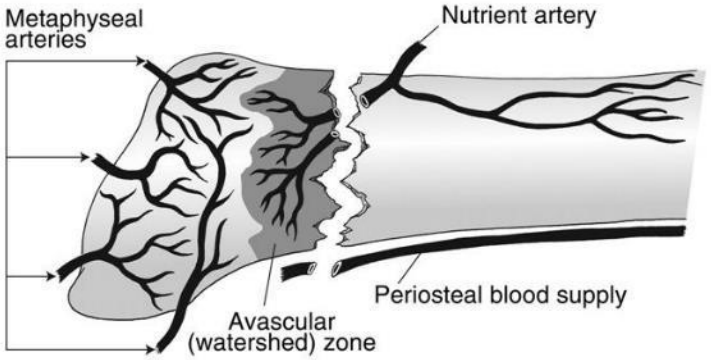
Type C2: Divergent, total

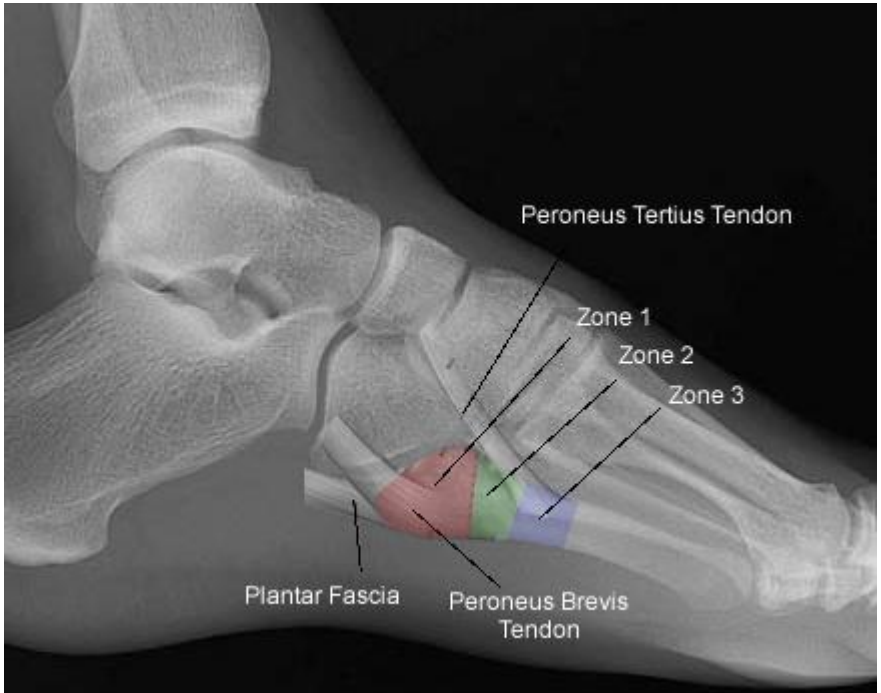
Lisfranc injury



5th Metatarsal base fracture

- Zone 1
  - PseudoJones fr
- Zone 2
  - Jones fr
  - Increased risk of nonunion (**15-30%**)
- Zone 3
  - Proximal diaphyseal fracture



