

STRUCTURAL BASIS OF MEDICAL PRACTICE
EXAMINATION 5

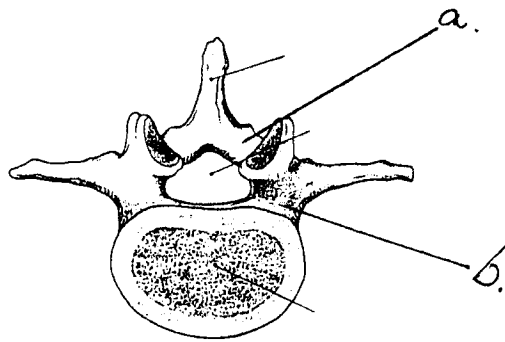
October 7, 2005

PART I. Answer in the space provided. (6 pts)

1. Identify the structures. (1 pt)

a. Lamina

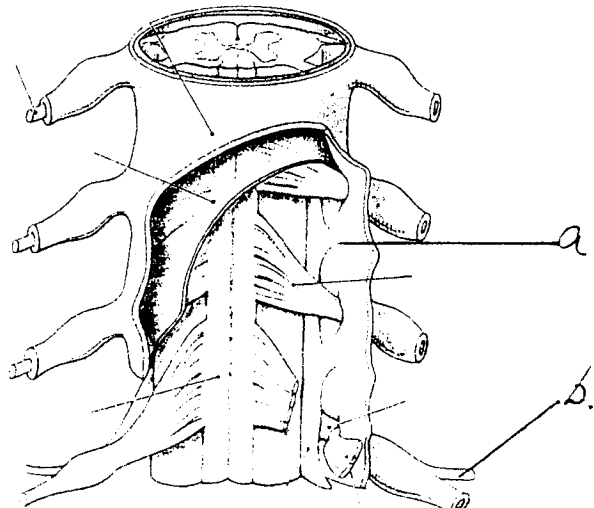
b. Pedicle



2. Identify the structures. (1 pt)

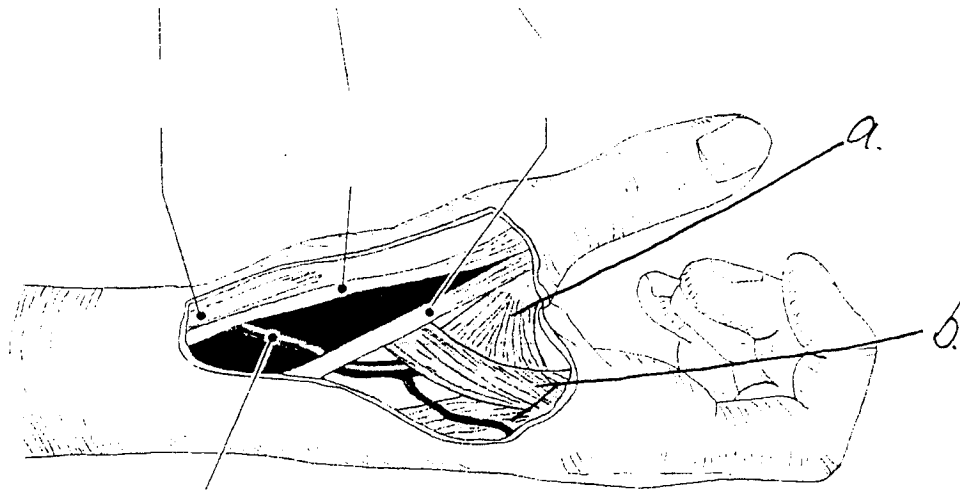
a. Denticulate Lig

b. Dorsal Ramus



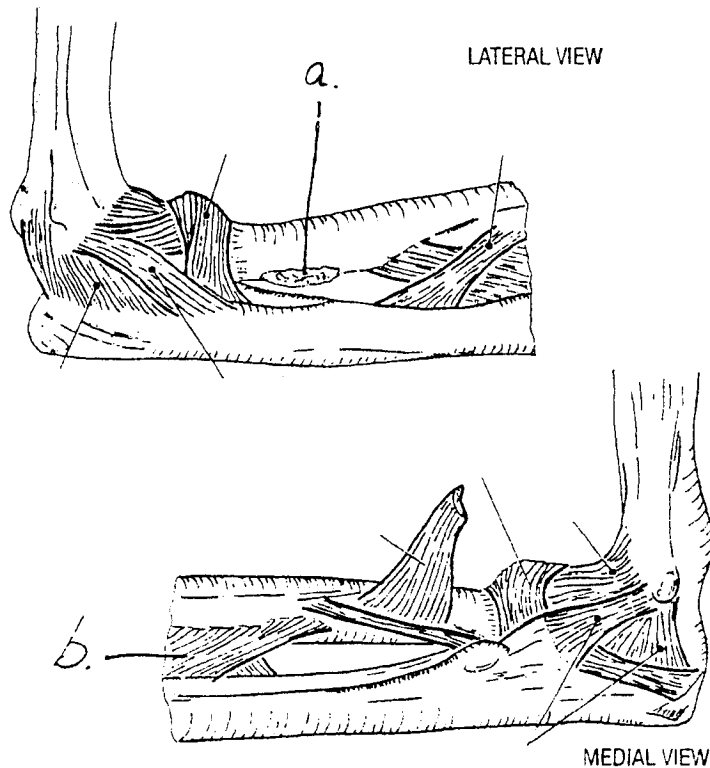
5. Identify the structures. (1 pt)

- a. Adductor Pollicis
- b. First Dorsal Interosseus



6. Identify the structures. (1 pt)

- a. Radial Tuberosity
- b. Interosseus Membrane



Part II. Circle the correct answer. All, none, or some may apply. (40 pts)

1. With respect to the development of muscles, bones, and limbs:

- a. Muscles are of endodermal origin.
- b. The skeletal system develops from paraxial and lateral plate mesoderm and from neural crest.
- c. Fingers and toes are formed when cell death in the apical ectodermal ridge occurs.
- d. Skeletal muscle is derived from paraxial mesoderm.
- e. The upper limb rotates 90 degrees laterally, so that the extensor muscles lie on the lateral and posterior surface and the thumbs lie laterally.
- f. The lower limb rotates approximately 90 degrees medially, placing the extensor muscles on the anterior surface and the big toe medially.
- g. Limb buds become visible as outpocketings from ventrolateral body wall at the end of the 8th week.
- h. The most sensitive period for teratogen-induced limb malformations is the 4th and 5th weeks of development.

2. With regard to the back region:

- a. The axial musculature is innervated by ventral rami.
- b. The serratus posterior inferior mediates exhalation.
- c. The serratus posterior superior retracts the scapula
- d. The dorsal scapular nerve crosses medial to the levator scapula muscle.
- e. The suprascapular nerve passes superior to the superior transverse scapular ligament.
