THE SUPERIOR COLLEGE, LAHORE

1st PROFESSIONAL MBBS

ANNUAL EXAMINATION 2019

ANATOMY

(SEQ's)

Time Allowed: 2 hours

Roll No. _____

Total Marks: 45

Instructions

1. The SEQ's part is to be submitted within 2 hours, Extra time will not be given.
2. Neat Hand Writing use of margin and marker for headlines will increase the presentation of your paper.
3. Do not write your name or disclose your identity in anyway.

Q1. A 60 years old man presented in emergency department with complaint of breathlessness, on chest X ray pleural effusion is diagnosed.

a) What are pleural recesses? (2)

b) Which border of rib is preferred during aspiration of pleural effusion, justify your answer? (1)

c) What is the nerve supply of pleura? (2)

Q2. a) Define synovial joint. Give one example each of a typical and atypical synovial joint? (1)

b) Enlist characteristics of a synovial joint? (4)

Q3. Draw & label light microscopic feature of serous and mucous acini? (4)

b) What is a serous demilune (1)

Q4 A patient is brought to emergency following fracture of humeral shaft in the middle

a) Name neurovascular structure that might be involved in such a fracture. (1)

b) Give an account of course and distribution of nerve that might be involved in this fracture? (3)

c) Name the clinical condition resulting from involvement of nerve in this area (1)

Q5. A patient with carpal tunnel syndrome reports to her doctor

a) Explain the anatomical basis of carpal tunnel syndrome (2)

b) Which nerve is most likely to be involved in this case? (1)

c) Give an account of distribution of this nerve in hand (2)

Q6 a) Describe the formation and contents of femoral sheath (3)

b) Enlist boundaries of femoral ring (1)

c) What is femoral hernia explain why is it more common in female (1)

Q7. What is a typical intercostal space enlist its contents? Draw a labelled diagram to show the formation of typical spinal nerve (1+4)

Q8 Give the origin, course, branches and distribution of left coronary artery; Explain the right and left dominance pattern of coronary circulation. (0.25+0.5+1.25+1+2)

Q9 A 50 years old female came to medical OPD with lurching gait,

a) what test should be done to check the muscles involved, (1)

b) explain the reason of lurching gait with your anatomical knowledge. (2)

c) Give the muscles involved and nerve supply? (1+1)

Fig. 15.5: Surface projection of the parietal pleura (black); visceral pleura and lung (pink) on the front of thorax

Pulmonary Ligament

The parietal pleura surrounding the root of the lung extends downwards beyond the root as a fold called the *pulmonary ligament*. The fold contains a thin layer of loose areolar tissue with a few lymphatics. Actually, it provides a dead space into which the pulmonary veins can expand during increased venous return as in exercise. The lung roots can also descend into it with the descent of the diaphragm (Fig. 15.6).

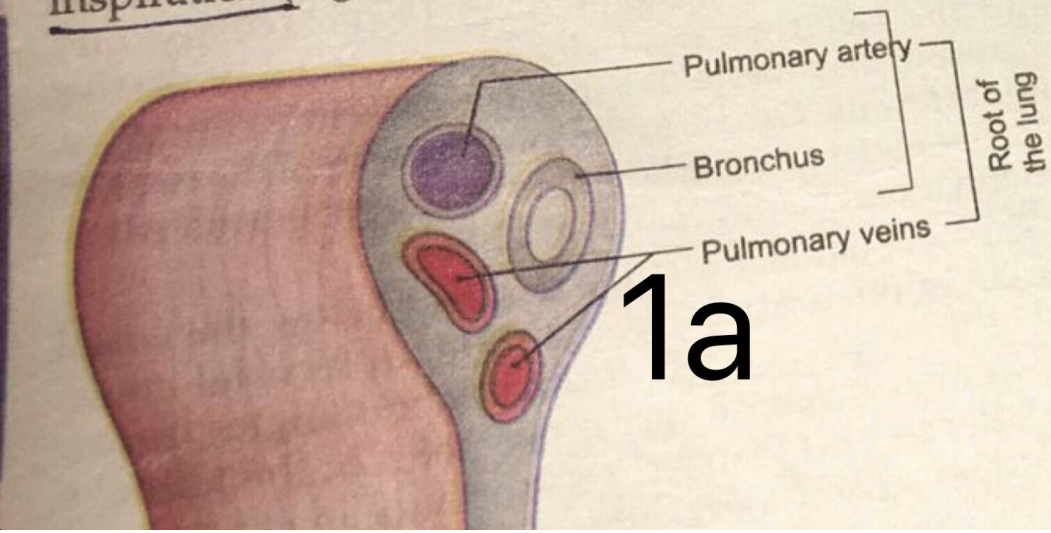
Recesses of Pleura

There are two recesses of parietal pleura, which act as 'reserve spaces' for the lung to expand during deep inspiration (Figs 15.5, 15.7 and 15.8).

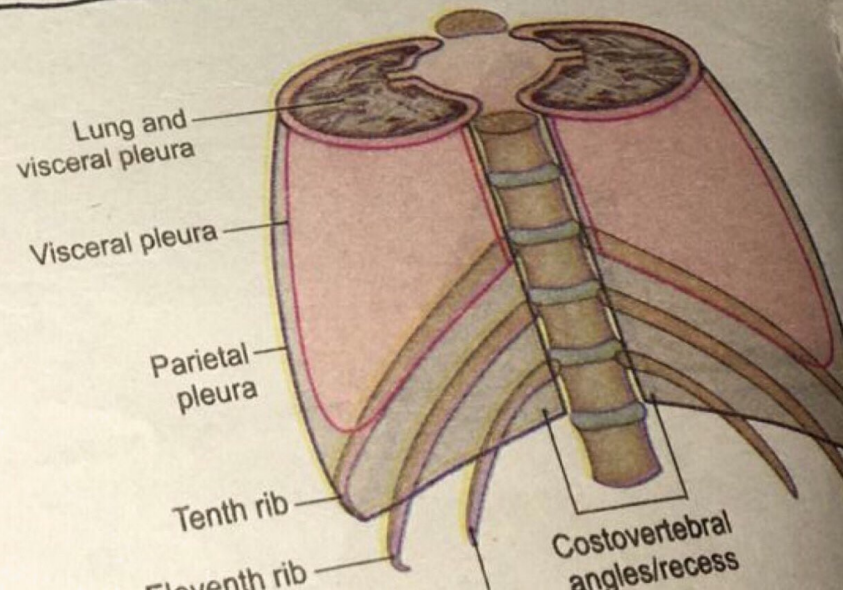
The *costomediastinal recess* lies anteriorly, behind the sternum and costal cartilages, between the costal and mediastinal pleurae, particularly in relation to the cardiac notch of the left lung. This recess is filled up by the anterior margin of the lungs even during quiet breathing. It is only obvious in the region of the cardiac notch of the lung.

The *costodiaphragmatic/costovertebral recess* lies inferiorly between the costal and diaphragmatic pleurae. Vertically, it measures about 5 cm, and extends from the eighth to tenth ribs along the midaxillary line (Fig. 15.7).

During inspiration, the lungs expand into these recesses. So these recesses are obvious only in expiration and not in deep inspiration.



1a



1b

CLINICAL ANATOMY

- Aspiration of any fluid from the pleural cavity is called *paracentesis thoracis*. It is usually done in the eighth intercostal space in the midaxillary line (Fig. 15.9). The needle is passed through the lower part of the space to avoid injury to the principal neurovascular bundle, i.e. vein, artery and nerve (VAN).
- Some clinical conditions associated with the pleura

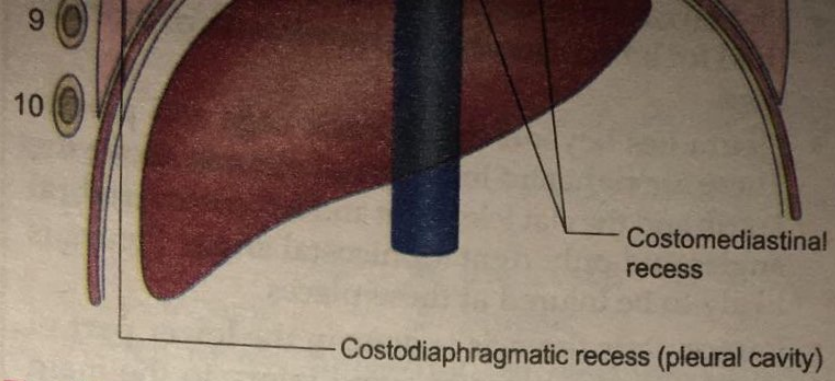


Fig. 15.8: Reflections of the pleura to show costodiaphragmatic and costomediastinal recesses

1c

Nerve Supply of the Pleura

The parietal pleura develops from the somatopleuric layer of the lateral plate mesoderm, and is supplied by the somatic nerves. These are the intercostal and phrenic nerves. The parietal pleura is pain sensitive. The costal and peripheral parts of the diaphragmatic pleurae are supplied by the intercostal nerves, and the mediastinal pleura and central part of the diaphragmatic pleurae by the phrenic nerves (C4).

The pulmonary pleura develops from the splanchnopleuric layer of the lateral plate mesoderm, and is supplied by autonomic nerves. The sympathetic nerves are derived from second to fifth sympathetic ganglia while parasympathetic nerves are drawn from the vagus nerve. The nerves accompany the bronchial vessels. This part of the pleura is not sensitive to pain.

Sympathetic dilates the bronchi. The parasympathetic narrows the bronchial tree and is also secretory to the glands.

2. DIARTHROSES

As compared to synarthroses, which are solid joints, the diarthroses are cavitated joints. More commonly these joints are called **synovial joints** (Fig. 4.5). Generally these joints permit free movement. Due to the presence of a joint cavity, the opposed bony surfaces in a synovial joint are not in continuity. However, the bones involved are linked by a surrounding *fibrous capsule*. The articulating bone surfaces (which rub against each other) have a protective covering of hyaline cartilage known, in this particular location, as *articular cartilage*.

The joint cavity contains a viscous lubricating fluid, called *synovial fluid*, which facilitates the sliding of articular surfaces against one another. The synovial fluid is secreted by the *synovial membrane*, which lines the inner aspect of the fibrous capsule. Within the joint cavity may also be present fibrocartilaginous structures like articular discs, menisci and labra.

Salient structural features of a synovial joint will be described further.

