

Pectoral girdle, SUPERIEUR ARM AND HAND

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csongradi 2001 The pectoral girdle is the set of bones which connect the upper limb to the axial skeleton on each side.

It consists of the

- clavicle
- scapula in humans

•in those species with three bones in the pectoral girdle, the coracoid.

•No joint exists between each clavicle and the thorax, instead the muscular connection between the two permits relatively great mobility of the shoulder girdle in relation to the pelvic girdle.



•In humans, the only joints between shoulder girdle and axial skeleton are the sternoclavicular joints on each side.

Pectoral girdle

•pectoral girdle = 2 clavicles + 2 scapulae

•*clavicle:* collar bone; keeps shoulders apart; vestigial or absent in quadrupeds; synovial jts with acromion process of scapula, and manubrium (sternum)

•<u>scapula</u>: shoulder blade; flat bone; coracoid process/spine: sites for muscle attachments to arm/thorax; extension of quadr limb (scapula glide); glenoid fossa forms synovial jt (shoulder) with humerus

- 1. Clavicle
- 2. Scapula
- 3. Humerus
- 4. Sternum
- 5. Cervical vertebrae
- 6. Thoracic vertebra



First rib
 Scapula
 Humerus
 Humerus
 Cervical
 vertebrae
 Thoracic
 vertebrae

three year old boy

clavicle

growth – plate

scapula

humerus

anterior-posterior view

clavicle, coracoid process and acromion. Immediately under the skin, the **pectoralis major**, **deltoid**, and **trapezius muscles** can be palpated.

The **clavipectoral triangle** (or deltopectoral triangle), which contains the cephalic vein, is bordered by the clavicle, pectoralis major muscle and deltoid muscle.

Finally, remember that the **neurovascular bundle** containing the axillary artery, axillary vein and brachial plexus courses under the clavicle and deep to the pectoralis major and minor before coursing into the arm.

Bony landmarks include the spine of the scapula, medial border of the scapula, and the acromion. Superficial muscles include the three parts of the trapezius, the deltoid, the teres major and the latissimus dorsi

coracoid process acromion clavicle coracoclavicular space

acromioclavicular space

medial border of scapula

Subscapular

fossa

RIGHT CLAVICLE, SUPERIOR VIEW

• A). clavicle

•acromial end- is flat and has a sm facet for articulation with the acromion;
•sternal end- has a large facet for articulation with the manubrium, and first costal cartilag
•conoid tubercle- conoid ligament the coracoclavicular
ligament attaches here;

Right

ANTERIOR VIEW

- B). scapula
- posterior surface

 spine
 acromion
 coracoid process
 suprascapular notch
 supraspinous fossae
 infraspinous fossae
- 2). borders
 - superior bordermedial borderlateral border
- 3). anterior surface•scapular fossae
- 4). lateral end•glencoid cavity

Joints

•*Glenohumeral* - humerus articulating with glenoid fossa of scapula

•Sternoclavicular (SC) - proximal clavicle articulating with manubrium and cartilage of rib 1

•Acromioclavicular (AC) - acromian process of scapula articulating with distal clavicle

•*Coracoclavicular* - coracoid process of scapula articulating with inferior clavicle

•Scapulothoracic - anterior scapula articulating with thoracic wall

Movements of Scapula and Muscles Causing Movement:

- Protraction (scapular abduction) serratus anterior, pectoralis minor
- •*Retraction (scapular adduction)* trapezius, rhomboid, levator scapulae
- Downward Rotation rhomboids, pectoralis minor
- Upward rotation trapezius, serratus anterior
- Depression trapezius (lower), pectoralis minor, subclavius
- Elevation trapezius (upper), levatro scapulae, rhomboid

POSTERIOR VIEW

•acromion-lateral extension of spine of scapula; •spine of scapula- the trapezius and deltoid attach here: •greater scapular notch- point at which the spine of the scapula ends, but the acromion continues; •coracoid process- partially seen as it projects anteriorly; •supraspinous fossa- the supraspinatus muscle originates here (part of rotator cuff); •infraspinous fossa- the infraspinatous muscles originates here (part of rotator cuff); •lateral border- teres minor muscle attaches here (part of rotator cuff), as does the teres major and the long head of the triceps brachii.

