Anatomy and Physiology II

Review Bones of the Upper Extremities

Muscles of the Upper Extremities
Anatomy and Physiology II

Review

Bones of the Upper Extremities
Questions From Shoulder Girdle Lecture

- Can you name the following structures?
  - F
    - Acromion
  - B
    - Spine of the Scapula
  - C
    - Medial (Vertebral) Border
  - E
    - Lateral (Axillary) Border
  - A
    - Superior Angle
  - D
    - Inferior Angle
  - G
    - Head of the Humerus
  - H
    - Greater Tubercle of Humerus
  - I
    - Deltoid Tuberosity
Questions From Shoulder Girdle Lecture

- Would you be able to find the many of the same landmarks on this view (angles, borders, etc)?
- Can you name the following?
  - D
    - Coracoid process of scapula
  - C
    - Lesser Tubercle
  - A
    - Greater Tubercle
  - B
    - Bicipital Groove (Intertubercular groove)
Questions From Upper Extremities Lecture

• Can you name the following structures?
  – B
    • Lateral epicondyle
  – A
    • Medial epicondyle
Questions From Upper Extremities Lecture

- Can you name the following landmarks?
  - C
    - Olecranon process
  - A
    - Head of the radius
  - B
    - Medial epicondyle
  - D
    - Lateral epicondyle
Questions From Upper Extremities Lecture

• Can you name the following bones and landmarks?
  – Which bone is A pointing to?
    • Ulna
  – Which bone is B pointing to?
    • Radius
  – C
    • Styloid process of the ulna
  – D
    • Styloid process of the radius
  – E
    • Interosseous membrane of forearm
Questions From Upper Extremities Lecture

- Can you name the following bony landmarks?
  - Which landmark is A pointing to?
    - Lateral epicondyle of humerus
  - Which bone is B pointing to?
    - Medial epicondyle of humerus
  - C
    - Olecranon process of the ulna
  - D
    - Lateral supracondylar ridge of humerus
  - E
    - Interosseous membrane of forearm
  - F
    - Radial tuberosity
• Name the following carpal bones
  – A
    • Scaphoid
  – B
    • Trapezoid
  – C
    • Trapezium
  – D
    • Lunate
  – E
    • Capitate
  – F
    • Triquetrum
  – G
    • Pisiform
  – H
    • Hamate
Name the following carpal bones

- A
  - Triquetrum
- B
  - Hamate
- C
  - Capitate
- D
  - Trapezoid
- E
  - Trapezium
- F
  - Scaphoid
- G
  - Lunate
Anatomy and Physiology II

Muscles of the Upper Extremities
Muscles

• Muscles that move the forearm and hand
  – Biceps brachii
  – Triceps brachii
  – Bracioradialis, Extensor carpi radialis (longus and brevis), Extensor carpi ulnaris
  – Pronator teres, Flexor carpi radialis, Palmaris longus, Flexor carpi ulnaris

• Muscles that move the hand and fingers
  – Finger flexors: Flexor digiti superficialis, Flexor digiti profundus,
  – Finger extensors: Extensor digitorum, Extensor digiti minimi
  – Anatomic snuffbox
    • Abductor pollicis longus, extensor pollicus brevis, extensor pollicis longus
Muscles of the Anterior Arm

Superficial Layer
- Biceps Brachii

Deep Layer
- Coracobrachialis
- Brachialis
The biceps brachii contains two heads, a long head and a short head.

**Attachments**
- Supraglenoid tubercle (long head) and coracoid process (short head) of the scapula to the radial tuberosity and the deep fascia overlying the common flexor tendon.