2a

Typical Synovial Joint	Atypical Synovial Joint
Elbow Joint, Shoulder Joint Hip Joint	Sternoclavicular and acromio-clavicular Joint

2a

Characteristics of Synovial Joints

- Synovial joints permit movement between 2 or more bones. They can be distinguished by the following characteristics:
  - articulating cartilage
  - the joint capsule
  - the joint cavity
  - the bursae (pl.) (bursa – sing.)
  - intrinsic ligaments
  - extrinsic ligaments

2b

Q #4

a) Radial nerve

c) Wrist drop

b) Triceps brachii, Anconeus

Radial	C 5,6,7,8 T_1	Posterior	of forearm Exit axilla Post. to axillary artery. Post. to humerus in radial groove with Brachial artery b/w medial and lateral head of bicep Perforate lateral intermuscular septum enters cubital fossa and divides in superficial and deep radial nerve

4b

Course —

cracked easily (Fig. 9.42).

Carpal tunnel syndrome (CTS): Involvement of th median nerve in carpal tunnel at wrist has becom a very common entity (Fig. 9.15).

a. This syndrome consists of motor, sensory vasomotor and trophic symptoms in the han caused by compression of the median nerve in the carpal tunnel. Examination reveals wasting of thenar eminence (ape-like hand), hypo-aesthesia to light touch on the palmar aspect of lateral 3½ digits. However, the skin over the thenar eminence is *not affected* as the branch of median nerve supplying it arises in the forearm.

b. Froment's sign/book holding test: The patien is unable to hold the book with thumb and other fingers.

5a

c. Paper holding test: The patient is unable to hold paper between thumb and fingers.
Both these tests are positive because of paralysis of thenar muscles.

d. *Motor changes:* Ape-/monkey-like thumb deformity (Fig. 9.40), loss of opposition of thumb. Index and middle fingers lag behind while making the fist due to paralysis of 1st and 2nd lumbrical muscles (Fig. 9.43).

e. *Sensory changes:* Loss of sensations on lateral 3½ digits including the nail beds and distal phalanges on dorsum of hand (Fig. 9.41).

f. *Vasomotor changes:* The skin areas with sensory loss is warmer due to arteriolar dilatation; it is also drier due to absence of sweating due to loss of sympathetic supply.

g. *Trophic changes:* Long-standing cases of paralysis lead to dry and scaly skin. The nails crack easily with atrophy of the pulp of fingers (Fig. 9.42).

h. It occurs both in males and females between the age of 25 and 70. They complain of intermittent attacks of pain in the distribution of the median nerve on one or both sides. The attacks frequently occur at night. Pain may be

Q#5

b) Compression of median nerve

c) Median nerve

1st, 2nd Lumbricals

Thenar eminence

- Abductor pollicis Brevis
- Flexor pollicis Brevis
- Opponense pollicis

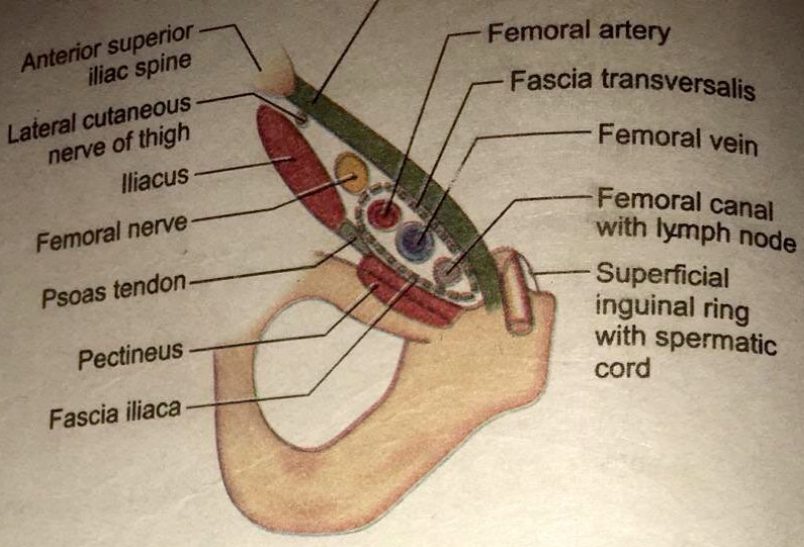
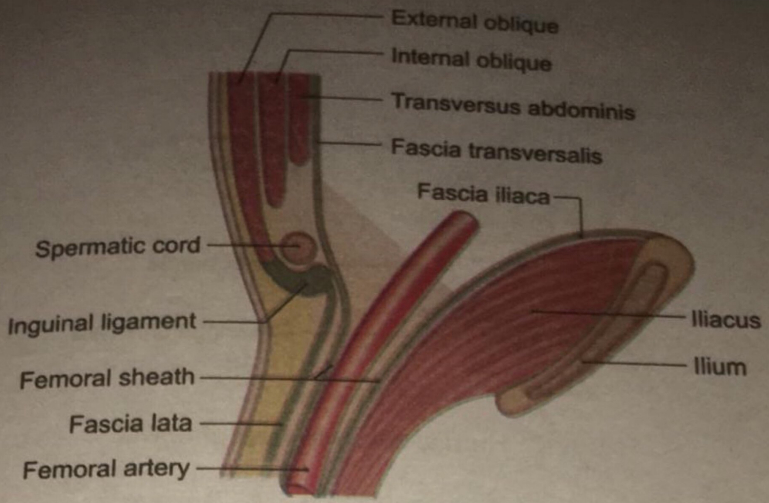


Fig. 3.12b: Formation of femoral sheath and its contents

6a

Femoral Sheath

This is a funnel-shaped sleeve of fascia enclosing the upper 3 to 4 cm of the femoral vessels. The sheath is formed by downward extension of two layers of the fascia of the abdomen. The anterior wall of the sheath is formed by the fascia transversalis which lies in the anterior abdominal wall deep to the transversus abdominis; and the posterior wall is formed by the fascia iliaca, which covers the iliacus muscle (Figs 3.12b and 3.13). Inferiorly, the sheath merges with connective tissue around the femoral vessels.



6a

Fig. 3.13: Formation of the femoral sheath by extension of the fascia transversalis and the fascia iliaca into the thigh

The femoral sheath is asymmetrical. Its lateral wall is vertical, and the medial wall is oblique being directed downward and laterally (Fig. 3.14).

The sheath is divided into the following three compartments by septa (Fig. 3.14).

a. The *lateral or arterial compartment* contains the *femoral artery* and the *femoral branch of the genitofemoral nerve.*

b. The *intermediate* or *venous compartment* contains the *femoral vein.*

c. The *medial or lymphatic compartment* is the smallest of all, and is known as the *femoral canal* which is described below.

The base or upper end of femoral canal is called *femoral ring*. The boundaries of ring are important.

It is *bounded* anteriorly by the inguinal ligament, posteriorly by pectineus and its covering fascia, medially by the concave margin of lacunar ligament, and laterally by the septum separating it from femoral vein.

The *inferior epigastric vessels* are closely related to junction of the anterior and lateral walls of ring. The femoral ring is closed by a condensation of extraperitoneal connective tissue called the *femoral septum*.

6b

The parietal peritoneum covering septum from above shows a depression called *femoral fossa*.

The femoral canal contains a lymph node of *Cloquet* or *Rosenmüller*, lymphatics, and a small amount of areolar tissue. The lymph node drains the glans penis in males and the clitoris in females.

Femoral hernia: The femoral canal is an area of potential weakness in the abdominal wall through which abdominal contents may bulge out forming a femoral hernia. A femoral hernia is more common in females because the femoral canal is wider. This is associated with the wider pelvis, and the smaller size of the femoral vessels, in the female (Fig. 3.16). It is never congenital.

Hernia comprises a neck and a sac. Coverings are the various layers on the sac. Mostly the content of hernial sac is a loop of bowel (Fig. 3.17).

The course of an enlarging hernial sac is typical. First it passes downwards through the femoral canal, then forwards through the saphenous opening, and finally upwards along with the superficial epigastric and superficial circumflex

iliac vessels. For reduction of such a hernia the reverse course has to be followed (Fig. 3.18).

- In cases of strangulation of a femoral hernia, the surgeon has to enlarge the femoral ring. This is possible only by cutting the lacunar ligament; which forms the medial boundary of the ring. Normally, this can be done without danger. Occasionally, however, an abnormal obturator artery may lie along the edge of the lacunar ligament; and cutting it may cause alarming haemorrhage (Fig. 3.19).
- *Abnormal obturator artery:* The normal obturator artery is a branch of the internal iliac. It gives a pubic branch which anastomoses with the pubic branch of the inferior epigastric artery. Occasionally, this anastomosis is large and the obturator artery then appears to be a branch of the inferior epigastric. Usually, the abnormal artery passes lateral to the femoral canal in contact with the femoral vein and is safe in an operation

Definition:

- ✓ Space between two ribs and their corresponding costal cartilage is called the Intercostal space.

7

Description:

- ✓ There are 9 Intercostal spaces anteriorly because 11^{th} and 12^{th} ribs are floating and open in the front.
- ✓ Intercostal spaces are 11 on each side and Posteriorly.
- ✓ 4^{th}, 5^{th} and 6^{th} intercostal spaces are called typical intercostal space because the typical intercostal nerves supply them, which supply only the thoracic region.