LATERAL VIEW

supraglenoid tubercle- the long head of the biceps brachii attaches here;
infraglenoid tubercle- the long head of the triceps brachii attaches here;
spinous process- divides the

supraspinous process- divides the supraspinous and infraspinous fossae, and serves as attachment for the deltoid and

trapezius muscles;

•acromion- articulates with the clavicle and is an attachment for the trapezius and deltoid musscles;

•superior and inferior angles;

•coracoid process- serves as an attachment point for the short head of the biceps brachii, corachobrachialis, and pectoralis minor.

Glenohumeral joint

Upper Arm: humerus

A variety of muscles attach to the humerus. These enable movement at the elbow and at the shoulder. The rotator cuff muscles attach at the *proximal* humerus, and can rotate and abduct the arm at the shoulder. Some of the forearm muscles, (such as pronator teres, and the flexors and extensors of the wrist) also attach to the *distal* humerus

- proximal end
 head of the humerus
 greater & lesser tubercle
- 2). distal end
 •condyle
 •capitulum
 •trochlea

epicondyle3). fossacoronoid fossa

•olecranon

1. Head

- 2. 2. Anatomical Neck
- 3. 3. Lesser Tubercle
- 4. 4. Intertubercular Groove
- 5. 5. Greater Tubercle
- 6. 6. Surgical Neck
- 7. 7. Deltoid Tuberosity

1. Radial Fossa

- 2. 2. Lateral Epicondyle
- 3. 3. Capitulum
- 4. 4. Trochlea
- 5. 5. Medial Epicondyle
- 6. 6. Coronoid Fossa
- 7. 7. Olecranon Fossa

Epiphyses of head and tubercles blend at fifth year, and unite with body at twentieth year

l. Body

Blend and white with Blend and white

80

Epiphysial lines of humerus in a young adult. Anterior aspect. The lines of attachment of the articular capsules are in blue.

Unites with body at eighteenth year

conor 1

Common Shoulder Injuries

Dislocation - anteriorly (subcoracoid), posteriorly (subspinous) or downward (subglenoid) are three most common
common when humerus is abducted and externally rotated
Rotator Cuff Damage (impingement syndrome, tears, especially "throwers" [javelin, tennis, pitchers, swimmers])
Subscapular Neuropathy - denervation of infraspinatus with accompanying loss of strength during external rotation of humerus that is common in volleyball

Forearm

line radius up with thumb line ulna up with little finger

A). ulna

proximal

 olecranon
 coronoid process
 troclear notch
 radial notch

2). distal•head of the ulna•styloid process

- B). radius
- proximal

 head of the radius
 radial tuberosity
- 2). distal•ulnar notch•styloid process

Joints

•*Humeroulnar Joint* - hinge joint (between trochlea and trochlear notch of ulna = "*elbow joint*")

•*Humeroradial Joint* - gliding joint (between capitulum and proximal head of radius)

• Proximal Radioulnar Joint - pivot joint (annular ligament binds radial head of radius to radial notch of ulna)

Ulna - Proximal & Distal End (Anterior Aspect)

- I. Olecranon Process
- 2. 2. Semilunar Notch
- 3. 3. Coronoid Process
- 4. 4. Tuberosity
- 5. 5. Radial Notch
- 6. 6. Ulna (Shaft)
- 7. 7. Head of Ulna
- 8. 8. Styloid Process

RADIUS

- 1. Head of Radius
- 2. 2. Neck of Radius
- 3. 3. Radial Tuberosity
- 4. 4. Radius (Shaft)
- 5. 5. Styloid Process
- 6. 6. Ulnar Notch

Wrist and Hand

Bones (29 including radius and ulna) •radius/ulna

carpals
proximal row (medial to lateral)
scaphoid, lunate, triquetrum, pisiform
distal row (medial to lateral)
trapezium, trapezoid, capitate, hamate
metacarpals
phalanges

- A). carpals
- 1). proximal (articulate radius and ulna)
- a). scaphoid
- b). luna
- c). triquetral
- d). pisiform
- 2). distal (articulate with metacarpals)
- a). trapezium
- b). trapezoid
- c). capitate
- d). hamate
- B). metacarpals

numbered 1 to 5 starting with the thumb side

C). phalanges

numbered 1 to 5 starting with the thumb side

- proximal phalanx
- medial phalanx
- •distal phalanx

Bones of the Right Hand (Dorsal Surface)

