



## Lecture 3

# Radiological anatomy of the humerus

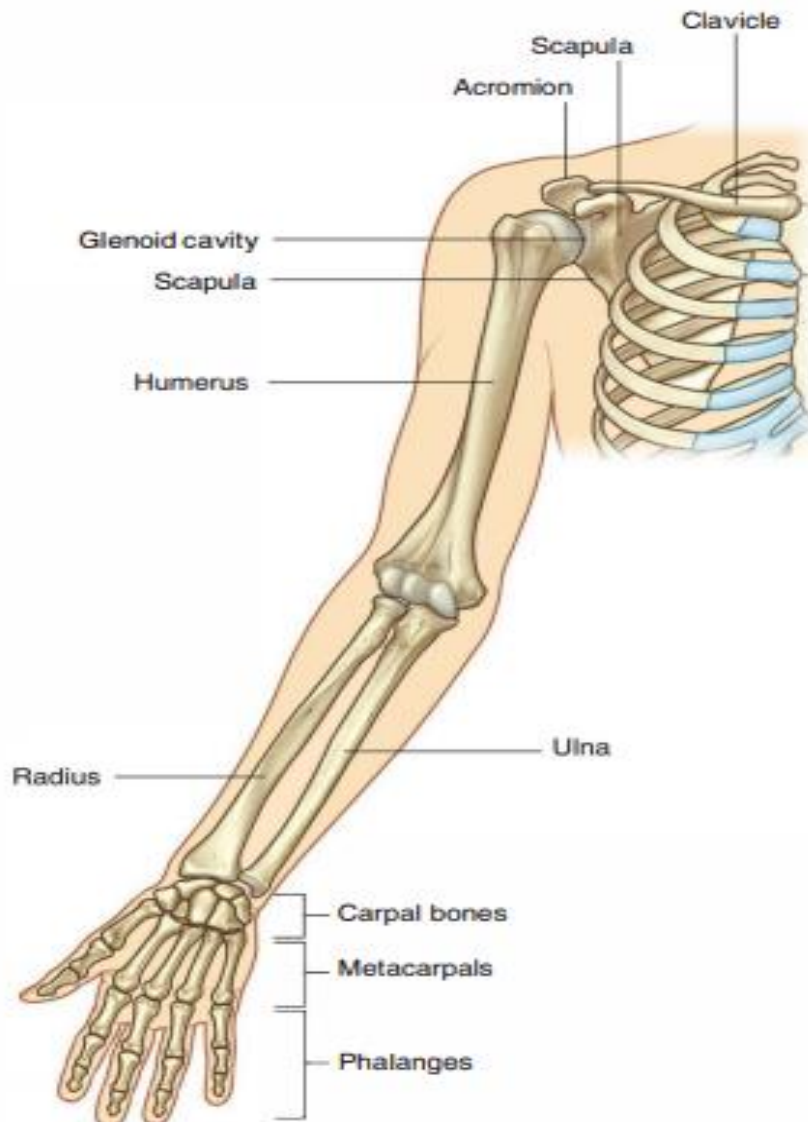
BY

Assistant Lecturer. Hind Moafak Abdul-Jabbar

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## *Radiological anatomy of the humerus*

**Humerus**, is a long bone forming the skeleton of the upper arm. It extends between the shoulder and the elbow and is the longest and largest bone of the upper limb, (figure 1).