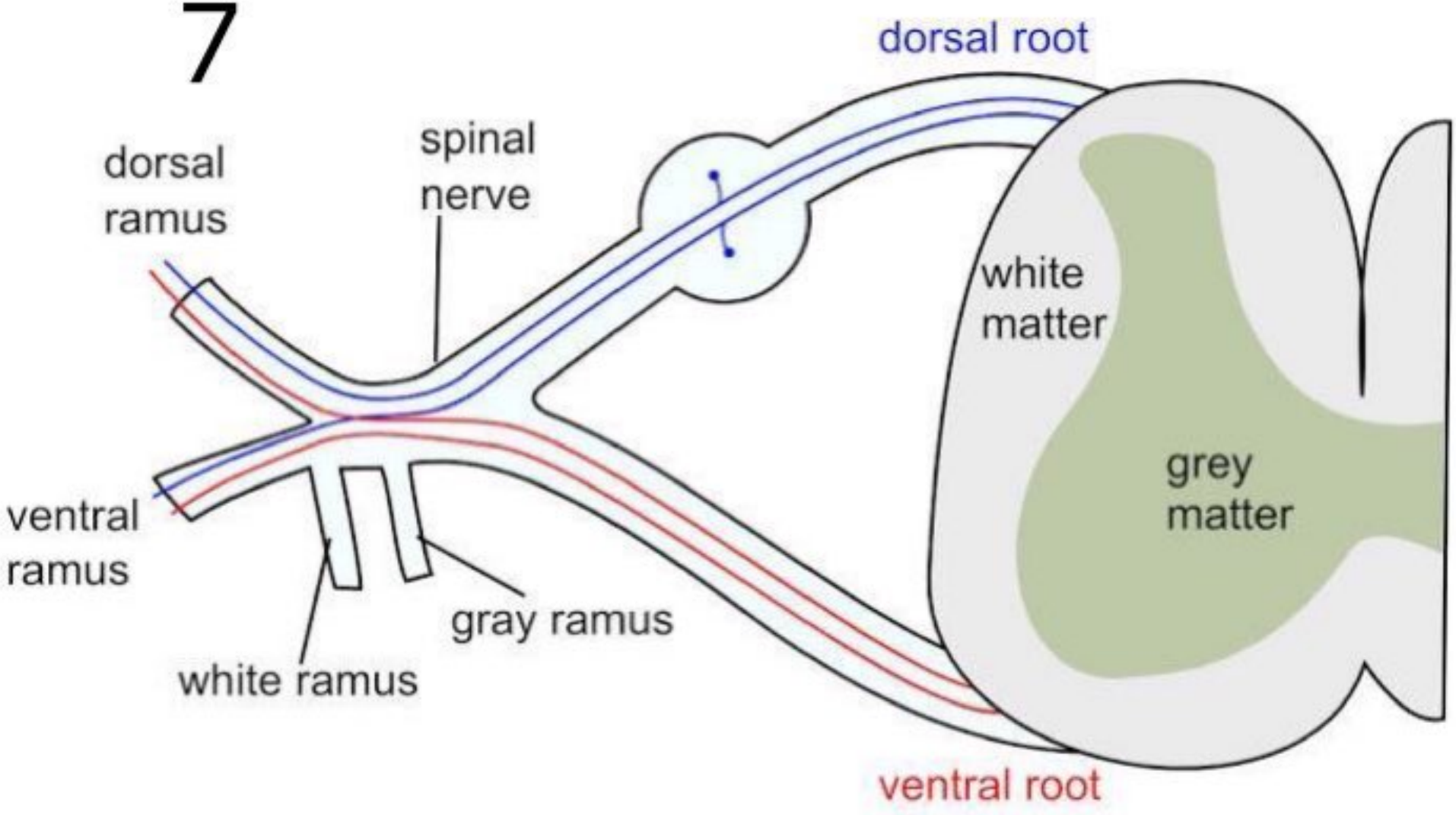
Boundary:

Superiorly: Sharp lower border of the upper rib.
Inferiorly: Blunt upper border of the lower rib.
Anteriorly: Lateral border of the sternum between the costal notches.
Posteriorly: Body of the corresponding thoracic vertebra.

Contents:

- ✓ Muscles: 1. External intercostal muscle,
  2. Internal intercostal muscle,
  & 3. Transversus thoracic muscle.
- ✓ Vessels: 1. Intercostal arteries,
  & 2. Intercostal veins.
- ✓ Nerve: One pair of corresponding spinal nerve.

7



LEFT CORONARY ARTERY

8

DISSECTION

Strip the visceral pericardium from the sternocostal surface of the heart. Expose the anterior interventricular branch of the left coronary artery and the great cardiac vein by carefully removing the fat from the anterior interventricular sulcus. Note the branches of the artery to both ventricles and to the interventricular septum which lies deep to it. Trace the artery inferiorly to the diaphragmatic surface and superiorly to the left of the pulmonary trunk (Figs 18.22a and b).

Trace the circumflex branch of left coronary artery on the left border of heart into the posterior part of the sulcus, where it may end by anastomosing with the right coronary artery or by dipping into the myocardium.

Position

Left coronary artery is larger than the right coronary artery. It arises from the left posterior aortic sinus of ascending aortic.

Course

1 The artery first runs forwards and to the left and emerges between the pulmonary trunk and the left

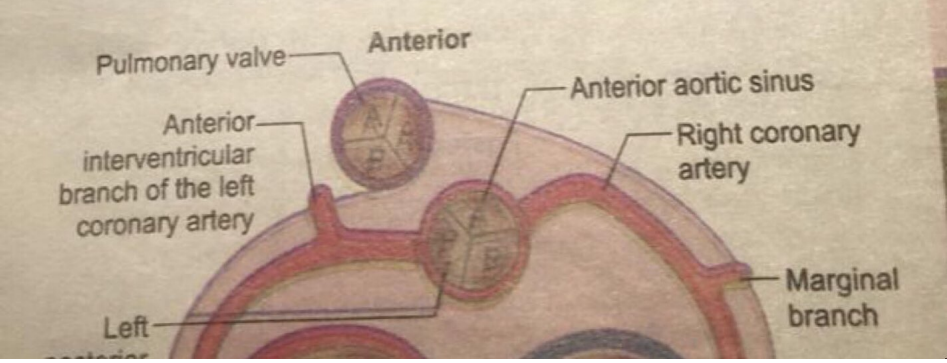
auricle. Here it gives the anterior *interventricular branch* which runs downwards in the groove of the same name. The further continuation of the left coronary artery is called the *circumflex artery* (Figs 18.22a and b and 18.23).

2 After giving off the anterior interventricular branch, the artery runs to the left in the left anterior coronary sulcus.

3 It winds round the left border of the heart and continues in the left posterior coronary sulcus. Near the posterior interventricular groove, it terminates by anastomosing with the right coronary artery.

Branches

- Anterior interventricular branch is a large branch. It descends in the anterior interventricular groove. It gives following branches:
  i. Anterior ventricular branches for the ventricles. The large branch is called "left diagonal artery".
  ii. Septal branches which supply anterior 2/3rd of the interventricular septum.
  iii. Left conus artery forms an arterial ring around the pulomonary trunk with a similar branch from right coronary artery.
- Circumflex branch is the terminal part of left coronary artery after it has given off the large anterior interventricular branch. Circumflex branch runs in the left anterior coronary sulcus, then curves around the left border of heart to lie in the left posterior coronary sulcus. It ends by anastomosing with the terminal part of right coronary artery, a little to the left of the crux. Its branches are:
  i. Left marginal artery which lies along the left border of heart till the apex of heart.



ii. Anterior and posterior ventricular branches
iii. Atrial branches which are in anterior, posterior and lateral groups.

Area of Distribution

1 Left atrium
2 Ventricles
   a. Greater part of the left ventricle, except the area adjoining the posterior interventricular groove.
   b. A small part of the right ventricle adjoining the anterior interventricular groove.
3 Anterior part of the interventricular septum (Fig. 18.24).
4 A part of the left branch of the AV bundle.

CARDIAC DOMINANCE

In about 10% of hearts, the right coronary is rather small and is not able to give the posterior interventricular branch. In these cases, the circumflex artery, the continuation of left coronary, provides the posterior interventricular branch as well as to the AV node. Such cases are called left dominant.

Mostly, the right coronary gives posterior interventricular artery. Such hearts are right dominant. Thus the artery giving the posterior interventricular branch is the dominant artery.

Q # 9

a) Trendlenebeg sign / test

c) Gleuteus medius, minimus
Superior Glutead nerve

It is a very big area over the iliac bone.

- *When the glutei medius and minimus (of right side) are paralysed,* the patient cannot walk normally. He bends or waddles on the right side or paralysed side to clear the opposite foot, i.e. left, off the ground. This is known as *lurching gait* (Fig. 5.10); when bilateral, it is called *waddling gait.*
- The normal gait depends on the proper abductor mechanism at both hips (Fig. 5.11). This mechanism comprises:

9b

a. The adequate power, provided by the glutei medius and minimus (Figs 5.12a to c).
b. The fulcrum, formed by a normal relationship of the head of the femur with the acetabulum.
c. The weight transmitted by the head and neck of the femur.

Normally when the body weight is supported on one limb, the glutei of the supported side raise the opposite and unsupported side of the pelvis. However, if the abductor mechanism is defective, the unsupported side of the pelvis drops, and this is known as a positive *Trendelenburg's sign.*

THE SUPERIOR COLLEGE, LAHORE

1ST PROFESSIONAL MBBS (PART - I)

ANNUAL EXAMINATION 2014

ANATOMY

SEQ,S

E: 2:15 HOURS

TOTAL MARKS: 45

Instructions

1. All MCQ's are to be attempted on the paper and returned to the invigilator within 2:15 HOURS after you have received the question pap
2. Any cuttings or overwriting in answering the objective part will not be accepted and no marks will be given even if the answer is correct.
3. Write your Roll No. only on the perforated portion of the title page.
4. Do not write your name or disclose your identity in anyway.

Attempt All Short Essay Questions Given Below:

Q1. A pt, who received an I/M injection in his arm a few day back, presented in OPD with the complaint of inability to abduct his shoulder.
a) What could be the cause?
b) Give the origin, insertion, nerve supply & action of deltoid muscle. (0.5,1,1,0.5,2

Q2. a) Briefly describe the boundaries and contents of cubital fossa (4)
b) Give its clinical importance. (1)

Q3. a) Give an account of the anastomoses present on the back of the thigh? (4)
b) What is GUY ROPES? (1)

Q4. a) Enlist the intracapsular and extracapsular ligaments of the knee joint? Give the attachments of the two menisci. Which meniscus is most commonly involved in injury and why? (2,1,1)
b) What is unhappy triad of knee injuries? (1)

Q5. a) What is a bronchopulmonary segment? Draw and label the bronchopulmonary segments of both the lungs. What is their clinical significance? (0.5,2.5,1)
b) Why right lung is more prone to infections? (1)

Q6. a) Briefly describe the origin, course, termination, relations and branches of arch of aorta.
b) What is coarctation of aorta? (0.5,1,0.5,2,0.5,0.5)

Q7. Define a blood vessel. Classify blood vessels on anatomical and functional basis? (0.5,2.5, 2)

Q8. Define the following:
a) Morula & implantation (1)
b) Conceptus & abortion (1)
c) Corpus luteum & Corpus albicans (1)
d) Placenta previa (2)

Q9. a) Draw and label histological diagram of cardiac muscle. (3)
b) Tabulate histological differences between smooth, skeletal and cardiac muscles. (2)

Q#1

(a) Paralyses of Deltoid muscle

1b

DELTOID

Origin

1 The anterior border and adjoining surface of the lateral one-third of the clavicle (Fig. 6.2).
2 The lateral border of the acromion where four septa of origin are attached (Fig. 6.2).
3 Lower lip of the crest of the spine of the scapula.

Insertion

The deltoid tuberosity of the humerus where three septa of insertion are attached.

Nerve Supply

Axillary nerve (C5, C6).

The acromial part of deltoid is an example of a *multipennate muscle*. Many fibres arise from four septa of origin that are attached above to the acromion. The fibres converge on to three septa of insertion which are attached to the deltoid tuberosity (Fig. 6.2).

Actions

1 The multipennate acromial fibres are powerful abductors of the arm at the shoulder joint from beginning to 90°.

proportional to the number of muscle fibres present in it (and not on their length), a multipennate muscle is much stronger than other muscles having the same volume.

