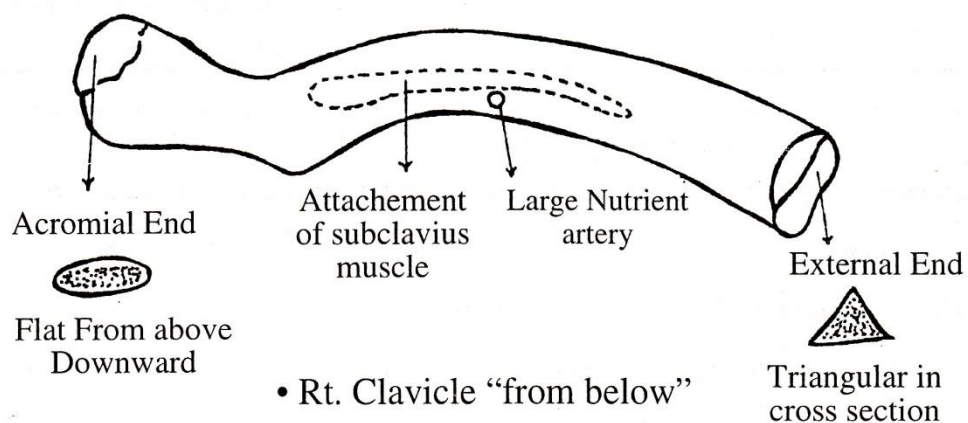
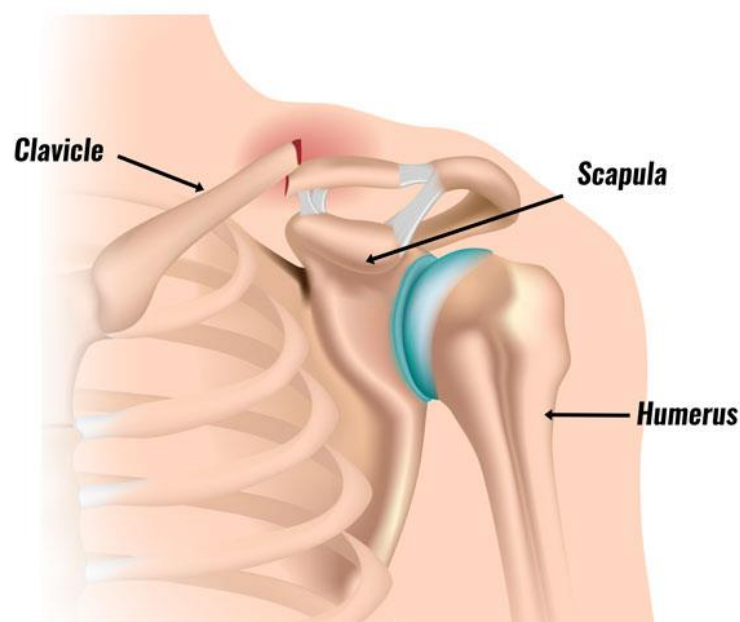


## Fracture of the clavicle

### \* Incidence:

- The **commonest** fracture in the body.
- Usually affect the **middle 1/3** of the clavicle (80%) due to :
  1. The **thinnest** part of the bone.
  2. It is the junction between **2 curves**
  3. It is the site of change in the **contour** of bone.
  4. The **groove** of the subclavius & **foramen** caused by the large nutrient artery.



\* **Aetiology** : (as general)

- **Usually indirect trauma** due to falling on outstretched hand .
- **Rarely direct trauma** due to fall on the shoulder or direct strike to clavicle .

MECHANISM OF INJURY

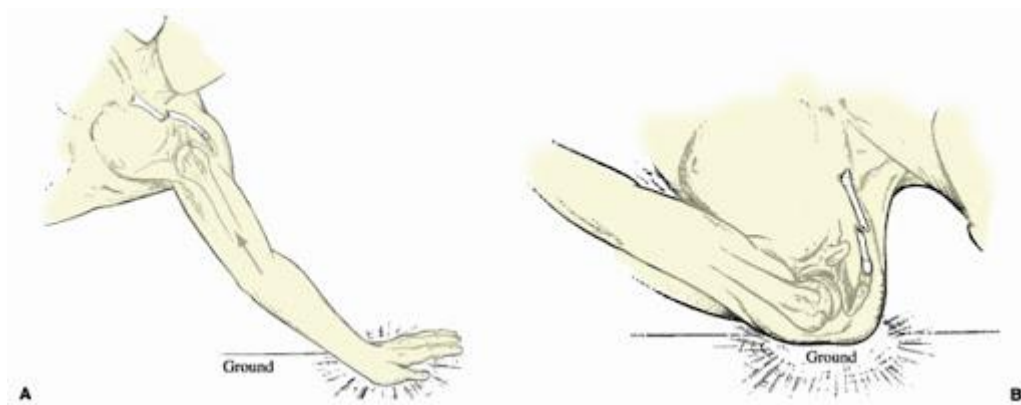
a) Fall with arm out, onto hand



b) Fall onto shoulder



c) Direct blow to shoulder



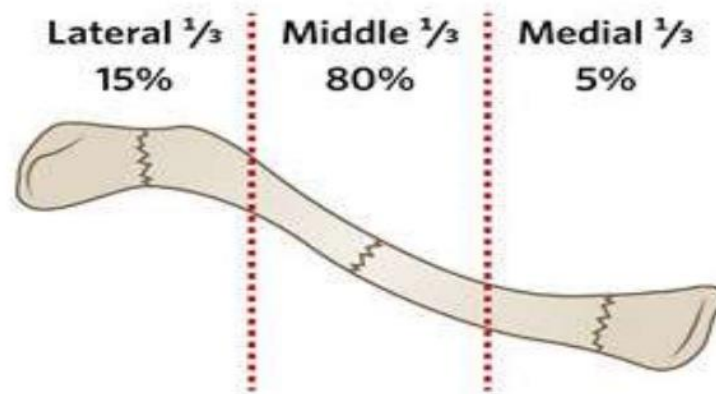
\* **Pathology**

**I) Classification** : (as general principles of fracture)

• **According to site** :