- f. The spinal accessory nerve crosses lateral to the levator scapula muscle.
- g. The semispinalis capitus muscle contributes to the anterior boundary of the suboccipital triangle.
- h. The thoracolumbar fascia contributes to the origin of the latissimus dorsi muscle.

3. With regard to the suboccipital region:

- a. The greater occipital nerve provides motor innervation to the muscles that compose the boundaries of the suboccipital triangle.
- b. The obliquus capitus inferior muscle rotates the atlantooccipital joint.
- c. The rectus capitus posterior muscle acts to flex the atlantooccipital joint
- d. The transverse foramina of the atlas and axis transmit the vertebral artery.
- e. The obliquus capitus superior muscle takes origin from the superior nuchal line
- f. The vertebral artery passes through the posterior atlantooccipital membrane.
- g. The suboccipital nerve crosses the superior nuchal line medial to the occipital artery
- h. The greater occipital nerve leaves the suboccipital region by passing posterior to the obliquus capitus inferior muscle.
- i. The spine of the axis is bifid whereas the atlas has a tubercle in place of a spine
- j. The rectus capitus posterior major muscle crosses both the atlantooccipital joint and the atlantoaxial joint.

4. With regard to the scapular region:

- b. The infraspinous fossa is the site of the acromial anastomosis.
- c. The omohyoid muscle is lateral to the superior transverse scapular ligament.
- d. Ligation (occlusion, blockage) of the 2nd part of the axillary artery causes reverse blood flow in the suprascapular artery.
- e. The upper fibers of the trapezius muscle insert lateral on the scapular spine
- f. The serratus anterior muscle assists the trapezius muscle in mediating upward rotation of the scapula
- g. The coracoid process provides for the insertion of the coracobrachialis and the origin of the pectoralis minor.