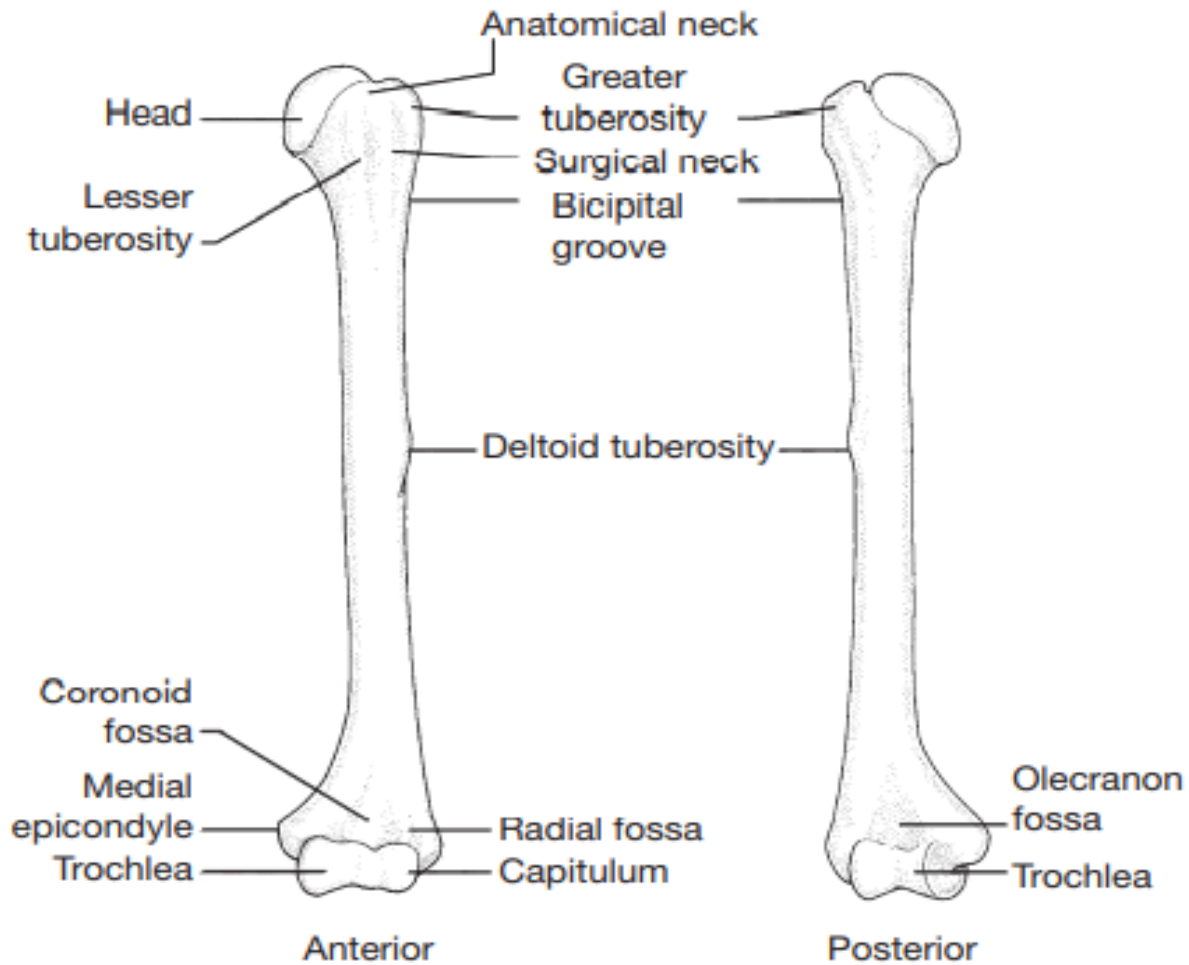


**Figure 1:** Bones of the upper limb.

The **humerus** is connected with the scapula at one end, and with both forearm bones (radius and ulna) on the other end. The proximal end of the humerus articulates with the glenoid cavity of the scapula at the **glenohumeral (shoulder) joint**.

At the distal end, the humerus articulates with the head of the radius and the trochlear notch of the ulna, forming the **elbow joint**.