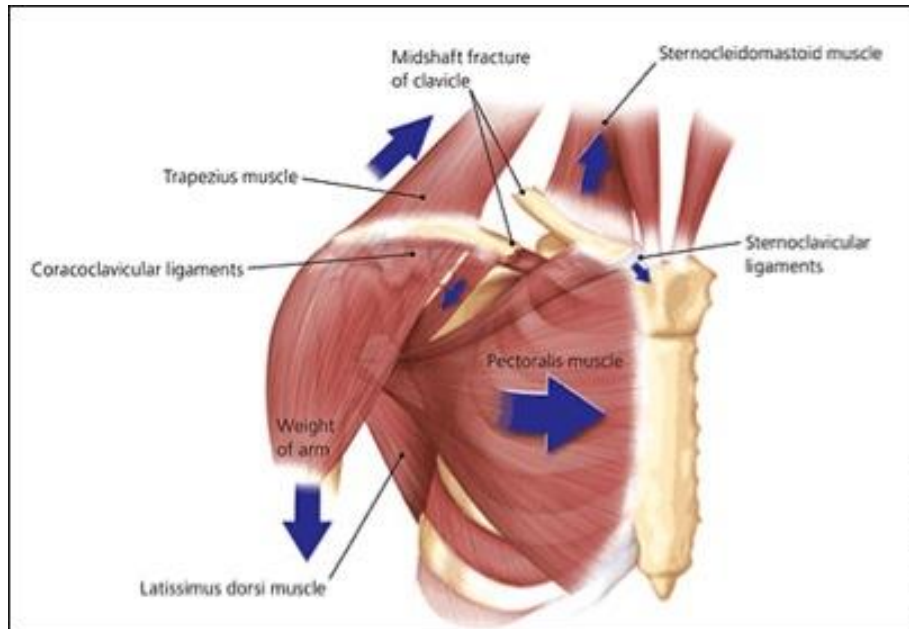
- **Fracture middle 1/3 (80%)**
- **Fracture lateral 1/3 (15%)**
- **Fracture medial 1/3 (5%)**

CLASSIFICATION :  
ON THE BASIS OF THEIR LOCATION



## II ) Displacement :

- **Medial** fragment → pulled upwards & backwards by the sternomastoid.
- **Lateral** fragment → displaced downwards (by the weight of the limb), forwards and medially (by pectoralis major).

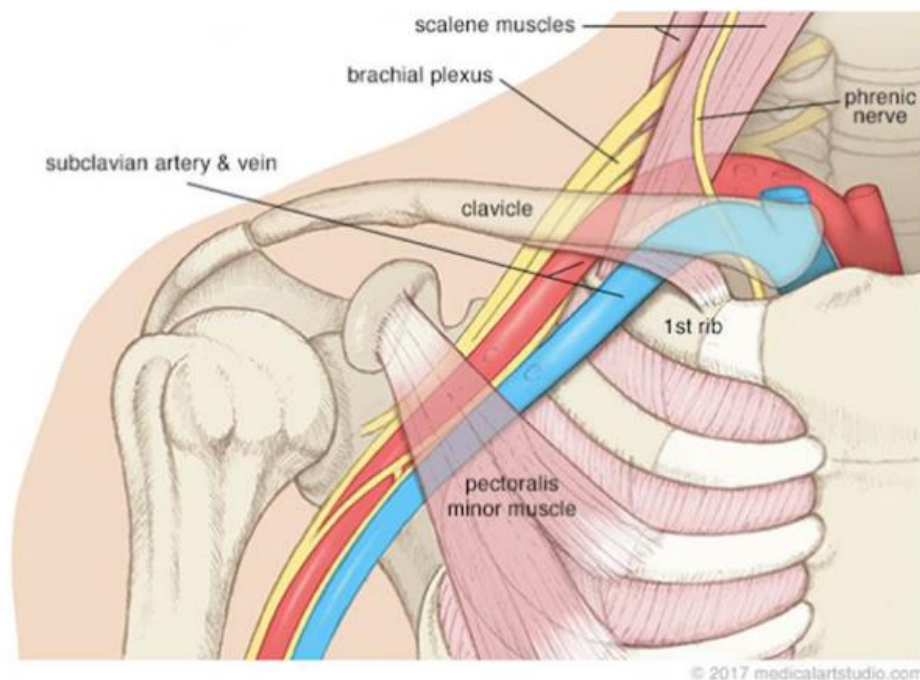
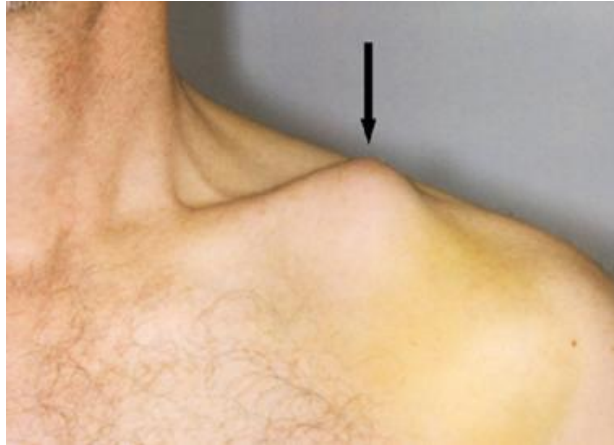


\* **Complications:** (no general complications )

- 1- **Malunion**, deformity & excessive callus formation are the commonest complications but function of the upper limb is not affected .
- 2- **Injury** of subclavian vessels, brachial plexus and dome of pleura.

### 3- Non union

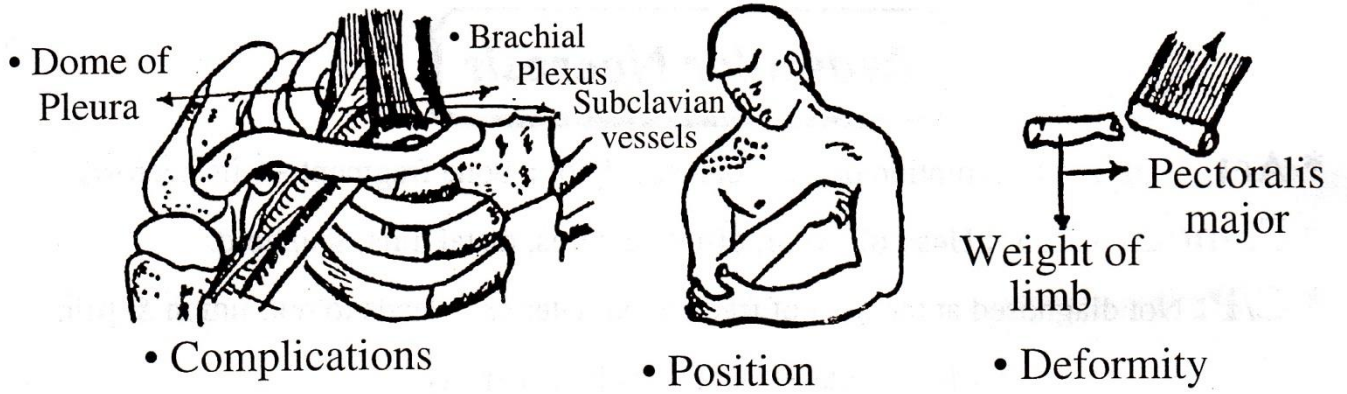
**1- Stiffness** of shoulder joint specially in elderly , if mobilization is not resumed rapidly after union of the fracture .



