1
Upper Limb

QUESTIONS

1.1 Which of the following statements best describes the scapula?

- ☐ **a.** It usually overlies the 2nd to 9th ribs.
- ☐ **b.** The spine continues laterally as the coracoid process.
- ☐ **c.** The suprascapular notch is found on its spine.
- ☐ **d.** It provides attachment for both heads of biceps.
- ☐ **e.** Most fractures involve the body.

1.2 Which statement is the best ending for the following sentence? When considering the humerus, it should be noted that the:

- ☐ **a.** Lesser tubercle has three facets.
- ☐ **b.** Bicipital groove separates the greater and lesser tubercles.
- ☐ **c.** Surgical neck separates the head from the tubercles.
- ☐ **d.** Common extensor origin is the medial epicondyle.
- ☐ **e.** Capitulum articulates with the ulna.

1.3 Which of the following statements regarding the radius and ulna is correct?

- ☐ **a.** Both have a styloid process at the proximal end.
- ☐ **b.** Both articulate with the humerus at the elbow joint.
- ☐ **c.** Both articulate with the carpal bones at the wrist joint.
- ☐ **d.** Direct injury usually produces transverse fractures of both bones in the distal third.
- ☐ **e.** Fracture is most commonly of the Smith's type.

1.4 Which of these statements best describes the carpus?

- ☐ **a.** It is markedly concave from side to side anteriorly.
- ☐ **b.** The most commonly fractured bone is the lunate.
- ☐ **c.** The scaphoid articulates with the 1st metacarpal.
- ☐ **d.** Fracture of the hamate may result in damage to the median nerve.
- ☐ **e.** The pisiform is usually the first bone to begin ossification.

1.5 Which statement most appropriately describes the female breast?

- ☐ **a.** It overlies the 3rd to 8th ribs.
- ☐ **b.** It consists of 2–3 lobules.
- ☐ **c.** It has suspensory ligaments, which tether the dermis to the fascia of the chest wall.
- ☐ **d.** The retro-mammary space lies deep to pectoralis major.
- ☐ **e.** The areolar glands are responsible for lactation.

1.6 Which of these statements best describes the pectoral girdle and shoulder?

- ☐ **a.** The clavicle ossifies in the foetus.
- ☐ **b.** The clavicle most commonly fractures at the junction of the medial and middle third.
- ☐ **c.** The subscapularis bursa is separate from the capsule of the shoulder joint.
- ☐ **d.** The capsule of the shoulder joint communicates with the subacromial bursa.
- ☐ **e.** The short head of biceps lies within the capsule of the shoulder joint.

1.7 Which of the following is true of the rotator cuff?

- ☐ **a.** Teres major is one of its four constituent muscles.
- ☐ **b.** Infraspinatus is innervated by the suprascapular nerve.
- ☐ **c.** Part of its action is to pull the humeral head superiorly.
- ☐ **d.** Subscapularis inserts onto the greater tuberosity of the humerus.
- ☐ **e.** It is deficient anteriorly.

1.8 When considering the axilla, which of the following statements is accurate?

- ☐ **a.** Pectoralis major and minor contribute to the anterior wall.
- ☐ **b.** The long thoracic nerve runs on the posterior wall.
- ☐ **c.** Teres minor forms the lower part of the posterior wall.
- ☐ **d.** The axillary artery lies anterior to the axillary sheath.
- ☐ **e.** The axillary nerve exits through the triangular space.

1.9 Which of these sentences best describes the elbow joint?

- ☐ **a.** The capitulum articulates with the head of the ulna.
- ☐ **b.** The capsule of the joint attaches to the radius.
- ☐ **c.** The annular ligament is attached to the ulna, but not to the radius.
- ☐ **d.** The radial nerve is a posterior relation.
- ☐ **e.** The valgus angle created by the joint is larger in men than in women.

1.10 Which statement correctly describes the cubital fossa?

- ☐ **a.** Its borders are entirely muscular.
- ☐ **b.** A branch of the musculocutaneous nerve is found in its floor.
- ☐ **c.** The median cubital vein traverses its roof.
- ☐ **d.** The median nerve lies lateral to the brachial artery within it.
- ☐ **e.** The radial nerve lies medial to the tendon of biceps within it.

1.11 Which of the following accurately describes the anterior compartment of the forearm?

- ☐ **a.** The median nerve enters the forearm between the two heads of flexor carpi ulnaris.
- ☐ **b.** Palmaris longus is present in approximately 15% of arms.
- ☐ **c.** Flexor digitorum profundus originates from the common flexor origin.
- ☐ **d.** Flexor pollicis longus is characteristically unipennate.
- ☐ **e.** The superficial flexor muscles are all innervated by the median nerve.