5. With regard to the axilla and brachial plexus

- a. The cords of the brachial plexus are named based on their position around the second part of the axillary artery.
- b. The axillary artery begins as the continuation of the subclavian artery at the upper border of the third rib.

- c. The subscapular artery usually arises from the third segment (part) of the axillary artery.
 - d. The suprascapular nerve arises from the upper trunk of the brachial plexus.
 - e. The medial cord is the direct continuation of the anterior division of the lower trunk.
 - f. The long thoracic nerve arises from the posterior cord of the brachial plexus.
 - g. The axillary nerve provides motor input to the deltoid and teres minor muscles
 - h. Complete lesions of the musculocutaneous and median nerves within the axilla will cause total loss of flexion at the elbow joint.
 - i. A lesion of the posterior cord involving all of its branches will cause total loss of medial rotation at the glenohumeral joint.
 - j. Complete lesions of the ulnar, median, radial, and musculocutaneous nerves within the axilla will cause total loss of flexion at the elbow.
6. With regard to the anterior compartment of the arm:
- a. All flexors in the anterior compartment of the arm are innervated by the musculocutaneous nerve.
 - b. The brachialis muscle assists the biceps brachii in flexing the arm.
 - c. The brachial artery begins lateral to the median nerve in the upper arm and then crosses to the medial side of the brachial artery as it approaches the cubital fossa.
 - d. The lateral antebrachial cutaneous nerve can be found crossing the anterior surface of the brachialis muscle and the posterior surface of the biceps brachii muscle.
 - e. The coracobrachialis muscle contributes to the range of abduction from 125 degrees to approximately 145 degrees.
 - f. The inferior ulnar collateral artery crosses anterior to the axis of the elbow joint.
7. With regard to the posterior compartment of the arm:
- a. The anterior boundary of the triangular space is, in part, formed by the spiral (radial) groove of the humerus.
 - b. The ascending branch of the profunda brachii artery participates in an anastomosis with the posterior humeral circumflex artery.
 - c. The lateral head of the triceps brachii originates superior and lateral to the spiral groove, whereas the medial head of the triceps brachii originates medial and inferior to the spiral groove.

- d. The profunda brachii artery gives rise to the middle collateral artery and the radial collateral artery.
- e. The deep radial nerve innervates the anconeus muscle.
- f. The radial collateral artery pierces the lateral intermuscular septum.
- g. A complete lesion of the radial nerve at the spiral (radial) groove causes loss of extension at the elbow.
- h. A complete lesion of the radial nerve at the spiral (radial) groove causes "wrist drop."

8. With regard to the anterior compartment of the forearm:

- a. The ulnar nerve passes between the two heads of origin of the flexor carpi ulnaris muscle
- b. The pronator teres has a humeral head of origin and a radial head of origin
- c. A complete lesion of the ulnar nerve at the ulnar groove would cause loss of flexion of the distal interphalangeal joint for the lateral two digits.
- d. A complete lesion of the ulnar nerve at the ulnar groove would cause the wrist joint to be partially extended and partially abducted (radially deviated).
- e. A complete lesion of the ulnar nerve at the ulnar groove will weaken abduction of the little finger.
- f. A complete lesion of the median nerve superior to the cubital fossa will weaken flexion at the elbow joint.
- g. A complete lesion of the median nerve superior to the cubital fossa would cause the wrist to be partially extended and partially adducted (ulnar deviated).
- h. The anterior interosseous nerve and artery pierce the distal interosseous membrane to enter the posterior compartment.

9. With regard to the posterior compartment of the forearm:

- a. The posterior interosseous nerve and the anterior interosseous artery travel along the posterior surface of the distal interosseous membrane.
- b. The deep radial nerve innervates all muscles in the posterior compartment of the forearm.
- c. The deep radial nerve is applied to the bony surface of the radius as it travels from the cubital fossa to the posterior compartment of the arm.
- d. The radial nerve innervates the supinator muscle.

