Current Clinical and Medical Education

Received 19 Mar 2024 | Revised 20 Mar 2024 | Accepted 18 May 2024 | Published Online 19 May 2024

vision publisher Medical Journals

Published By: Vision Publisher

ISSN 2942-0792

CCME 02 (5), 220-243

# The Humerus Bone: Anatomy, Breaks, and Function

Ali Abbas Ali [1], Ridha Ali Latif [2], Hussein Abbas Alwan [3], Sajjad Ali Qasim [4]

1,2,3,4 Hilla University College, Department of Applied Medical Physics, Iraq.

**Abstract:**Humerus, long bone of the upper limb or forelimb of land vertebrates that forms the shoulder joint above, where it articulates with a lateral depression of the shoulder blade (glenoid cavity of scapula), and the elbow joint below, where it articulates with projections of the ulna and the radius. In humans the articular surface of the head of the humerus is hemispherical; two rounded projections below and to one side receive, from the scapula, muscles that rotate the arm. The shaft is triangular in cross section and roughened where muscles attach. The lower end of the humerus includes two smooth articular surfaces (capitulum and trochlea), two depressions (fossae) that form part of the elbow joint, and two projections (epicondyles). The capitulum laterally articulates with the radius; the trochlea, a spool-shaped surface, articulates with the ulna. The two depressions—the olecranon fossa, behind and above the trochlea, and the coronoid fossa, in front and above—receive projections of the ulna as the elbow is alternately straightened and flexed. The epicondyles, one on either side of the bone, provide attachment for muscles concerned with movements of the forearm and fingers.

**Keywords:** Bone,Anatomy,Joint

**Corresponding Author:**Ali Abbas Ali †, Hilla University College, Department of Applied Medical Physics, Iraq.



**Supplementary information** The online version of this article (https://doi.org/xx.xxx/xxx.xx) contains supplementary material,which is available to autho-rized users.

## Introduction

A bone is a rigid organ that constitutes part of the skeleton in most vertebrate animals. Bones protect the various other organs of the body, produce red and white blood cells, store minerals, provide structure and support for the body, and enable mobility. Bones come in a variety of shapes and sizes and have complex internal and external structures.

- **The bones of the skeleton belong to two groups:**

i. **The appendicular skeleton**

comprises 126 Trusted Source bones, including those of the limbs, shoulders, and pelvic girdle. It provides structure and support to other parts of the body.

ii. **The axial skeleton**

has less range of motion than the appendicular skeleton. It comprises the bones of the skull, vertebral column, and thoracic cage.

1. Bone structure

Bones are composed of two types Trusted Source of tissue.

Compact (cortical) bone is a hard outer layer that is dense, strong, and durable. It makes up around 80% of adult bone mass and forms the outer layer of bone.

Cancellous (trabecular or spongy) bone makes up the remaining 20% of bone and consists of a network of trabeculae, or rod-like, structures. It is lighter, less dense, and more flexible than compact bone.

Bones also contain:

osteoblasts and osteocytes, responsible for creating bone

osteoclasts, or bone-resorbing cell osteoid, a mix of collagen and other proteins inorganic mineral salts within the matrix nerves and blood vessels bon membranes, including the endosteum and periosteum.

**Bone marrow:**

Bone marrow is present in almost all bones where cancellous, or spongy, bone is present.

Bone marrow produces blood cells, including: red blood cells,
which deliver oxygen to cells

white blood cells, essential for the body's immune system

platelets, which the body uses for clotting.

2. Functions of bone :

1. Attachment for muscles
2. Mechanical basis for movement
3. Protection of internal organs
4. A frame to support the body
5. Storage for calcium, phosphorus. and other salts
6. Production of red and white blood cells.[1][2][3]

**HUMERUS**

(Proximal - Shaft - Distal)

The humerus is a long bone of the upper limb, which extends from the shoulder to the elbow.

The proximal aspect of the humerus articulates with the glenoid fossa of the scapula, forming the glenohumeral joint. Distally, at the elbow joint, the humerus articulates with the head of the radius and trochlear notch of the ulna.

In this article, we shall look at the anatomy of the humerus – its bony landmarks and clinical correlations.

## 1. Proximal Landmarks

The proximal humerus is marked by a head, anatomical neck, surgical neck, greater and lesser tuberosity and intertubercular sulcus.

The upper end of the humerus consists of the head. This faces medially, upwards and backwards and is separated from the greater and lesser tuberosities by the anatomical neck.

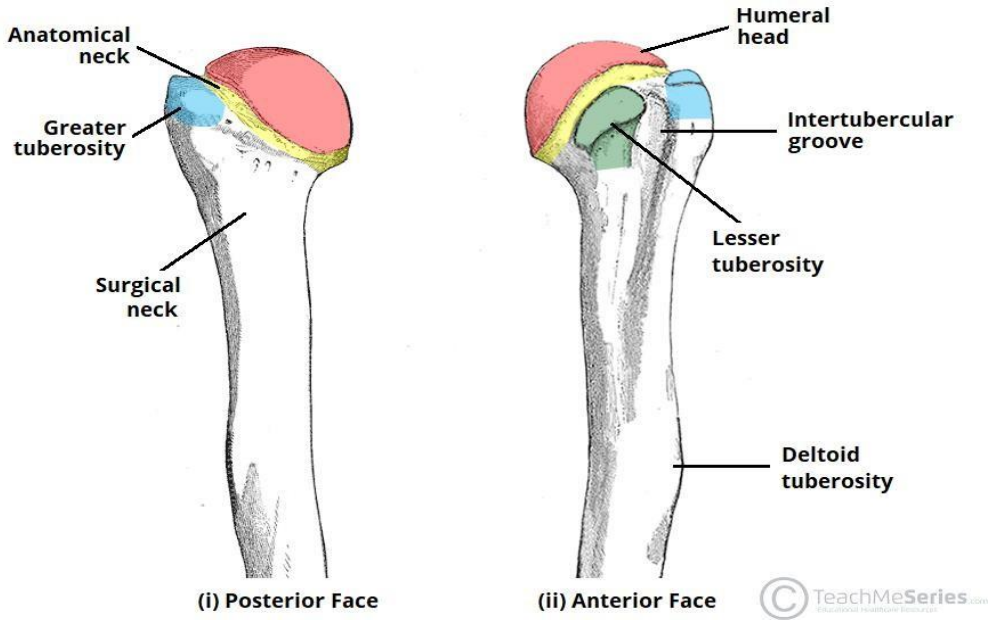
The greater tuberosity is located laterally on the humerus and has anterior and posterior surfaces. It serves as an attachment site for three of the **rotator cuff muscles** – supraspinatus, infraspinatus and teres minor – they attach to superior, middle and inferior facets (respectively) on the greater tuberosity.

The lesser tuberosity is much smaller, and more medially located on the bone. It only has an anterior surface. It provides attachment for the last rotator cuff muscle – the subscapularis.