1.12 Which of the following best describes the forearm?

- ☐ **a.** The median nerve is related anteriorly to flexor digitorum superficialis.
- ☐ **b.** Pronator quadratus lies deep to the long flexor tendons just proximal to the wrist.
- ☐ **c.** The ulnar nerve lies superficial to flexor carpi ulnaris.
- ☐ **d.** Flexor digitorum profundus is partially supplied by the posterior interosseous nerve.
- ☐ **e.** The radial nerve carries motor fibres in the anterior compartment of the forearm.

1.13 Which of the following statements best describes the structures in the posterior compartment of the forearm?

- ☐ **a.** Brachioradialis is innervated by the posterior interosseous nerve.
- ☐ **b.** The common extensor origin is the medial epicondyle of the humerus.
- ☐ **c.** The posterior interosseous nerve pierces supinator.
- ☐ **d.** The extensor retinaculum is attached to the radius and the ulna.
- ☐ **e.** The extensor tendons pass through the extensor retinaculum in the same fascial compartment.

1.14 Which of these statements about the wrist joint is correct?

- ☐ **a.** It is a synovial joint between the ulna and the carpal bones.
- ☐ **b.** The triquetral articulates with the ulna.
- ☐ **c.** The joint line lies at the level of the styloid process of the ulna.
- ☐ **d.** It has palmar, dorsal and collateral ligaments.
- ☐ **e.** The capsule is continuous with the distal radioulnar joint.

1.15 Which of the following statements best describes the carpal tunnel?

- ☐ **a.** The flexor retinaculum is attached to the trapezoid.
- ☐ **b.** The tendons of flexor digitorum superficialis lie with the index and little finger tendons anterior to those of the middle and ring fingers.
- ☐ **c.** The median nerve lies directly deep to the tendons of flexor digitorum superficialis.
- ☐ **d.** The palmar cutaneous branch of the median nerve lies superficial to the flexor retinaculum.
- ☐ **e.** The tendon of flexor carpi ulnaris lies within the carpel tunnel.

1.16 The flexor tendons of the forearm run within sheaths in the hand. Which of the following statements best describes these structures?

- ☐ **a.** The fibrous flexor sheaths run from the metacarpal heads to the proximal phalanges.
- ☐ **b.** The annular pullies overlie the interphalangeal joints.
- ☐ **c.** The synovial sheath of the middle finger tendon is continuous with its sheath in the carpal tunnel.
- ☐ **d.** The cruciform pullies overlie the phalanges.
- ☐ **e.** The flexor digitorum profundus tendon pierces the flexor digitorum superficialis tendon.

1.17 Which statement regarding the anatomical snuffbox is correct?

- ☐ **a.** Abductor pollicis longus and extensor pollicis brevis form the ulnar border.
- ☐ **b.** The extensor pollicis longus tendon forms the radial border.
- ☐ **c.** The floor is formed by the scaphoid and trapezoid.
- ☐ **d.** The radial artery runs in the floor.
- ☐ **e.** The origin of the basilic vein is found in its roof.

1.18 Which statement regarding the anatomical spaces of the hand is true?

- ☐ **a.** The thenar space lies lateral to the 3rd metacarpal.
- ☐ **b.** The hypothenar space lies lateral to the 5th metacarpal.
- ☐ **c.** The midpalmar space lies superficial to the palmar aponeurosis.
- ☐ **d.** The pulp spaces lie on the dorsal aspect of the fingers and thumb.
- ☐ **e.** The web spaces lie between adjacent metacarpal bones.

1.19 Which of the following best describes the lumbricals?

- ☐ **a.** The lumbricals arise from the tendons of flexor digitorum superficialis.
- ☐ **b.** There is a lumbrical inserted into the extensor expansion of all five digits.
- ☐ **c.** The median and radial nerves innervate the lumbricals.
- ☐ **d.** The action of the lumbricals is to extend the distal interphalangeal joint.
- ☐ **e.** The action of the lumbricals is to flex the proximal interphalangeal joint.

1.20 The following are statements about the interosseous muscles of the hand. Which is correct?

- ☐ **a.** The palmar interossei abduct the fingers.
- ☐ **b.** There are four palmar interossei.
- ☐ **c.** There are three dorsal interossei.
- ☐ **d.** The dorsal interossei are bipennate.
- ☐ **e.** The palmar interossei are all supplied by the median nerve.