\* **Clinical picture:** (as general)

1. **Deformity** : Typical position of a mother carrying or lactating her baby.
2. The shoulder is dropped.
3. Exam. The distal part of the upper limb to exclude injury of subclavian vessels ( 5Ps + C ) or injury of brachial plexus ( motor and sensory exam.)

[Type text]



\* **Investigation :** (as general principles of fractures)





\* **Treatment:**

**I. Conservative treatment** is the usual treatment by using a broad arm sling or figure 8 clavicle brace only , without reduction , combined with analgesics for 3 weeks.



**Broad arm sling**

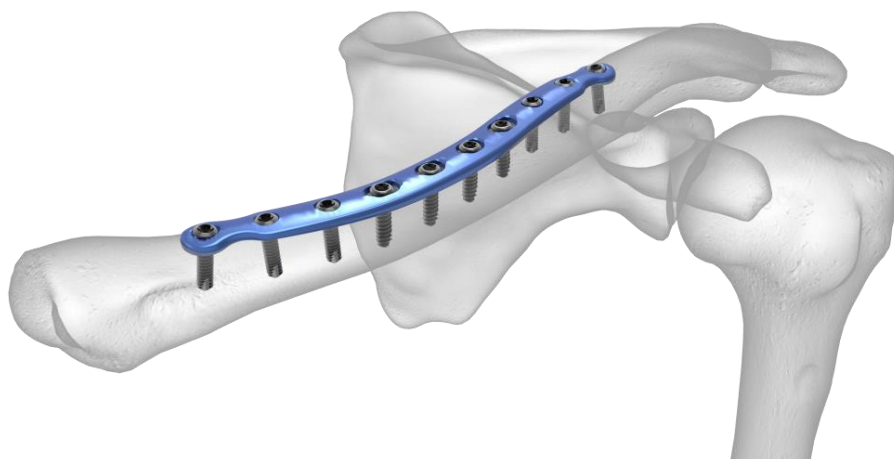


**Figure 8 clavicle brace**

**II) Open reduction & internal fixation :**

- **Indications** : rarely needed in case of one of the followings
  - Vascular, nervous or pleural injury.
  - Cosmetic reasons in females.
  - Painful non-union.
- **Method** : usually by plate and screws .

3. **Rehabilitation:** Active movement of the fingers since the first day.

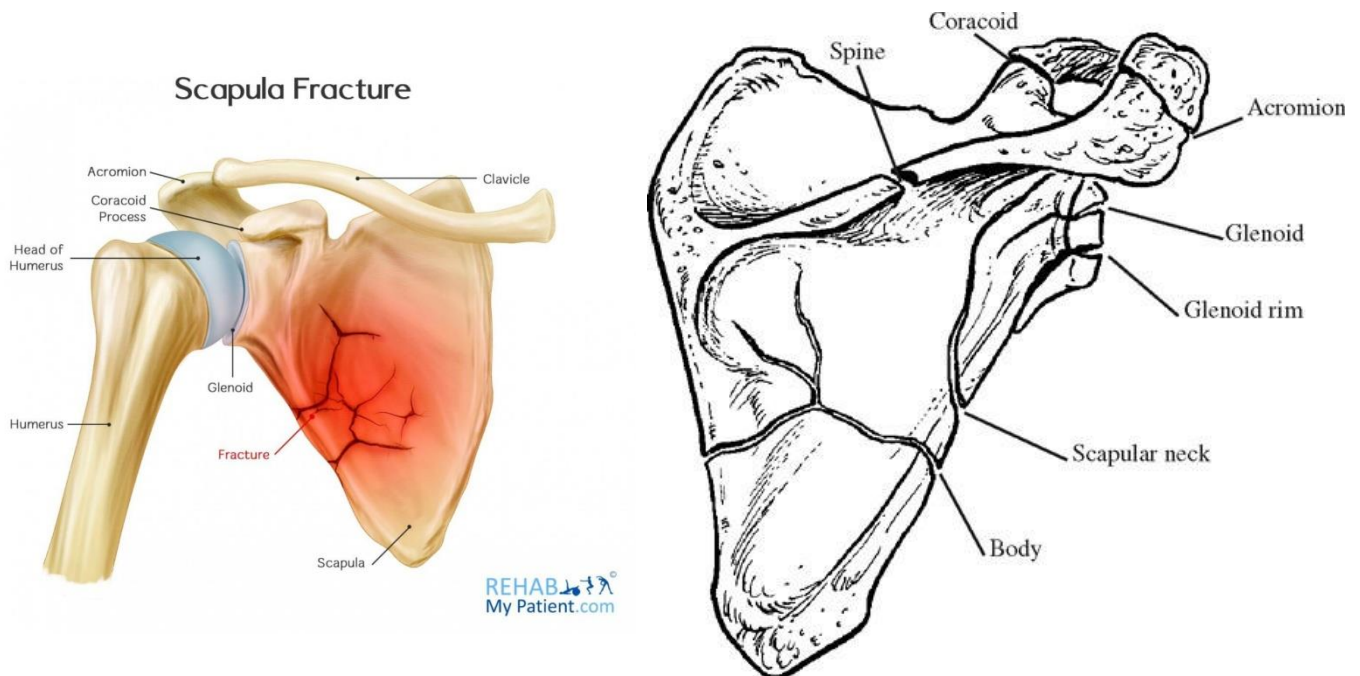


## Fracture Scapula

\* **Incidence & aetiology** : Rare fracture , usually due to direct trauma .

\* **Pathology** :

- The fracture usually affect the **body or neck of scapula** .
- Less commonly it affect spine , acromion process , coracoids process or glenoid cavity .
- **Comminuted undisplaced** fracture is common.



\* **Complications** :

- 1-Osteoarthritis & stiffness of shoulder joint if articular surface is affected .
- 2-Associated chest injury is common .

\* **Clinical picture & investigation** : ( as general principles of fractures ) .