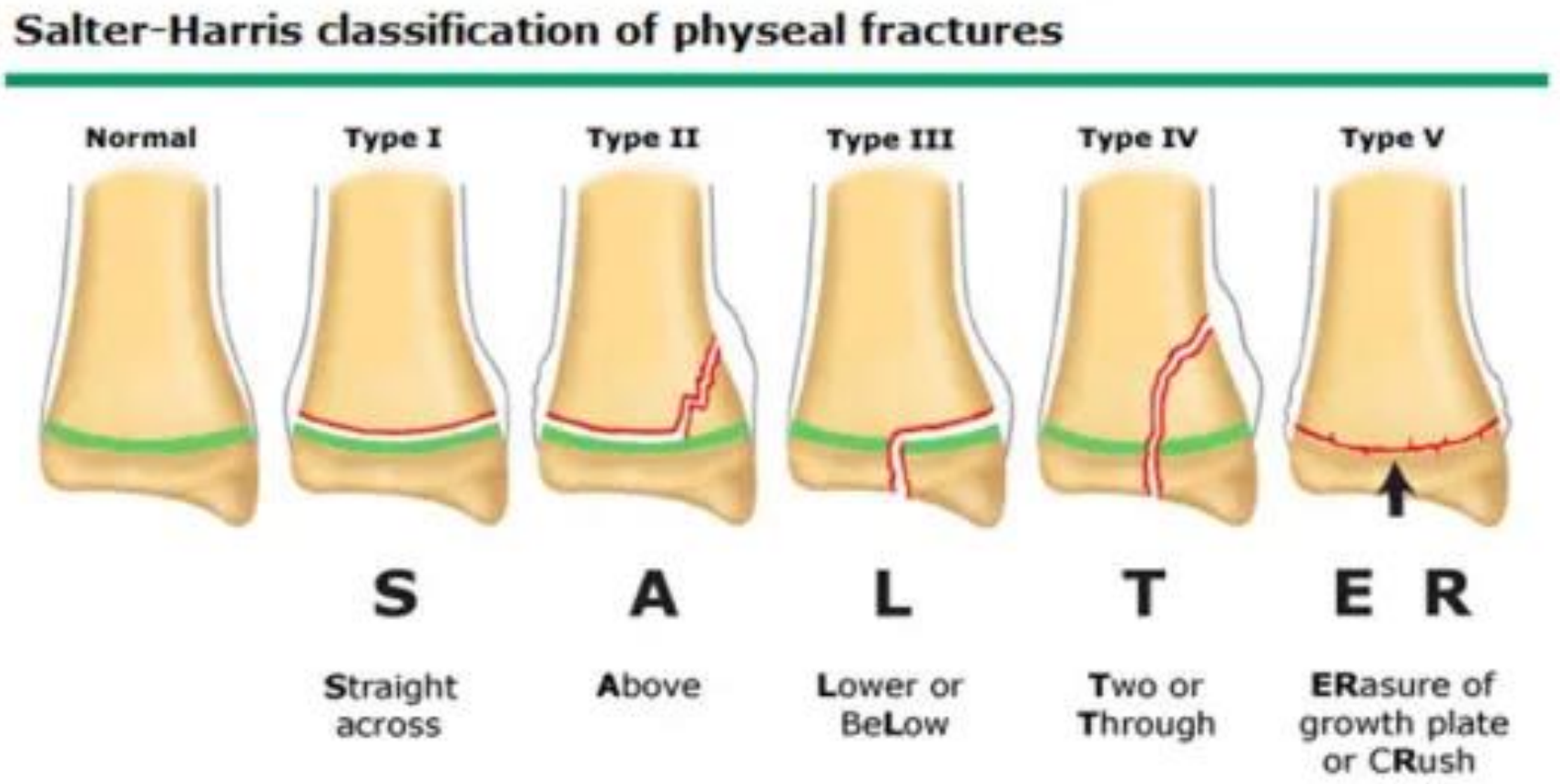


Children Specific Fractures

- **Green-stick** fracture: incomplete or bending fracture
- **Torus fracture** (buckle fracture) : compression fracture of metaphyseal region with cortical buckling, relatively stable injury
- **Plastic deformation**: bending of the bone without any evidence of discontinuity in the cortex

Rockwood AC, Wilkins EK. Fractures in Children (Vol. 3). 6th ed.