1.21 These statements consider the vasculature and lymphatic drainage of the breast. Which is true?

- ☐ **a.** The main blood supply is derived from branches of the internal mammary artery.
- ☐ **b.** Venous drainage is predominantly to the internal mammary vein.
- ☐ **c.** Lymphatic drainage is divided evenly between the axillary and internal mammary nodes.
- ☐ **d.** The superficial lymphatics of each breast remain separate in healthy people.
- ☐ **e.** All the axillary lymphatics drain through the apical axillary nodes.

1.22 Which of the following statements best describes the subclavian artery?

- ☐ **a.** It is divided into three parts by the scalenus medius muscle.
- ☐ **b.** The second part gives no constant branch.
- ☐ **c.** It is crossed posteriorly by the vagus nerve.
- ☐ **d.** It lies anterior to the subclavian vein.
- ☐ **e.** It is prone to aneurysmal change in the presence of a cervical rib.

1.23 Which of the following statements about the axillary artery is accurate?

- ☐ **a.** It is divided into three parts by pectoralis major.
- ☐ **b.** It becomes the brachial artery at the inferior border of teres minor.
- ☐ **c.** The cords of the brachial plexus are named according to their positions relative to the first part.
- ☐ **d.** The axillary vein lies medial throughout its course.
- ☐ **e.** It gives the suprascapular artery as one of its branches.

1.24 The brachial plexus gives rise to the nerve supply of the upper limb. Which of these statements about its branches is correct?

- ☐ **a.** The terminal branch of the medial cord is the ulnar nerve.
- ☐ **b.** The terminal branch of the posterior cord is the median nerve.
- ☐ **c.** The axillary nerve is a branch of the lateral cord.
- ☐ **d.** The radial nerve arises from the medial cord.
- ☐ **e.** The long thoracic nerve arises from the roots.

1.25 Which of these statements about the musculocutaneous nerve is correct?

- ☐ **a.** It is a branch of the medial cord of the brachial plexus.
- ☐ **b.** It pierces brachialis to enter the anterior compartment of the arm.
- ☐ **c.** Brachioradialis is innervated by one of its branches.
- ☐ **d.** The medial cutaneous nerve of the forearm is its terminal branch.
- ☐ **e.** It contributes to the innervation of the shoulder joint.

1.26 Select the most appropriate ending for the following sentence. The median nerve:

- ☐ **a.** Arises from both the posterior and medial cords of the brachial plexus.
- ☐ **b.** Passes from the medial to the lateral side of the brachial artery in the arm.
- ☐ **c.** Gives no muscular branches in the arm.
- ☐ **d.** Enters the forearm by passing between the two heads of flexor carpi ulnaris.
- ☐ **e.** Supplies all of flexor digitorum profundus.

1.27 Which of these statements best completes the following sentence? The ulnar nerve:

- ☐ **a.** Has the ulnar artery as a medial relation at the wrist.
- ☐ **b.** Passes deep to the flexor retinaculum at the wrist.
- ☐ **c.** Usually innervates the lateral two lumbricals.
- ☐ **d.** Innervates adductor pollicis.
- ☐ **e.** Innervates the skin of the lateral (radial) 1½ digits.

1.28 Which statement considering the relations of nerves to the humerus is the most accurate?

- ☐ **a.** The axillary nerve runs around the anatomical neck.
- ☐ **b.** The median nerve runs in the spiral groove.
- ☐ **c.** Mid-shaft humeral fractures will usually result in complete paralysis of triceps.
- ☐ **d.** The ulnar nerve is related to the lateral epicondyle.
- ☐ **e.** Deltoid may atrophy following shoulder dislocation.

1.29 Consider the dermatomes of the upper limb. Which of the following statements best completes this sentence? The skin over the:

- ☐ **a.** Clavicle derives its cutaneous innervation from C4.
- ☐ **b.** Thumb derives its cutaneous innervation from T1.
- ☐ **c.** Little finger derives its cutaneous innervation from C7.
- ☐ **d.** Posterior surface of the forearm derives its cutaneous innervation from T1.
- ☐ **e.** Lateral aspect of the upper limb derives its cutaneous innervation from C8 and T1.

1.30 Which of the following statements ends this sentence correctly? The spinal nerve root mediating the:

- ☐ **a.** Biceps jerk is C5.
- ☐ **b.** Supinator jerk is C7.
- ☐ **c.** Triceps jerk is C6.
- ☐ **d.** Deltoid reflex is C4.
- ☐ **e.** Pectoral reflex is C5.

ANSWERS

1.1

d. The long head of biceps takes origin from the supraglenoid tubercle and its tendon runs within the shoulder joint capsule in its own synovial sheath. The short head of biceps arises from the coracoid process via a conjoint tendon with coracobrachialis.