\* **Treatment** :

- 1- Usually conservative treatment by broad arm sling .

**2-** Open reduction & internal fixation is occasionally needed , by screws or plate & screws , for displaced intra-articular fracture affecting the glenoid cavity .





## Dislocation of the shoulder joint

\* **Incidence:** The commonest dislocation in the body due to:

1. **Shallow** glenoid cavity & **large** head of the humerus.
2. **Weak** surrounding capsule, muscles & ligaments.
3. Wide range of shoulder **movements**.

\* **Classifications :**

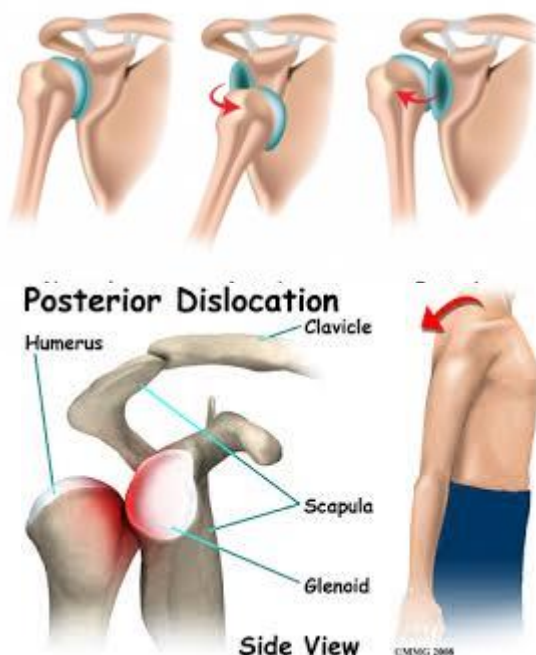
1- **Anterior dislocation :** The commonest type .

2- **Posterior dislocation :** Less common , it may be one of the followings :

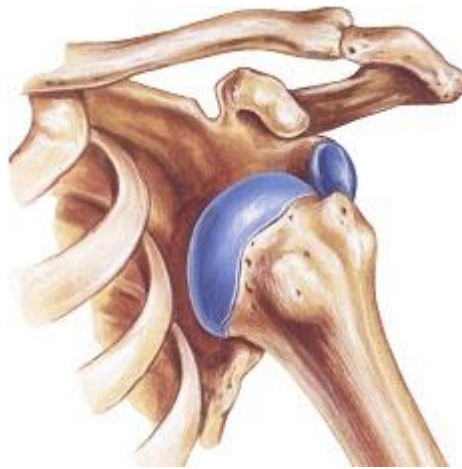
a. **Subacromial:** The head of the humerus lies below the acromion process.

b. **Subspinous:** The head of the humerus lies below the spine of the scapula.

3- **Inferior dislocation (Luxation erecta):** The rarest , the head of humerus glides on the lateral border of the scapula with a fully abducted arm.



# Anterior Dislocation



\* **Aetiology:** Trauma which may be due to:

1. Fall on the out stretched hand.
2. Forcible extension & external rotation of the abducted arm.

\* **Classification:**

1. **Subcoracoid:** The commonest type.
2. **Subclavicular , Subglenoid or Intra-thoracic :** are very rare .

\* **Complications:**

## **A. Joint complications:**

1. Rupture of the anterior part of the capsule & labrum glenoidal → the commonest **recurrent dislocation** in the body .
2. Stiffness of shoulder joint : if early movement is neglected .

**B. Bone complications** → fracture dislocation, associated fracture neck of humerus or greater tuberosity .

**C. Muscle complications** → tear in the supraspinatous or subscapularis muscles.



Subcoracoid



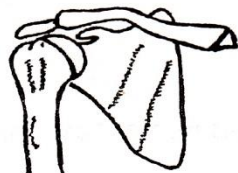
Subglenoid



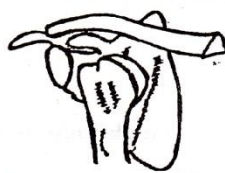
Subclavicular



Intrathoracic



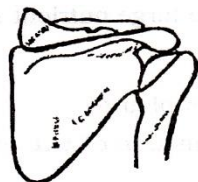
• Normal



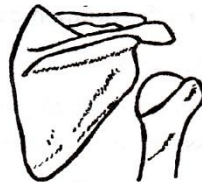
• Subcoracoid



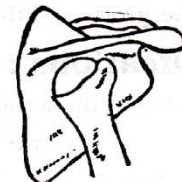
• Subclavicular



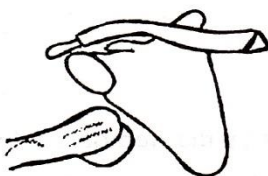
• Normal



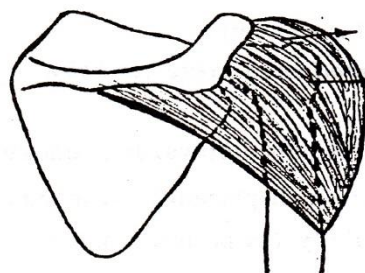
• Subacromial



• Subspinous



• Luxation Recta



Deltoid

greater  
tuberosity



• Flat shoulder

**D. Nerve injury** → neuropraxia of axillary nerve or rarely posterior cord of the brachial plexus and spontaneous recovery often occurs .

**E.** Injury of **axillary artery** is rare .

\* **Clinical picture:**

1- History of **trauma** followed by **absolute loss of movements** of the shoulder joint

2- Severe pain & tenderness over the shoulder joint.

3- **Deformity:**

a. **Flat shoulder** with prominent acromion.

b. The arm appears to take **origin** from below the clavicle .

c. The patient support the elbow of the injured side in a position of abduction & external rotation of the arm.



4- The **head of the humerus** is felt in abnormal site, usually below the coracoid.

#### 5- **Measurements :**

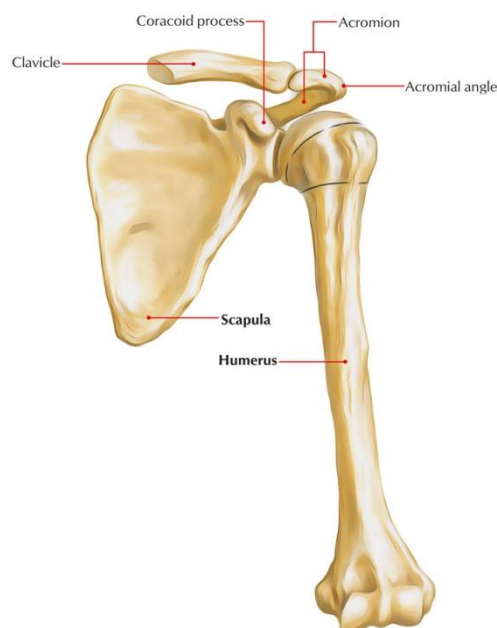
- a. The **distance** between tip of acromion & lateral epicondyle is increased.
- b. Concavity of axilla is obliterated & circumference of shoulder is increased.