Salter-Harris classification



Supracondylar elbow fracture

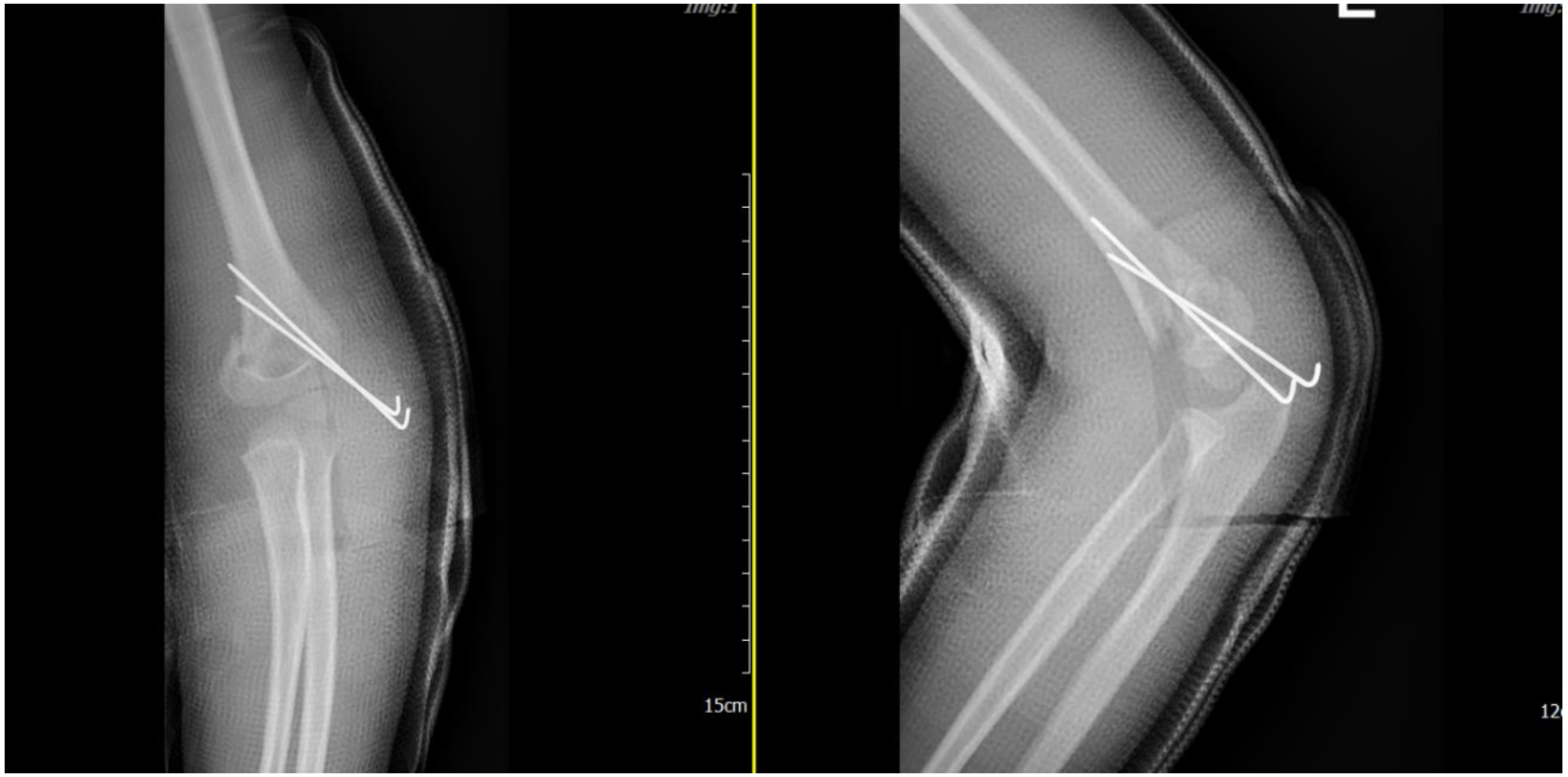
- Most common elbow fracture in children

- Hyperextension type (the most common)
- Flexion type (rare)

- Sequelae : cubitus varus deformity

Case presentation

Case presentation



Neurological compromise

- Neuropraxia (15-20 %)
- Median nerve (anterior interosseous nerve, AIN) > radial nerve > ulnar nerve (flexion type, pinning)
- Complete return of nerve function is usual (requests several months)

Neurological compromise

- Most common causes:
  -- initial severity of trauma (marked displacement, open fracture)
  -- repeated attempts at closed reduction
  -- hemorrhage or hematoma

Neurological compromise

- Most nerve injuries resolve without intervention within 3 months.
- Surgical exploration with neurolysis or nerve grafting is recommended to 3-6 months after the fracture unless there is evidence of neural recovery.

