Systematic Anatomy
(For international students)

Department of Anatomy, Fudan University

Teaching contents
The bones of upper limb
and their articulation

Dr. Hongqi Zhang (张红旗)
Email: zhanghq58@126.com
The bones of upper limb and their junction

The upper limb is characterized by considerable mobility and is adapted for grasping & manipulation.
Bones of Shoulder girdle
- Clavicle 1
- Scapula 1

Bones of free upper limb
- Humerus 1
- Ulna 1
- Radius 1
- Carpal bones 8
- Metacarpal bones 5
- Phalangeal bones 14
Clavicle

S-shaped, long bone
1 shaft & 2 ends
medial 2/3 convex forward
lateral 1/3 convex backward
Sternal end medially
Acromial end laterally
Superior surface
Inferior surface

Fracture of the clavicle

Superior view (right)

Inferior view (right)

Fall down
Scapula

A broad triangular flat bone
Lie on posterolateral aspect of the thorax
Overlying the 2nd - 7th ribs

Morphological features:
three angles, three borders, two surfaces
Scapula

Ant. Surface: concave subscapular fossa
Post. surface: convex spine of scapula supraspinous fossa Infraspinous fossa acromion

Two surfaces

Observe the specimen
Scapula

Three borders

Superior border:
Lateral (axillary) border
Medial (vertebral) border
coracoid process
scapular notch
Scapula

Superior: opposite to the 2nd rib
Inferior: opposite to the 7th rib or 7th intercostals space
Lateral: glenoid cavity
supra- and infraglenoid tubercles

Three angles

Anterior view

Lateral view
Bones of free upper limb

1-Humerus 1
2-Ulna 1
3-Radius 1
4-Carpal bones 8
5-Metacarpal bones 5
6-Phalangeal bones 14
A largest and longest bone in the upper limb

A long bone in arm
1 body
2 ends
   Upper end
   Lower end

Bones of right upper limb
Humerus

◆ Upper end:
  head of humerus, anatomical neck
  Surgical neck
  greater tubercles
  lesser tubercles,
  crests of greater & lesser tubercle,
  intertubercular sulcus

Observe the specimen
Humerus

Shaft:
- deltoid tuberosity
- Radial groove

Lower end:
- Lat. & med epicondyle
- capitulum, trochlea
- olecranon fossa
- sulcus for ulnar n.

Observe the specimen
Ulna

Upper end
Olecranon
Trochlear notch
Coronoid process
Radial notch of ulna
Ulnar tuberosity
Interosseous border
Body
Interosseous border
Lower end
Styloid process of ulna
Ulnar notch
Articular circumference

Observe the specimen

Right radius & ulna
in supination

Observe the specimen
Radius

- **Upper end**
  - head of radius
  - neck of radius
  - radial tuberosity
  - articular circumference

- **Shaft:**
  - interosseous border

- **Lower end:**
  - styloid process laterally,
  - ulnar notch medially,
  - carpal articular surface

Observe the specimen
Bones of the hand

Carpal 8
Metacarpal 5
Phalangeal 14
Carpal bones

Proximal row
(lateral to medial)
S-Scaphoid
L-Lunate
T-Triquetral
P-Pisiform

Distal row
(lateral to medial)
Tm-Trapezium
Td-Trapezoid
C-Capitate
H-Hamate
Joints of the upper limb

- Joints of should girdle
- Joints of the free upper limb bone
The medial end of the clavicle articulate with the manubrium sterni and it is the only direct connection between the shoulder girdle & axial skeleton. The lateral end articulates with the acromion of the scapula.
Sternoclavicular joint

Movements:
Elevation and depression,
Forward and backward,
Rotation and circumduction

Acromioclavicular joint

Coracoacromial lig

Coranoid process
Joints of free upper limb bone

- The Shoulder joint
- The Elbow joint
- The Joint of the ulna and the radius
- The Wrist joint
- The Joints of the hand
Shoulder joint

Classification:
- ball and socket joint
- multiaxial synovial joint
- the most flexible joint

Bones:
- head of humerus and glenoid cavity of scapula

Capsule:
- Thin and lax, especially (lower part)

Attachments:
- proximal to glenoid labrum
- distal to anatomical neck
- Lower wall of capsule is lax
- Tendon of long head of biceps brachii
Shoulder joint

• Accessory structures
  – Glenoid labrum:
    Coracohumeral lig

• Movements:
  Flexion, extension,
  Adduction, abduction,
  Medial Rotation
  Lateral Rotation,
  Circumduction

Easy to dislocate to anterior and inferior direction

Anterior dislocation of right shoulder
Elbow joint

Bones:
lower end of humerus, upper ends of radius and ulna

- **Humeroulnar joint** - 1
  Formed by trochlear of humerus & troclear notch (hinge)

- **Humeroradial joint** - 2
  Formed by capitulum of humerus & head of radius (ball and socket)

- **Proximal radioulnar joint** - 3
  Formed by articular circumference of radius and radial notch of ulna
Elbow joint

**Capsule**: thin and lax

**Ligaments**

- **Radial collateral lig-1.**
  Attached to lateral epicondyle & annular ligament of radius