#### 6- **Special tests:** In dislocation of the shoulder only:

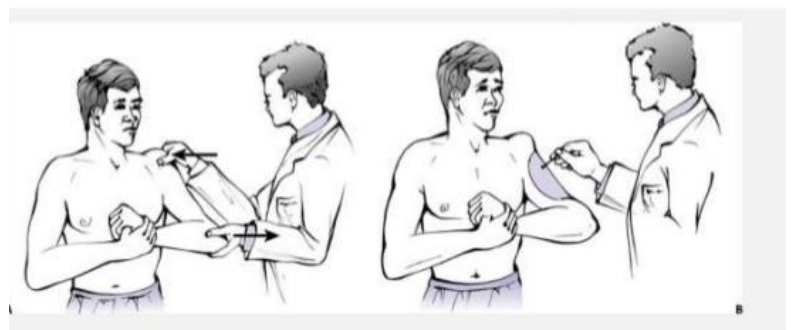
- a. The patient **cannot touch** his chest with his elbow or the opposite shoulder with the tips of the fingers.
- b. A **ruler** touch the tip of the acromion & lateral epicondyle at the same time.

7- Exam. **Axillary nerve** by exam. Abduction of shoulder ( deltoid ) and sensation on the lateral aspect of arm .

#### **1-**Exam. of **supraspinatus** ( initiation of abduction of shoulder joint )



***Axillary N. tested for both sensory & motor components***



\* **Investigations :**

**1- Plain X-ray :**



**2- MRI** to detect injury of surrounding muscles , capsule or labrum glenoidal .

\* **Treatment:**

**I) Reduction:** Under general anaesthesia , 2 methods.

**1. Kocher's method :** The classical **commonly used** method

- Apply traction on the abducted arm then external rotation of the arm.
- The arm is adducted till the elbow touches the chest then the arm is internally rotated so that the patient's hand touches the healthy shoulder.

**2. Other methods :**

**a) Hippocrates method :** (rarely used)

- With the patient lying down, the surgeon puts his unbooted foot in the patient's axilla & pulls on the extended upper limb .

**b)Stemson's method :** Hanging arm technique .

**a) Traction-countertraction method**



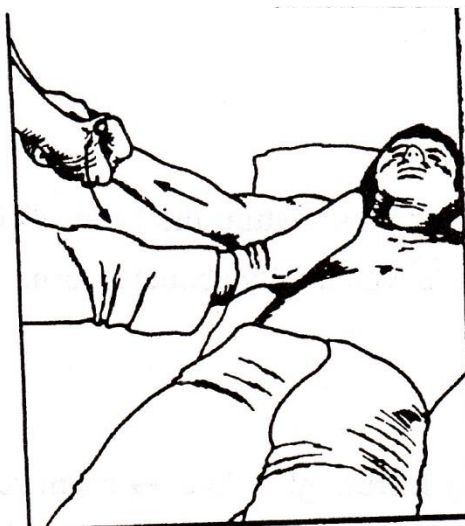
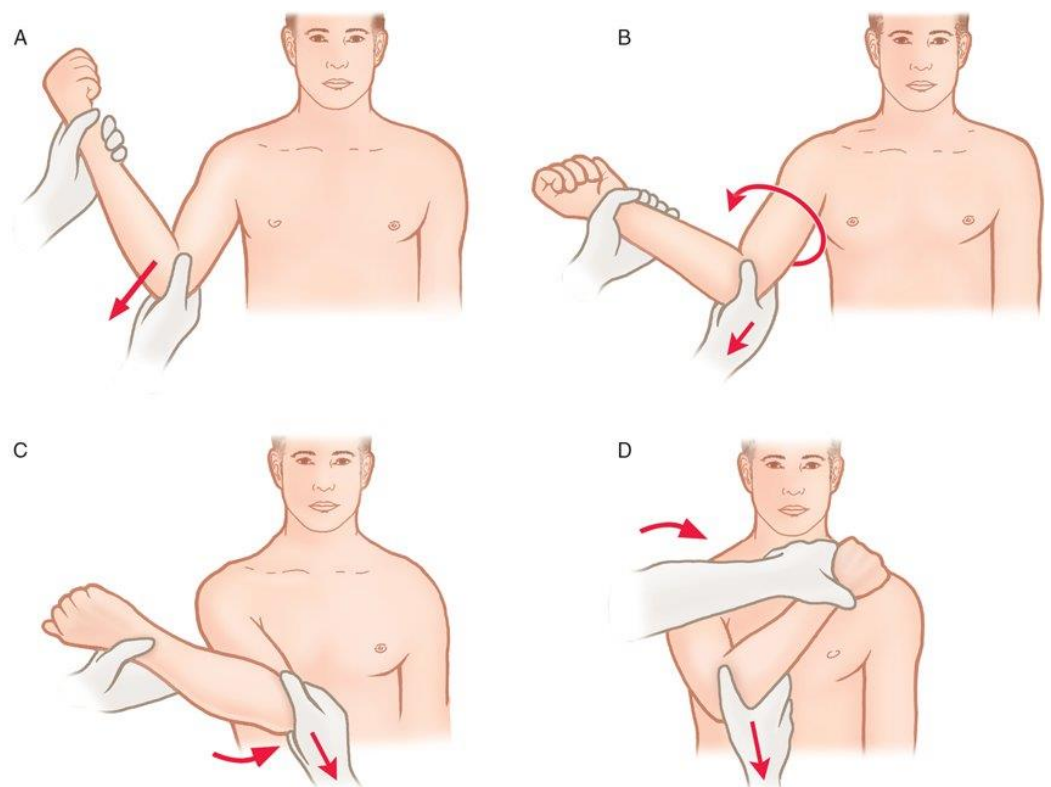
**II) Fixation:** The arm is suspended in a sling & bandaged to the chest to fix the shoulder in adduction & internal rotation or fixed in a brace for 3-4 week .