Separating the two tuberosities is a deep groove, known as the intertubercular sulcus. The tendon of the long head of the biceps brachii emerges from the shoulder joint and runs through this groove.

The edges of the intertubercular sulcus are known as lips. Pectoralis major, teres major and latissimus dorsi insert on the lips of the intertubercular sulcus.

The surgical neck extends from just distal to the tuberosities to the shaft of the humerus. The axillary nerve and circumflex humeral vessels lie against the bone here.




Clinical Relevance: Surgical Neck Fracture

The surgical neck of the humerus is a frequent site of fracture – usually by a direct blow to the area, or falling on an outstretched hand.

The key neurovascular structures at risk here are the axillary nerve and posterior circumflex artery.

Axillary nerve damage will result in paralysis to the deltoid and teres minor muscles. The patient will have difficulty performing abduction of the affected limb. The nerve also innervates the skin over the lower deltoid (regimental badge area), and therefore sensation in this region may be impaired.

## 2. Shaft

The shaft of the humerus is the site of attachment for various muscles. Cross section views reveal it to be circular

proximally and flattened distally.

On the lateral side of the humeral shaft is a roughened surface where the deltoid muscle attaches. This is known is as the deltoid tuberosity.

The radial (or spiral) groove is a shallow depression that runs diagonally down the posterior surface of the humerus, parallel to the deltoid tuberosity. The radial nerve and profunda brachii artery lie in this groove.

The following muscles attach to the humerus along its shaft:

Anteriorly – coracobrachialis, deltoid, brachialis, brachioradialis.

Posteriorly – medial and lateral heads of the triceps (the spiral groove demarcates their respective origins).

Clinical Relevance: Mid-Shaft Fracture

A mid-shaft fracture of the humerus risk damage to the radial nerve and profunda brachii artery (as they are tightly bound in the radial groove).

The radial nerve innervates the extensors of the wrist. In the event of damage to this nerve (either direct or as a consequence of swelling), the extensors will be paralyzed. This results in unopposed flexion of the wrist, known as 'wrist drop'.

There can also be some sensory loss over the dorsal (posterior) surface of the hand, and the proximal ends of the lateral 3 and a half fingers dorsally.

### 3. Distal Region

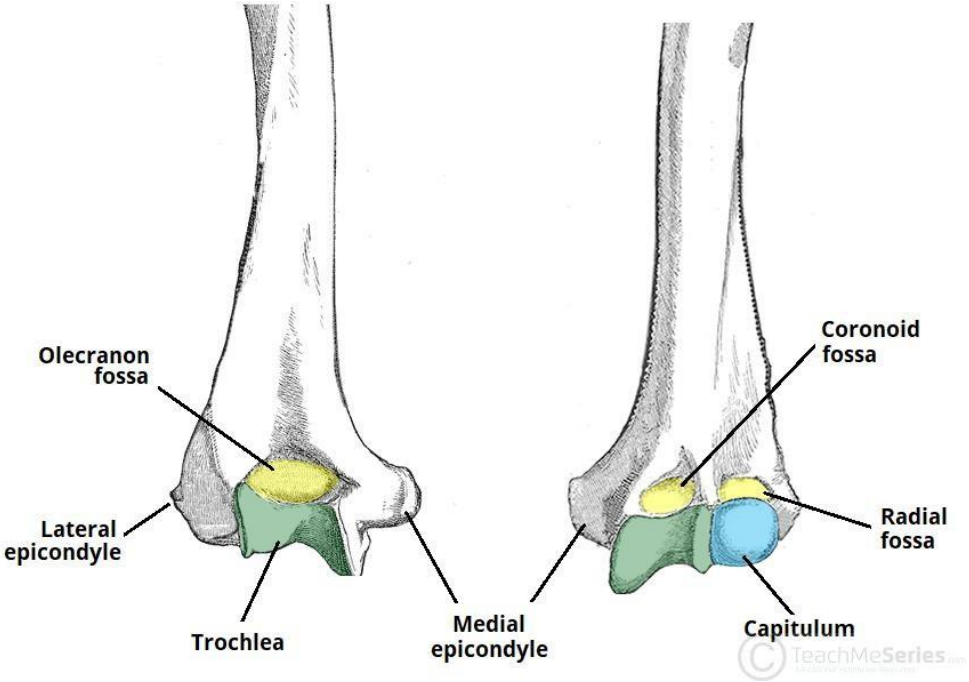
The lateral and medial borders of the distal humerus form medial and

lateral supraepicondylar ridges. The lateral supraepicondylar ridge is more roughened, providing the site of common origin of the forearm extensor muscles.

Immediately distal to the supraepicondylar ridges are extracapsular projections of bone, the lateral and medial epicondyles. Both can be palpated at the elbow. The medial is the larger of the two and extends more distally. The **ulnar nerve** passes in a groove on the posterior aspect of the medial epicondyle where it is palpable.

Distally, the trochlea is located medially, and extends onto the posterior aspect of the bone. Lateral to the trochlea is the capitulum, which articulates with the radius.

Also located on the distal portion of the humerus are three depressions, known as the coronoid, radial and olecranon fossae. They accommodate the forearm bones during flexion or extension at the elbow.




Bony landmarks of the distal humerus. It articulates with the radius and ulna to form the elbow joint.

Articulations

The proximal region of the humerus articulates with the glenoid fossa of the scapula to form the glenohumeral joint (shoulder joint).

Distally, at the elbow joint, the capitulum of the humerus articulates with the head of the radius and the trochlea of the humerus articulates with the trochlear notch of the ulna.

Clinical Relevance: Supracondylar Fracture

A supracondylar fracture is a fracture of the distal humerus just above the elbow joint. The fracture is typically transverse or oblique, and the most common mechanism of injury is falling on an outstretched hand. It is more common in children than adults.

In this type of injury, the brachial artery can be damaged; either directly, or via swelling following the trauma. The resulting ischaemia can cause Volkmann's ischaemic contracture – uncontrolled flexion of the hand – as flexor muscles become fibrotic and short.

There also can be damage to the anterior interosseous nerve (branch of the median nerve), ulnar nerve or radial nerve. The anterior interosseous nerve can be tested by asking the patient to make an 'okay' sign, testing for weakness of flexor pollicis longus.

The Gartland classification is used for these fractures: Type 1 is minimally displaced

Type 2 is displaced with but with an intact posterior cortex Type 3 is completely off-ended.

Type 1 can usually be managed conservatively with an above elbow cast whereas types 2 and 3 typically require surgical fixation with crossed, bi-cortical k-wires. [4][5][6][7]


A supracondylar fracture of the humerus.

Humerus Radiography

What's an X-Ray?

An X-ray is a safe and painless test that uses a small amount of radiation to make an image of bones, organs, and other parts of the body.

The X-ray image is black and white. Dense body parts, such as bones, block the passage of the X-ray beam through the body. These look white on the X-ray image. Softer body tissues, such as the skin and muscles, allow the X-ray beams to pass through them. They look darker on the image.