**Action**
- Flexes the forearm at the elbow joint, supinates the forearm at the elbow joint.
- Flexes the arm at the shoulder joint.
Muscles of the Posterior Arm

Superficial Layer

- Triceps Brachii
  - Long Head

Deep Layer

- Triceps Brachii
  - Lateral Head

- Triceps Brachii
  - Medial Head
Triceps Brachii

- The only muscle on the posterior arm
- Contains three heads
- Do not need to know attachments for the test
- Action
  - Extends the forearm at the elbow joint
  - Extends the arm at the shoulder joint (long head)
Muscles of the Anterior Forearm

- Biceps Brachii
- Pronator Teres
- Flexor Carpi Radialis
- Palmaris Longus
- Flexor Carpi Ulnaris
- Brachioradialis
Muscles of the Anterior Forearm

Superficial Layer
- Flexor Carpi Radialis
- Palmaris Longus
- Flexor Carpi Ulnaris

Intermediate Layer
- Flexor Digitorum Superficialis
- Flexor Pollicis Longus

Deep Layer
- Flexor Digitorum Profundis
Muscles of the Anterior Forearm

- These muscles have a common origin at the medial epicondyle of the humerus which is referred to as the common flexor tendon
  - **Common flexor tendon also includes the pronator teres and flexor digiti superficialis**
  - **The flexor carpi ulnaris also has an attachment on the proximal 2/3 of the ulna**

- They cross the wrist joint
  - **FCR attaches to the base of the 2nd and 3rd metacarpal**
  - **Palmaris longus attaches into the palmar aponeurosis**
    - An aponeurosis is a flat tendon
  - **FCU attaches to the base of the 5th metacarpal, the pisiform and the hook of the hamate**

- Actions
  - All flex the hand at the wrist joint
  - FCR radially deviates the hand at the wrist joint
  - FCU ulnar deviates the hand at the wrist joint

- For the test: not necessary to know specifics
  - Know that they all have a common attachment as part of the common flexor tendon on the medial epicondyle of the humerus
  - Know the actions of each
  - Know what an aponeurosis is
Muscles of the Posterior Forearm

- Brachioradialis
- Extensor Carpi Radialis Longus
- Extensor Carpi Radialis Brevis
- Extensor Digitorum
- Extensor Digitorum Minimi
- Extensor Carpi Ulnaris
Muscles of the Posterior Forearm
Muscles of the Posterior Forearm

- All of these muscles have a common origin at the lateral epicondyle
  - ECRL is on the supracondylar ridge
- They cross the wrist joint
  - ECRL attaches to the base of the 2nd metacarpal, ECRB attaches to the base of the 3rd metacarpal
  - Extensor digitorum attaches to the digits (middle and distal phalanx) of fingers 2-5, Extensor digiti minimi attaches to the little finger (posterior surface of the middle and distal phalanx of finger 5)
  - FCU attaches to the base of the 5th metacarpal, the pisiform and the hook of the hamate
- Actions
  - All extend the hand at the wrist joint, extensor digitorum and extensor digiti minimi extend the fingers
  - ECRL and ECRB radially deviate the hand at the wrist joint
  - ECU ulnar deviates the hand at the wrist joint
- For the test: not necessary to know specifics
  - Know that they all have a common attachment as part of the common extensor tendon on the lateral epicondyle of the humerus
  - Know the actions of each
Anatomic Snuff Box
Not on Test
Anatomic Snuffbox
Not on Test

- This is a depression at the radially posterior portion of the wrist.
- It is bordered on its radial side by extensor pollicis brevis and abductor pollicis longus and on its ulnar side by extensor pollicis longus.
- The trapezium bone makes up the floor.
- The terminal branch of the musculocutaneous and radial nerve and the radial artery cross this depression.
- This is the location for LI-5.
Location of LU-7
Not on Test
Wrist and Hand
Superficial Palmar Dissections [Continued]

- Palmar aponeurosis
- Palmaris brevis muscle (reflected)
- Palmar digital nerves from superficial branch of ulnar nerve to 5th and medial half of 4th fingers
- Transverse fasciculi
- Superficial transverse metacarpal ligaments
- Palmar digital arteries and nerves

Not on Test - Palmar Aponeurosis Relevant to Carpal Tunnel
Not on Test
Carpal Tunnel