- 1. Styloid Process of Radius
- 2. 2. Navicular (Scaphoid)
- 3. 3. Lunate
- 4. 4. Triquetral
- 5. 5. Pisiform
- 6. 6. Trapezium
- 7. 7. Trapezoid
- 8. 8. Capitate
- 9. 9. Hamate
- 10. 10. Metacarpal
- 11. 11. Proximal Phalange
- 12. 12. Middle Phalange
- 13. 13. Distal Phalange
- 14. 14. Styloid Process of Ulna

Bones of the Right Hand (Palmar Surface)

- 1. Navicular (Scaphoid)
- 2. 2. Lunate
- 3. 3. Triquetral
- 4. 4. Pisiform
- 5. 5. Trapezium
- 6. 6. Trapezoid
- 7. 7. Capitate
- 8. 8. Hamate
- 9. 9. Metacarpal
- 10. 10. Proximal Phalange
- 11. 11. Middle Phalange
- 12. 12. Distal Phalange

Some upper extremity bones and landmarks to be familiar with

Clavicle:

Acromioclavicular [AC] joint (acromian process and distal •Acromial extremity clavicle) •Conoid tubercle •Subclavian groove •Costal tuberosity •Sternal extremity Sternoclavicular [SC] joint (proximal clavicle and manubrium + **1st rib**) **Scapula:** •Acromian process •Coracoid process **Coracovicular joint (coracoid process and inferior clavicle)** •Scapular notch Superior border •Medial border Scaupolothoracic joint (anterior scapula and thoracic wall) •Lateral border •Superior angle •Inferior angle •Subscapular fossa •Infraspinous fossa •Supraspinous fossa •Glenoid fossa **Glenohumeral joint (humeral head and glenoid fossa)** •Spine

Humerus:

•Head	
•Neck	
•Greater tuber	cle
•Lesser tuberc	le
•Intertubercula	ar (bicipital) groove
•Deltoid tubero	osity
•Shaft (diaphys	sis)
•Lateral supra	condylar ridge
•Lateral epicor	ndyle
•Capitulum	Humeroradial joint (gliding joint between capitulum and radial head)
•Radial fossa	
•Medial suprac	condylar ridge
•Medial epicon	dyle
•Trochlea	Humeroulnar joint (humeral trochlea and trochlear notch of ulna) "elbow
joint''	
 Coronoid foss 	a
 Olecranon fos 	sa
Radius:	
•Head	Radioulnar joints
•Neck	
 Radial tubero 	sity
•Shaft (diaphys	sis)
•Styloid proces	

•Styloid process

Ulna:

•Olecranon process •Semilunar (trochlear) notch •Coronoid process •Ulnar tuberosity •Shaft (diaphysis) •Head •Styloid process Wrist/Hand: Wrist joint (condyloid between distal radius and proximal carpals) **Carpals: (radial to ulnar)** •Proximal Row **Intercarpals** (gliding or plane joints between carpal bone) •Scaphoid •Lunate •Triquetrum •Pisiform •Disal Row •Trapezium •Trapezoid •Capitate •Hamate

5 Metacarpals (**1** = thumb) Carpometacarpal (CMC) (saddle for 1, plane for 2-5)

Phalanges/digits (14 per hand)

•5 proximal phalanges

Proximal Interphalangeal (PIP) (hinge joint between 1st

and 2nd phalanges of 2-5)

Interphalangeal (IP) (hinge joint on thumb only between

distal and proximal phalanx)

- •4 middle phalanges (thumb doesn't have)
- •5 distal phalanges

Distal Interphalangeal (DIP) (hinge joint between middle and distal phalanges of 2-5)

Want an easy way to remember the carpal bones?!? Remember this... Naughty (Navicular) Lovers (Lunate) Try (Triquetral) **P**ositions (Pisiform) That (Trapezium) They (Trapezoid) Can't (Capitate) Handle (Hamate)

WHAT'S WRONG

Comminuted clavicle fracture; Note 5th rib fracture in addition

Fracture Dislocations of the Proximal Humerus:

anterior-posterior view: adult

R

100

ulna

humerus

plates & screws

radius