What's a Humerus X-Ray?

In a humerus X-ray, an X-ray machine sends a beam of radiation through the upper arm (between the shoulder and elbow), and an image is recorded on a computer or special film. This image shows the soft tissues and the bone in the upper arm, which is called the humerus.

An X-ray technician will take pictures of the humerus:

- from the front (anteroposterior view or AP)
- from the side (lateral view)

1. Humerus (AP view):

the AP view of the humerus is part of the humerus series and is usually taken in a standing position. However, it can also be obtained in a supine position.

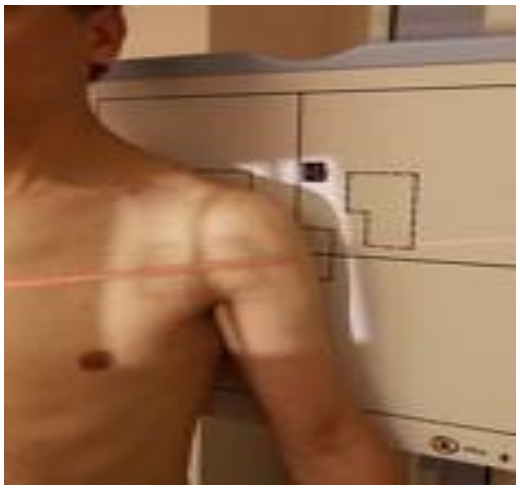
The projection demonstrates the humerus in its natural anatomical position allowing for adequate radiographic examination of the entire humerus and its respected articulations.

Indications:

Humerus views are often done to exclude large humeral shaft fractures or suspected symptomatic metastatic lesions [1]. If an occult fracture is suspected at either the proximal or distal end, it is best to do a separate elbow or shoulder series.

**Patient position:**

- the patient is preferably erect
- the patient's back is against the image receptor
- the affected arm is abducted and centered to the upright detector, if possible, the arm is slight externally rotated to mimic the true anatomical position



Technical factors:

- anteroposterior projection
- centering point
  - mid humerus shaft
- collimation
  - superior to the skin margins above the glenohumeral joint
  - inferior to include the distal humerus including the elbow joint
  - lateral to include the skin margin
  - medial to include skin margin
- detector size
  - 35 cm x 43 cm
- exposure
  - 60-70 kVp
  - 7-15 mAs
- Grid
  - yes (this can vary departmentally).[8][9]

x-ray image of humerus.

**2.** Humerus (lateral view):

The lateral view of the humerus is part of the humerus series and is usually taken in a standing position. However, it can also be taken in the supine position in the acute, trauma setting.

The projection demonstrates the humerus in the lateral position allowing for adequate radiographic examination of the entire humerus and its respected articulations.

**Indications**:

Humerus views are often done to exclude large humeral shaft fractures or suspected symptomatic metastatic lesions , if an occult fracture is suspected at either the proximal or distal end, it is best to do a separate elbow or shoulder series.

**Patient position:**

- patient is preferably erect
- patient stands facing the detector with the injured side closest to the detector
- patient is then rotated so that the lateral aspect of the shoulder of the affected side, the arm and the elbow are all in contact with the upright bucky
- the elbow is flexed 90° (as close to 90° as possible)
- place the patient's hand on their ASIS or stomach to maintain position

**Technical factors:**

- posteroanterior projection
- centering point
  - mid humerus shaft
- collimation
  - superior to the skin margins above the glenohumeral joint
  - inferior to include the distal humerus including the elbow joint
  - lateral to include the skin margin
  - medial to include medial skin margin

- detector size
  - 35 cm x 43 cm
- exposure
  - 60-70 kVp
  - 7-15 mAs
- grid
  - yes (this can vary departmentally).[10]


x-ray image of humerus

Fracture

1. What is a bone fracture?

A fracture is a broken bone. It can range from a thin crack to a complete break. Bone can fracture crosswise, lengthwise, in several places, or into many pieces. Most fractures happen when a bone is impacted by more force or pressure than it can support.

## 2. What are the symptoms of a fracture?

Most fractures are accompanied by intense pain when the initial injury occurs. It may become worse when you move or touch the injured area. In some cases, you may even pass out from the pain. You may also feel dizzy or chilled from shock.

## 3. What are the different types of fracture?

Fractures can be classified as closed or open, as well as incomplete or complete.

Closed vs. open

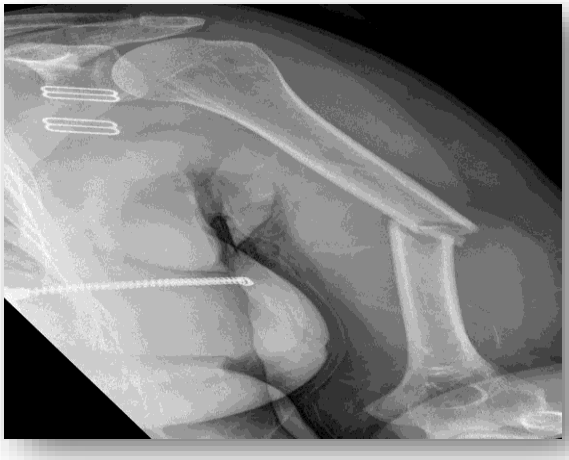

A closed fracture is also called a simple fracture. In a closed fracture, the broken bone doesn't break your skin.

An open fracture is also called a compound fracture. In an open fracture, the ends of the broken bone tear your skin. When your bone and other internal tissues are exposed, it puts you at higher risk of infection.

**Incomplete vs. complete**


In an incomplete fracture, your bone doesn't break completely. In other words, it cracks without breaking all the way through. Types of incomplete fracture include**:** hairline fracture, greenstick fracture, buckle or torus fracture.

In a complete fracture, your bone breaks completely. It's snapped or crushed into two or more pieces. Types of complete fracture include: single fracture, comminuted fracture, compression fracture, nondisplaced fracture.[11][12][13]



And there is also what called **Pathological Fracture** which is a broken bone that's caused by a disease, rather than an injury. Some conditions weaken your bones, which makes them more likely to break. Everyday things, such as coughing, stepping out of a car, or bending over can fracture a bone that's been weakened by an illness.

- What are the symptoms?

Pathologic fractures don't always have symptoms. When they do, they share the same symptoms as an injury-related fracture. These include:

1. mild to severe pain near the broken bone
2. bruising, tenderness, and swelling near the broken bone
3. numbness, tingling, or weakness near the broken bone

In some cases, it may be hard to tell the difference between symptoms of a pathologic fracture and those of the underlying condition affecting your bones.

- What are the causes?

Osteoporosis is a disease that weakens your bones, making them more likely to break.

Cancer is a disease involving unusual cell growth. It can affect almost all areas of your body.