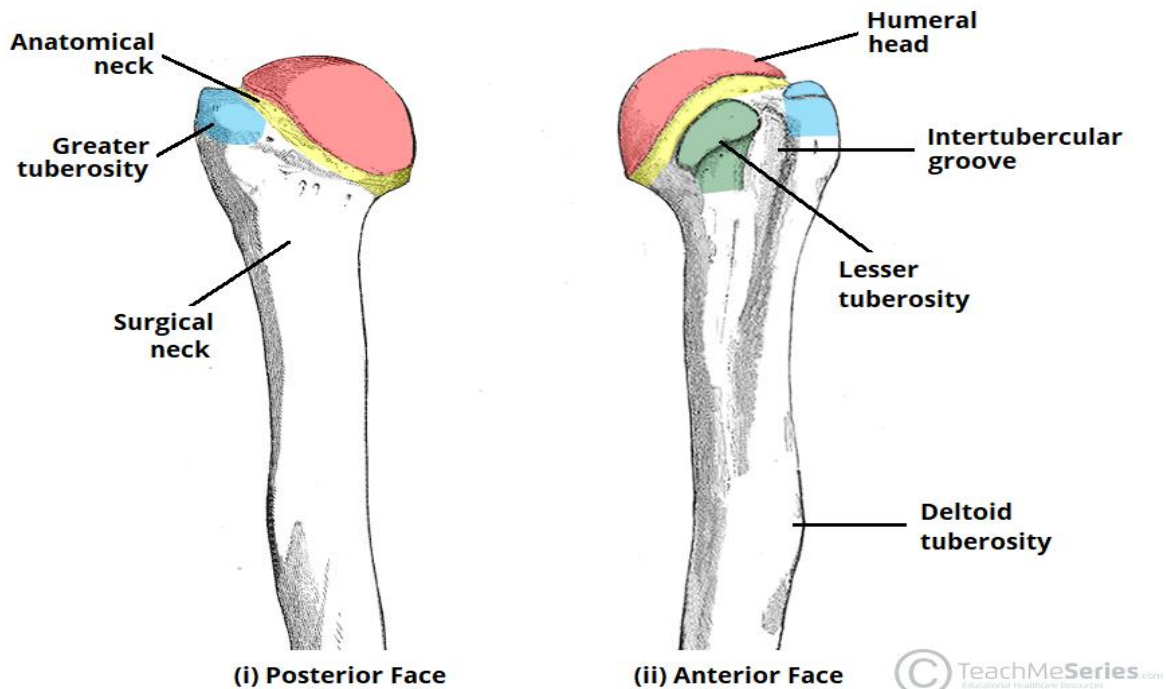
**The humerus has three main parts**: a proximal end, a shaft, and a distal end, (fig. 2).



**Figure 2:** The humerus: anterior and posterior views.

### Proximal end of humerus:

The **proximal end of the humerus** consists of the: **head**, an **anatomical neck**, **surgical neck**, and the **greater tuberosity** and **lesser tuberosity**, (figure 3).



**Figure 3:** Proximal end of the humerus.

\* **Head of the humerus:** has a hemispherical shape and has a smooth articular surface, which is covered by hyaline cartilage. The **humeral head** articulates with the **glenoid cavity of the scapula**.

\* **Anatomical neck of the humerus:** is a narrowing below the articular surface of the head.

\* **Greater tuberosity:** is the most lateral part of the proximal end of the humerus.

\* **Lesser tuberosity:** is found anterior to the anatomical neck.

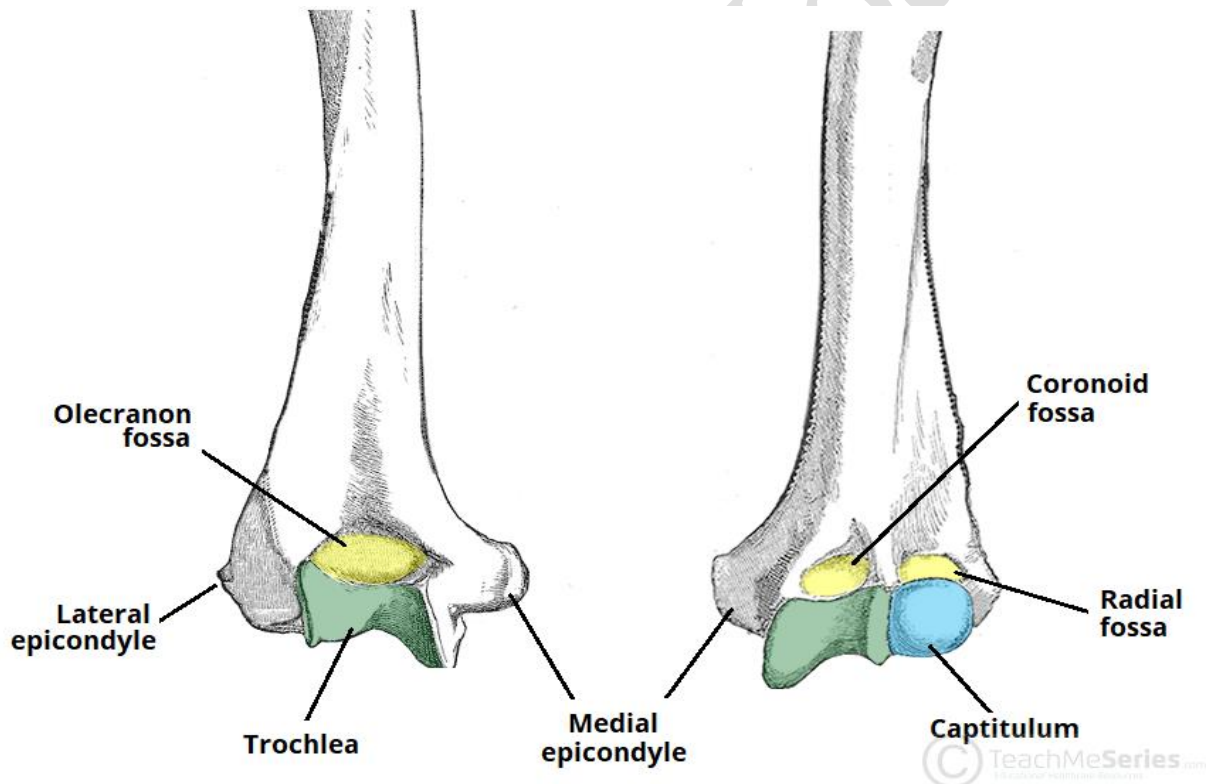
There is a deep groove separating the greater and lesser tuberosity, which is called the **intertubercular groove**. It is also known as the (**bicipital groove**). The long tendon of the biceps brachii muscle, lie within the intertubercular sulcus.