**III) Open reduction & internal fixation** in case of fracture dislocation .

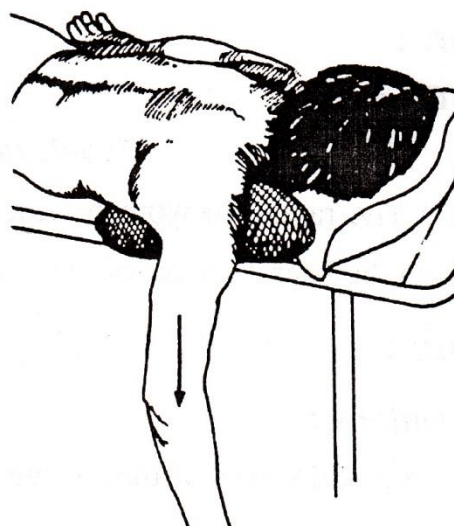
**IV) Rehabilitation:** (as general)

**V) In recurrent dislocation:** Surgical repair of the capsule , subscapularis muscle & labrum glenoidal .

### Kocher's method



Alternative methods of reduction:  
Hippocratic method



\* Hanging-Arm Technique



\* Method of Fixation

# Traction-countertraction



## Fractures of the Proximal Humerus

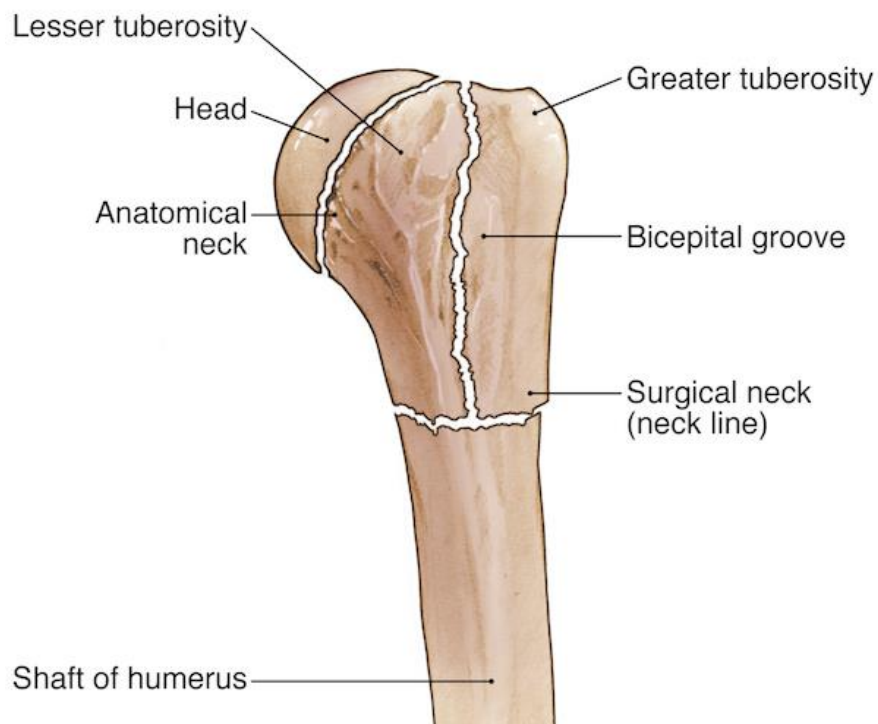
### \* **Incidence :**

- Usually occur in old osteoporotic postmenopausal women .
- It is the commonest fracture in the humerus .

\* **Aetiology :** usually due to falling in outstretched hand or fall on the shoulder .

### \* **Pathology :**

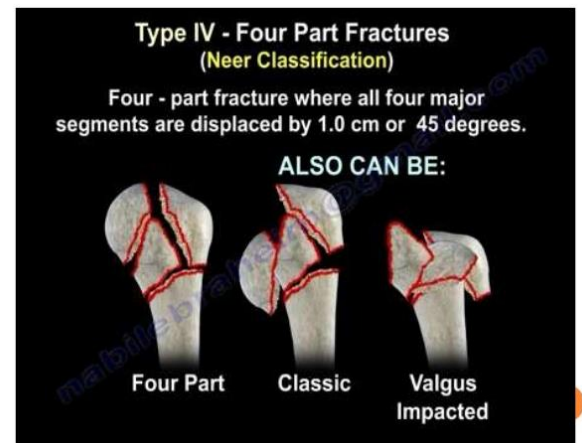
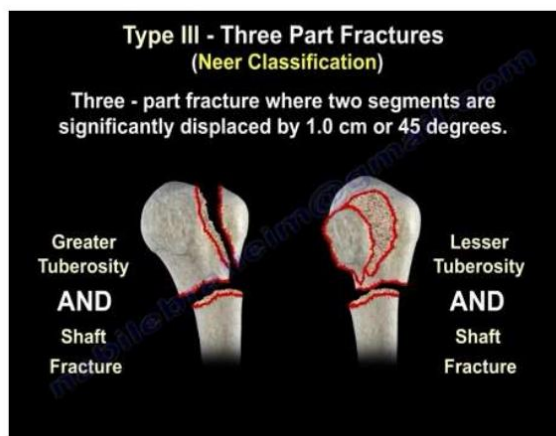
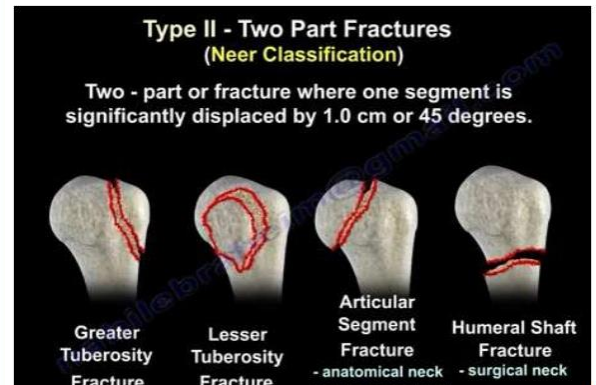
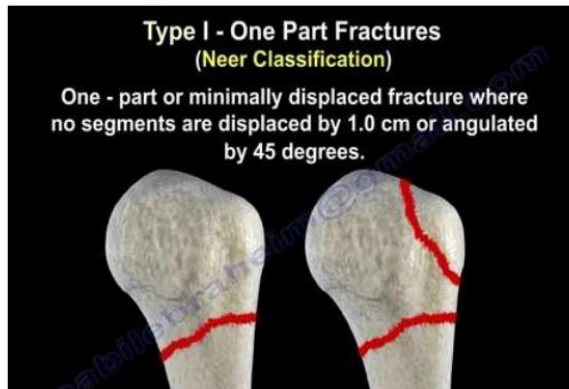
- **Site :** greater & lesser tuberosities and anatomical & surgical neck of humerus ( the commonest ).