1b

2 The anterior fibres are flexors and medial rotators of the arm.

3 The posterior fibres are extensors and lateral rotators of the arm.

2a

Features

Cubital (Latin *cubitus, elbow*) fossa is a triangular hollow situated on the front of the elbow (it is homologous with the popliteal fossa of the lower limb situated on the back of the knee.)

Boundaries

Laterally – Medial border of the brachioradialis (Fig. 8.14).

Medially – Lateral border of the pronator teres.

Base – It is directed upwards, and is represented by an imaginary line joining the *front of* two epicondyles of the humerus.

Apex – It is directed downwards, and is formed by the area where brachioradialis crosses the pronator teres muscle.

Roof

The roof of the cubital fossa (Fig. 8.15) is formed by:

a. Skin.
b. Superficial fascia containing the median cubital vein joining the cephalic and basilic veins. The lateral cutaneous nerve of the forearm lies along with cephalic vein and the medial cutaneous nerve of the forearm along with basilic vein.
c. Deep fascia.
d. Bicipital aponeurosis.

Floor

It is formed by:

i. Brachialis (Figs 8.16a and b)

ii. Supinator surrounding the upper part of radius

Contents

2a

The fossa is actually very narrow. The contents described are seen after retracting the boundaries. From medial to the lateral side, the contents are as follows:

1 *The median nerve:* It gives branches to flexor carpi radialis, palmaris longus, flexor digitorum superficialis and leaves the fossa by passing between the two heads of pronator teres (Figs 8.17 and 8.18).

2 The termination of the *brachial artery*, and the beginning of the radial and ulnar arteries lie in the fossa.

The radial artery is smaller and more superficial than the ulnar artery. It gives off the radial recurrent branch.

The ulnar artery goes deep to both heads of pronator teres and runs downwards and medially, being separated from the median nerve by the deep head of the pronator teres (Fig. 8.19).

Ulnar artery gives off the anterior ulnar recurrent, the posterior ulnar recurrent, and the common interosseous branches (Fig. 8.10).

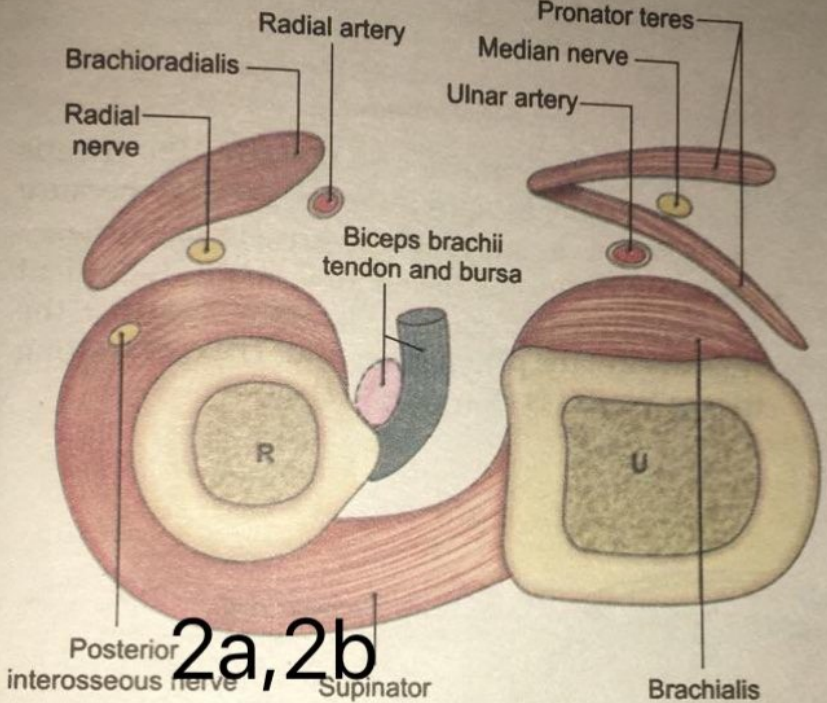
The common interosseous branch divides into the anterior and posterior interosseous arteries, and latter gives off the interosseous recurrent branch.

3 The tendon of the *biceps brachii*, with the bicipital aponeurosis (*see* Fig. 9.3b).

Figs 8.
the bra
cross-s

Roof

Fig. 8.18: Contents of the right cubital fossa; mnemonic—MBBR



2a,2b

Fig. 8.19: Contents of the cubital fossa as seen a cross-section

4 The *radial nerve:* It desends medial to lateral epicondyle to enter cubital fossa. In the fossa it gives off the posterior interosseous nerve or deep branch of the radial nerve which gives branches to extensor capri radialis brevis and supinator. Then it leaves the fossa by piercing the supinator muscle (Fig. 8.17). The remaining superficial branch runs in the front of forearm for some distance.

CLINICAL ANATOMY

- The cubital region is important for the following reasons:

a. The median cubital vein is often the vein of choice for intravenous injections (*see* Fig. 7.8).
b. The blood pressure is universally recorded by auscultating the brachial artery in front of the elbow (Fig. 8.11).

- The anatomy of the cubital fossa is useful while dealing with the fracture around the elbow, like the supracondylar fracture of the humerus.

2b

BACK OF THIGH

Gluteal Artries anastomose with each other and then circumflex femoral artries

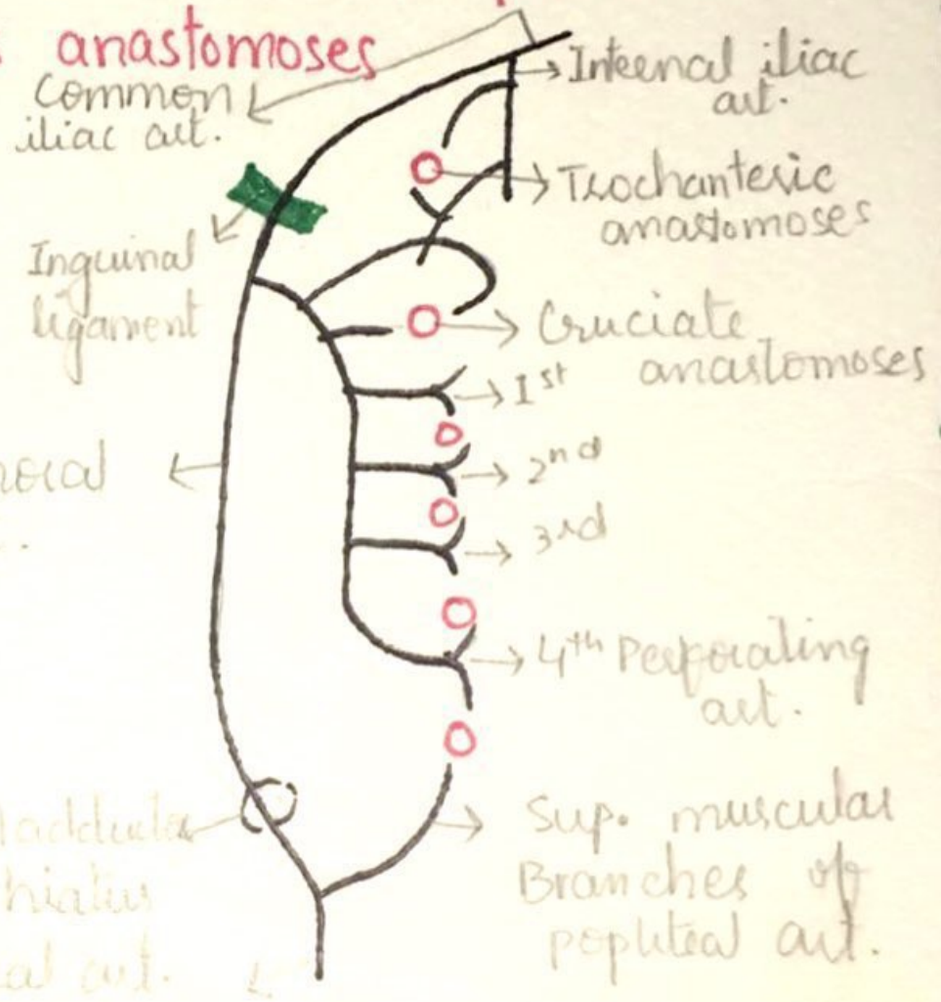
Circumflex femoral anastomoses with 1st Perforating art.

Back of Thigh

4th Perforating Art. anastomoses with upper muscular Branches of Popliteal Art.

Perforating artries anastomoses with each other

3a



3b Pes **anserinus**

- Pes **anserinus** ("goose foot") refers to the conjoined tendons of three muscles that insert ont the anteromedial (front and inside) surface of the proximal extremity of the tibia.
- The muscles are the sartorius, gracilis and semitendinosus sometimes referred to as the guy ropes.

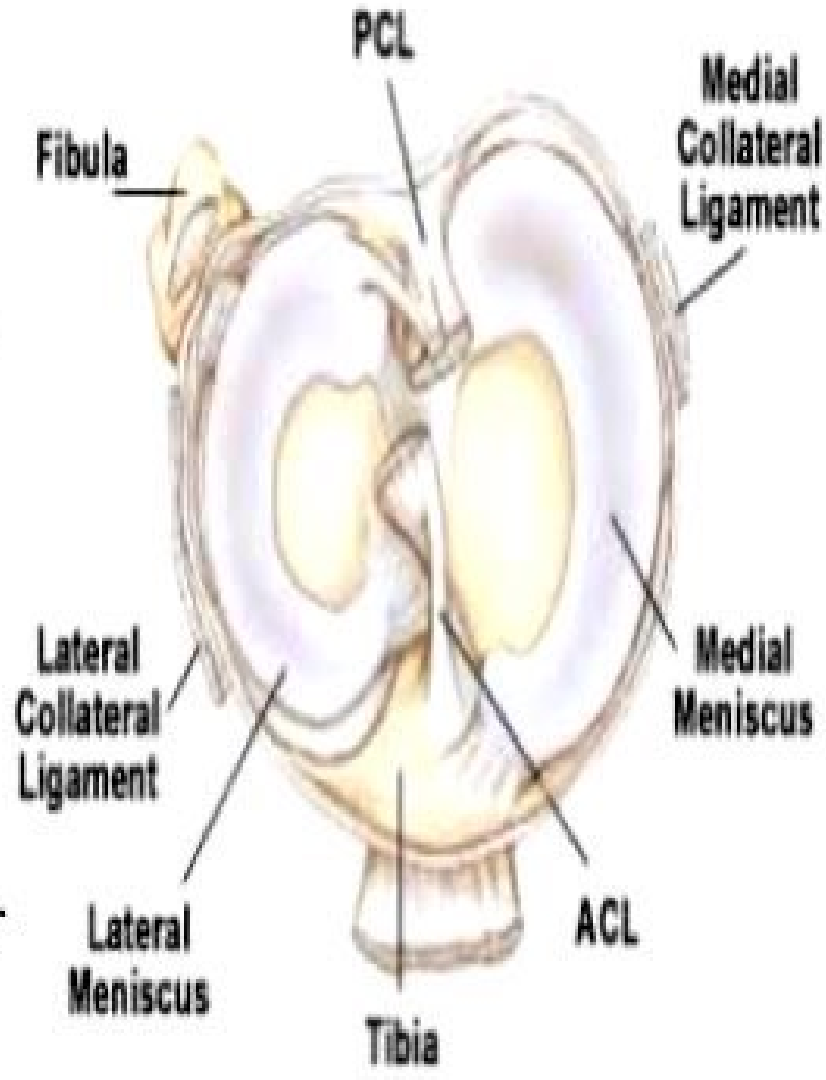
Extracapsular ligaments are found outside the **joint** capsule and include the patellar **ligament**, lateral and medial collateral **ligaments**, and oblique and arcuate popliteal **ligaments**.