- e. A complete lesion of the posterior interosseous nerve causes "wrist drop."
 - f. A complete lesion of the deep radial nerve causes "wrist drop."
 - g. The interosseous recurrent artery lies deep to the anconeus muscle and forms an anastomosis with the middle collateral artery.
 - h. The posterior interosseous artery circles the lateral aspect of the radius in close proximity to the posterior interosseous nerve.
10. With regard to the dorsum of the hand:
- a. The tendon of the extensor indicis muscle is anterior (palmar) to the tendon of the extensor digitorum muscle.
 - b. The deep radial nerve innervates the extensor digitorum brevis prior to providing sensation between the second and third digits.
 - c. The dorsal interosseous muscles are bipennate (have two heads of origin with a central tendon).
 - d. Independent movement of the digits during extension is partly due to intertendinous slips.
 - e. The superficial radial nerve provides sensation to the nail beds of the radial 2 fingers.
 - f. The index finger has two dorsal interosseous muscles inserting onto the extensor hood.
 - g. The interosseous muscles attach to the extensor hood distal to the attachments of the lumbricals.
 - h. The superficial radial nerve travels from the anterior forearm to the dorsum of the hand by passing deep to the tendon of the extensor pollicis brevis.

Part III. Indicate your understanding of the following. Answer in the space provided. (18 pts)

1. Define the boundaries, contents, relationships, and importance of the cubital fossa. (6 pts)

The cubital fossa is a triangular space is located on the anterior surface of the forearm. Its base is formed by an imaginary line drawn between the two epicondyles of the humerus with its apex pointing distally. It is bounded by the brachioradialis laterally and the pronator teres medially. The roof of the cubital fossa is a combination of the bicipital aponeurosis and the antebrachial fascia. The floor of the fossa is formed by the brachialis muscle and the supinator muscles. With the exception of the ulnar nerve all major nerves and vessels that supply the forearm and hand pass through it. Most lateral within the cubital fossa just behind the brachioradialis muscle you will find the radial nerve and as you travel distally you will note it splits into its superficial branch and its deep branch. As you move medially you will encounter the biceps tendon. Medial to the tendon you will encounter the brachial artery which branches into a radial and ulna arteries deep in the cubital fossa. Medial to the brachial artery you will encounter the median nerve that will travel with the artery until the artery splits. At that point the median nerve will continue superficially over the ulnar artery and then give off the anterior interosseous nerve. Both the median nerve and the brachial artery are held down by the bicipital aponeurosis in the cubital fossa. Three veins can be found superficial to the fossa the cephalic, median cubital and the basilica vein. The clinical importance of this structure relates to the fact it is a site of venipuncture for both drawing blood and administering drugs. One should be careful when accessing this area as it could indeed result in damaging a major structure heading into the forearm.

2. Define the boundaries, contents, relationships, and importance of the anatomical snuff box. (6 pts)

The anatomical snuff box is a triangular space located on the dorsal surface of your wrist when the thumb is extended and abducted. The radial boundary is formed by the tendons of the abductor pollicis and the extensor pollicis brevis while the ulnar boundary is the extensor pollicis longus. The roof is formed by fascia on the dorsum of the hand and the floor is defined by the scaphoid bone. The radial nerve courses deep within the snuff box where it will give off a dorsal carpal branch and eventually trifurcate into the princeps pollicis, radialis indices, and travel to form the deep palmer arch. It is of clinical importance as it is a site to evaluate a patients pulse and tenderness in this area may be indicative of a scaphoid bone fracture.

3. Define the boundaries, contents, relationships, and importance of the carpal tunnel (6 pts)

The carpal tunnel is defined as the space between the carpal bones of the wrist and the flexor retinaculum located on the anterior surface. This space allows for all flexor tendons as well as the median nerve to pass into the hand proper. The flexor retinaculum is the most superficial component of the carpal tunnel and is located deep in the palmar surface of the hand. It is attached on the radial side to the tubercles of the scaphoid and the trapezium and on the ulnar side to the pisiform and the hook of the hamate. Tendons contained within the carpal tunnel are the flexor digitorum superficialis (superficial) and the flexor digitorum profundus (deep) contained within a shared common ulnar bursa. Radial to the flexor digitorum tendons you will find the flexor pollicis longus tendon contained within the radial bursa. The flexor carpi radialis tendon enters the hand via its own compartment superficial to the trapezium radial to the carpal tunnel. The median nerve courses through the carpal tunnel deep to the flexor retinaculum but superficial to the flexor digitorum superficialis tendons. The ulnar artery and nerve pass into the hand superficial to the flexor retinaculum medial to the Palmaris longus tendon which is also superficial. The clinicians will often make an incision through the flexor retinaculum to relieve the pressure that can occur with carpal tunnel syndrome. If left untreated the pressure can result in the death of the tendons and nerve that pass through it due to ischemic conditions.