- **Classifications :** Neer's classification is the commonest , based on the number of displaced fragments .

- **Type I :** One part fracture with minimal displacement .
- **Type II :** 2 part fractures with significant displacement .

- **Type III** : 3 part fractures with significant displacement .
- **Type IV** : 4 part fractures with significant displacement .



\* **Complications :**

- 1- **Neurovascular injury** : axillary nerve & vessels .
- 2- **Fracture dislocation** due to associated shoulder dislocation .
- 3- **Malunion** , delayed union or non-union .
- 4- **Stiffness** of shoulder joint due to neglected early exercise after healing of the fracture .
- 5- **Avascular necrosis** of head of humerus is common in fracture anatomical neck .

\* **Clinical picture** : ( as general principles of fractures )

\* **Investigations** : ( as general principles of fractures )

\* **Treatment :**

**I) Children :** Always treated by closed reduction & sling with arm to chest bandage for 3 weeks because malunion is corrected by remodeling during growth .

**II) Adults & elderly :**

1) **Undisplaced fractures :** sling or brace for 3 weeks .

2) **Displaced fractures :**

a- Closed reduction and sling for 3 weeks for **stable fracture**.

b- **Open reduction & internal fixation :**

• **Indications :**

- Unstable fracture .
- Fracture dislocation .
- 3 or 4 part fracture .

• **Methods :**

- Intra-medullary wire fixation .
- Screws or plate & screws .
- Intramedullary nail.



c- **Hemiarthroplasty :** replacement of the head of humerus by prosthesis in fracture **anatomical neck** of the humerus .



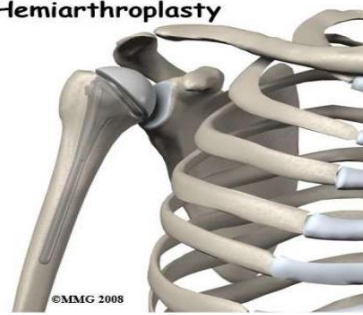
INTRA-MEDULLARY K WIRE FIXATION







### Hemiarthroplasty





## Fracture shaft of humerus

\* **Incidence** : a common fracture in all ages .

\* **Aetiology** :

- Usually **indirect trauma** due to falling on outstretched hand → oblique fracture or twisting trauma → spiral fracture .
- **Direct trauma** : Direct trauma or fall on the arm → transverse fracture .
- **Pathological fracture** : Humerus is a common site for 1<sup>st</sup> and 2<sup>nd</sup> bone tumours .

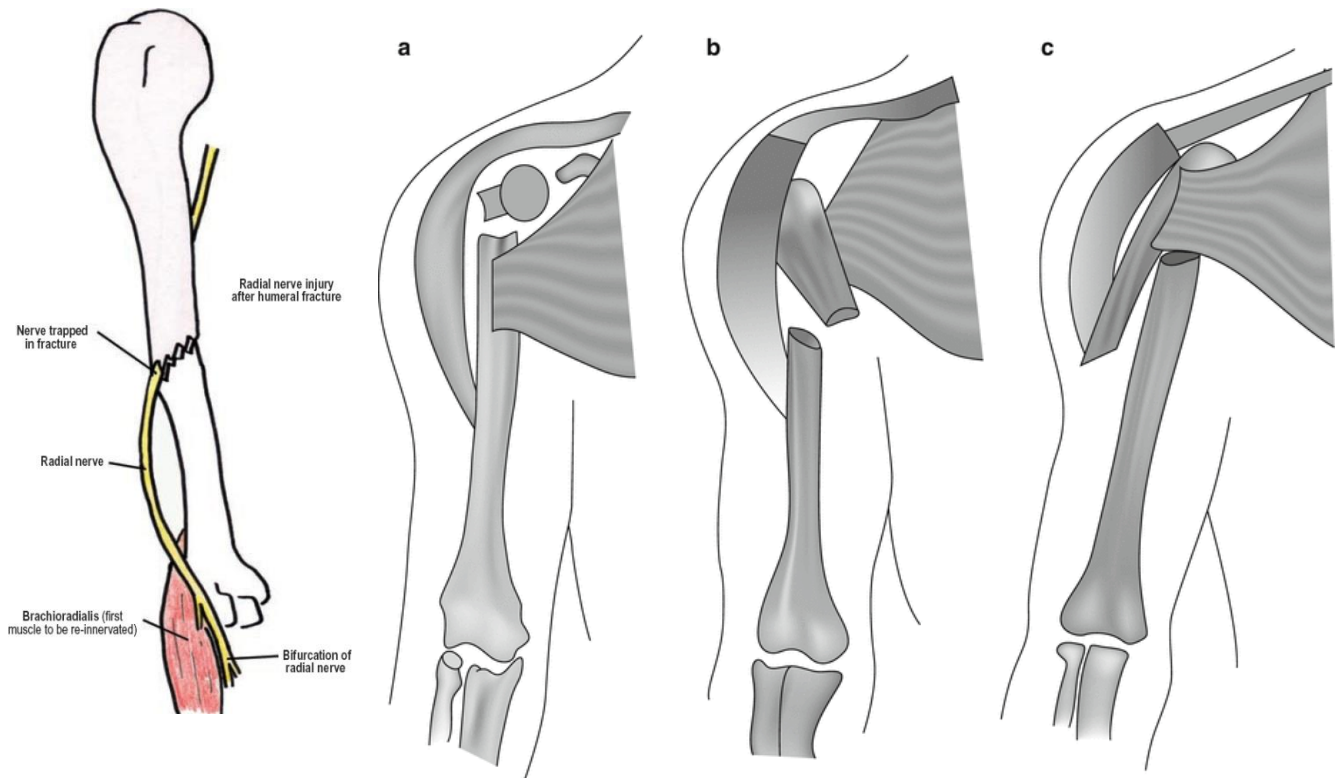
\* **Pathology** :

**I) Classification** : ( as before in general principles of fractures ) +

- **Displacement** : Depends on the level of the fracture

	<b>Proximal Fragment</b>	<b>Distal Fragment</b>
<b>Just below surgical neck</b>	Abduction by supraspinatus	Adduction by muscles inserted in bicipital groove
<b>Above insertion of deltoid</b>	Adduction by muscles inserted in bicipital groove	Abducted by deltoid
<b>Below insertion of deltoid</b>	Abducted by deltoid	Adducted & upwards displacement by coracobrachialis .