Osteomyelitis is an infection in the bone. It's caused by a bacterial or fungal infection spreading to nearby bones. In rare cases, osteomyelitis leads to a pathologic fracture.[14][15][16]

Humerus Fractures

Fractures are one of the most common injuries to the humerus. Humerus fractures are classified by their location:

**Proximal:** A break that occurs at the end of your humerus closest to your shoulder.

**Mid-shaft or middle:** A break that occurs in the shaft or body of your humerus.

**Distal:** A break that happens at the end of your humerus that's closest to your elbow.

**Humerus fracture causes:**

A humerus fracture most often occurs due to a direct blow. This type of injury often happens in contact sports or car accidents. You can also break your humerus if you fall with your arm outstretched.

Sometimes a humerus fracture can happen due to an underlying health condition. This is called a **pathologic fracture** and can be caused by conditions such

as osteoporosis or cancer.

**Humerus fracture symptoms:**

Some of the most common signs that you may have fractured your humerus include:

1. arm pain, which can be severe and often gets worse with movement.
2. a cracking or snapping sound that happens at the time of the injury.
3. Swelling.
4. bruising.
5. a visible lump or bump in your upper arm.
6. decreased range of motion.[17][18]

1. Proximal Humeral Fractures:

Proximal humeral fractures are especially common among older patients. A few patients have axillary nerve damage (reducing sensation over the middle deltoid) or axillary artery damage.

i. Etiology of Proximal Humeral Fractures:

Most of these fractures result from a fall on an outstretched arm; less often, a direct blow is involved.

Classification

Fractures are classified by the number of parts that result; a part is defined as a key anatomic structure that is displaced ( > 1 cm) or angulated (> 45°) in relation to its normal anatomic position. The 4 key anatomic structures of the proximal humerus are the

- Anatomic neck
- Surgical neck
- Greater tuberosity
- Lesser tuberosity

For example, if no structures are displaced or angulated, the fracture has one part. If one structure is angulated or displaced, the fracture has 2 parts

ii. Symptoms and Signs of Proximal Humeral Fractures:

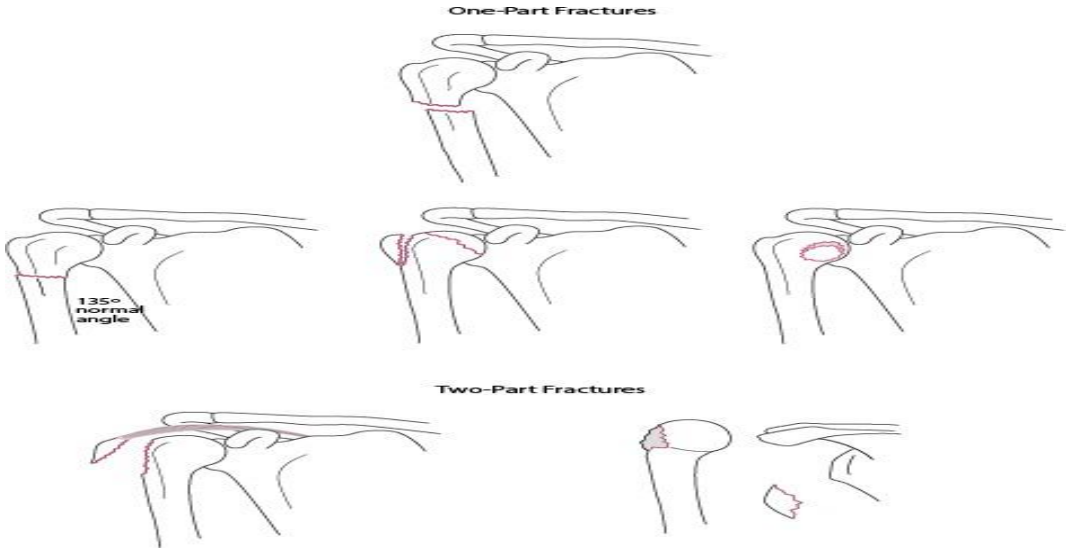
The shoulder and upper arm are painful and swollen; patients have difficulty raising their arm.

iii. Diagnosis of Proximal Humeral Fractures:

- Plain x-rays
- CT Scan

X-rays should include at least

- A true anteroposterior internal rotation view
- A trans-scapular Y (oblique) view
- An axillary view to assess the glenohumeral joint




CT is done if fractures are complex or poorly visualized on plain x-rays.

iv. Treatment of Proximal Humeral Fractures:

- Usually a sling and early range-of-motion exercises.
  - Sometimes open reduction with internal fixation (ORIF) or prosthetic joint replacement.

**One-part fractures**

rarely require reduction; most (almost 80%) are treated with immobilization in a sling, sometimes with a swathe and early range-of-motion exercises, such as Codman exercises.

These exercises are particularly useful for older adults. Because contractures are a risk, early mobilization is desirable, even if alignment is anatomically imperfect.

**Fractures with tow-parts**

are immobilized, and patients are referred to an orthopedic surgeon. These fractures may require ORIF or placement of a prosthetic joint (shoulder replacement).[19]

2. Mid-Shaft Humerus Fractures:

A mid-shaft humerus fracture represents about 3% of all broken bones. It typically doesn't involve the shoulder or elbow joints.

The most common cause of a humeral shaft fracture is a fall, but high-energy injuries (motor vehicle collisions, sports injuries)

and penetrating trauma (gunshot wounds) also can cause this injury. Many humeral shaft fractures, especially in older people, occur as a result of the weakening of the bone from osteoporosis.

### i. Symptoms of Mid-Shaft Humerus Fracture:

The various signs and symptoms of a mid-shaft humerus fracture include:

1. Severe arm pain
2. Swelling
3. Restricted motion of the shoulder and arm
4. Bruising
5. Stiffness
6. Deformity

### ii. Diagnosis of a Mid-Shaft Humerus Fracture:

Anteroposterior (AP) and lateral plain film radiographs of the humerus are usually that is all that is required. The elbow and shoulder should be visible.

In severely comminuted cases, CT imaging may be requested for pre-operatively planning, although this is not routinely done.

### iii. Treatment of a Mid-Shaft Humerus Fracture:

The vast majority of mid-shaft humerus fractures heal without surgery, which minimizes complications.

The most common treatment for a humeral shaft fracture is called a **fracture brace**, often referred to as a Sarmiento brace, named after the physician who popularized this treatment method.

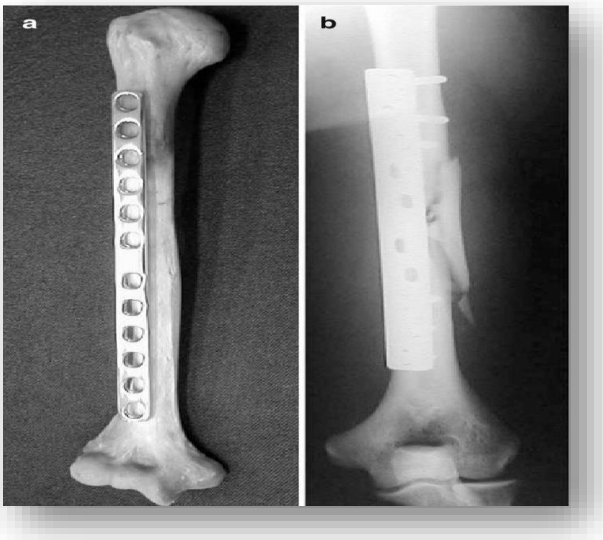
Usually, the fracture is treated in a splint or sling for a week to allow swelling to subside, and then you're fitted with a fracture brace. The brace looks like a clamshell and holds the humerus in alignment. An advantage of the fracture brace is that as healing progresses, you can begin to use your shoulder and elbow.