Explanations

a. The scapula overlies the 2nd to 7th ribs on the posterolateral aspect of the thorax. Its medial border runs lateral, and parallel to, the spinous processes of the thoracic vertebrae.

b. The spine continues laterally as the acromion process, which articulates with the clavicle. The spine of the scapula divides the posterior surface into a smaller supraspinous, and larger infraspinous, fossa.

c. The suprascapular notch occurs on the superior border at the junction between its medial 2/3 and lateral 1/3. The superior transverse scapular ligament runs across this notch; the suprascapular artery runs above it and suprascapular nerve runs below.

e. The body is rarely fractured because the majority of the scapular surface is covered by strong muscles and the bone is protected by its association with the thoracic wall. Fractures of the scapula body are therefore associated with high-energy injury, and most fractures involve the subcutaneous, more vulnerable, acromion.

1.2

b. The bicipital, or intertubercular groove separates the tubercles, and contains the long head of biceps and the attachment of latissimus dorsi.

Explanations

a. The lesser tubercle has one facet, which provides attachment for subscapularis. The greater tubercle has three facets, which are the attachment sites of supraspinatus, infraspinatus and teres minor.

c. The anatomical neck is formed by a groove around the head of the humerus, and separates this from the tubercles. The surgical neck lies distal to the tubercles at the proximal end of the humeral shaft, a common site for fractures.

d. The site of the common extensor origin is the anterior aspect of the lateral epicondyle.

e. The distal humerus has two articular surfaces: laterally the capitulum for articulation with the head of the radius and medially the trochlea for articulation with the trochlear notch of the ulna.

1.3

b. The ulna articulates with the trochlea, and the radius with the capitulum.

Explanations

a. Both the radius and ulna have a styloid process at the distal end. The radial styloid is larger and usually projects 1 cm distal to the ulnar styloid.

c. The ulna does not articulate with any carpal bone, but does articulate with the triangular cartilage, the distal end of which forms part of the wrist joint.

d. Fracture of both bones by direct trauma will usually produce transverse fractures at the same level. This would mostly occur in the middle third of the bones as this is the weakest point.

e. A Colles fracture is the commonest form of forearm fracture and classically occurs when falling on the outstretched hand. This results in a radial fracture 2–3 cm proximal to the wrist joint. The distal fragment displaces posteriorly, radially and proximally (impaction), producing a "dinner fork" deformity. A Smith's fracture involves volar displacement of the distal fragment and is less common.

1.4

a. The 8 carpal bones, arranged in 2 rows of 4, form the carpus. The carpus is convex posteriorly and concave anteriorly from side to side. This shape is maintained by the shape of the bones and by the pull of the flexor retinaculum.

Explanations

b. The most commonly fractured bone is the scaphoid. This occurs most commonly as a result of a fall onto the palm, with the hand extended and abducted. The principal blood supply of the scaphoid enters from its distal end. A fracture may therefore interrupt the blood supply to the proximal fragment, leading to avascular necrosis and consequent degenerative change.

c. The scaphoid is one of the four proximal bones of the wrist and articulates with the radius proximally. The trapezium is the carpal bone which articulates with the 1st metacarpal.

d. The deep branch of the ulnar nerve is closely related to the hook of the hamate, and is threatened by a hamate fracture. Decreased grip strength usually ensues.

e. The pisiform bone is a small, pea-shaped, sesamoid bone in the tendon of the flexor carpi ulnaris. Its ossification centre usually does not appear until the age of 9–12 years. It is the last carpal bone to begin ossification.

1.5

c. The dermis is tethered to the breast ducts and the deep fascia overlying pectoralis major by fibrous strands known as the suspensory ligaments of Cooper. As these atrophy and weaken with age the breast becomes more pendulous.

Explanations

a. The base of the adult female breast consistently overlies the 2nd to 6th ribs, from the sternal edge to the midaxillary line. The upper outer quadrant extends towards the axilla as the "axillary tail".

b. The breast consists of 15–20 lobules of glandular tissue, all individually drained by a corresponding lactiferous duct, which empty at the nipple via the lactiferous sinus.

d. The retro-mammary space is located between the posterior capsule of the breast and the fascia over pectoralis major. This space is commonly exploited in the placement of implants.

e. The areolar glands of Montgomery are modified sebaceous glands located beneath the areola and are responsible for

lubricating the area. These glands may enlarge or become infected, especially during pregnancy.

1.6

a. The clavicle is the first bone to ossify. It does so in week 5–6 of foetal life.