- No anterior displacement due to presence of brachialis and biceps or posterior displacement due to presence of triceps .
- No overriding due to traction on the distal fragment by gravity .



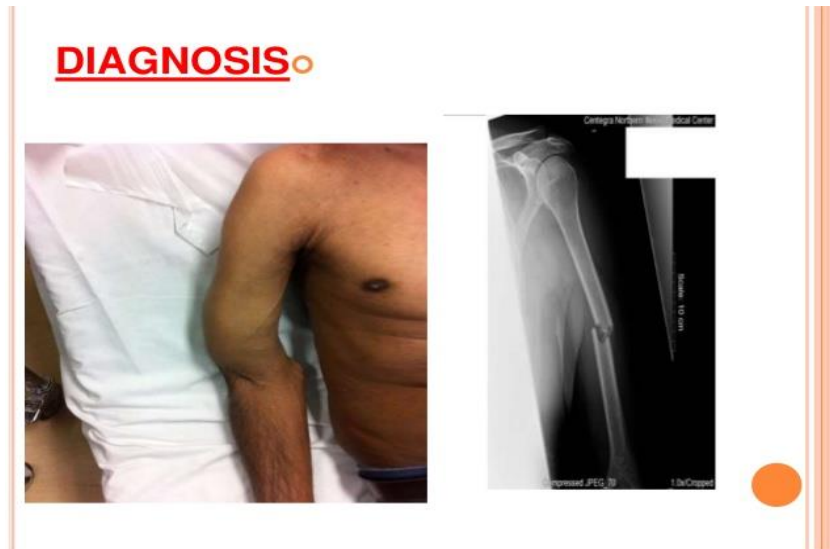
\* **Complications :**

- 1- Radial nerve injury is very common and in 90% of cases improve within 3 months without intervention .
- 2- Injury of brachial artery .
- 3- Malunion , delayed union .
- 4- Avascular necrosis of distal humerus if the fracture pass through the foramen for nutrient artery .
- 5- Nonunion .
- 6- Stiffness of shoulder or elbow joints if early movements are neglected .

\* **Clinical picture :** ( as before in general principles of fractures ) +

- The affected limb is supported by the affected arm by the opposite hand .

- Exam. to detect **radial nerve injury** ( paralysis of extensors of wrist and fingers , wrist & fingers drop deformity and sensory loss in the 1<sup>st</sup>. dorsal interosseous space) .



- \* **Investigations :** ( as before in general principles of fractures ) +



- \* **Treatment :**

**I) Usually by conservative treatment :**

a- **Closed reduction** is usually not needed since gravity tends to correct any overriding or angulation and obtain good alignment .

b- **External fixation** for 6 weeks by one of the following :

1- Usually by **U shaped plaster slab** extending from above the shoulder , on the lateral aspect of arm , around flexed elbow , on medial aspect of arm to the axilla and suspending the forearm by a sling with the elbow flexed at 90° .

2- **Hanging cast** : extends from axilla to wrist with the elbow flexed 90° .

3- **Recently humeral shaft brace** is increasingly popular .

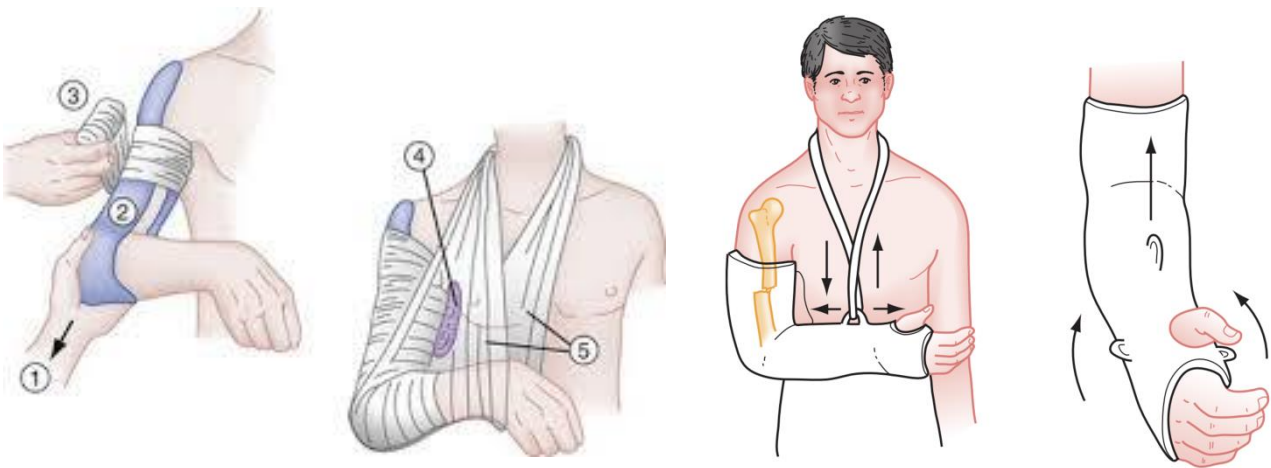
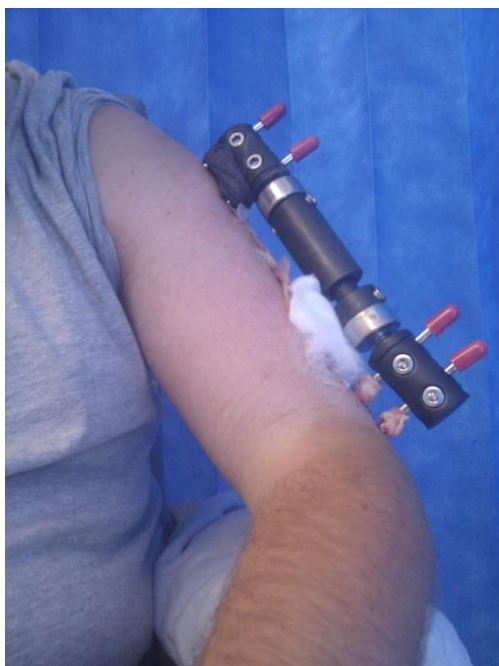


Figure 52-14. Hanging cast technique.



**II) External skeletal fixator** for compound fracture .

**III) Open reduction and internal fixation** are seldom needed

- **Indications** : failure of closed reduction , bilateral fractures , segmental fracture , associated vascular injury or pathological fracture
- **Method** : usually by plate and screws .

## Treatment

**Surgery : ORIF with P&S both humerus**