Reasons to consider surgical treatment include:

- Multiple fractures
- Open fractures (when the bone is exposed)
- Injuries to blood vessels or nerves[4]
- Failure to heal with nonsurgical treatment (nonunion).

However, surgery comes with additional risks, including nerve injury and failure of the bone to heal.

Types of surgical procedures include:




1. Metal Plates: The most common and success
2. ful surgery for treatment of a humerus fracture is to place a large metal plate along the humerus, and secure it with screws.


3. Rods: An intramedullary rod or nail is a metal rod that is placed down the hollow center of the bone. The advantage of the metal rod is the surgery is less invasive, and the surgeon stays away from important nerves that travel down the arm.[20][21][22][23]

3. Distal Humeral Fractures:

Distal humeral fractures are common among children aged 3 to 11 years. The usual injury mechanism is a fall on an outstretched arm with the elbow extended or direct force, often causing posterior displacement or angulation.

The brachial artery or median or radial nerve may be damaged, particularly when the fracture is posteriorly displaced or angulated. Neurovascular injury sometimes leads to compartment syndrome of the forearm, which can cause Volkmann ischemic contracture (a flexion contracture at the wrist resulting in a clawlike hand deformity). Fractures are usually intra-articular, causing hemarthrosis.

i. Symptoms and Signs of Distal Humeral Fractures:

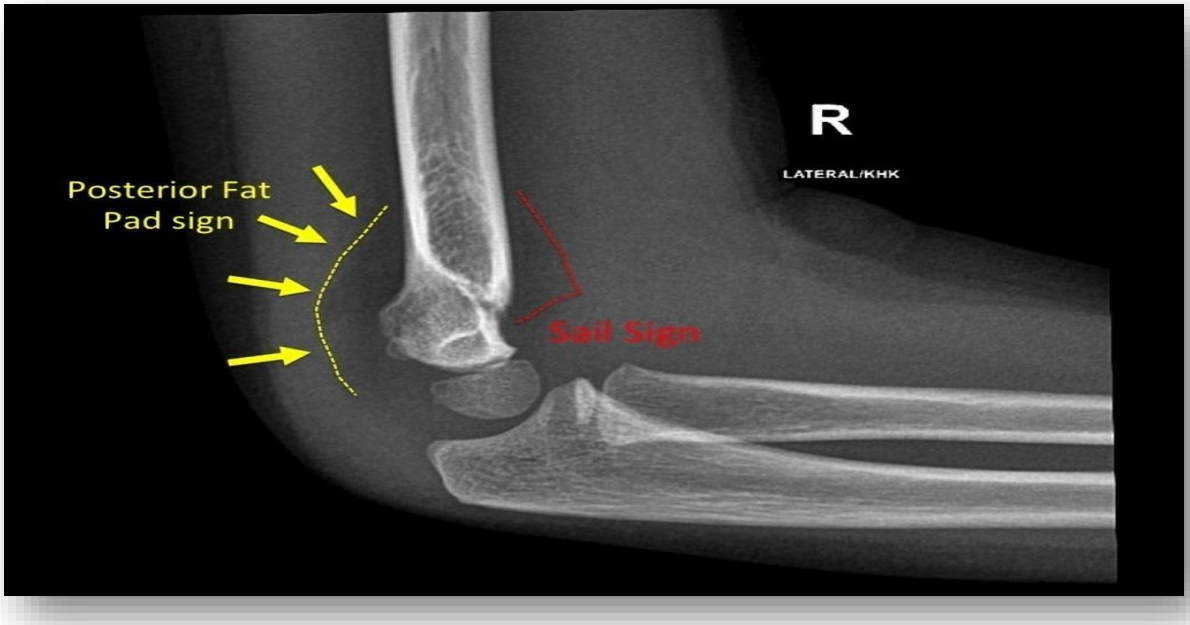
The elbow area is painful and swollen, and the elbow's range of motion is limited. Ecchymoses over the anterior medial forearm suggest brachial artery injury.

ii. Diagnosis of Distal Humeral Fractures:

Anteroposterior and lateral x-rays, A fracture line may not be visible but other x-ray findings may suggest fracture. They include

- Posterior fat pad
- Anterior fat pad (sail sign)
- Abnormal anterior humeral line
- Abnormal radiocapitellar line

A **posterior fat pad** on a true lateral x-ray of the elbow is always abnormal; this finding is specific for joint effusion but not highly sensitive.




A **displaced anterior fat pad** may indicate joint effusion but is not specific.


However, if a posterior fat pad is seen or if a large anterior fat pad (sail sign) is present, an occult fracture should be

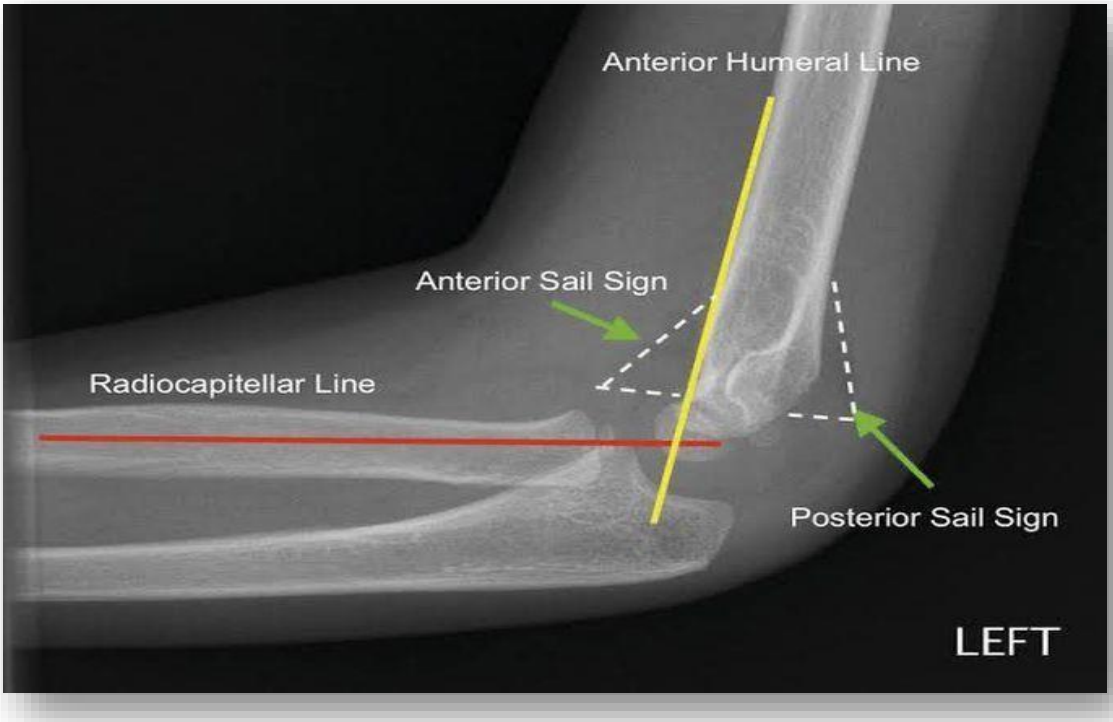
assumed and should be treated as such.