- **Ulnar collateral lig-2.**
  Attached to medial epicondyle to medial border of trochlear notch

- **Annular lig.of radius-3**
  Attached to ant. & post.margins of radial notch of ulna, surrounds the head of radius
Joints between radius and ulna

1-Proximal radioulnar joint
2-Distal radioulnar joint
   Formed by head of ulna, ulnar notch of radius and an articular disc
3-Interosseous membrane of forearm
   A fibrous membrane between the shaft of radius and ulna
The movement of the forearm bones

Ant. view supination  Ant. view pronation
Joint of the hand

- Radiocarpal joint
- Carpometacarpal joint
- Intercarpal joint
- Intermetacarpal joint
- Metacarpophalangeal joint
- Interphalangeal joint
Radiocarpal joint (ellipsoid)

Bones
- Carpal articular surface of radius & articular disc below the ulna
- Proximal row of carpal: Scaphoid, lunate, triquetral bones, but not pisiform

Capsule: Lax & strengthened by surrounding lig.

Movements:
- Flexion & extension,
- Adduction & abduction,
- & circumduction

Ligaments of wrist coronal section-dorsal view
Joints of the hand

Intercarpal joints
Carpometacarpal joints:
★ Carpometacarpal joint of thumb Bones:
  trapezium and base of first metacarpal
Movement:
  Flexion & extension,
  Adduction & abduction
  and opposition
Intermetacarpal joints
Metacarpophalangeal joints
Interphalangeal joints

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Bones of Shoulder girdle

Clavicle 1
Scapula 1

Bones of free upper limb

Humerus 1
Ulna 1
Radius 1
Carpal bones 8
Metacarpal bones 5
Phalangeal bones 14
◆ The Shoulder joint
◆ The Elbow joint
◆ The Joint of ulna & radius
◆ The Wrist joint
◆ The Joints of the hand
Muscle of rotator cuff
Posterior view

Muscle of rotator cuff
Anterior view

Dislocation of shoulder joint
Elbow: lateral radiograph

Elbow: anteroposterior radiograph

Subluxation and dislocation
X-ray of upper limb bones-fRACTURE

The fracture of the humerus  Double fracture of the forearm
Fracture of the distal end of the radius

Colles’ fracture
Within 2.5cm distal end of radius
Wrist and hand; anteroposterior radiograph

Metacarpal fracture
Upper Limb X-ray
Upper Limb X-ray

Surgical neck fracture

Fracture of the ulnar

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kyphosis  

scoliosis  

scoliosis
The important contents today

- Master the name, number and location of the upper limb bones
- Master the morphological feature of the scapular, humerus, ulna and radius
- Master the arrangement of the hand bone
- Master the structure and movement of the shoulder joint, elbow joint and the wrist joint.
knowledge related to the clinic

- Fracture of clavicle
- Fracture of scapula
- Fracture of surgical neck of humerus
- Fracture of shaft of humerus
- Supracondylar fracture of the humerus
- Fracture of ulna
- Fracture of radius
- Double fracture of both radius & ulna
- Colle’s fracture
  - Within 2.5 cm distal end of radius
- Shoulder dislocation
- Subluxation of capitulum radius
The end! Good luck to you!
## Description of bones of upper limb

<table>
<thead>
<tr>
<th>Bone</th>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scapula</td>
<td>• Glenoid fossa</td>
<td>• Depression that articulates with humerus</td>
</tr>
<tr>
<td></td>
<td>• Spine</td>
<td>• Long, posterior process for muscle attachment</td>
</tr>
<tr>
<td></td>
<td>• Acromion process</td>
<td>• Articulates with clavicle</td>
</tr>
<tr>
<td>Clavicle</td>
<td>• Acromial end</td>
<td>• Articulates with scapula</td>
</tr>
<tr>
<td></td>
<td>• Sternal end</td>
<td>• Articulates with manubrium of sternum</td>
</tr>
<tr>
<td>Humerus</td>
<td>• Head</td>
<td>• Round process that articulates with scapula</td>
</tr>
<tr>
<td></td>
<td>• Deltoid tubercle</td>
<td>• Round process for the deltoid muscle</td>
</tr>
<tr>
<td></td>
<td>• Olecranon fossa</td>
<td>• Posterior, oval depression for the olecranon process of the ulna</td>
</tr>
<tr>
<td></td>
<td>• Capitulum</td>
<td>• Round process superior to radius</td>
</tr>
<tr>
<td></td>
<td>• Trochlea</td>
<td>• Concave surface that articulates with ulna</td>
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| Ulna       | • Olecranon process  
             | • Semilunar notch                                     | • Fits into olecranon fossa of humerus  
             |                                                           | • “Half-moon” depression that articulates with the trochlea of ulna |
| Carpals (8)| • Scaphoid    
             | • Lunate      
             | • Triquetrum  
             | • Pisiform    
             | • Trapezium   
             | • Trapezoid   
             | • Capitate    
             | • Hamate      | • Proximal row  
             |                                                           | • Distal row |