

Lecture 12

The skeletal system VI - The Shoulder Girdle. The Upper Limb

Plan of the Lecture

1. The Pectoral Girdle
 - a. The Clavicle
 - b. The Scapula
2. The Upper Limb
 - a. The Humerus
 - b. The Radius
 - c. The Ulna
 - d. The Carpal Bones
 - e. The Metacarpal Bones
 - f. The Phalanges

LEARNING OUTCOMES

1. identify and describe the features of the clavicle, scapula, humerus, radius, ulna, and bones of the wrist and hand.

The pectoral girdle (shoulder girdle) supports the arm and links it to the axial skeleton. It consists of two bones on each side of the body: the clavicle (collarbone) and scapula (shoulder blade). The medial end of the clavicle articulates with the sternum at the sternoclavicular joint, and its lateral end articulates with the scapula at the acromioclavicular joint. The scapula also articulates with the humerus at the glenohumeral joint. These are loose attachments that result in a shoulder far more flexible than that of most other mammals, but they also make the shoulder joint easy to dislocate. The clavicle is slightly S-shaped, somewhat flattened from the upper to lower surface, and easily seen and palpated on the upper thorax. The superior surface is relatively smooth and rounded, whereas the inferior surface is flatter and marked by grooves and ridges for muscle attachment. The medial sternal end has a rounded, hammerlike head, and the lateral acromial end is markedly flattened. Near the acromial end is a rough tuberosity called the conoid tubercle—a ligament attachment that faces toward the rear and slightly downward. The scapula, named for its resemblance to a spade or shovel, is a triangular plate that posteriorly overlies ribs 2 through 7. Its only direct attachment to the thorax is by muscles; it glides across the rib cage as the arm and shoulder move. The three sides of the triangle are called the superior, medial (vertebral), and lateral (axillary) borders, and its three angles are the superior, inferior, and lateral angles. A conspicuous suprascapular notch in the superior border provides passage for a nerve. The broad anterior surface of the scapula, called the subscapular fossa, is slightly concave and relatively featureless. The posterior surface has a transverse ridge called the spine, a deep indentation superior to the spine called the supraspinous fossa, and a broad surface inferior to it

called the infraspinous fossa. Each upper limb contains 30 bones distributed in the following regions. 1. The arm proper (brachial region or brachium) extends from shoulder to elbow. It contains only one bone, the humerus. 2. The forearm (antebrachial region or antebrachium) extends from elbow to wrist and contains two bones: the radius and ulna. In anatomical position, these bones are parallel and the radius is lateral to the ulna. 3. The hand consists of the carpal region, with 8 small carpal bones arranged in two rows in the base of the hand; the metacarpal region in the palm, with 5 bones; and the fingers (digits), with 14 bones. The two hands together contain over one-quarter of all the bones in the body. Note that what we colloquially call the wrist—the narrow region where one might wear a bracelet or wristwatch—is not what anatomists call the wrist (carpal region): the thick, fleshy base of the hand proximal to the hollow of the palm. The humerus has a hemispherical head that articulates with the glenoid cavity of the scapula. The smooth surface of the head (covered with articular cartilage in the living state) is bordered by a groove called the anatomical neck. Other prominent features of the proximal end are muscle attachments called the greater and lesser tubercles and an intertubercular sulcus between them that accommodates a tendon of the biceps muscle. The surgical neck, a common fracture site, is a narrowing of the bone just distal to the tubercles, at the transition from the head to the shaft. The shaft has a rough area called the deltoid tuberosity on its lateral surface. This is an insertion for the deltoid muscle of the shoulder. The radius has a distinctive discoidal head at its proximal end. When the forearm is rotated so the palm turns forward and back, the circular superior surface of this disc spins on the capitulum of the humerus, and the edge of the disc spins on the radial notch of the ulna. Immediately distal to the head, the radius has a narrower neck and then widens to a rough prominence, the radial tuberosity, on its medial surface. The distal tendon of the biceps muscle terminates on this tuberosity. At the proximal end of the ulna is a deep, C-shaped trochlear notch that wraps around the trochlea of the humerus. The posterior side of this notch is formed by a prominent olecranon—the bony point where you rest your elbow on a table. The anterior side is formed by a less prominent coronoid process. Laterally, the head of the ulna has a less conspicuous radial notch, which accommodates the edge of the head of the radius. At the distal end (head) of the ulna is a medial styloid process. The bony lumps you can palpate on each side of your wrist are the styloid processes of the radius and ulna. Notice that the “heads” of the radius and ulna are at opposite ends—the proximal end of the radius but distal end of the ulna. The carpal bones are arranged in two rows of four bones each. Although they are colloquially called wrist bones, the narrow point where one might wear a wristwatch is at the distal end of the radius and ulna. The short carpal bones allow movements of the hand from side to side and anterior to posterior. Bones of the palm are called metacarpals. Metacarpal I is located proximal to the base of the thumb and metacarpal V proximal to the base of the little finger. On a skeleton, the metacarpals look like extensions of the fingers, making the fingers seem much longer than they

really are. The proximal end of a metacarpal bone is called the base, the shaft is called the body, and the distal end is called the head. The heads of the metacarpals form the knuckles when you clench your fist. The bones of the fingers are called phalanges, in the singular, phalanx. There are two phalanges in the pollex (thumb) and three in each of the other digits. Phalanges are identified by roman numerals preceded by proximal, middle, and distal.

Check yourself! The questions for self-control

1. Describe how to distinguish the medial and lateral ends of the clavicle from each other, and how to distinguish its superior and inferior surfaces.
2. Name the three fossae of the scapula and describe the location of each.
3. What three bones meet at the elbow? Identify the fossae, articular surfaces, and processes of this joint and state to which bone each of these features belongs.
4. Name the four carpal bones of the proximal row from lateral to medial, then the four bones of the distal row in the same order.
5. Name the four bones from the tip of the little finger to the base of the hand.

Recommended readings:

1. Kenneth S Saladin - Anatomy & Physiology. The Unity of Form and Function (2016, McGraw-Hill Education)
2. Barbara Gylys - Medical Terminology Systems (2012, F.A. Davis Company)
3. Richard L. Drake A. Wayne Vogl, Adam W. M. Mitchell - Gray's Atlas of Anatomy, Second Edition (2015, Churchill Livingstone Elsevier)