Explanations

b. The clavicle most commonly fractures at the junction of its middle and lateral third. It is the most commonly fractured long bone in the body.

c. The subscapularis bursa communicates directly with the joint capsule via the gaps between the glenohumeral ligaments. These ligaments reinforce the anterior portion of the joint capsule.

d. The subacromial bursa lies beneath the coracoacromial ligament, and its lower layer is attached to the tendon of supraspinatus. Only if this tendon is torn does the bursa come into communication with the joint. This bursa is commonly injected, both as a therapeutic and diagnostic manoeuvre, when treating supraspinatus tendonitis.

e. The short head of biceps is not directly related to the shoulder. The long head of biceps takes origin from the supraglenoid tubercle of the scapula. It then passes anterior to the head of the humerus within the shoulder joint, enclosed in a tube of synovial membrane.

1.7

b. The suprascapular nerve innervates both supraspinatus and infraspinatus.

Explanations

a. The four muscles which complete the rotator cuff are supraspinatus, infraspinatus, teres minor and subscapularis.

c. The rotator cuff acts to bring the humeral head into contact with the glenoid; thus providing stability, as the shoulder joint has a ball but an incomplete socket. Part of its action is to pull the humeral head inferiorly, opposing the superior pull of deltoid. In a radiograph of a patient with a rotator cuff tear the humeral head is, therefore, seen to lie superiorly.

d. Subscapularis is the only rotator cuff muscle to insert onto the lesser tuberosity. The other three muscles insert onto the greater tuberosity.

e. The cuff is deficient inferiorly. The shoulder joint capsule is also lax inferiorly, because it is attached to the surgical, not the anatomical, neck of the humerus at this point. Dislocation of the humeral head from the glenoid therefore usually occurs inferiorly.

1.8

a. The anterior wall of the axilla is formed by pectoralis major and minor, subclavius and the clavipectoral fascia.

Explanations

b. The long thoracic nerve runs superficial to serratus anterior on the medial wall.

c. The posterior wall consists of subscapularis, teres major and latissimus dorsi.

d. The axillary artery runs within the axillary sheath, together with the cords of the brachial plexus.

e. The axillary nerve runs through the quadrangular space accompanied by the posterior circumflex humeral artery. The quadrangular space is bordered by teres minor, teres major, the long head of triceps and the humerus.

1.9

c. The annular ligament is attached to the radial notch of the ulna and slings around the head and neck of the radius. The radius remains free to rotate within the ligament, allowing supination and pronation.

Explanations

a. The head of the radius articulates with the capitulum. The trochlear notch of the ulna articulates with the trochlea of the humerus.

b. The joint capsule is attached to the humerus at the edge of the capitulum and trochlea posteriorly, and above the radial and coronoid fossae superiorly. Inferiorly it is attached to the trochlear notch of the ulna and the annular ligament, but not the radius itself.

d. The radial nerve is an anterior relation of the joint; it is found at the lateral extremity of the cubital fossa.
e. This is known as the "carrying angle". The larger valgus angle noted in women is required to allow the arm to clear the wider pelvis.

1.10

c. The median cubital vein is a favourite target for venepuncture.

Explanations

a. The borders of the cubital fossa are the pronator teres and brachioradialis muscles and an imaginary line drawn between the medial and lateral epicondyles of the humerus. It is therefore a triangular space.
b. The lateral cutaneous nerve of the forearm is the terminal, superficial branch of the musculocutaneous nerve and lies in the roof of the cubital fossa.
d. The brachial artery lies lateral to the median nerve and medial to the tendon of biceps.
e. The radial nerve lies lateral to the tendon of biceps covered by brachioradialis.

1.11

d. Flexor pollicis longus is one of the deep group of flexor muscles. Its principle origin is from the radius. It is characteristically unipennate, which aids its identification during forearm surgery.

Explanations

a. The median nerve enters the forearm between the two heads of pronator teres. The ulnar nerve enters the forearm by passing between the two heads of flexor carpi ulnaris.
b. Palmaris longus is a vestigial structure, absent in 13% of arms.
c. Flexor digitorum profundus is one of the deep group of flexor muscles and principally takes origin from the ulna.
e. The superficial group of flexor muscles are pronator teres, flexor carpi radialis, palmaris longus, flexor digitorum superficialis and flexor carpi ulnaris. The median nerve innervates

all these muscles except flexor carpi ulnaris, which is innervated by the ulnar nerve.

1.12

b. Pronator quadratus is attached to the radius and ulnar and lies against the anterior surfaces of these bones.