Intracapsular ligaments are found inside the **joint** capsule, with the cruciate **ligaments** being the most well known of this subgroup.

4a

MEDIAL MENISCUS

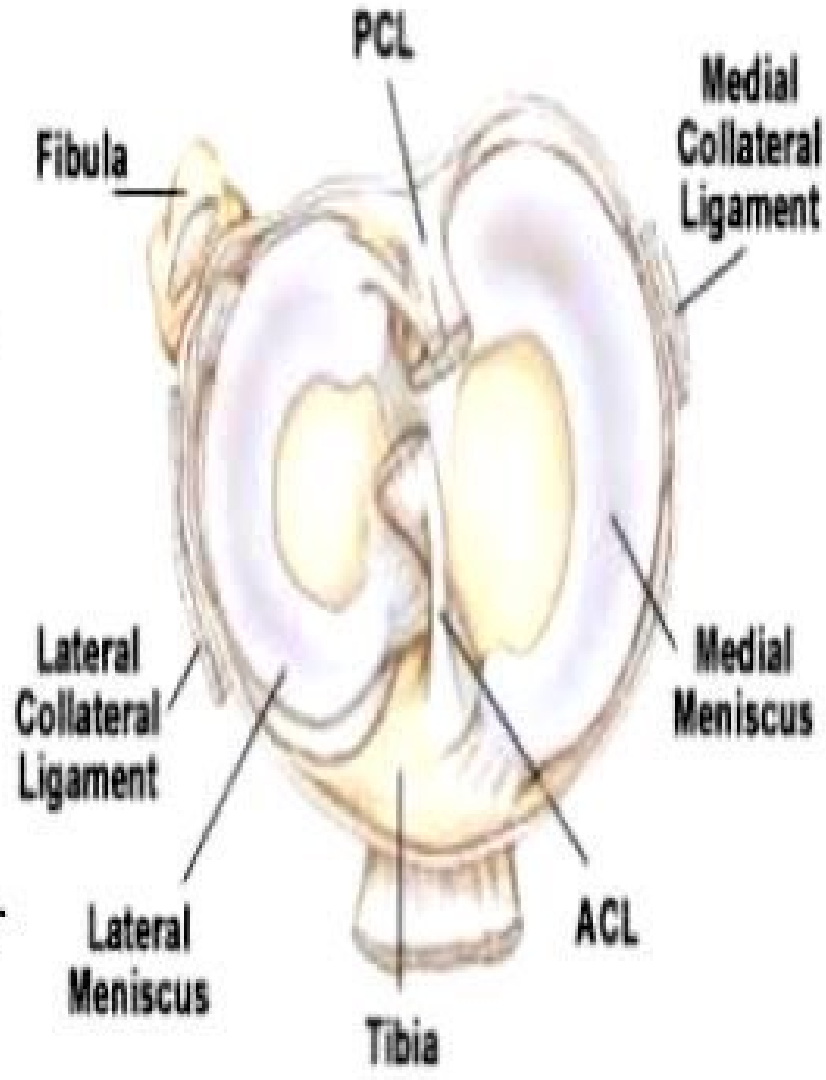
- C- Shaped structure and lateral meniscus is more circular.
- **Anterior horn** : Attached to the tibia anterior to the intercondylar eminence to the ACL.
- **Posterior horn** : Anchored immediately in front of the attachment of PCL posterior to the intercondylar eminence.



MEDIAL MENISCUS

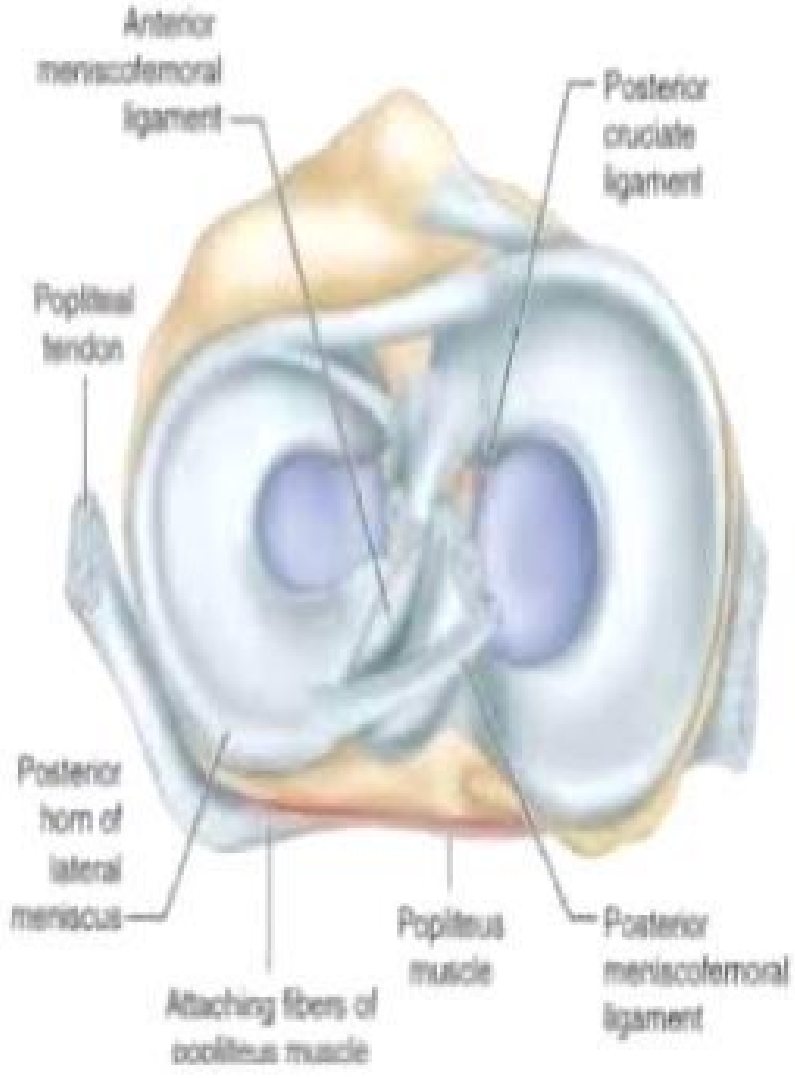
4a

- C- Shaped structure and lateral meniscus is more circular.
- **Anterior horn** : Attached to the tibia anterior to the intercondylar eminence to the ACL.
- **Posterior horn** : Anchored immediately in front of the attachment of PCL posterior to the intercondylar eminence.



LATERAL MENISCUS 4a

- Circular shaped
- The anterior and posterior horns are closer to each other & near insertion of ACL
- **Anterior Horn** : Attached to the tibia in front of the intercondylar eminence.
- **Posterior Horn** : Attached to the posterior aspect of the intercondylar eminence in front of posterior attachment of medial meniscus.



The medial **meniscus is more** commonly injured because it is firmly attached to the medial collateral ligament and joint capsule. The lateral **meniscus**, on the outside of the knee, is **more** circular in shape.

4a

Q Define unhappy triad knee

Unhappy triad is a **knee** injury that results from a chain of separate injuries in the **knee joint**. As the name suggests, there are three types of injuries involved here – an injury to the medial collateral ligament, the meniscus (a cartilage in the **joint**), and the cruciate ligament.

4b

Bronchopulmonary Segments

The most widely accepted classification of segments is given in Table 16.3. There are 10 segments on the right side and 10 on the left side (Figs 16.5 and 16.8).

Definition

1. These are well-defined anatomic, functional and surgical sectors of the lung.
2. Each one is aerated by a tertiary or segmental bronchus.
3. Each segment is pyramidal in shape with its apex directed towards the root of the lung (Fig. 16.8).
4. Each segment has a segmental bronchus, segmental artery, autonomic nerves and lymph vessels.
5. The segmental venules lies in the connective tissue between adjacent pulmonary units of bronchopulmonary segments.
6. During segmental resection, the surgeon works along the segmental veins to isolate a particular segment.

Relation to Pulmonary Artery

The branches of the pulmonary artery accompany the bronchi. The artery lies dorsolateral to the bronchus. Thus each segment has its own separate artery (Fig. 16.9).

Relation to Pulmonary Vein

The pulmonary veins do not accompany the bronchi or pulmonary arteries. They run in the intersegmental planes. Thus each segment has more than one vein and each vein drains more than one segment. Near the hilum, the veins are ventromedial to the bronchus.

It should be noted that the bronchopulmonary segment is not a bronchovascular segment because it does not have its own vein.

