

# **Upper Limb Bones – Expanded Subtopics**

## **1. Clavicle – Features and Applied Anatomy**

- S-shaped bone acting as a strut between sternum and scapula.
- Medial end articulates with sternum (sternoclavicular joint); lateral end with acromion (acromioclavicular joint).
- Subcutaneous and palpable throughout its length.
- Fracture is common at the junction of medial 2/3 and lateral 1/3.
- Protects neurovascular structures like subclavian vessels and brachial plexus.

## **2. Scapula – Features and Applied Anatomy**

- Flat triangular bone over the posterior thoracic wall (2nd to 7th ribs).
- Has spine, acromion, coracoid process, glenoid cavity for humeral articulation.
- Serves as attachment site for multiple muscles including rotator cuff.
- Winged scapula occurs due to long thoracic nerve injury affecting serratus anterior.
- Fractures are rare and usually associated with high-energy trauma.

### **3. Humerus – Features and Applied Anatomy**

- Longest bone of upper limb; articulates proximally with scapula and distally with radius and ulna.
- Proximal features: head, anatomical and surgical neck, greater and lesser tubercles.
- Shaft features radial groove (for radial nerve) and deltoid tuberosity.
- Distal features: capitulum, trochlea, medial/lateral epicondyles, olecranon fossa.
- Common fracture sites: surgical neck (axillary nerve), shaft (radial nerve), medial epicondyle (ulnar nerve).

## **4. Radius – Features and Applied Anatomy**

- Lateral bone of the forearm; participates in both elbow and wrist joints.
- Head articulates with capitulum and radial notch (for rotation).
- Radial tuberosity for biceps insertion; distal end forms styloid process.
- Fractures include Colles' (distal radius, dorsal displacement) and Smith's (ventral displacement).
- Involved in pronation and supination with ulna.

## **5. Ulna – Features and Applied Anatomy**

- Medial bone of the forearm; larger proximally, tapers distally.
- Olecranon process fits into olecranon fossa of humerus during extension.
- Coronoid process, trochlear notch, and ulnar tuberosity are key landmarks.
- Styloid process at distal end; does not articulate directly with wrist bones.
- Monteggia fracture: ulnar shaft fracture with radial head dislocation.

# Ossification – Centers and Timelines

## 1. Clavicle

- First bone to begin ossification in the body (5th–6th week intrauterine life).
- Has both membranous and endochondral ossification.
- Primary center: shaft (5th–6th week IUL).
- Secondary center: sternal end (appears at 18–20 years, fuses by 25 years).

## 2. Humerus

- Primary center: shaft (8th week IUL).
- Secondary centers:
  - Head – appears at birth.
  - Greater tubercle – appears around 1 year.
  - Lesser tubercle – appears around 3–5 years.
  - Fusion of all epiphyses with shaft: 20 years.

### **3. Radius**

- Primary center: shaft (8th week IUL).
- Secondary centers:
  - Lower end – appears at 1 year, fuses by 20 years.
  - Head (upper end) – appears at 5 years, fuses by 18 years.

### **4. Ulna**

- Primary center: shaft (8th week IUL).
- Secondary centers:
  - Lower end – appears at 6 years, fuses by 20 years.
  - Olecranon (upper end) – appears at 10 years, fuses by 16 years.