膝關節

- 膝關節是人體中**最大的關節**。
- **膝關節**是全身上下**最容易發生傷害**的關節。
- 膝蓋時時刻刻所承受的壓力，遠超過我們所想像。

根據統計膝蓋的負重

- 站立和走路是體重的1～2倍
- 上下坡或上下階梯是體重的3～4倍
- 跑步是體重的4倍
- 打球和上籃是體重的6倍
- 蹲跪是體重的8倍

何謂膝關節炎？

- **膝關節炎**是相當常見的疾病。
- 關節軟骨因**老化**、**外傷**、**感染**、**痛風**、**新陳代謝**及**自體免疫疾病**等等原因造成軟骨磨損、變薄或消失，導致關節吸收衝撞的能力減低進而造成關節腫脹發炎，活動疼痛甚至變形。
- 其中又以**退化性關節炎最常見**，在六十歲以上的民眾，25%的女性及15%的男性罹患此病。

退化性膝關節炎之分類

- **原發性退化關節炎**：
  主要以**老化**及**肥胖**為主要原因，造成軟骨結構崩解及產生發炎反應。
- **續發性退化關節炎**：
  因**外傷**、**感染**、**痛風**、**新陳代謝疾病**及**自體免疫疾病**等原因造成軟骨磨損。

退化性膝關節炎的成因

- 若由老化所引起，**幾乎不可避免**。經過幾十年的勞動，再加上年紀大了，軟骨的修補變得比較慢，長期磨損結果，造成關節軟骨愈來愈薄。
- **體重過重**，膝關節會更容易老化。
- 另外有些人較容易產生退化性關節炎，主要是**體質**的問題，因為膠原蛋白的異常使得他的關節軟骨特別容易退化。
- 一旦開始磨損，關節的邊緣和軟骨下方骨質就會漸漸增生硬化，會產生所謂的**骨刺**，關節韌帶也可能磨損造成關節不穩定。磨損掉落的軟骨會在關節內移動，造成磨損，甚至卡住關節，長期的磨損之後，大多數會變成**O型腿**。也會引起**滑液囊關節膜發炎**，病人的關節會非常的疼痛、腫脹。

如何預防膝關節炎

1. **減少關節負重**(減肥及不要搬提重物)，避免劇烈運動、蹲跪跑跳、爬樓梯，改以散步、游泳等溫和運動以維持良好的心肺功能。
2. 外出活動**曬曬太陽**，必要時可使用枴杖-雖然許多長輩都嫌不好看，但是可以減少關節負擔。
3. 可**使用護膝**增強膝蓋的穩定並減少疼痛，但使用過久則會造成大腿肌肉萎縮，所以要**適度增強肌力**訓練，如此可增加關節靈活度及減輕關節負擔。
4. **避免溼冷**的環境，可在冬天或冷氣房裡蓋上毯子。發作疼痛時可適當使用醫師開立之藥物及冷熱敷。

膝關節保健四種保健方法

一、調整姿勢與強化肌力訓練

二、使用護膝帶

三、放置楔形鞋跟墊

四、不要穿高跟鞋，慎選運動鞋

膝關節炎的治療原則

食補–藉由飲食來〝補一下〞能強化關節，例如多吃一點**膠質的食物**如蹄筋、豬耳朵、木耳。

–**均衡且健康的飲食**，多吃些新鮮蔬菜水果、魚蝦、奶製品及豆類等含鈣質的食物，這樣才有益健康

膝關節炎的治療原則

口服藥物治療

1. Acetaminophen：如普拿疼，但要注意肝功能狀況。
2. NSAID(**非類固醇抗發炎劑**)或COX-2**專一抑制劑**：雖然後者長效且比較不會傷胃，但在老人家及胃潰瘍患者仍然要小心使用。若有服用心臟藥物(特別是抗凝血劑)都要詢問醫師。
3. **葡萄糖胺**藥物：如維骨力。
4. **軟骨素**：心臟病服用抗凝血劑者，應避免使用軟骨素。

膝關節炎的治療原則

關節注射治療

1. **類固醇**:可以抑制發炎反應，但也可能加速關節軟骨的破壞。
2. **玻尿酸**:玻尿酸是蛋白分子，分子量很大，保護關節軟骨的潤滑劑，具有潤滑吸震效果。
3. **高濃度血小板血漿(PRP)**:高濃度血小板具有多種細胞聚合分子與主要生長因子，故能啟動傷口修復機制，進而使軟骨再生。