Explanations

a. The median nerve is found on the deep surface of this muscle, to which it is usually bound with fascia.

c. The nerve lies under flexor carpi ulnaris with the ulnar artery on its lateral side.

d. The anterior interosseous nerve is the branch of the median nerve which supplies the deep flexor muscles: the lateral two tendons of flexor digitorum profundus, pronator quadratus and flexor pollicis longus.

e. The radial nerve divides in the cubital fossa. The posterior interosseous nerve carries motor fibres into the extensor compartment of the forearm. The radial nerve continues as a purely sensory nerve to supply an area of skin on the dorsum of the hand. This nerve is often referred to as the superficial branch of the radial nerve.

1.13

c. The posterior interosseous nerve enters the extensor compartment by passing through supinator.

Explanations

a. The radial nerve gives branches to brachioradialis and extensor carpi radialis longus before crossing the elbow joint, and therefore before the posterior interosseous nerve is given off. In a lesion of the radial nerve below the elbow these muscles are therefore spared.

b. The common flexor origin is from the medial epicondyle of the humerus. The common extensor origin is from the lateral epicondyle.

d. The extensor retinaculum is attached to the radius, the triquetral and the pisiform; it is not attached to the ulna.

e. The extensor retinaculum has six fascial compartments. The tendons of the extensor muscles are distributed between them.

1.14

d. The palmar, dorsal and collateral ligaments of the wrist joint represent thickenings of the joint capsule.

Explanations

a. The wrist joint is a synovial joint between the radius, the articular disc and the scaphoid, lunate and triquetral bones.

b. The triquetral articulates with the articular disc of the inferior radioulnar joint.

c. The joint line lies at the level of the styloid process of the radius, which can easily be palpated. This is a useful surface landmark when injecting the wrist joint.

e. The distal radioulnar joint is a synovial joint and its capsule is not continuous with the radiocarpal joint. The two joints are separated from each other by the articular disc.

1.15

d. This fact allows a lesion of the median nerve within the carpal tunnel to be distinguished from a more proximal median nerve lesion, as sensation to the palm will be spared.

Explanations

a. The flexor retinaculum is attached laterally to the scaphoid and trapezium, and medially to the hamate and pisiform.

b. The tendons of flexor digitorum superficialis are arranged within the carpel tunnel with middle and ring finger tendons anterior to those of the little and index fingers. The tendons of flexor digitorum profundus lie in a row, deep to the superficialis tendons.

c. The median nerve is the most superficial structure within the carpal tunnel. It lies deep to flexor digitorum superficialis in the forearm and then passes lateral and superior to it as it passes distally.

e. The tendon of flexor carpi ulnaris, which inserts into the pisiform, is superficial to the carpel tunnel. The tunnel does, however, contain the tendon of flexor carpi radialis.

1.16

e. The flexor digitorum superficialis tendon splits to enclose the profundus tendon as it inserts into the middle phalanx of

the finger. The profundus tendon continues to insert into the base of the distal phalanx.

Explanations

a. The fibrous flexor sheaths run from the metacarpal heads to the distal phalanges. They are occupied by the tendons of flexors digitorum superficialis and profundus in the fingers and the tendon of flexor pollicis longus in the thumb.

b. The annular pullies overlie the phalanges and consist of strong transverse sheath fibres.

c. In the index, middle and ring fingers there is a gap between the common flexor sheath in the carpal tunnel and the synovial sheaths of the fingers. The sheaths of the thumb and little finger are continuous with those of the carpal tunnel.

d. The cruciform pullies overlie the interphalangeal joints and consist of loose fibres which are arranged obliquely.

1.17

d. The pulse of the radial artery is palpable in the floor of the snuffbox.

Explanations

a. The radial border of the snuffbox is formed by the tendons of these two muscles.

b. The tendon forms the ulnar border after winding around the dorsal tubercle (of Lister). At this level it gains a blood supply from branches of the anterior interosseous artery. The tendon may undergo necrosis and rupture after a Colles fracture if these blood vessels are disrupted.

c. The floor is formed by the radial styloid, the scaphoid and the trapezium.

e. The origin of the cephalic vein is in the roof. The constant position of the vein at this point makes it a popular target for intravenous cannulation; the so called "Houseman's vein".

1.18

a. The thenar space lies lateral to the lateral septum of the palmar aponeurosis which is attached to the middle metacarpal bone.

Explanations

b. The hypothenar space lies medial to the medial septum of the palmar aponeurosis which is attached to the 5th metacarpal bone.

c. The midpalmar space lies deep to the palmar aponeurosis between its medial and lateral septa.

d. The pulp spaces lie over the palmar surfaces of the tips of the fingers.

e. The web spaces lie between the bases of the proximal phalanges.

1.19

d. By pulling on the extensor expansion the lumbricals extend both the distal and proximal interphalangeal joints.