**The anterior humeral line** is a line drawn along the anterior border of the humerus on a true lateral x-ray. Normally, this line transects the middle of the capitellum. If the line transects none or only the anterior part of the capitellum, a posteriorly displaced distal humeral fracture is possible, then oblique views are taken, and other imaging


may be done.

**The radiocapitellar line** is a line drawn through the midshaft of the radius on a true lateral x-ray of the elbow, normally it bisects the capitellum. If it does not, an occult fracture should be suspected.

A complete neurovascular examination is done if a fracture is suspected. Particular attention should be paid to the




median, radial, and ulnar nerves. Distal pulses should be compared with those of the opposite limb, particularly if ecchymoses or enlarging swelling (which suggest brachial artery injury) are present on the anterior medial forearm.

iii. Treatment of Distal Humeral Fractures:

1. Early orthopedic consultation
2. For nondisplaced fractures or occult fractures, splinting
3. For displaced fractures, often open reduction with internal fixation (ORIF)
4. For clinically suspected fractures, splinting and close follow-up

Displaced supracondylar fractures should be splinted in the position that they are in; they should not be reduced because of the risk of reduction-related median nerve and radial artery injury.

Most fractures are managed by an orthopedic surgeon because long-term complications are a risk. Most patients are admitted for neurovascular observation, although some clinicians splint and discharge patients who have nondisplaced fractures if patients can be trusted to return for follow-up the next day.

Posteriorly displaced or angulated distal humeral fractures, in particular, should be reduced by an orthopedic surgeon because nerves and/or the radial artery can be injured during reduction. Casting with closed reduction may be tried but is typically not recommended because ORIF is usually necessary.

If a fracture is suspected clinically (eg, children cannot move their elbow in a normal range of motion) and x-rays appear normal, the joint should be splinted and close follow-up should be arranged.[24]

Dislocation

What is a dislocation?

Dislocation is the medical term for bones in one of your joints being knocked or pushed out of their usual place.

A joint is any place in your body where two bones meet. They're part of your skeletal system. You have hundreds of joints throughout your body. They support your body from head to toe.

Any joint in your body can be dislocated. Dislocations can be painful and make it hard (or impossible) to use your affected joint. Dislocations can also strain or tear the tissues around your joints, including your:

- Muscles.
- Nerves.
- Tendons.
- Blood vessels.

Types of dislocations:

Healthcare providers classify dislocations based on how far the bones in your joints were moved:

**Complete dislocations (luxation):** A complete dislocation happens when the bones in your joint are totally separated and pushed out of place.

**Subluxation**: Subluxation is the medical term for a partial dislocation. You have a subluxation if something pulls your joint apart and the bones still touch, just not as completely as usual.

**The most commonly dislocated joints include:**

- Fingers.
- Shoulders.

- Knees.
- Elbows.
- Hips.
- Jaws.[25][26][27]

Humerus Dislocation

## 1. Shoulder dislocation

**A shoulder dislocation** occurs when the round ball at the top of the humerus, leaves the socket in the shoulder blade, or scapula. That means the ball and socket bones of the shoulder are separated, with the ball of the humerus out of position.

Tissues that hold the bones together – including muscles, tendons that connect muscles to bones and ligaments that join the shoulder bone to the shoulder blade – are also sometimes injured. In addition, tearing of cartilage, a rubbery tissue that covers and protects the ends of bones, is possible.

A partially dislocated shoulder, or shoulder subluxation, means that only part of the upper arm bone is out of socket.

### i. cause of shoulder dislocation:

A shoulder dislocation is usually caused by a fall or blow to the shoulder. This can happen during sports activities. Dislocated shoulders are more common in teens than younger children.

### ii. symptoms of a dislocated shoulder:

Symptoms of a dislocated shoulder include:

1. Extreme pain and/or weakness
2. Swelling
3. Bruising or redness
4. Muscle spasms
5. Numbness, tingling or weakness in the arm, hand or fingers
6. Immobility of the arm, or difficulty moving it
7. Shoulder visibly out of place

### iii. Treatment of dislocated shoulder:

If a shoulder dislocation is diagnosed, the doctor will carefully place the arm bone back into the shoulder socket and into the correct alignment, a process called “closed reduction.” It’s closed because it doesn’t require surgery. Usually no surgery is necessary, especially if the shoulder was dislocated for the first time. The doctor may determine that surgery is needed if bones or tendons are injured. If the shoulder is dislocated more than once, which is more common among young athletes, doctors might surgically repair or tighten ligaments that keep the arm bone connected to the shoulder blade.[28][29][30][31]

## 2. Elbow dislocation

**A elbow dislocation** occurs when any of the three bones in the elbow joint become separated or knocked out of their normal

positions.

Dislocation can be very painful, causing the elbow to become unstable and sometimes unable to move. Dislocation damages the ligaments of the elbow and can also damage the surrounding muscles, nerves and tendons (tissues that connect the bones at a joint).

i. causes of dislocated elbow:

There can be various causes of a dislocated elbow.

Most elbow dislocations occur when people try to stop a fall with their outstretched hand.

Car accidents can cause dislocated elbows when people reach out to brace themselves against impact.

Sports injuries can cause dislocations. Overuse can also be a cause.

In some cases, a joint disorder such as Ehlers-Danlos syndrome causes dislocations. Ehlers-Danlos makes joints unusually loose and flexible.

ii. symptoms of a dislocated elbow:

A dislocated elbow can be partial or complete. A complete elbow dislocation involves a total separation and is called a luxation. When the elbow joint is partially dislocated, it is called a subluxation.

Doctors also classify elbow dislocations according to the extent of the damage and where it occurs. The 3 types include:

a) Simple: No major injury to the bone

b) Complex: Severe injuries to the bone and ligament

c) Severe: Damage to the nerves and blood vessels around the elbow

The signs and symptoms of a dislocated elbow vary depending on the severity of the injury and the bones involved. They include:

1. Bruising
2. Deformed-looking arm (bone looks out of place)
3. Weakness in the joint
4. Loss of ability to move the elbow
5. Pain
6. Swelling

iii. Treatment of dislocated elbow:

Some dislocated elbows return to their usual position on their own. More severe cases need a doctor to return the bones to their proper position.