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5a

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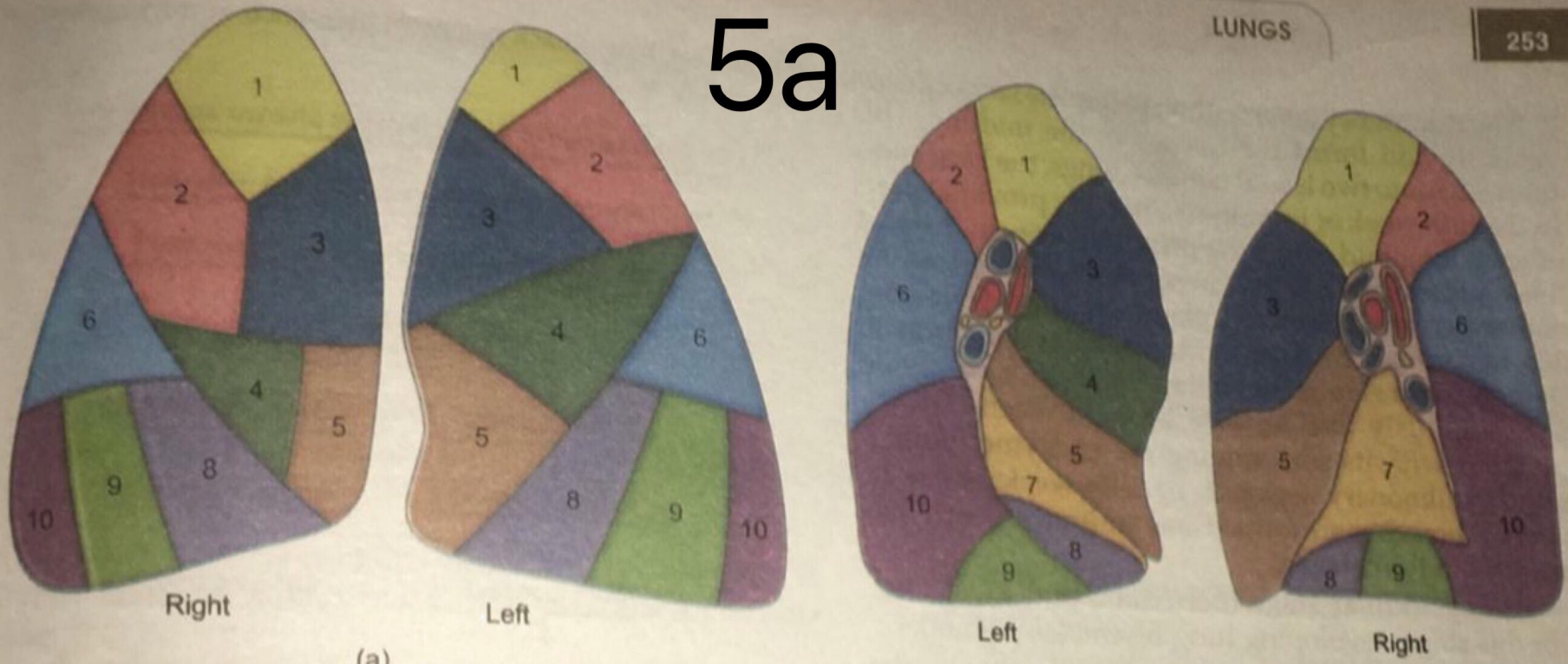
5a



Right lung		
Upper lobe	**Middle lobe**	**Lower lobe**
1. Apical	4. Lateral	6. Superior
2. Posterior	5. Medial	7. Medial basal
3. Anterior		8. Anterior basal
		9. Lateral basal
		10. Posterior basal

Left lung	
Upper lobe	**Lower lobe**
1. Apical	6. Superior
2. Posterior	7. Medial basal
3. Anterior	8. Anterior basal
4. Superior lingular	9. Lateral basal
5. Inferior lingular	10. Posterior basal

Figs 10.8a and b: The bronchopulmonary segments as seen on: (a) The costal aspects of the right and left lungs. Medial basal segments (no. 7) are not seen, and (b) segments seen on the medial surface of left and right lungs. Lateral segment of middle lobe (no. 4) is not seen on right side

Intersegmental planes

- Usually the infection of a bronchopulmonary segment remains restricted to it, although tuberculosis and bronchogenic carcinoma may spread from one segment to another.
- Knowledge of the detailed anatomy of the bronchial tree helps considerably in:
  a. Segmental resection (Fig. 16.12).
  b. Visualising the interior of the bronchi through a bronchoscope passed through the mouth and trachea. The procedure is called bronchoscopy.

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the fourth thoracic vertebra into two primary principal bronchi, one for each lung. The *right principal bronchus* is 2.5 cm long. It is shorter, wider and more in line with the trachea than the left principal bronchus (Fig. 16.5). Inhaled particles or foreign bodies therefore, tend to pass more frequently to the right lung, with the result that infections are more common on the right side than on the left.

5b

syndrome (Fig. 19.8), i.e. dyspnoea, dysphagia, dysphonia, etc.

ARCH OF THE AORTA

Arch of the aorta is the continuation of the ascending aorta. It is situated in the superior mediastinum behind the lower half of the manubrium sterni.

Course

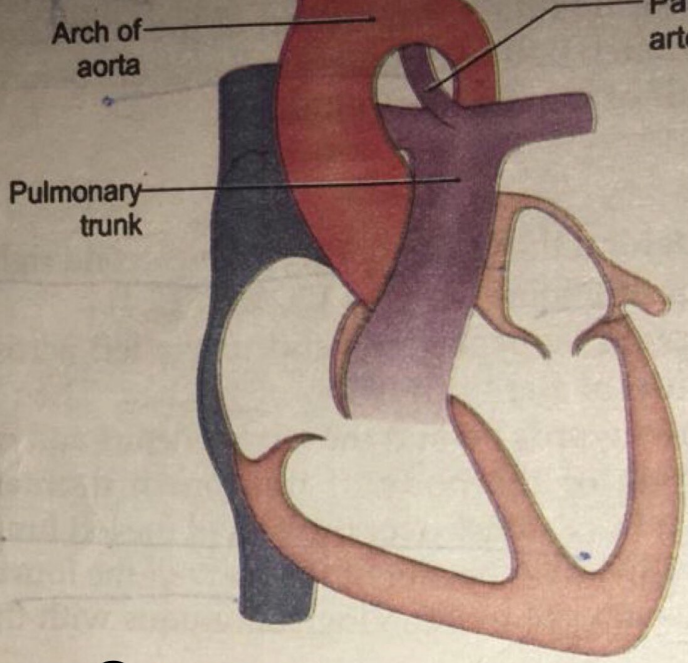
1. It begins behind the upper border of the second right sternochondral joint (*see* Figs 17.2 and 17.4).
2. It runs upwards, backwards and to the left across the left side of the bifurcation of trachea. Then it passes downwards behind the left bronchus and on the left side of the body of the fourth thoracic vertebra. It thus arches over the root of the left lung.
3. It ends at the lower border of the body of the fourth thoracic vertebra by becoming continuous with the descending aorta.

Thus the beginning and the end of arch of aorta are at the same level, although it begins anteriorly and ends posteriorly.

Relations

Anteriorly and to the Left

1. Four nerves from before backwards:
   a. Left phrenic.
   b. Lower cervical cardiac branch of the left vagus.
   c. Superior cervical cardiac branch of left sympathetic chain.
   d. Left vagus (Fig. 19.9).
2. Left superior intercostal vein, deep to the phrenic nerve and superficial to the vagus nerve.
3. Left pleura and lung.
4. Remains of thymus.



6a

Fig. 19.7: Patent ductus arteriosus

Posteriorly and to the Right

1 Trachea, with the deep cardiac plexus and the tracheobronchial lymph nodes.
2 Oesophagus
3 Left recurrent laryngeal nerve
4 Thoracic duct
5 Vertebral column

Superior

1 Three branches of the arch of the aorta:
   a. Brachiocephalic
   b. Left common carotid
   c. Left subclavian arteries (Fig. 19.10)

18.24: Tran...
areas supplied by the two coronary ...

6a

2 All three arteries are crossed close to their origin by the left brachiocephalic vein.

Inferior

1 Bifurcation of the pulmonary trunk (Fig. 19.2).
2 Left bronchus
3 Ligamentum arteriosum with superficial cardiac plexus on it.
4 Left recurrent laryngeal nerve.

Branches

1 Brachiocephalic artery which divides into the right common carotid and right subclavian arteries (Fig. 19.2).
2 Left common carotid artery.
3 Left subclavian artery.

Narrowing

6b

COARCTATION OF AORTA

Aortic coarctation (constriction) occurs in approximately 10% of children with CHDs. Coarctation is characterized by an aortic constriction of varying length (Fig. 13-41). Most coarctations occur distal to the origin of the left subclavian artery at the entrance of the ductus arteriosus (juxtaductal coarctation).

The classification into preductal and postductal coarctations is commonly used; however, in 90% of instances, the coarctation is directly opposite the ductus arteriosus. Coarctation occurs twice as often in males as in females and is associated with a mitral (bicuspid) aortic valve in 70% of cases (see Fig. 13-12*E*).

In **postductal coarctation**, the constriction is just distal to the ductus arteriosus (see Fig. 13-41*A* and *B*). This permits development of a collateral circulation during the fetal period (see Fig. 13-41*B*), thereby assisting with passage of blood to inferior parts of the body.

In **preductal coarctation**, the constriction is proximal to the ductus arteriosus (see Fig. 13-41*C*). The narrowed segment may be extensive (see Fig. 13-41*D*); before birth, blood flows through the ductus arteriosus to the descending aorta for distribution to the lower body.

In an infant with severe **aortic coarctation**, closure of the ductus arteriosus results in hypoperfusion and rapid deterioration of the infant. These babies usually receive

Interductal

BLOOD VESSELS

The blood vessels form a network of tubes that carry blood away from the heart, transport it to the tissues of the body, and then return it to the heart. The blood vessels that carry the blood away from the heart are called arteries, while those, which return the blood to the heart, are called veins.

CLASSIFICATION OF BLOOD VESSELS

A. Anatomical Classification

Taking into account the flow of blood, first away and then toward the heart, the blood vessels are classified into the following 5 categories:

1. Arteries
2. Arterioles
3. Capillaries
4. Venules
5. Veins

7

Arteries

The arteries are efferent vessels that carry blood away from the heart to the organs and tissues of the body. On their way to different parts of body the arteries branch in a tree-like manner; the branches progressively decrease in diameter. The arteries are classified into two main types: (1) elastic arteries and (2) muscular arteries.

Elastic arteries are those in which the tunica media is mainly composed of elastic variety of connective tissue fibers and the amount of smooth muscle is comparatively very low. These arteries possess large caliber and, hence are also known as *large arteries*. The main arteries issuing from the heart, i.e., the aorta and pulmonary trunk are elastic arteries. In addition, main branches of the aorta (the brachiocephalic, left common carotid, left subclavian and common iliac), and those of the pulmonary trunk (i.e.,

the right and left pulmonary arteries) also belong to the elastic variety of arteries.

The **muscular arteries** are so named because their tunica media is chiefly composed of smooth muscle cells. Considering their size (i.e., diameter) these arteries are also called *medium-sized arteries*. Most of the named arteries of the body belong to this group, e.g., the axillary, brachial, radial and ulnar arteries of the upper limb, and the femoral, popliteal, anterior tibial and posterior tibial arteries of the lower limb.