Explanations

a. The lumbricals, four in number, arise from the radial side of the tendons of flexor digitorum profundus.

b. They are inserted into the extensor expansions of the fingers only. The thumb has no lumbrical.

c. The lumbricals are supplied by the same nerves as their parent tendons: the ulnar two muscles by the ulnar nerve and the radial two muscles by the median nerve.

e. The lumbricals flex the metacarpophalangeal joints, allowing the fingers to be flexed at this joint while remaining straight. The lumbricals are thought to have an important proprioceptive function, regulating finger position.

1.20

d. The dorsal interossei are bipennate and the palmar interossei are unipennate.

Explanations

a. The palmar interossei adduct the fingers towards a plane running down the middle finger. The dorsal interossei abduct the fingers away from the same plane. This can be remembered using "PAD DAB" (Palmar ADduct, Dorsal ABduct).

b. Only three palmar interossei are required. The thumb is adducted by adductor pollicis and the middle finger cannot be adducted towards itself. Therefore, only the index, ring

and little fingers require interossei. These muscles arise from their own metacarpals and insert into their respective proximal phalanges and extensor expansions.

c. There are four dorsal interossei. The spaces in between the metacarpals all contain a dorsal interosseous muscle. The middle two are inserted into either side of the middle finger. The outer two are inserted into the ring and index fingers. The thumb and little fingers have their own abductor muscles.

e. All the interosseous muscles are supplied by the ulnar nerve.

1.21

e. There are five main groups of nodes in the axilla. The anterior, posterior, lateral and central groups empty into the apical group. The apical nodes drain into the subclavian lymph trunk.

Explanations

a. The main supply is via the lateral thoracic and thoracoacromial branches of the axillary artery. The internal mammary (internal thoracic) artery supplies a significant part of the medial aspect via perforating branches. The posterior intercostal arteries also make a minor contribution.

b. Venous drainage follows the arterial supply of the breast and is primarily to the axillary vein.

c. Approximately 75% of drainage is to the axillary lymph nodes, primarily to the anterior group. The majority of the remaining drainage, especially of the medial part, is to the internal mammary nodes.

d. The superficial lymphatics have connections with the opposite breast and anterior abdominal wall. If the normal drainage channels become obstructed by malignant disease, metastatic spread may, therefore, occur to the contralateral breast or axillary nodes.

1.22

e. Smaller cervical ribs tend to cause neurological symptoms associated with pressure on the lower trunks of the brachial plexus, but larger cervical ribs may put pressure on the artery,

causing aneurysmal change. This may lead to thrombus formation and consequent embolic occlusion of the distal vessels.

Explanations

a. The subclavian artery is divided into three parts by scalenus anterior. The first part lies medial, the second part deep to and the third part lateral to the muscle. The subclavian artery continues as the axillary artery at the lateral border of the first rib.

b. The branches of the subclavian artery are:

First part	Vertebral artery
	Internal thoracic artery
	Thyrocervical trunk
Second part	Costocervical trunk
	Dorsal scapular artery (variable)
Third part	No constant branches

c. It is crossed anteriorly by the vagus nerve. On the right side the recurrent laryngeal branch hooks around the artery at this level before ascending into the neck.

d. The subclavian vein lies anterior to the subclavian artery throughout its course. This important relation must be borne in mind when inserting a subclavian central line.

1.23

d. The axillary vein lies as a medial relation throughout the course of the axillary artery.

Explanations

a. The axillary artery is divided into three parts based on the relation medially, posteriorly and then laterally to pectoralis minor. The first part gives off one, the second two and the third part three branches (see 1.23e).

b. The axillary artery commences as the continuation of the subclavian artery at the lateral border of the first rib, and ends at the inferior border of teres major to become the brachial artery.

c. The cords of the brachial plexus are named according to their relation to the second part of the axillary artery, that is medial, lateral and posterior to it.

e. The suprascapular artery is a branch of the subclavian artery. The branches of the axillary artery are as follows:

First part	Superior thoracic
Second part	Thoracoacromial trunk
	Lateral thoracic
Third part	Subscapular
	Posterior circumflex humeral
	Anterior circumflex humeral

1.24

a. The medial cord also gives the medial cutaneous nerve of the arm, the medial cutaneous nerve of the forearm, the medial pectoral nerve and the medial head of the median nerve.

Explanations

b. The median nerve arises as the union of a branch from the medial and lateral cords of the brachial plexus.

c. The axillary nerve is a branch of the posterior cord. It gives motor fibres to deltoid and teres minor before innervating the skin over the lateral aspect of the shoulder. This nerve innervates an autonomous area over the deltoid (the "regimental badge" area), allowing the axillary nerve to be tested.

d. The radial nerve arises from the posterior cord. The posterior cord also gives off the upper subscapular, thoracodorsal, lower subscapular and axillary nerves.

e. The long thoracic nerve (of Bell) arises from the anterior primary rami of C5, C6 and C7. This nerve innervates serratus anterior. Damage to this nerve, for example when inserting a chest drain, leads to winging of the scapula.