Treatment for a dislocated elbow varies according to the severity of the injury. Treatments for an elbow dislocation include:

**Manipulation**: A doctor returns the bones to their normal positions, called a joint reduction.

**Medication**: Your doctor may recommend over-the-counter medicine to reduce pain.

**Rest**: Once the joint is back in place, you may need to keep it immobile and protect it. Using a sling can help the elbow joint heal.

**Physical therapy**: You may need to do exercises to strengthen the muscles and tendons in the elbow to help support it after it heals.

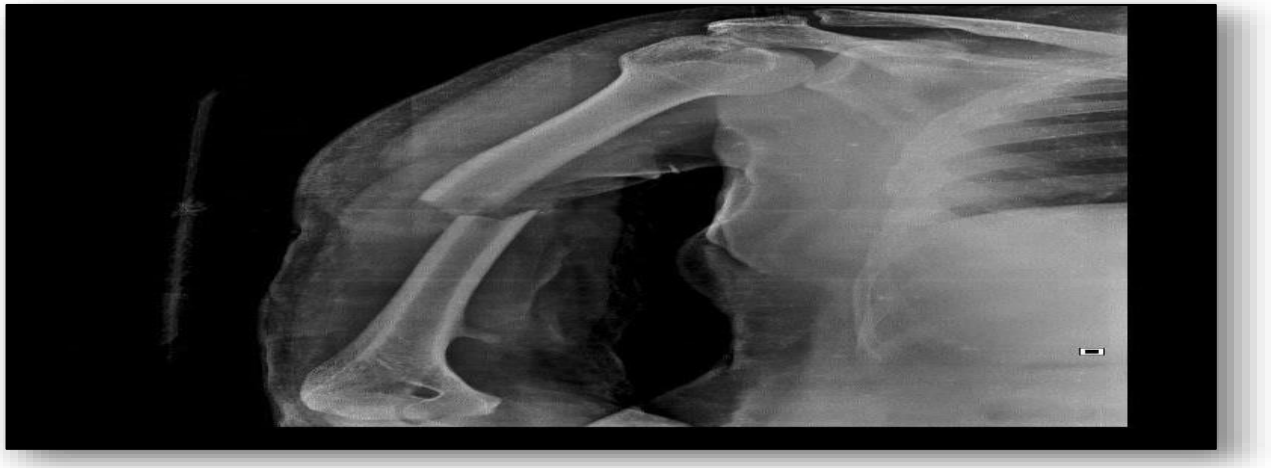
**Surgery**: You may need surgery if:

- Your doctor is unable to return the bones to their proper positions through manipulation.
- Dislocation damaged nerves or blood vessels in the elbow.
- Torn tendons or muscles need repair.[32][33][34][35]

SOME CASES ABOUT HUMERUS

## Case 1

It's for adult male about the age of 30 who Fall from a high place and has a fracture in his midshaft, this image took in a

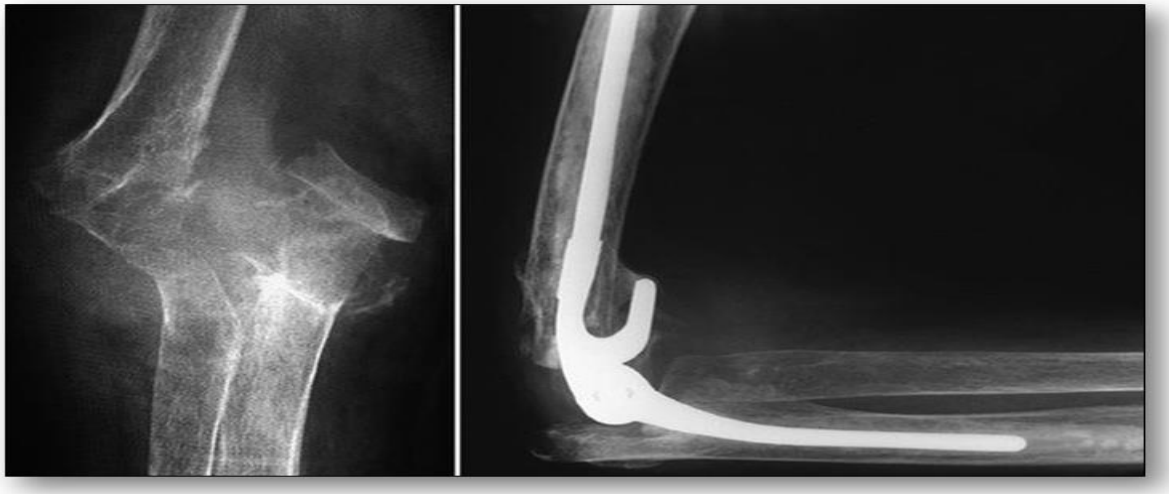


x-ray lab in Bagdad.

## Case 2

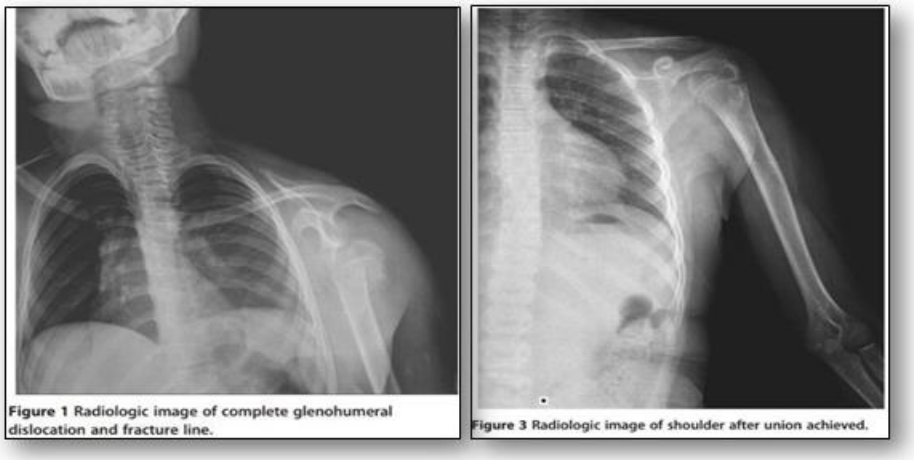

it's for teenage male about the age of 17 who fall during played football and has Complete (oblique) fracture in distal humerus ,this image from Al-Salam hospital.

## Case 3



(Left) Preoperative x-ray of an elderly patient shows a distal humerus that has fractured into multiple pieces. (Right) The patient's elbow joint has been replaced with metal and plastic implants.

## Case 4




it's for Female (child) about the age of 7 who fall from a high place approximately 1.5 m and has Complete glenohumeral dislocation and fracture line.

## Case 5

it's for adult male about the age of 56 who has Liver cirrhosis which cause Pathological fracture.