膝關節炎的治療原則

手術

1. 關節鏡沖洗及清創術
2. 矯正切骨術
3. 人工膝關節置換術

Indication of high tibia osteotomy

Age < 60 yrs

Angular Deformity

- <15 deg of fixed varus deformity
- No > 15 degrees flexion contracture
  - Valgus deformities
  - Valgus up to 12 deg can corrected
  - Valgus >12 deg prefer distal osteotomy

No osteoporosis

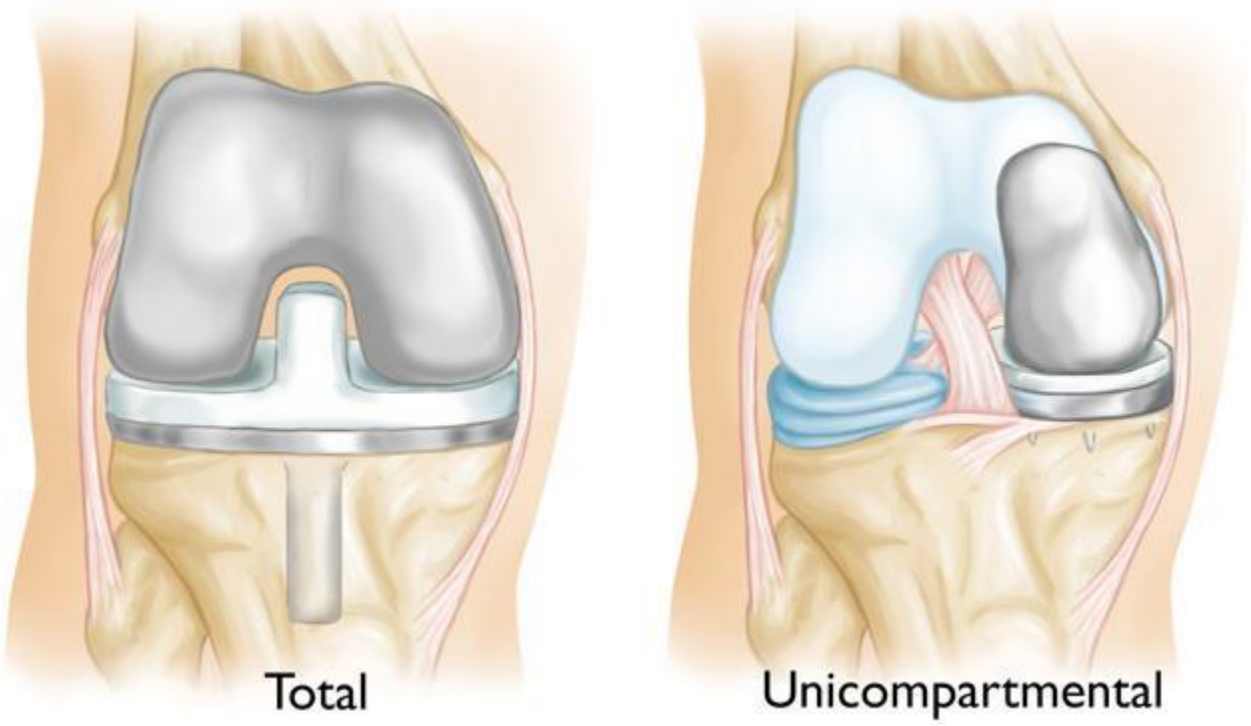
Unicompartment OA

No laxity

No previous meniscus surgery

膝關節炎的治療原則

人工膝關節置換術



想減輕膝蓋的負擔，把握以下幾個原則：

1. **減重**，儘可能維持標準體重。
2. **少做長期蹲跪的動作**。
3. **多訓練膝關節周圍的肌肉**。大腿前側的四頭肌，大腿後側的二頭肌，增強這些肌群，可增加膝關節的穩定性，減緩關節的磨損。
4. **運動中如果感到不適，要立刻停下來，不要勉強**。疼痛其實就是最好的警訊
5. **要有足夠的休息**。
6. **了解自己的極限，量力而為**。
7. **如果要運動，一定要循序漸進，慢慢增加時間與量**。


The End