1.25

e. The musculocutaneous nerve gives a branch to the shoulder joint as it crosses it.

Explanations

a. It is the terminal branch of the lateral cord of the brachial plexus. It therefore contains fibres derived from the anterior primary rami of C5, C6 and C7. The other branches of

the lateral cord are the lateral pectoral nerve and the lateral head of the median nerve.

b. It pierces coracobrachialis, 5 cm below the conjoint tendon, to enter the anterior compartment of the arm.

c. It innervates the muscles of the anterior compartment: biceps, brachialis and coracobrachialis. Brachioradialis is innervated by the radial nerve.

d. Its terminal branch is the lateral cutaneous nerve of the forearm. The medial cutaneous nerve of the forearm is a branch of the medial cord of the brachial plexus.

1.26

c. The only branch the median nerve gives in the arm is a branch to the elbow joint.

Explanations

a. It arises, by two heads, from the medial and lateral cords of the brachial plexus. The posterior cord gives rise to the radial nerve.

b. The commencement of the nerve is lateral to the artery. It usually passes in front of the brachial artery and descends to lie medial to it at the elbow.

d. It enters the forearm by passing between the two heads of pronator teres. The ulnar nerve passes between the two heads of flexor carpi ulnaris.

e. It innervates all of flexor digitorum superficialis but only the radial two tendons of flexor digitorum profundus. The ulnar two tendons are innervated by the ulnar nerve.

1.27

d. The other small muscles of the thumb are supplied by the median nerve. The ulnar nerve supplies all the muscles of the hypothenar eminence as well as the medial half of flexor digitorum profundus and flexor carpi ulnaris.

Explanations

a. The ulnar and radial arteries lie between their respective nerves at the wrist, such that the ulnar artery lies lateral to the ulnar nerve and the radial artery lies medial to the radial nerve.

b. It enters the hand, with the ulnar artery, by passing through Guyon's canal, which is superficial to the flexor retinaculum. It is, therefore, commonly damaged in lacerations of the wrist and is also liable to compression at this point.

c. The medial two lumbricals are usually innervated by the ulnar nerve. The lateral two are usually supplied by the median nerve.

e. It supplies the skin over the medial (ulnar) 1½ digits.

1.28

e. Deltoid will atrophy as a result of severe damage to the axillary nerve, which may occur following dislocation of the shoulder. The axillary nerve also innervates teres minor and skin over the lateral side of the proximal part of the arm. Sensory loss in this area suggests nerve damage.

Explanations

a. The axillary nerve (C5, C6) winds around the surgical neck of the humerus, accompanying the posterior circumflex humeral vessels. It is prone to damage in humeral neck fractures or dislocation of the shoulder.

b. The radial nerve runs in the spiral groove, where it is accompanied by the profunda brachii artery.

c. Mid-shaft humeral fractures may damage the radial nerve as it runs in the spiral groove. The branches to the lateral and long head of triceps arise before the nerve enters the groove, and thus only the medial head is affected. The characteristic sign of this injury is wrist drop due to paralysis of the posterior compartment of the forearm.

d. The ulnar nerve passes posterior to the medial epicondyle where it is superficial, easily palpable and prone to injury.

1.29

a. The statement is correct.

Explanations

b. The hand derives its cutaneous innervation from C6, C7 and C8, with the thumb being innervated by fibres derived from C6.

c. The skin overlying the little finger derives its cutaneous innervation from C8.

d. The posterior surface of the forearm is innervated by fibres from C6, C7 and C8. The dermatomes are organised in this order from proximal to distal.

e. The lateral aspect of the upper limb is supplied by fibres arising from C5 and C6. The medial aspect of the upper limb is innervated by fibres from C8 and T1.

1.30

a The biceps jerk principally tests the C5 reflex arc, with a contribution from C6.

Explanations

b. The supinator jerk corresponds primarily to the C6 reflex arc, with a contribution from C5.

c. The triceps jerk is principally mediated by C7, with a contribution from C8.

d. This reflex may be of occasional use, and is elicited by placing the examiner's index finger across the tip of the shoulder on the deltoid muscle belly, and tapping the finger. It solely tests the reflex arc of spinal cord segment C5.

e. The pectoral reflex is elicited by placing the examiner's index and middle fingers on the lateral border of pectoralis major and tapping them with a tendon hammer. It tests the reflex arc of C7.