\* **Surgical neck of the humerus:** There is also a slight narrowing below the greater and lesser tuberosity. It is a common fracture site, (figure 3).

**Shaft of the humerus:** the **deltoid tuberosity** on the lateral aspect of the midshaft is the site of insertion of the deltoid muscle, (fig. 2).

### Distal end of humerus:

The **distal end of the humerus** has both **articular** and **non-articular parts**. The **articular part** is consisting of a medial **trochlea** and a lateral **capitulum**. This part of the humerus articulates with both ulna and radius bones. The **non-articular part** consists of the **medial** and **lateral epicondyles**, as well as the **olecranon fossa**, **coronoid fossa**, and **radial fossae**, (figure 4).



**Figure 4:** Distal end of the humerus.

\* **Trochlea:** is a projection that is shaped like a pulley and located medially, extending onto the posterior aspect of the humerus. It articulates with the ulna at the trochlear notch, (figure 4).

- \* **Capitulum:** is a rounded and convex projection on the distal end of the humerus, located lateral to the trochlea. It articulates with the head of the radius, (figure 4).
- \* **Medial epicondyle:** is a blunt projection that forms the end of the medial border of the humerus, (figure 4).
- \* **Lateral epicondyle:** is smaller than the medial, and it is where the lateral border of the humerus ends, (figure 4).
- \* **Olecranon fossa:** is a deep depression on the posterior surface of the distal end, superior to the trochlea. During the extension of the elbow, the tip of the ulnar olecranon process lodges into this fossa, (figure 4).
- \* **Coronoid fossa:** is a smaller depression that is also located superior to the trochlea but on the anterior surface of the humerus. Upon elbow flexion, the coronoid process of the ulna lodges into this fossa, (figure 4).
- \* **Radial fossa:** is a hollow area, which is located lateral to the coronoid fossa and superior to the capitulum of the humerus, the margin of the head of the radius lodges into this fossa upon full elbow flexion, (figure 4).

### **Ossification centers of the humerus bone:**

1. **Body:** (8<sup>th</sup> week) of fetal life.
2. **Head:** (1 year) of age.
3. **Capitulum:** (1 year).
4. **Greater tuberosity:** (3 years).
5. **Lesser tuberosity:** (5 years).
6. **Medial epicondyle:** (5 years).