Arterioles

The arterioles also called **small arteries,** constitute a very important segment of the circulatory system because they form the principal component of the peripheral resistance to flow that regulates the blood pressure. Arterioles range 0.2 to 0.4 mm in diameter. The tunica intima of these vessels consists of endothelium and a thin subendothelial layer of connective tissue. The tunica media of the larger arterioles consists of two layers of circularly-arranged smooth muscle fibers. The smaller arterioles also called *terminal arterioles*, have only one layer of smooth muscle in their wall and each individual smooth muscle cell completely encircles the endothelium. The arterioles branch into smaller vessels, called *metarterioles*, which are surrounded by a discontinuous layer of smooth muscle. The metarterioles (Fig. 6.1) branch into capillaries which form networks. There is a simple ring of smooth muscle cells at the point where capillaries originate from the metarteriole. This smooth muscle ring is known as a *precapillary sphincter* (Fig. 6.1). Constriction of this sphincter can completely stop the blood flow within a capillary.

A narrow lumen with relatively thick muscular walls enables the arterioles to dilate or constrict to a considerable extent. Consequently, the arterioles play a very important role in controlling the flow of blood from arteries into capillaries and, later, into organs according to their functional requirements. If needed, an arteriole can dilate to increase the blood flow to capillaries by as much as four times the normal supply.

Capillaries

Capillaries occur as networks of microscopic vessels which connect the arterial and venous systems. Networks (plexuses) of capillaries exist in almost every part of the body. Microscopically the capillaries are seen as delicate endothelial tubes. Outer to the endothelial lining, a very thin layer of collagenous and reticular connective tissue fibers is present. Through the thin walls of the capillaries substances are exchanged between the blood and tissues of the body. Arrangement of capillaries in the form of networks serves to increase the surface area for the exchange of materials. Capillaries

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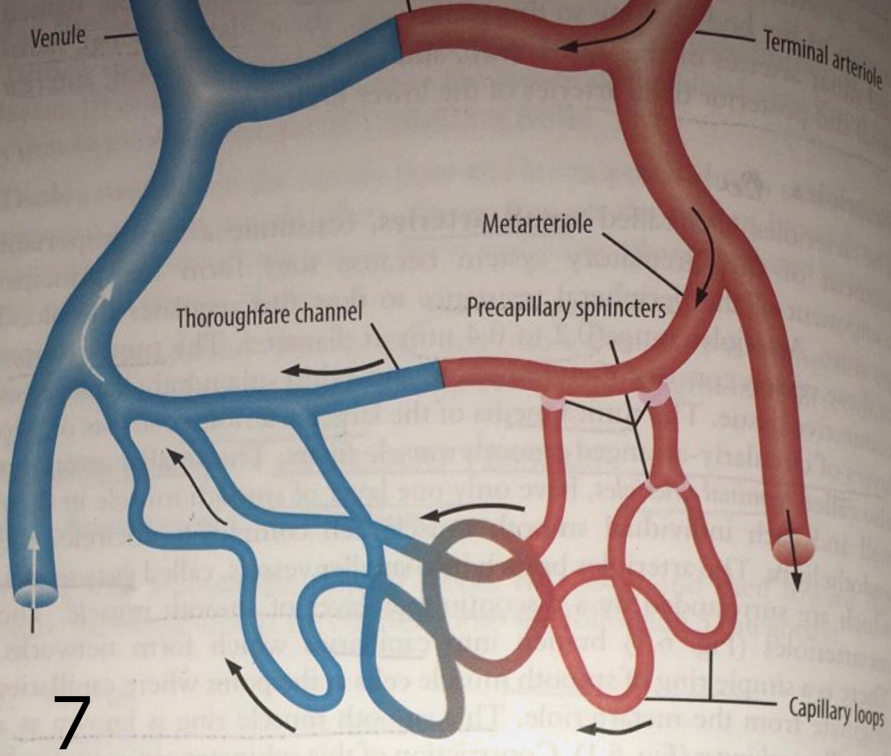

Fig. 6.1: A schematic diagram showing microcirculation of blood.

generally measure 0.75 mm in length and 7 to 9 μm in diameter; however, the sinusoidal capillaries have much larger diameter.

Types of Capillaries

The capillaries are classified into three different types; each type is related to specific functions. These three types are:

1. Continuous capillaries
2. Fenestrated capillaries
3. Sinusoidal capillaries

Continuous capillaries. These capillaries measure 7–9 μm in diameter and do not have any pores, gaps or discontinuities in their walls. Most of the capillaries of the body belong to this variety. Examples of continuous capillaries are capillaries found in muscles, lungs and brain.

Fenestrated capillaries. These capillaries have the same diameter as that of the continuous capillaries but the walls of fenestrated capillaries are characterized by the presence of circular pores in the lining endothelial cells (in Latin, *fenestra*=window). These pores range from 60 to 80 nm in diameter. Fenestrated capillaries are found in those locations in the body where rapid exchange of materials between the blood and tissues is required, e.g., in intestines, endocrine glands and kidneys.

Sinusoidal capillaries. These capillaries, which are also called *sinusoids*, exhibit the following characteristics:

1. Their luminal diameter (30–40 μm) is much larger than the continuous or fenestrated capillaries.
2. Their walls are irregular and tortuous.
3. Intercellular gaps exist between the endothelial cells (due to which the blood can diffuse out of the circulation with only a minimal hindrance).
4. Lining endothelial cells show pores.
5. Phagocytic cells may be found to be located in the walls of sinusoids. Major locations in the body where sinusoidal capillaries are found include liver, spleen, bone marrow and medulla of suprarenal gland.

7

Venules

The blood from capillaries drains into venules. Two or more capillaries converge and join together to form a *postcapillary venule*. These venules are about 30 μm in diameter and consist mainly of endothelium and a thin tunica adventitia. Postcapillary venules play important role in the exchanges between the blood and intercellular fluid. In response to inflammation they allow water, solutes and leukocytes to move out into the intercellular space. The postcapillary venules join to form *muscular venules*, which contain smooth muscle in their tunica media. The muscular venules converge and join to form *collecting venules*, which drain blood into veins.

Preferential Channels

In some regions of the body the metarterioles, after giving rise to capillaries, continue as low resistance channels which open into venules; these channels are called preferential channels or ***thoroughfare channels*** (Fig. 6.1). Preferential channels open when constriction of precapillary sphincters reduces blood flow through the local capillary network. The thoroughfare channels serve to by-pass the capillary bed and sustain blood flow through the region when the capillaries are not being used. Preferential channels are

3. **Resistance vessels**. This group includes the arterioles. As already mentioned these vessels have a small lumen but relatively thick muscular walls and, hence, are the principal source of the peripheral resistance to blood flow.

4. **Exchange vessels**. Walls of these vessels allow exchange of substances and defensive cells between blood and intercellular fluid. This group of vessels includes capillaries, sinusoids and postcapillary venules.

5. **Reservoir vessels**. These vessels, also called *capacitance vessels*, include larger venules and all types of veins. Due to their distensibility, these vessels accommodate large volume of blood and, thus, serve as reservoirs of blood. As a matter of fact, more than 70% of the total blood volume is in this part of the CVS at any one time.

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Total Marks:
Obtained Mar

Name: Muhammad Affan

Roll No: 78

Date: 18 September 2018

Time Allowed: 02:15 hours

Instructions:

1. The subjective part is to be submitted within
not be given.
2. Neat handwriting, use of margins and marker
the outlook/presentation of your paper

Attempt All Short Essay Questions Given Below:

Q1.a) In follow-up visit of diagnosed case of breast cancer patient, doctor told
members about metastatic spread of cancer to vertebral column .With y
knowledge ,give the different routes of spread of breast cancer to differe
body. (3)

b) write a short Note on carpel tunnel syndrome? (2)

Q2. classify connective tissue and enlist and draw different types of connectiv
tissue cells (2.5+2.5)

Q3. A 40 year old female, came to OPD with numbness and tingling in her right
finger which becomes worse on moving, she also complains of having diffic
her blouse; On examination there is atrophy of thenar muscles and inabilit
thumb

a) What is your diagnosis?
b) Name the affected structure.
c) Give the origin, course and branches of this structure.

Q4. Tabulate the attachments, actions and innervation of rotator cuff muscles

Q5. Give the origin, course, relations and branches of femoral artery. Name th
formed by this artery in lower limb. (0.

Q6. A 65 year old patient comes to the cardiac emergency with chest pain radi
left arm. A diagnosis of anterior wall myocardial infarction is made
a) Name the artery most likely to be involved in anterior wall myocard
b) Give the origin, course and distribution of the involved artery.
c) What is left dominance pattern of coronary arterial circulation.

Q7. Draw and label the azygos, hemiazygos and accessory azygos system of vei

③ Rout of cancer spread:

⇒Upper - outer quadrent of breast in frequent site for cascinoma

It spread in these ways:

⇒From internal mammary node to adjacent breast and due to rex. in superficial lymphatics

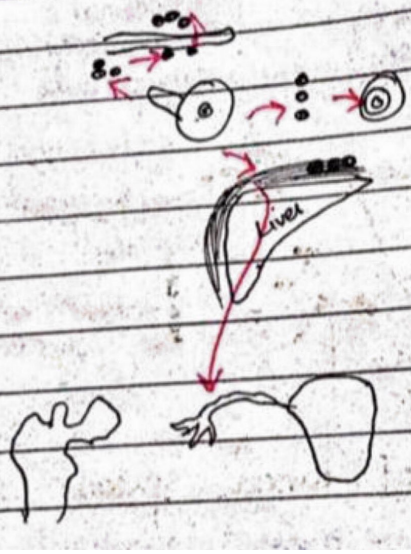
⇒From apical nodes to head and neck

Saleha Sajid 68

⇒From diaphragmetic nodes to abdomen

It can also spread to pelvis.

1a



leads to wrist drop (see Fig. 9.25).

Carpal tunnel syndrome: Median nerve gets compressed under the flexor retinaculum, leading to paralysis of muscles of thenar eminence. It is called 'ape-like or monkey-like hand'. There is loss of sensation in lateral 3½ digits including nail beds. Median nerve is the 'eye of the hand'. There is little clawing of index and middle fingers also (*see* Figs 9.40 to 9.44).