**Case 6**

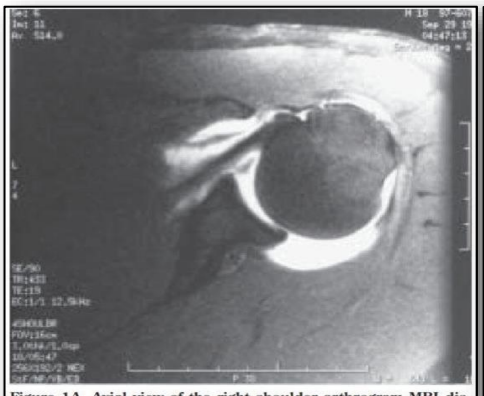


Figure 1A. Axial view of the right shoulder arthrogram-MRI displaying an anterior labral tear. Also noted is the subscapularis tendon traversing anterior to the glenoid and inserting onto the humerus.

Figure 1B. Coronal view of the same shoulder demonstrating a complete tear in the supraspinatus tendon. At the time of surgery, this proved to be a 2 cm tear in the central portion of the tendon leaving the anterior and posterior borders intact.

it's for teenage male about the age of 18 who get a hit whilelaying football and has Left anterior shoulder dislocation.

**Recommendation and Conclusions**

1- The shoulder joint is one of the easiest joint to dislocate because the ball joint of your upper arm sits in a very shallow socket. This makes the arm extremely mobile and able to move in direction, but also means it is not very stable.

2- It can be said that the humerus does not break easily due to its structural structure that provides protection and support for the bone, in addition to being stabilized by the muscles and ligaments surrounding it, and strengthened by sports training. However, the exposure of the bone to large and sudden external forces, such as accidents and severe fractures, can lead to its fracture regardless of its strength and durability.

3- The dislocated more common in children because their growth plates are weaker than the muscles or tendons. Growth plates are the areas at the end of long bones grow. Dislocation happen more often among teens.

4- Titanium and it's alloys have been used as medical implants due to their long fatigue

life, corrosion resistance, high biocompatibility and lower Young's modulus

compared to other

5- Humerus fractures are caused by direct trauma to the arm or shoulder or by axial loading transmitted through the elbow. Attachments from pectoralis major, deltoid, and rotator cuff muscles influence the degree of displacement of proximal humerus fractures, and extreme sports ( Boxing sport) ext.

6- The patient should be go to the hospital, not to Arab medicine, so not to be exposed to medical errors.

7- When the patient breaks down, should be take calcium ,vitamin D3,vitaminC, proteins, carbohydrates, fats and some minerals.

8- Sometimes the muscle is exposed to atrophy due to gypsum, which can be treated with physical therapy, or undergoing surgery.

**References**


1. Lee, Cassandra. (January 2001). The Bone Organ System: Form and Function. Science Direct. Academic Press. pp. 3–20. doi:10.1016/B978-012470862-4/50002-7. ISBN 9780124708624.
2. de Buffrénil, Vivian; de Ricqlès, Armand J; Zylberberg, Louise; Padian, Kevin; Laurin, Michel; Quilhac, Alexandra. (2021). Vertebrate skeletal histology and paleohistology (Firstiton ed.). Boca Raton, FL: CRC Press. pp. xii + 825. ISBN 978-1351189576.

3. William C Lloyd III, MD, FACS. (2022,Aug 19(. By Tim Newman.
4. Oliver Jones. (June 3,2021). information about humerus from Teach me anatomy.
5. K.L. Moore, A.F. Dalley, A.M.R. Agar. (2006). Clinically Oriented Anatomy, 5th Edition, Lippincott Williams & Wilkins. p.732-3.
6. S. Standring. (2008). Gray's Anatomy The Anatomical Basis Of Clinical Practice, 40th Edition, Elsevier Health Sciences UK p.1446-50.
7. R.L. Drake, A. Wayne, A.W.M. Mitchell. (2010). Gray's Anatomy For Students, 2nd Edition, Churchill Livingstone. p.997-1000, 1035-6, 1053-4.
8. O'Sullivan GJ, Carty FL, Cronin CG. (2015). Imaging of bone metastasis: An update. World J Radial. 7 (8): 202-11. doi:10.4329/wjr.v7.i8.202 - Free text at pubmed - Pubmed citation.
9. Whitley AS, Sloane C, Hoadley G et-al. (2005). Clark's positioning in radiography. Hodder Arnold Publication. ISBN:0340763906. Read it at Google Books - Find it at Amazon.
10. O'Sullivan G. Imaging of Bone Metastasis. (2015). An Update. WJR. 7(8):202. doi:10.4329/wjr.v7.i8.202
11. Broken bones or fractures. (n.d.) cedars-sinai.edu/Patients/Health-Conditions/Broken-Bones-or-Fractures.aspx
12. Exercise for your bone health. (2015, May). Retrieved from niams.nih.gov/health_info/bone/Bone_Health/Exercise/default.asp
13. Fractures. (n.d.) urmc.rochester.edu/encyclopedia/content.aspx?ContentType ID=85&ContentID=P00915
14. Fakler JKM, et al. (2013). Safety aspects in surgical treatment of pathological fractures of the proximal femur – modular endoprosthetic replacement vs. intramedullary nailing. DOI: 10.1186/1754-9493-7-37
15. Metastatic bone tumors. (n.d.). (2021). my.clevelandclinic.org/health/articles/metastastic-bone-tumors
16. Bounds EJ, et al. (2021). Humeral shaft fractures. ncbi.nlm.nih.gov/books/NBK448074/
17. Danielle Campagne , MD. (Dec 2022). information about Proximal Humeral Fractures from MSD MANUAL.).https://www.msdmanuals.com/professional/injuries-poisoning/fractures/proximal-humeral- fractures
18. Carroll EA, Schweppe M, Langfitt M, Miller AN, Halvorson JJ. (2012). Management of humeral shaft fractures. J Am Acad Orthop Surg. 20(7):423–433. doi:10.5435/JAAOS-20-07-423
19. National Center for Biotechnology Information, StatPearls. (2020). Humeral Shaft Fractures.
20. Ayotunde OA, Sunday OK, Oluwatoyin A, Dare OJ. (2012). Results of surgical treatment of nonunion of humeral shaft fracture with dynamic compression plate and cancellous bone grafting. Acta Ortop Bras.;20(4):223–225. doi:10.1590/S1413-78522012000400006
21. Y.Luo,M.D. (2017). information about Mid-Shaft Humeral Fractures from Randy https://www.randyluomd.com/mid-shaft-humerus-fracture-hand-upper-extremity-surgeon-houston-tx.html
22. Danielle Campagne , MD. (Dec 2022). information about Distal Humeral Fractures from MSD MANUAL
23. American Academy of Orthopaedic Surgeons. (3/1/2023). Dislocated Shoulder. (https://orthoinfo.aaos.org/en/diseases--conditions/dislocated-shoulder/) .
24. _Danielle Campagne, MD. (3/1/2023). Overview of Dislocations(https://www.merckmanuals.com/professional/injuries-poisoning/dislocations/overview-of-dislocations).