Flexor Tendons, Arteries and Nerves at Wrist
Cross Section

Palmaris longus tendon
Median nerve (*)
Flexor pollicis longus tendon in tendinous (radial) bursa
Flexor carpi radialis tendon
Ulnar artery
Ulnar nerve
Flexor digitorum superficialis tendon (*)
(in ulnar bursa)
Flexor digitorum profundus tendon (*) in common flexor sheath (ulnar bursa)
Hamate
Capitate
Trapezium
Trapezoid

3 4
2 5

Simple method of demonstrating arrangement of flexor digitorum superficialis tendon quartet within carpal tunnel

*Contents of carpal tunnel
Carpal Tunnel

- Carpal Bones and the Flexor Retinaculum make a tunnel
- Several structures pass through this tunnel
  - Nine tendons
    - Flexor digitorum profundus (4 tendons)
    - Flexor digitorum superficialis (4 tendons)
    - Flexor pollicis longus (1 tendon)
  - Median Nerve
- The median nerve can become entrapped and cause numbness, tingling and discomfort in the first 4 and ½ fingers
- This is carpal tunnel syndrome
Not on Test
Good view of Anular Ligament and other Ligaments of Elbow

Ligaments of Elbow in 90° Flexion
Lateral and Medial Views

- Humerus
- Joint capsule
- Triceps brachii tendon
- Biceps brachii tendon
- Radius
- Anular ligament of radius
- Subcutaneous olecranon bursa
- Ulna
- Oblique cord
- Ulnar collateral ligament
- Radial collateral ligament
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Identification and Application
Identification and Application

- Can you name the following structures?
  - A
    - Medial Epicondyle of the humerus
  - B
    - Flexor carpi radialis
  - C
    - Palmaris longus
  - D
    - Flexor carpi ulnaris
Identification and Application

• Name the following muscles
  – A
    • Biceps brachii
  – B
    • Brachioradialis
  – C
    • Palmaris longus
  – D
    • Flexor carpi radialis
  – E
    • Flexor carpi ulnaris
Identification and Application

• Can you name the following structures?
  – A
    • Brachioradialis
  – B
    • Biceps brachii
  – C
    • Flexor carpi radialis
  – D
    • Palmaris longus
  – E
    • Flexor carpi ulnaris
  – What bony landmark is F pointing to?
    • Medial epicondyle
Identification and Application

• Name the following structures
  – A
    • Brachioradialis
  – B
    • Extensor carpi radialis longus
  – C
    • Extensor carpi radialis brevis
  – D
    • Extensor carpi ulnaris
Identification and Application

• Which is true about LI-3?
  – It is directly proximal to the base of the second metacarpal
  – It is directly proximal to the base of the distal phalanx of the second finger
  – It is directly proximal to the head of the second metacarpal
  – It is directly proximal to the head of the first metacarpal
Identification and Application

• What boney landmark is LI-12 anterior to?
  – The lateral supracondylar ridge

• What landmark is LI-11 anterior to?
  – The lateral epicondyle
Identification and Application

• What point is described below?
  • At the wrist joint, on the radial side of the flexor carpi ulnaris, in the depression at the proximal border of the pisiform bone.
    – HE-7

• What is A pointing to?
  • Palmaris longus

• What is B pointing to?
  • Flexor carpi radialis
Identification and Application

• SI-6 is located on the radial side of what boney landmark?
  – Styloid process of the Ulna
• SI-4 is located in the depression between the _____ of the fifth metacarpal and the _____ (carpal bone).
  – Base
  – Triquetrum
• What bone is it over?
  – Hamate
• SI-5 is located between the head of the _____ and the _____ (carpal bone).
  – Ulna
  – Triquetrum
Questions From Shoulder Girdle and Upper Extremities Lectures

• Can you name the following muscles?
  – A
    • Pectoralis minor
  – B
    • Biceps brachii
  – C
    • Serratus anterior
Questions From Shoulder Girdle and Upper Extremities Lectures

• Can you name this muscle?
  – Triceps brachii