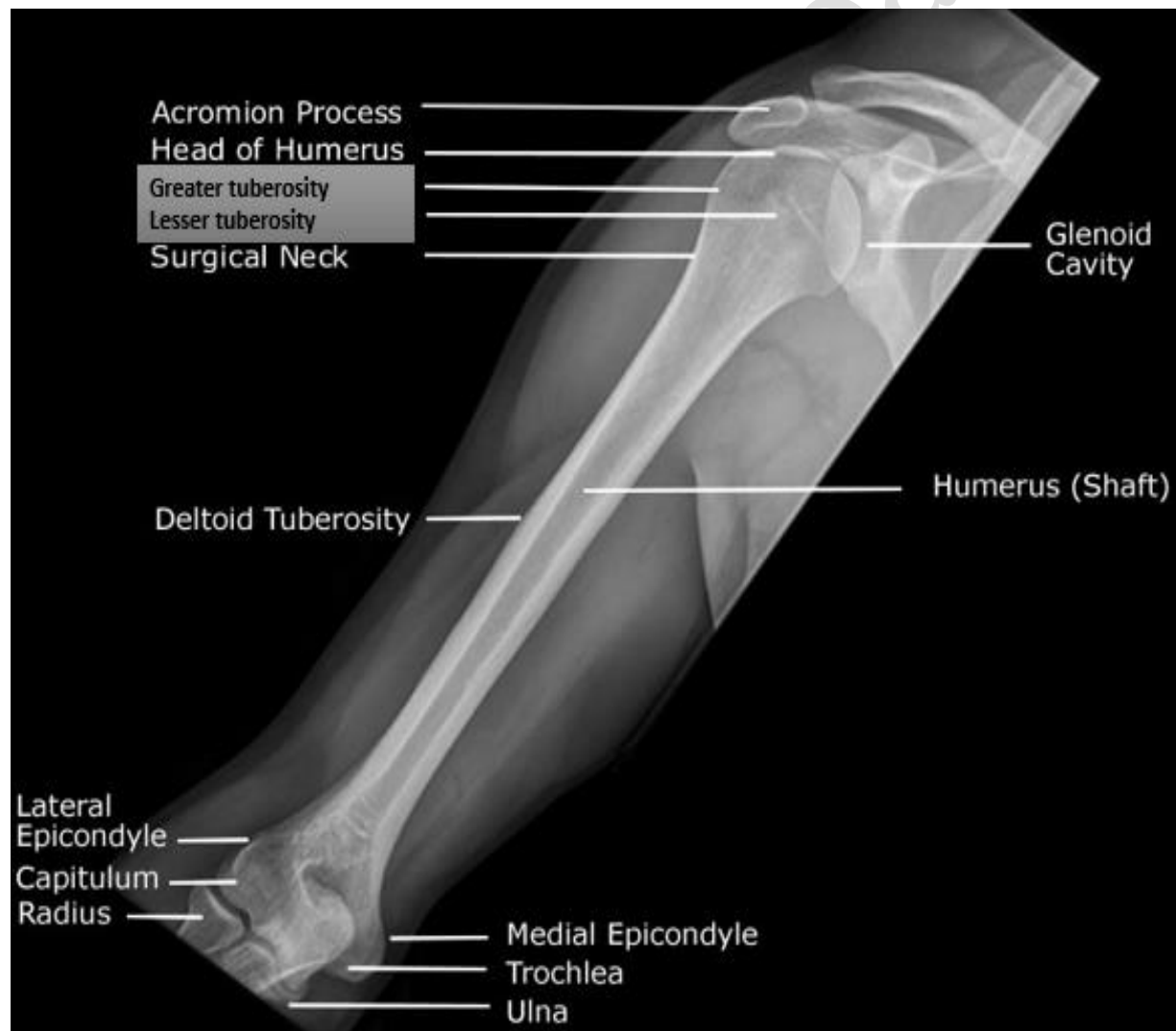
7. **Trochlea:** (9 years).

8. **Lateral epicondyle:** (11 years).

### Imaging of the humerus:

#### • Radiography:

Radiographic evaluation is essential to evaluate the position, location, and type of fracture, dislocation of the humerus and pathologic processes including osteoporosis. Images must include the shoulder and elbow joints. Anteroposterior (AP) and lateral views are obtained.



**Figure 5:** AP view of humerus bone.



**Figure 6:** Lateral view of humerus bone.



**Figure 7:** supracondylar fracture in the lower end of humerus.





**Figure 8:** Proximal humerus fracture (humeral surgical neck fracture).



**Figure 9:** Left humerus shaft fracture.