1b

④ Classification

Q2

Connective tissue

- Embryonic C. tissue
  - Mesenchymal in embryonic life
  - Mucoid: Umblical cord, Pulp of growing teeth (Nucleopulposis)
- C. tissue Proper
  - Loose C. tissue
    - Superficial Fascia, Deep Fascia, Omentum
  - Dense C. tissue
    - Irregular: Capsule around glands
    - Regular: Aponeurosis, Tendon, Ligament
  - Reticular: Spleen, Liver
- Specilized C. tissue
  - → Bone
  - → cartilage
  - → Blood
  - Adipose
    - White: Skin
    - Brown: Around neck

④ Classification

Q2

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- Embryonic C.Tissue
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  - Mucoid: Umbilical cord, Pulp of growing teeth (Nucleopulposis)
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  - Dense C.Tissue
    - Irregular: Capsule around glands
    - Regular: Aponeurosis, Tendon, Ligament
  - Reticular: Spleen, Liver
- Specialized C.Tissue
  - → Bone
  - → Cartilage
  - → Blood
  - Adipose
    - White: Skin
    - Brown: Around neck

2

Q2

Fibroblast

Fibrocyte

Adipocyte:

Large Lymphocyte

Small Lymphocyte:

Eosinophil:

Monocyte:

Neutrophil:

4/2/2021

Basophil

Mast cell:

Q #3

a) Carpal tunnel syndrome

b) Median nerve

Median	$C_6, 7, 8\ T_1$	Lateral branch from lateral cord and Medial branch from medial cord	and deep radial nerve Lateral and median roots from median nerve lateral to axillary art. descends in arm adjacent to brachial artery Nerve gradually crossing artries to ulnar to be medial to brachial artery in cubital fossa	Muscular Articular Vascular Communicating Palmar cutaneous Ant. interossei	Muscles of ant. forearm except (Flexor carpi ulnaris and half flexor digitorum profundus) and intrinsic muscle in thenar half and Palmar skin	Carpel tunnel Syndrome Trauma of median nerve Flexion of 2nd, 3rd is Po Thenar muscles function is lo Pronator syndrome Paralysis of muscles innerv by it
lary	$C_5, 6$	Posterior	Exit axilla Posteriorly			

3

4

TABLE 3.6. SCAPULOHUMERAL (INTRINSIC SHOULDER) MUSCLES

Muscle	Proximal Attachment	Distal Attachment	Innervation[a]	Muscle Action
Deltoid	Lateral third of clavicle; acromion and spine of scapula	Deltoid tuberosity of humerus	Axillary nerve (**C5**, C6)	Clavicular (anterior) part: flexes and medially rotates arm Acromial (middle) part: abducts arm Spinal (posterior) part: extends and laterally rotates arm
Supraspinatus[b]	Supraspinous fossa of scapula	Superior facet of greater tubercle of humerus	Suprascapular nerve (C4, **C5**, C6)	Initiates and assists deltoid in abduction of arm and acts with rotator cuff muscles[b]
Infraspinatus[b]	Infraspinous fossa of scapula	Middle facet of greater tubercle of humerus	Suprascapular nerve (**C5**, C6)	Laterally rotates arm; and acts with rotator cuff muscles[b]
Teres minor[b]	Middle part of lateral border of scapula	Inferior facet of greater tubercle of humerus	Axillary nerve (**C5**, C6)	Laterally rotates arm; and acts with rotator cuff muscles[b]
Teres major	Posterior surface of inferior angle of scapula	Medial lip of intertubercular sulcus of humerus	Lower subscapular nerve (C5, **C6**)	Adducts and medially rotates arm
Subscapularis[b]	Subscapular fossa (most of anterior surface of scapula)	Lesser tubercle of humerus	Upper and lower subscapular nerves (C5, **C6**, C7)	Medially rotates arm; as part of rotator cuff, helps hold head of humerus in glenoid cavity

[a]The spinal cord segmental innervation is indicated (e.g., "**C5**, C6" means that the nerves supplying the deltoid are derived from the fifth and sixth cervical segments of the spinal cord). Numbers in boldface (**C5**) indicate the main segmental innervation. Damage to one or more of the listed spinal cord segments or to the motor nerve roots arising from them results in paralysis of the muscles concerned.

[b]Collectively, the supraspinatus, infraspinatus, teres minor, and subscapularis muscles are referred to as the rotator cuff, or SITS, muscles. Their primary function is to hold the humeral head in the glenoid cavity of the scapula during all movements of the glenohumeral (shoulder) joint.

FEMORAL ARTERY

This is the chief artery of the lower limb. Developmentally, it is not derived from the axis artery. The original axis artery in the uppermost part of the limb is represented by the inferior gluteal artery.

Origin

It is the continuation of external iliac artery. It begins behind the inguinal ligament at the midinguinal point.

Extent and Course

It passes downwards and medially, first in the femoral triangle (Fig. 3.11), and then in the adductor canal. At the lower end of the adductor canal, i.e. at the junction of the middle and lower thirds of the thigh, it passes through an opening in the adductor magnus to become continuous with the popliteal artery (Fig. 3.21) (*see* Appendix 1, Table A1.7).

Relations of Femoral Artery in Femoral Triangle

Anterior: Skin, superficial fascia, deep fascia and the anterior wall of the femoral sheath.

Posterior: Psoas major, the pectineus, and the adductor longus. The posterior wall of the femoral sheath intervenes between these structures and the artery (Fig. 3.22).

Medial: Just below the inguinal ligament the femoral vein is medial to the artery. However, the vein gradually crosses to the lateral side to lie posterior to the artery. It

5

FEMORAL ARTERY

This is the chief artery of the lower limb. Developmentally, it is not derived from the axis artery. The original axis artery in the uppermost part of the limb is represented by the inferior gluteal artery.

Origin

It is the continuation of external iliac artery. It begins behind the inguinal ligament at the midinguinal point.

Extent and Course

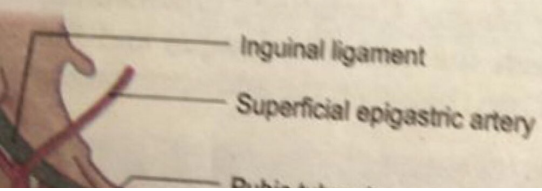
It passes downwards and medially, first in the femoral triangle (Fig. 3.11), and then in the adductor canal. At the lower end of the adductor canal, i.e. at the junction of the middle and lower thirds of the thigh, it passes through an opening in the adductor magnus to become continuous with the popliteal artery (Fig. 3.21) (*see* Appendix 1, Table A1.7).

Relations of Femoral Artery in Femoral Triangle

Anterior: Skin, superficial fascia, deep fascia and the anterior wall of the femoral sheath.

Posterior: Psoas major, the pectineus, and the adductor longus. The posterior wall of the femoral sheath intervenes between these structures and the artery (Fig. 3.22).

Medial: Just below the inguinal ligament the femoral vein is medial to the artery. However, the vein gradually crosses to the lateral side to lie posterior to the artery. It



is directly behind the artery at the apex of the femoral triangle, and lateral to the lower end of the artery.

Lateral: The femoral nerve is lateral to the upper part of the artery. Lower down the artery is related to the branches of the nerve.

Branches in the Femoral Triangle

The femoral artery gives off three superficial and three deep branches in the femoral triangle.

The superficial branches are:

a. Superficial external pudendal supplies the skin of external genital organs (Fig. 3.21).
b. Superficial epigastric for skin and fasciae of lower part of anterior abdominal wall.
c. Superficial circumflex iliac for skin along the iliac crest.

The deep branches are:

a. Profunda femoris (Fig. 3.22)
b. Deep external pudendal supplies the external genital organs.
c. Muscular branches.

Q # 6:

a) Left ant. descending coronary artery

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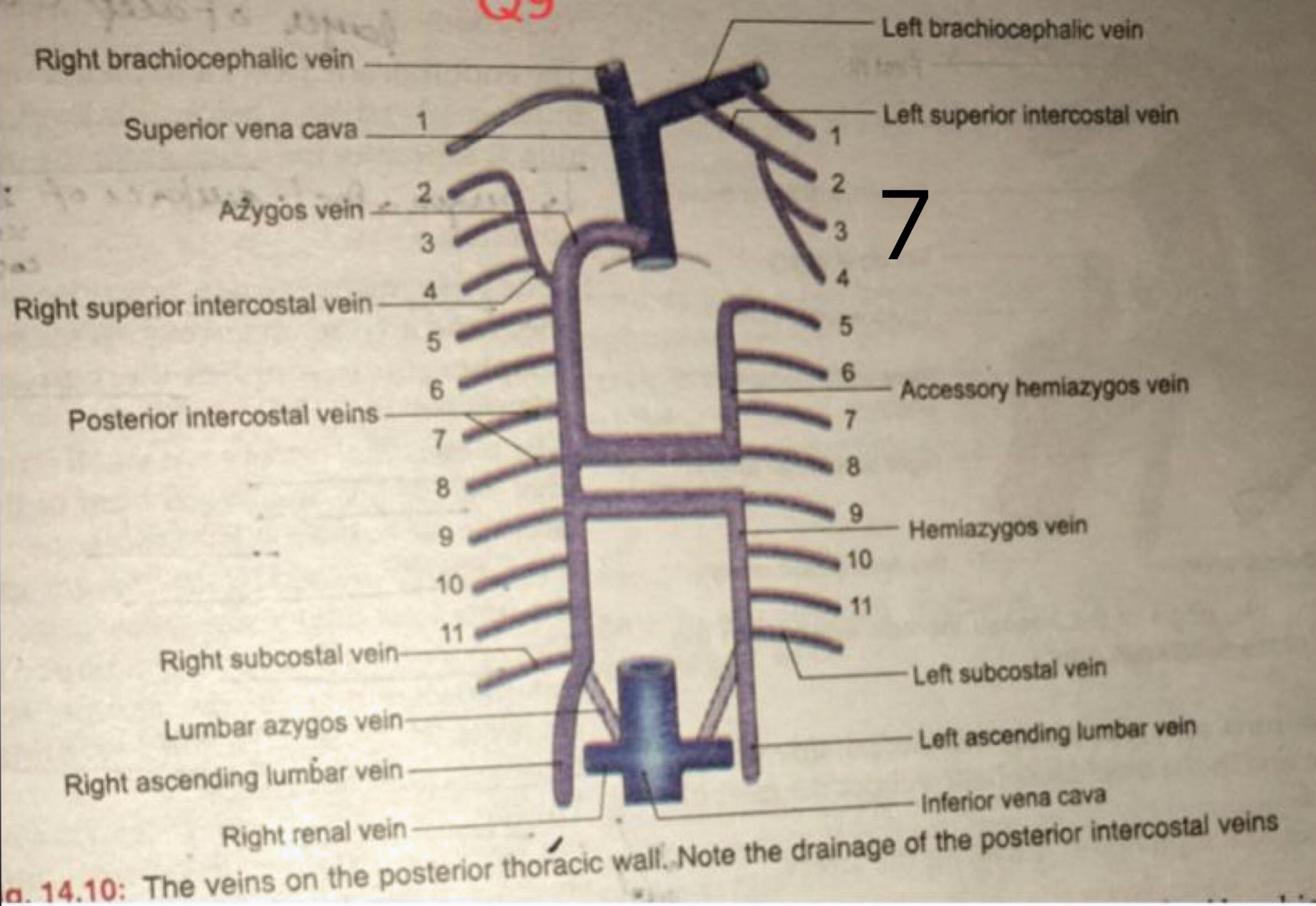

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g. 14.10: The veins on the posterior thoracic wall. Note the drainage of the posterior intercostal veins